Appendix G

NOP, Initial Study, and NOP Comments

G1 NOP
G2 Initial Study
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Appendix G

NOP, Initial Study, and NOP Comments

Appendix G1 NOP

NOTICE OF PREPARATION
ENVIRONMENTAL IMPACT REPORT

1005 O'BRIEN DRIVE AND 1320 WILLOW ROAD
CITY OF MENLO PARK

June 2, 2023

To: State Clearinghouse
State Responsible Agencies
State Trustee Agencies
Other Public Agencies
Interested Parties and Organizations

From: Chris Turner
Associate Planner
City of Menlo Park
701 Laurel Street
Menlo Park, CA 94025

Subject:	Notice of Preparation (NOP) of an Environmental Impact Report for the 1005 O'Brien Drive and 1320 Willow Road Life Sciences Project
Lead Agency:	City of Menlo Park
Project Title:	1005 O'Brien Drive and 1320 Willow Road Life Sciences Project
Project Area:	City of Menlo Park

Purpose of Notice and Public Review Period

The City of Menlo Park (City) is the lead agency for the 1005 O'Brien Drive and 1320 Willow Road Life Sciences Project (Proposed Project). Pursuant to the California Environmental Quality Act (CEQA), upon deciding to prepare an Environmental Impact Report (EIR), the City, as lead agency, must issue a Notice of Preparation (NOP) to inform trustee and responsible agencies and the public of the decision to undertake preparation of an EIR. The purpose of the NOP is to provide information describing the Proposed Project and its potential environmental effects to those who may wish to comment regarding the scope and content of the information to be considered in the EIR. Agencies should comment on such information as it relates to their statutory responsibilities in connection with the Proposed Project. Agencies and the public are invited to provide comments on the scope and content of the environmental review, potential mitigation strategies, and Project alternatives.

The 30+-day comment period for this NOP is from Friday, June 2, 2023, through Wednesday, July 5, 2023. Written or emailed comments are due no later than 5:00 p.m. on Wednesday, July 5, 2023. Verbal comments may be submitted at a public scoping meeting that will occur at the June 26, 2023, meeting of the City's Planning Commission.

Project Location and Existing Conditions

The Project proposes to demolish the three existing onsite buildings; construct two Life Sciences/Research and Development (R&D) buildings and one parking structure; and develop approximately 59,344 square feet of open space, including landscaping, seating areas, and a sports court. The project site would include 31,535 square feet of publicly accessible open space. A lot merger and line adjustment are proposed to merge the existing three parcels that comprise the Project site into a single parcel and relocate the boundary between APN 055-421-190 and APN 055-421-060 to accommodate the proposed site layout and internal vehicular circulation. The Proposed Project would also include two back-up diesel-fueled generators for emergency use, one for each building.

The Project would be constructed in two phases. As shown in Figure 1, Phase 1 Construction, the first phase would occur in the western portion of the site and would include demolition of the buildings addressed as 985 O'Brien Drive and 1001 O'Brien Drive buildings (a total of approximately 40,586 square feet) as well as the eastern half of 1320 Willow Road (approximately 24,032 square feet); construction of a 154,381 square-foot, 5-story tall R&D building; construction of the first five levels of the parking structure in the northeast portion of the site; and development of 38,559 square feet of open space along the Project site's O'Brien Drive frontage and the northern site boundary. This phase would remove 10 existing trees within the site and plant 100 new trees. As shown in Figure 2, Phase 2 Construction, the second phase would occur in the western portion of the site, along the Willow Road frontage, and would include demolition of the remaining approximately 26,013 square feet of the existing building on this parcel; construction of a 73,617 square foot, 4-story tall R&D building; construction of two additional levels of the parking

structure; and development of 20,785 square feet of open space along the northern site boundary, including planting 45 new trees.

The detailed Proposed Project plan set is available for review at the City's website: menlopark.gov/1005OBrien
The Proposed Project would be developed using the bonus level of development allowed by the Zoning Ordinance, which provides for an increase in density, gross floor area, and/or height in exchange for the provision of community amenities. Development regulations for the LS District indicate a base level building height of 35 feet (up to 110 feet with Bonus Level designation), a maximum FAR of 55 percent for life science uses (up to 125 percent with Bonus Level designation), and a minimum open space requirement of 20 percent. The Project proposes to meet the open space requirement in part with publicly accessible open space, including a sports court, to be located in the northeast corner of the site. The Project proposes to utilize the bonus-level development provisions in exchange for payment of the City's in-lieu fee for community amenities.

Project Approvals

The Proposed Project is anticipated to require the following actions, entitlements, and discretionary approvals from the City:

- Environmental Review
- Use Permit
- Architectural Control
- Lot Merger and Lot Line Adjustment
- Development Agreement
- Heritage Tree Removal Permits
- Community Amenity Approval
- Below-Market-Rate Housing In-Lieu Fee Approval
- Natural Gas Usage Approval

In addition, a Housing Needs Assessment and a Fiscal Impact Analysis will be prepared for informational purposes, as required by the 2017 Settlement Agreement between the cities of Menlo Park and East Palo Alto. Certification of the EIR and approval of all entitlements would be at the discretion of the City's Planning Commission.

Responsible and/or Reviewing Agencies

The agencies listed below are expected to review the EIR to evaluate the Proposed Project with respect to the resources and infrastructure within their jurisdiction or control:

- Bay Area Air Quality Management District
- California Department of Transportation
- California Regional Water Quality Control Board/San Mateo Countywide Water Pollution Prevention Program
- City/County Association of Governments of San Mateo County
- Menlo Park Fire Protection District
- Menlo Park Municipal Water
- Native American Heritage Commission
- Pacific Gas & Electric
- San Francisco Public Utilities Commission (if encroachment into the Hetch Hetchy aqueduct easement is necessary)
- San Mateo County Environmental Health Services Division
- San Mateo County Transportation Authority
- San Mateo County Water Pollution Prevention Program; and
- West Bay Sanitary District

Project Description

The Project proposes to demolish the three existing onsite buildings; construct two Life Sciences/Research and Development (R&D) buildings and one parking structure; and develop approximately 59,344 square feet of open space, including landscaping, seating areas, and a sports court. The project site would include 31,535 square feet of publicly

accessible open space. A lot line adjustment is proposed to merge the existing three parcels that comprise the Project site into a single parcel and relocate the boundary between APN 055-421-190 and APN 055-421-060 to accommodate the proposed site layout and internal vehicular circulation. The Proposed Project would also include two back-up diesel-fueled generators for emergency use, one for each building.

The Project would be constructed in two phases. As shown in Figure 1, Phase 1 Construction, the first phase would occur in the western portion of the site and would include demolition of the buildings addressed as 985 O'Brien Drive and 1001 O'Brien Drive buildings (a total of approximately 40,586 square feet) as well as the eastern half of 1320 Willow Road (approximately 24,032 square feet); construction of a 154,381 square-foot, 5-story tall R&D building; construction of the first five levels of the parking structure in the northeast portion of the site; and development of 38,559 square feet of open space along the Project site's O'Brien Drive frontage and the northern site boundary. This phase would remove 10 existing trees within the site and plant 100 new trees. As shown in Figure 2, Phase 2 Construction, the second phase would occur in the western portion of the site, along the Willow Road frontage, and would include demolition of the remaining approximately 26,013 square feet of the existing building on this parcel; construction of a 73,617 square foot, 4-story tall R&D building; construction of two additional levels of the parking structure; and development of 20,785 square feet of open space along the northern site boundary, including planting 45 new trees.

The detailed Proposed Project plan set is available for review at the City's website: menlopark.gov/1005OBrien

The Proposed Project would be developed using the bonus level of development allowed by the Zoning Ordinance, which provides for an increase in density, gross floor area, and/or height in exchange for the provision of community amenities. Development regulations for the LS District indicate a base level building height of 35 feet (up to 110 feet with Bonus Level designation), a maximum FAR of 55 percent for life science uses (up to 125 percent with Bonus Level designation), and a minimum open space requirement of 20 percent. The Project proposes to meet the open space requirement in part with publicly accessible open space, including a sports court, to be located in the northeast corner of the site. The Project proposes to utilize the bonus-level development provisions in exchange for payment of the City's in-lieu fee for community amenities.

Probable Environmental Effects and Scope of the EIR

The Project site is within the ConnectMenlo study area. ConnectMenlo updated the City's General Plan Land Use and Circulation Elements and rezoned the land in the M-2 Area (now referred to as the Bayfront Area). The ConnectMenlo EIR was prepared as a program EIR, pursuant to CEQA Guidelines Section 15168, to evaluate the environmental effects of the City's General Plan, which is a long-range planning document. ConnectMenlo was approved on November 29, 2016. In addition, the City recently adopted an updated Housing Element, which is a component of the General Plan, and certified a Subsequent EIR for the Housing Element Update.

CEQA Guidelines Section 15168(c)(1) provides that when later activities within the scope of a planning document may have effects that were not examined in the program EIR, a new initial study must be prepared. Further, CEQA Guidelines Section 15168(d) sets out the procedures for simplifying the preparation of environmental documents through incorporating by reference the analyses and mitigation measures in the program EIR.
The Proposed Project is consistent with the land use and zoning designations established for the site under ConnectMenlo. An Initial Study has been prepared to evaluate the potential environmental impacts of the Proposed Project and determine what level of additional environmental review is appropriate. As outlined in CEQA Guidelines Section 15168(c), the Initial Study discloses the relevant impacts and mitigation measures covered in the ConnectMenlo EIR and determines whether the Proposed Project is within the parameters of the ConnectMenlo EIR and the Housing Element Update Subsequent EIR. The Initial Study is available for review online through the Project website listed above.

The analysis in the Initial Study demonstrates that the ConnectMenlo EIR and the Housing Element Update Subsequent EIR serve as adequate environmental analysis for some of the effects of the Proposed Project; these two program EIRs are incorporated in the Initial Study by reference, pursuant to CEQA Guidelines Sections 15150, 15130, and 15183. A focused EIR will be prepared for potentially significant impacts that need further discussion and/or mitigation beyond that provided in the ConnectMenlo EIR and the Housing Element Update Subsequent EIR. Thus, a focused EIR will be prepared to evaluate the following topics:

- Air Quality
- Greenhouse Gas Emissions
- Noise (construction and traffic noise)
- Population, Employment, and Housing
- Transportation/Traffic

Under the 2017 Settlement Agreement between the cities of Menlo Park and East Palo Alto, the City is required to prepare an EIR for Projects like this one that request bonus level development within the LS-B zoning district. The agreement establishes requirements for transportation impact analysis and mitigation and for preparation of a Housing Needs Assessment, both of which will be included in the EIR.

Environmental Resources With no Adverse Impacts

The Proposed Project is anticipated to result in no environmental effects in the following areas:

- Agricultural or Forestry Resources
- Mineral Resources
- Wildfire

The Project site is fully developed in an urbanized area and located between SR 84 and US 101. As such, there are no agricultural, forestry, or mineral resources on or adjacent to the site and the Proposed Project would have no adverse effects associated with such resources. Further, wildfires are not a concern because there are no areas of substantial vegetation in proximity to the Project site and there are no mapped Fire Hazard Severity Zones near the site. A detailed analysis of these topics will not be included in the EIR.

Environmental Resources With Less Than Significant Effects

As demonstrated in the Initial Study, the Proposed Project is not anticipated to result in significant environmental effects in the following areas:

- Aesthetics/Light and Glare
- Biological Resources
- Cultural Resources
- Energy
- Geology and Soils
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning
- Noise (airport and airstrip noise)
- Public Services
- Recreation
- Tribal Cultural Resources
- Utilities and Service Systems
- Wildfire

Alternatives

Based on the significance conclusions determined in the EIR, alternatives to the Proposed Project that may be capable of reducing any identified impacts will be analyzed. CEQA Guidelines Section 15126.6(e) requires the evaluation of a No-Project Alternative. Other alternatives may be considered during preparation of the EIR and will comply with the CEQA Guidelines, which call for a "range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project." The EIR will discuss the process by which alternatives are identified, including consideration of any feasible alternatives that are suggested during the scoping process.

Public Scoping Meeting and EIR Process

The City of Menlo Park is hosting a public hearing in a teleconference meeting (virtual and in Menlo Park City Council Chambers located at 751 Laurel St., Menlo Park, California) for the EIR scoping session during the NOP public comment period on **June 26, 2023,** during a regularly scheduled Planning Commission meeting beginning at **7:00 p.m.** or as near as possible thereafter via a virtual meeting.

The meeting link would be available with publication of the Planning Commission agenda and staff report on the City's website at menlopark.gov/agenda, not less than 72 hours in advance of the meeting.

Trustee and responsible agencies, as well as members of the public, are invited to attend to learn more about the Proposed Project and to provide input on the scope and content of the EIR through public comment. The scoping process is designed to enable the City to determine the scope and content of the EIR at an early stage. This includes identifying the full range of actions involved in approving, constructing, and operating the Project; identifying potentially significant environmental effects, alternatives, and mitigation measures to be analyzed in the EIR; and eliminating from inclusion in the EIR any environmental resource areas where significant impacts are not expected.

Following the close of the NOP comment period, a Draft EIR will be prepared that will consider all NOP comments. In accordance with CEQA Guidelines Section 15105(a), the Draft EIR will be released for public review and comment for a required minimum 45-day review period. Following the close of the 45-day minimum public review period, the City will prepare a Final EIR, which will include responses to all substantive comments received on the Draft EIR. The Draft EIR and Final EIR and will be considered by the Planning Commission in considering whether to certify the EIR and approve, conditionally approve, or deny the Project.

Submittal of Comments

Comments regarding the appropriate scope of analysis and content in the EIR are invited from all interested parties. Please submit comments to the City no later than 5 p.m. on Wednesday, July 5, 2023. However, we would appreciate your response at the earliest possible date. Please send your written comments to Christopher Turner at the physical or email address shown below with "1005 O'Brien Drive and 1320 Willow Road Project EIR" as the subject. Emailed comments are preferred.

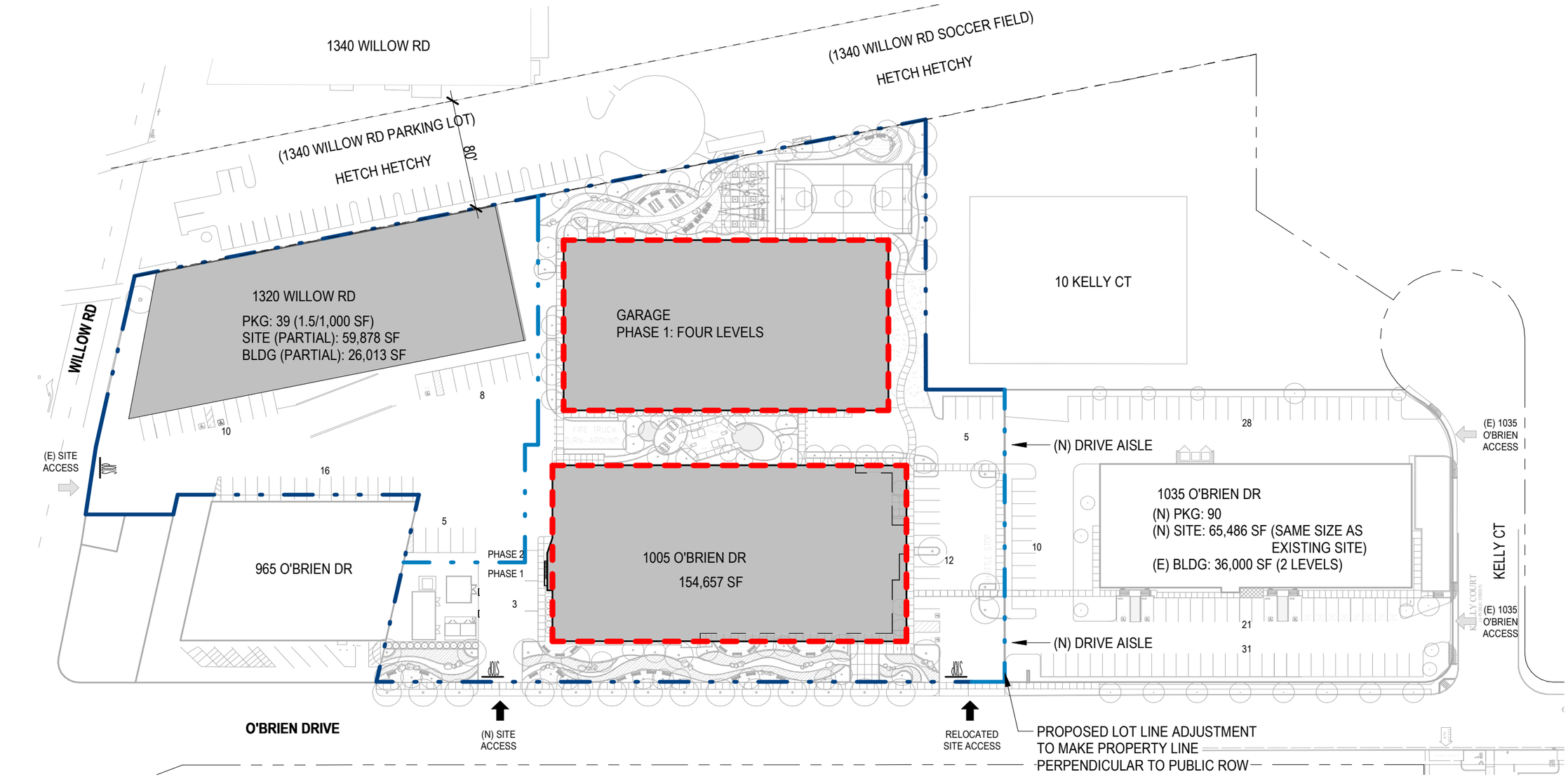
If you have any questions regarding the proposed Project or the process, please contact Chris Turner at the contact information listed below.

Name: Chris Turner
Title: Associate Planner
Department: Community Development, City of Menlo Park
Mail: 701 Laurel Street, Menlo Park, CA 94025
Email: crturner@menlopark.gov
Phone: (650) 330-6724

Please visit the project webpage menlopark.gov/1005OBrien to stay informed about the project and to sign up for the email list.

_____
Chris Turner
City of Menlo Park

June 2, 2023



1 PHASE 1

1" = 80'-0"

PHASE 1 SITE: 123,738 SF

EXISTING PROPERTY LINES

LOT LINE ADJUSTMENT DURING PHASE 1

PHASE 1 BUILDINGS

N

SOURCE: DES, 2022

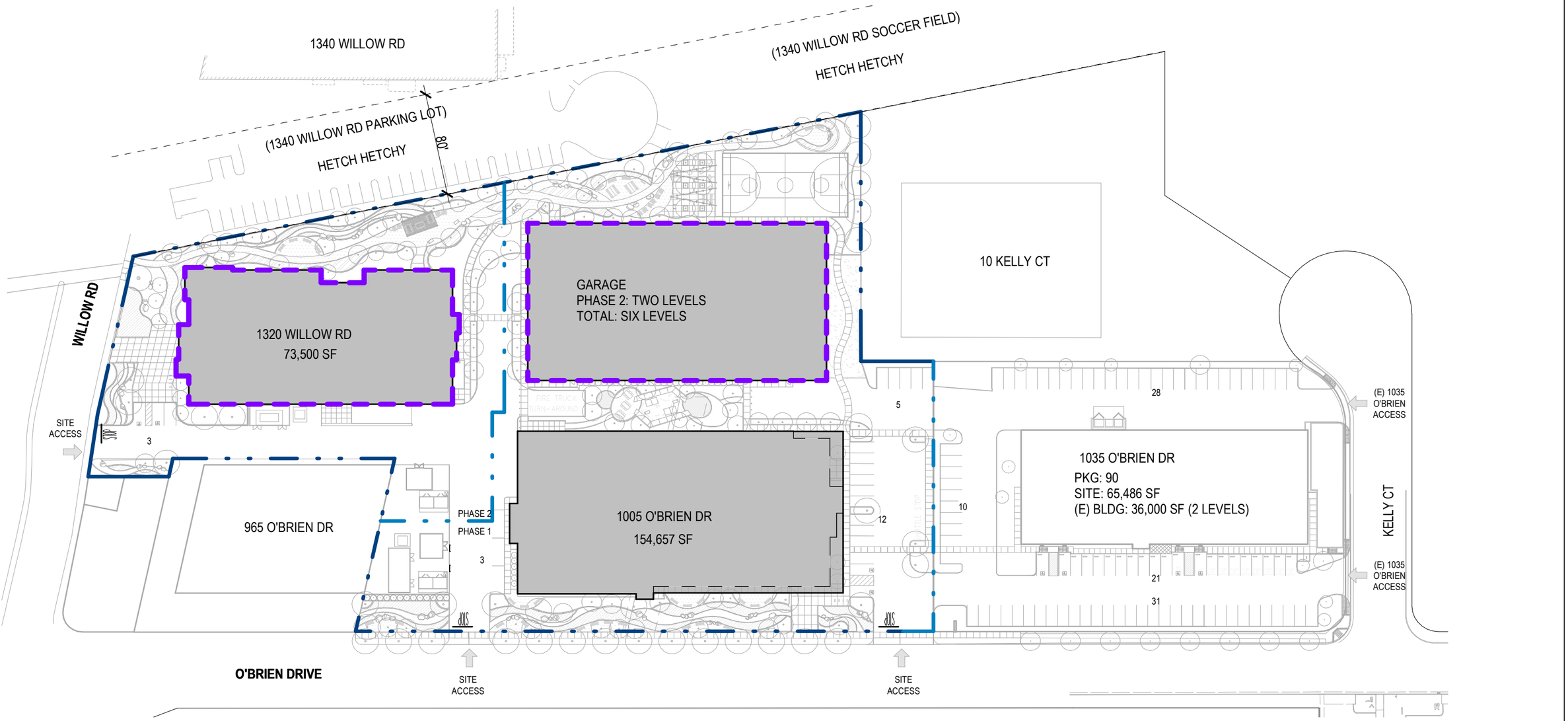
DUDEK

0 100 200 Feet

FIGURE 1

Phase 1 Construction

1005 O'Brien Drive and 1320 Willow Road Life Science Project



1 PHASE 2

1" = 80'-0"

PHASE 2 SITE: 59,878 SF

EXISTING PROPERTY LINES

LOT LINE ADJUSTMENT DURING PHASE 1

PHASE 2 BUILDINGS

N

SOURCE: DES, 2022

DUDEK 0 100 200 Feet

FIGURE 2

Phase 2 Construction

1005 O'Brien Drive and 1320 Willow Road Life Science Project

Appendix G

NOP, Initial Study, and NOP Comments

Appendix G2 Initial Study

Initial Study

1005 O'Brien Drive and 1320 Willow Road Life Sciences Project

JUNE 2023

Prepared for:

CITY OF MENLO PARK
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Acronyms and Abbreviations

Acronym or Abbreviation	Definition
AB	Assembly Bill
ABAG	Association of Bay Area Governments
ACM	asbestos-containing material
APN	Assessor's Parcel Number
BAAQMD	Bay Area Air Quality Management District
BAWSCA	Bay Area Water Supply and Conservation Agency
Bay	San Francisco Bay
BMP	best management practice
CAL FIRE	California Department of Forestry and Fire Protection
CalEEMod	California Emissions Estimator Model
CALGreen	California Green Building Standards Code
CARB	California Air Resources Board
CBC	California Building Standards Code
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CGS	California Geological Survey
City	City of Menlo Park
CRHR	California Register of Historical Resources
DTSC	California Department of Toxic Substances and Control
EIR	environmental impact report
ESA	Environmental Site Assessment
EV	electric vehicle
FEMA	Federal Emergency Management Agency
FHSZ	Fire Hazard Severity Zone
GHG	greenhouse gas
HCP	Habitat Conservation Plan
HVAC	heating, ventilation, and air conditioning
kBTU	thousand British thermal units
kWh	kilowatt-hour
LBP	lead-based paint
LEED	Leadership in Energy and Environmental Design
LRA	Local Responsibility Area
LS-B	Life Sciences-Bonus Available zoning district
mgd	million gallons per day
MPFPD	Menlo Park Fire Protection District
MPMW	Menlo Park Municipal Water
MPPD	Menlo Park Police Department
MRP	Municipal Regional Stormwater Permit
MTC	Metropolitan Transportation Commission
NAHC	Native American Heritage Commission

Acronym or Abbreviation	Definition
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
PCE	Peninsula Clean Energy Authority
PG&E	Pacific Gas and Electric Company
Project, Proposed Project	1005 O'Brien Drive/1320 Willow Road Project
RWQCB	Regional Water Quality Control Board
SFPUC	San Francisco Public Utilities Commission
SMCEHD	San Mateo County Environmental Health Department
SUHSD	Sequoia Union High School District
SVCW	Silicon Valley Clean Water
SWPPP	stormwater pollution prevention plan
SWRCB	State Water Resources Control Board
TDM	Transportation Demand Management
UWMP	Urban Water Management Plan
VMT	vehicle miles traveled
WBSD	West Bay Sanitary District
WSCP	Water Shortage Contingency Plan
WWTP	Wastewater Treatment Plant

1 Introduction

1.1 Project Overview

O'Brien Drive Portfolio, LLC (Project sponsor) has submitted an application to the City of Menlo Park (City) requesting approval of various discretionary entitlements in support of the proposed 1005 O'Brien Drive and 1320 Willow Road Research and Development Project (Proposed Project, or Project). The Proposed Project would involve demolition of existing site buildings and construction of two research and development (R&D) buildings, a parking garage, publicly accessible open space, and landscaping within the Bayfront Area of the City.

1.2 Purpose of this Initial Study

This Initial Study has been prepared by the City as the lead agency under the California Environmental Quality Act (CEQA) and in conformance with CEQA (Public Resources Code Section 21000 et seq) and the CEQA Guidelines (Title 14, California Code of Regulations, Chapter 3). The City is the lead agency under CEQA because the City is the public agency with the principal responsibility for approving this Project. The information, analysis, and conclusions contained in this Initial Study form the basis for deciding whether an Environmental Impact Report (EIR), a Negative Declaration, or a Mitigated Negative Declaration should be prepared. Where only certain topic areas warrant analysis in an EIR, the document is referred to as a focused EIR.

In 2016, the Menlo Park City Council adopted an update to the Menlo Park General Plan (herein referred to as ConnectMenlo) that modified the Land Use and Circulation Elements (City of Menlo Park 2016a), which serves as the City's comprehensive and long-range guide to land use and infrastructure development.

Because the General Plan is a long-range planning document, the ConnectMenlo EIR (City of Menlo Park 2016b) was prepared as a program EIR, pursuant to CEQA Guidelines Section 15168. In addition, in January 2023 the City adopted its 2023–2031 Housing Element update and certified a Subsequent EIR that tiers from the ConnectMenlo EIR (City of Menlo Park 2023a). Once a program EIR has been certified, subsequent activities within the program must be evaluated to determine whether additional CEQA review is needed. When subsequent activities are found to be within the program EIR's scope, additional environmental review may not be required (CEQA Guidelines Section 15198[c]), provided that feasible mitigation measures and the alternatives identified in the program EIR are incorporated into subsequent activities (CEQA Guidelines Section 15168[c][3]). If a subsequent activity would have effects that are not within the scope of a program EIR, the lead agency must prepare a new Initial Study, leading to a Negative Declaration, a Mitigated Negative Declaration, or an EIR.

Because the Proposed Project's location and development parameters are consistent with ConnectMenlo, the ConnectMenlo Program EIR and the Housing Element Update Subsequent EIR serve as the first-tier environmental analysis for the Project (e.g., is incorporated by reference pursuant to Sections 15150, 15130, and 15183). However, certain topics are required to be included in a Project-level EIR under the terms of the 2017 *City of East Palo Alto v. City of Menlo Park* Settlement Agreement, which settled a lawsuit regarding the ConnectMenlo EIR, regardless of whether subsequent activities could be within the program EIR's scope.

Section 15168(d) of the CEQA Guidelines provides for simplifying the preparation of environmental documents by incorporating relevant analyses and discussions. Where an EIR has been prepared or certified for a program or

plan, the environmental review for a later activity consistent with the program or plan should be limited to effects that were not analyzed as significant in the prior EIR or effects that could be substantially reduced or avoided (CEQA Guidelines Section 15152[d]). By tiering from the ConnectMenlo EIR and the Housing Element Update Subsequent EIR, the environmental analysis for this Project relies on those EIRs for the following:

- A discussion of general background and setting information for environmental topic areas,
- Overall growth-related issues,
- Issues that were evaluated in detail in ConnectMenlo EIR and/or Housing Element Update Subsequent EIR for which there is no significant new information or change in circumstance that would require further analysis,
- Assessment of cumulative impacts, and
- Mitigation measures adopted and incorporated in the ConnectMenlo EIR and as modified in the Housing Element Subsequent EIR.

This Initial Study has been prepared to evaluate the potential environmental impacts of the Project and determine what level of additional environmental review is appropriate. In accordance with the requirements outlined in Section 15168 of the CEQA Guidelines, this Initial Study has been prepared to disclose the relevant impacts and mitigation measures covered in the ConnectMenlo EIR and the Housing Element Subsequent EIR and discuss whether the Project is within the parameters of the ConnectMenlo EIR and the Housing Element Subsequent EIR. Based on the findings in this Initial Study, a focused EIR will be prepared for impacts that need further discussion and/or mitigation beyond that provided in the ConnectMenlo EIR and the Housing Element Subsequent EIR. This is discussed in more detail in Chapter 3, Initial Study Checklist.

1.3 Lead Agency

Under CEQA, the lead agency is the public agency with primary responsibility over approval of the Project. The City of Menlo Park is the CEQA lead agency because it is responsible for discretionary approval of the Proposed Project.

1.4 Document Organization

This Initial Study is organized as follows:

Chapter 1: Introduction. This chapter provides an introduction to the environmental review process. It describes the purpose and organization of this document as well as presents a summary of findings.

Chapter 2: Project Description. This chapter provides a detailed description of the Project, including an overview of the existing conditions at and surrounding the Project site, Project objectives and design, and anticipated construction activities.

Chapter 3: Initial Study Checklist. This chapter presents analysis of the Project's potential effects on the environmental resources identified in the CEQA Environmental Checklist and determines if Project actions have the potential to result in impacts that are more severe than impacts identified in the ConnectMenlo EIR or significant impacts that were not evaluated in the ConnectMenlo EIR. The analysis in this Initial Study identifies several environmental resource areas for which more detailed Project-specific analysis is required, which will be presented in the Focused EIR that will be prepared for the Project.

Chapter 4: References. This chapter lists the references used in preparation of this Initial Study.

Chapter 5: List of Preparers. This chapter identifies City and consultant staff involved in preparation of this Initial Study.

2 Project Description

2.1 Introduction

O'Brien Drive Portfolio, LLC (Project sponsor) has submitted an application to the City of Menlo Park (City) requesting approval of various discretionary entitlements in support of the proposed 1005 O'Brien Drive and 1320 Willow Road Research and Development Project (Proposed Project or Project). The Project would include demolition of three existing buildings on the Project site, which contain office, research and development (R&D) and warehouse uses, and construction of two R&D buildings, a parking garage, and open space/pedestrian areas. The reasonably foreseeable and potentially significant adverse environmental effects of the Proposed Project are evaluated in this environmental impact report (EIR). Consistent with CEQA Guidelines Section 15124, the Project description provided in this chapter includes the location and boundaries of the Project site, as shown on a location map and regional map; a statement of the Project objectives; a general description of the Project's technical, economic, and environmental characteristics and supporting public utilities facilities; a description of discretionary approvals necessary to authorize the Project to proceed, including a list of the agencies that are expected to use the Project's CEQA compliance documentation (including this Initial Study and the Project's focused EIR) in their decision making; and a list of permits and other approvals required to implement the Project.

Information has been provided by O'Brien Drive Portfolio, LLC, as the Project sponsor, and by City staff. The following Project description serves as the basis for the environmental analysis contained in this Initial Study. As discussed in Chapter 1, Introduction, based on the findings in this Initial Study, a focused EIR will be prepared for impacts that need further discussion and/or mitigation beyond that provided in the ConnectMenlo EIR and the Housing Element Subsequent EIR. The City will serve as the lead agency with final decision making authority relative to the proposed Project and certification of the EIR.

2.2 Project Location and Existing Conditions

Project Location

The Proposed Project is located in the Bayfront Area of the City (as shown in Figure 2-1, Project Vicinity and Location). The City is located at the southern edge of San Mateo County and is generally bound by San Francisco Bay to the north and east; the cities of East Palo Alto and Palo Alto and Stanford University to the southeast; and Atherton, Redwood City and unincorporated North Fair Oaks to the northwest. Under the City's recent General Plan update, referred to as ConnectMenlo, the Bayfront Area is the focus of future land use changes. The Bayfront Area is generally bound by San Francisco Bay to the north; Redwood City to the west; East Palo Alto to the southeast; and Bay Road and the Menlo Park neighborhoods of Belle Haven, Flood Triangle, Suburban Park, and Lorelei Manor to the south, as shown in Figure 2-1. The Bayfront Area has historically been developed with industrial, warehousing, and office uses.

Existing Development

The 4.22-acre Project site (Assessor's Parcel Numbers [APNs] 055-421-160,055-421-050, and 055-421-060) is located at 1005 O'Brien Drive and 1320 Willow Road (as shown in Figure 2-2). The site is bounded on the north by right-of-way for the Hetch-Hetchy water line and the Mid-Peninsula High School, Willow Road to the west, O'Brien

Drive to the south and two adjoining properties on the east (1035 O'Brien Drive and 10 Kelly Court). Further, the site is located north of United States Route (U.S. Route) 101, south of Bayfront Expressway (State Route [SR] 84), and west of University Avenue (SR 109).

As shown on Figure 2-2, the Project site includes all of the three following contiguous parcels:

- APN 055-421-160 (1320 Willow Road) is 2.20 acres (95,973 square feet) located in the northwestern portion of the Project site and includes one building.
- APN 055-421-050 (985 O'Brien Drive) is 1.00 acre (43,561 square feet) located in the southwestern portion of the Project site and contains one building.
- APN 055-421-060 (1001 O'Brien Drive) is 1.02 acres (44,223 square feet) located in the southeastern portion of the Project site and contains one building.

In addition, approximately 1,230 square feet in the southwest corner of APN 055-421-190, which currently contains a portion of the surface parking lot for 1035 O'Brien Drive, would be added to the Project site while an equal area in the northeast corner of APN 055-421-060 would be added to the 1035 O'Brien Drive parcel, as shown in Figure 2-3. This land swap would be implemented by a lot line adjustment.

Environmental Conditions

This discussion provides an overview of the existing environmental conditions at the Project site. The information presented here is summarized from a range of technical studies that were prepared to support the environmental review process for the Project and are included as technical appendices to this Initial Study. These include:

- Appendix A1 Biological Resources Assessment
- Appendix A2 Tree Survey Report
- Appendix B Built Environment Inventory and Evaluation Report

The Project site is generally flat and is characterized by existing industrial uses within a developed portion of the Bayfront Area (Appendix A1). Specifically, the site consists of three existing office, R&D, and storage buildings totaling 90,631 square feet of building space as well as surface parking. All buildings were constructed between 1961 and 1968 and are single-story (Appendix B). Though the Project site largely consists of impermeable surfaces, including existing buildings and paved roads/parking areas, there is a small area of landscaping along the eastern border of the site as well as 11 trees onsite, with 4 located along the Willow Road frontage and 7 located along the O'Brien Drive frontage (Appendix A2). Sidewalks are present along Willow Road; however, there are no sidewalks on O'Brien Drive, along the southern border of the Project site.

The site is within the Federal Emergency Management Agency (FEMA) Zone AE (FEMA 2019), indicating it is likely to be subject to inundation during a 100-year flood (Appendix A1).

Existing industrial and office uses surround the Project site to the south and east. Some of the existing industrial buildings are leased for non-industrial uses, such as a church located directly west of the Project site. Mid-Peninsula High School is located immediately north of the Project site, with additional industrial and office buildings located north of the school. The area north and northeast of Mid-Peninsula High School is planned for redevelopment under the Willow Village project, which would replace the existing industrial and office buildings with a town square district, a residential/shopping district, and a corporate campus district, including a maximum of 1,730 multi-family

residential units. As shown on Figure 2-1, other schools in the vicinity include Belle Haven School to the west, Bright angel Montessori Academy to the southwest, Costano Elementary School to the northeast, Cesar Chavez Ravenswood Middle School to the southeast, KIPP Valiant Community Preparatory School to the south, Residential development is located west of the site, across Willow Road, as well as further south and east of the Project site (beyond intervening industrial/office uses). The San Francisco Bay is located approximately 0.5 mile north and 1.25 miles east of the Project site.

City of Menlo Park General Plan and Zoning Designations

The Project site is designated under the General Plan as Life Sciences (LS) and is zoned as Life Sciences/Bonus Available (LS-B). Thus, development of the Project site is subject to the requirements of the Menlo Park Municipal Code Chapter 16.44, LS District. The purpose of this zoning designation is to provide opportunity for new life science and R&D uses, and high-tech offices with supportive sales and personal services. Specifically, Section 16.44.010 provides that the purpose and intent of the LS district is to:

(1) Attract research and development and light industrial uses, particularly those that support bioscience and biomedical product development and manufacturing and/or are potentially revenue generating businesses;

(2) Allow administrative and professional office uses and other services that support light industrial and research and development sites nearby;

(3) Provide opportunities for quality employment and development of emerging technology, entrepreneurship, and innovation;

(4) Facilitate the creation of a thriving business environment with goods and services that support adjacent neighborhoods as well as the employment base.

Development regulations for the LS District indicate a base level building height of 35 feet (up to 110 feet with Bonus Level designation), a maximum Floor Area Ratio of 55 percent for life science uses (up to 125 percent with Bonus Level designation), and a minimum open space requirement of 20 percent. The Project proposes to meet the open space requirement in part with publicly accessible open space, including a sports court, to be located in the northeast corner of the site. The Project proposes to utilize the bonus-level development provisions in exchange for payment of the City's in-lieu fee for community amenities.

The ConnectMenlo General Plan and zoning designations applied to the Project site extend to other properties in the Project vicinity. Specifically, surrounding uses are designated in ConnectMenlo as office uses, with zoning designations that include Office-Bonus (O-B), Life Sciences (LS), Residential Mixed Use (R-MU), and High Density Residential (R4) (City of Menlo Park 2016a).

2.3 Project Objectives

CEQA requires an EIR to include a statement of objectives for the Proposed Project, including the underlying purpose of the Project. As noted in the CEQA Guidelines, these objectives help the lead agency to determine which Project alternatives to evaluate in the EIR (Guidelines 15124(b)). The overarching intent of the Proposed Project is to deliver R&D uses that would support life science tenants within the Bayfront Area of the City, consistent with the General Plan and zoning, in addition to providing publicly accessible open space uses. More specifically, the objectives for the Proposed Project are as follows:

- To build a new cutting-edge life science building that will cater to the Bay Area and Stanford entrepreneurial community, as well as life sciences companies both regionally and nationally, by providing space for reliable laboratory and research uses, with accessory office areas and tenant amenities such as private outdoor areas.
- To develop an environmentally sustainable, high-quality aesthetic facility with the flexibility to accommodate a single life science tenant or meet the needs of multiple tenants.
- To create a Project that grows a broad socioeconomic base of jobs as well as a business-to business tax base for the City of Menlo Park.
- To develop space that will accommodate life science employees and jobs in the new Life Sciences district.
- To provide or pay in-lieu fees to fund community amenities for surrounding neighborhoods consistent with ConnectMenlo goals and policies.
- To achieve Leadership in Energy and Environmental Design (LEED) Gold certification or equivalent.
- To enhance public accessibility from O'Brien Drive and Willow Road to potential future public open spaces along the Hetch Hetchy aqueduct easement, while providing private (non-public) open space opportunities onsite

2.4 Proposed Project

The Proposed Project would include demolition of existing onsite buildings, construction of two R&D buildings and one parking structure, and development of open space, landscaping, and a sports court. The Project would be developed in two phases, as further described below. A lot line adjustment is proposed to merge the existing three parcels that comprise the Project site into a single parcel and relocate the boundary between APN 055-421-190 and APN 055-421-060 to accommodate the proposed site layout and internal vehicular circulation.

2.4.1 Phase 1

Phase 1 of the Project would include:

- Demolition of 985 O'Brien Drive and 1001 O'Brien Drive buildings (total 40,586 square feet) and demolition of the eastern half of 1320 Willow Road (approximately 24,032 square feet),
- Lot line adjustment in the central portion of the site to combine the existing parcels at 985 and 1001 O'Brien and the eastern portion of the parcel at 1320 Willow Road into a single parcel and to make the eastern property line perpendicular to O'Brien Drive, which would bring the western portion of the surface parking lot for 1035 O'Brien Drive into the Project site,
- Construction of one R&D building with 154,581 square feet at 1005 O'Brien Drive,
- Construction of chemical storage enclosure and solid waste/recycling enclosure, and installation of an emergency generator and enclosure west of the 1005 O'Brien Drive building,
- Construction of a five-level parking garage,
- Restriping existing asphalt south of the building at 1320 Willow Road to create surface parking, and
- Construction of landscaping, open space, and designated pedestrian areas.

Phase 1 of the Project would involve demolition of the existing buildings at 985 O'Brien Drive and 1001 O'Brien Drive. The eastern portion of the existing building at 1320 Willow Road would be removed as well, while the remaining western portion would be removed during Phase 2 of the Project and would remain in use until then.

During Phase 1, it is anticipated that the current tenant in the western side of 1320 Willow would continue operations. Once buildings at 985 O'Brien Drive and 1001 O'Brien Drive are demolished, a lot merger and lot line adjustment would take place in the central portion of the site to create a single parcel to contain the proposed building at 1005 O'Brien and the parking garage. A lot line adjustment would also take place along the southeast portion of the site to align the property line perpendicular to O'Brien Drive, as shown in Figure 2-3.

Phase 1 construction would include a new building at 1005 O'Brien Drive that would consist of approximately 155,000 square feet in 5 stories. A deck would be constructed on the southeast corner of the roof, to include seating areas, plants, and a trellis. The building would be primarily used for and designed to accommodate life science tenants. The Project sponsor's life science tenants in other nearby buildings have typically consisted of companies that design medical devices and services, develop clean technology products, and engineer environmentally sustainable foods. To accommodate such uses, the building would include 30 to 45 percent office space and 55 to 70 percent laboratory space.

Phase 1 also includes construction of a parking garage to accommodate vehicles for onsite users, totaling 139,500 square feet. During operation of Phase 1, four out of the five parking garage floors would be open for vehicular use and access to Level 5 would be blocked by bollards that could be removed for fire department/emergency access only. At completion of Phase 1, the four levels in the parking garage would provide 336 parking spaces, 102 of which would include electric vehicle (EV) charging stations, and an additional 50 would be "EV Ready," meaning conduit would be installed below the parking space surface to support future installation of additional EV charging stations.

Building Materials

The new buildings would be constructed using neutral-colored glass fiber reinforced concrete, reinforced metal, as well as tinted blue and clear (bird-safe) glass windows. Ceramic glass patterns would be applied to the building windows to reduce window glare, block sun/heat into the building, and reduce the potential for bird-strike occurrences.

Phase 1 Landscaping and Open Space

Under Phase 1, the Project proposes to remove ten trees: seven onsite trees, all of which are identified as heritage trees as defined in Menlo Park Municipal Code Chapter 13.24, Heritage Trees, plus three non-heritage trees from the adjacent parcel to accommodate changes in vehicular circulation and surface parking in the area of the proposed lot line adjustment.

During this phase, the Project would include development of approximately 38,559 square feet of open space, of which approximately 21,633 square feet would be publicly accessible, as shown in Figure 2-4. Landscaping would include planting 100 new trees. Open space would be situated along the northern and southern border of the site as well as the central portion of the site and would include the following components:

- meandering pedestrian paths/walkways,
- a main entry plaza,
- bioretention areas for stormwater,
- public gathering space,
- public seating and gathering areas,

- picnic and bistro tables,
- a sports court,
- outdoor terrace and activity space, and
- flex turf space (with emergency access).

2.4.2 Phase 2

Phase 2 of the Project would include:

- Demolition of the remaining western portion of the building at 1320 Willow Road (approximately 26,013 square feet);
- Construction of one R&D building at 1320 Willow Road consisting of 73,500 square feet;
- Construction of one full additional floor and one partial additional floor within the parking garage structure, resulting in a final seven-level garage with 6.5 floors of parking;
- Construction of chemical storage enclosure and solid waste/recycling enclosure south of the 1320 Willow Road building and west of the 1005 O'Brien Drive building, and installation of an emergency generator; and
- Construction of additional landscaping, open space, and designated pedestrian areas.

The remaining portion of the existing building at 1320 Willow Road would be demolished during Phase 2. Following demolition, the Project would construct an approximately 73,500 square-foot, four-story, building, as shown on Figure 2-5. The building would be intended for and designed to accommodate life science tenants. Similar to the building proposed at 1005 O'Brien Drive, the 1320 Willow Road building would also include 30 to 45 percent office space and 55 to 70 percent laboratory space. Construction of the 1320 Willow Road building would use building materials similar to the 1005 O'Brien Drive building, including neutral-colored glass fiber reinforced concrete, reinforced metal, and tinted blue and ceramic glass window patterns to reduce bird strikes. A roof deck would be constructed on the northern side of the building, to include seating areas, plants, and a trellis.

Phase 2 would also involve construction of one full additional parking garage floor and one partial additional parking garage floor, resulting in a total of 172,800 square feet. Construction staging for Phase 2 would occur on parking level 5 as well as outside the parking garage, within the Project site. At completion of Phase 2, 191 additional parking spaces would be added to the parking garage, 57 of which would include EV charging stations and 29 EV Ready, for a total of 527 parking spaces (159 with EV charging stations and 79 EV Ready).

Phase 2 Landscaping and Open Space

In Phase 2, the Project proposes to remove an additional three onsite trees, two of which are heritage trees and one non-heritage. The Project design preserves one existing tree onsite, which is a heritage tree.

During Phase 2, approximately 20,785 square feet of additional open space would be created within the Project site, of which approximately 9,902 square feet would be publicly accessible, and 45 additional trees would be planted (see Figure 2-6). New open space developed during this phase would be primarily located along the northwest and western boundary of the site and would include additional walking/pedestrian pathways, public gathering spaces, a public plaza, bioretention areas, public seating areas, bike racks, and a main entry plaza to the 1320 Willow Road Building along Willow Road. The public plaza is envisioned to function as a central gathering

space site within the open space area and would consist of a concrete pad with a trellis and backdrop screening and flexible seating, suitable for picnics and similar activities.

2.4.3 Vehicle Circulation

Site Access

Site Access is currently provided along Willow Road, on the western site boundary, and along O'Brien Drive to the south. There is limited pedestrian infrastructure in the Project area. There are existing sidewalks along Willow Road; however, no sidewalks are present on O'Brien Drive, along the southern border of the Project site.

Vehicular access to the site is currently provided by seven driveways off of O'Brien Drive which is proposed to be consolidated to a single driveway located along the west side of the proposed building at 1005 O'Brien Drive. Along the eastern property boundary, the existing driveway that provides access to 1035 O'Brien Drive would be used and an internal vehicular connection would be created to allow access between the Project parking lot and the parking lot at 1035 O'Brien Drive. There is also one existing driveway off of Willow Road that provides access to the western portion of the site; no change to this driveway is proposed.

Parking

As described above, upon completion of Phase 2, the Project would include a 7-level parking garage with 527 parking spaces available for site users. Of these spaces, 159 spaces would include EV charging stations and 79 spaces would be EV Ready.

Enclosed long-term bicycle parking would be provided in the parking garage, as well as in both the R&D buildings. Outdoor short term bicycle parking would also be provided in the western portion of the site, west of the 1320 Willow Road building, in the southern portion of the Project site, at the southeast corner of the 1005 O'Brien Drive building, and in the northern portion of the site, north of the parking garage. In total, 48 long-term and 20 short-term bicycle parking spaces would be provided.

Emergency Access

Emergency and fire access would be provided throughout the site. Specifically, fire lanes would be striped along O'Brien Drive on the southern boundary of the Project site, along the west side of the proposed parking garage, and between 1005 O'Brien Drive and the parking garage. A fire truck turnaround area would be designated within the central area of the site with access to each of the proposed buildings. Additionally, no on-street parking would be permitted along the Project site frontage on O'Brien Drive.

2.4.4 Other Site Improvements

Landscaping

As described above, landscaping would be incorporated in both Phases 1 and 2 of the Project. Approximately 59,344 square feet of open space would be developed, of which approximately 31,535 square feet would be available and accessible to the public (Tarlton Properties 2023). Landscaping would be provided throughout the site including within public open spaces (e.g., flex turf space, meandering pedestrian walkways/paths, gathering/event space, and seating on benches and at tables). Drought tolerant plantings and trees would be

incorporated as part of site landscaping. In addition to new plantings, public water/drinking fountains, ornamental areas with natural rocks, and games such as ping pong and cornhole would also be incorporated throughout the site.

The site would offer amenities accessible to the general public as well as amenities available only to site users. Public amenities focused along the northern site boundary would include active space (i.e., sports court and public event areas) and semi-active space (i.e., public gathering and respite areas). Additional public open space located on the south and west sides would include meditative space (i.e., strolling paths and seating areas) as well as a walking path that provides access from Willow Road on the west to the sports court area. Private amenities would include seating and tables, public gathering areas, and activity spaces, in addition to building entry plazas. Private amenities would be located between the proposed parking garage and the building at 1005 O'Brien Drive as well as on the roof deck on the 1005 building. These private spaces would only be accessible to building tenants and visitors.

As previously discussed, the Project would remove ten existing trees from the Project site and adjacent parcel in Phase 1 and remove an additional three onsite trees in Phase 2, preserving one onsite heritage tree. Approximately 100 new trees would be planted within the site as part of Phase 1 and an additional 45 new trees would be planted onsite as part of Phase 2. Trees would be located around pedestrian walking paths, public gathering areas, and within the proposed entry and public event plazas. New trees would consist of 14 street trees along O'Brien Drive (including trident maple, emerald sunshine elm, and wireless zelkova), 23 screening trees along the Project site's northern boundary (including Canary Island pine and coast live oak), 63 canopy trees located throughout the site (including October glory maple, autumn gold ginkgo, Keith Davey Chinese pistache, London plane tree, and Chinese elm), and 45 accent trees located throughout the site (including arbutus marina, western redbud, Brisbane box, Muskogee crape myrtle, and Chinese elm).

Project site landscaping would be required to comply with the City's Water-Efficient Landscaping ordinance (Municipal Code Chapter 12.44), which provides criteria for water conservation, soil management, irrigation, and stormwater management.

Bioretention Areas

The City of Menlo Park lies within the jurisdiction of San Francisco Bay Regional Water Quality Control Board (RWQCB) (Region 2) and the city is a co-permittee of the Municipal Regional Stormwater Permit (MRP; Order No. R2-2015-0049) and National Pollutant Discharge Elimination System (NPDES) Permit No. CAS612008. Under Provision C.3 of the MRP, the co-permittees use their planning authorities to include appropriate source control, site design, and stormwater treatment measures in new development and redevelopment projects to address both soluble and insoluble stormwater runoff pollutant discharges and prevent increases in runoff flows from new development and redevelopment projects. The Proposed Project is subject to the MRP requirements because it meets the definition of a regulated project under MRP section C.3.b.ii.(3)(a).

Accordingly, the Project design incorporates bioretention areas throughout the site to provide for onsite stormwater management and treatment by collecting water runoff in vegetated areas. Approximately 4,490 square feet of stormwater treatment areas would be provided in the Phase 1 portion of the Project site, while Phase 2 would introduce an additional 1,020 square feet of stormwater treatment areas (Tarlton Properties 2023). These bioretention areas would be designed as vegetated basins and swales incorporated into the landscaping along the Project site frontages on O'Brien Drive (Phase 1) and Willow Road (Phase 2). A Hydrology Report was prepared for each of the two Project phases; these reports are included in this Initial Study as Appendix E. The size and design of these areas were determined based on the size of the drainage basin each serves and the extent of impervious

surfaces within that basin, and each would be sized slightly larger than the required size under the San Mateo County C.3 Manual guidelines (Appendix E and Tarlton Properties 2023).

Lighting

Project lighting would be incorporated for building and site security and accessibility. Exterior building lights would be angled downward to prevent light pollution onto sensitive receptors, while security lighting throughout the site may consist of lighted pathways and gathering areas. Project site lighting must comply with the design standards for the LS-B District (Municipal Code Section 16.44.120), which require, in part, that lighting be designed to a pedestrian scale, that light fixtures be placed no more than 40 feet apart, that parking areas be well lit for safety, and that lighting fixtures and sources be energy efficient.

2.4.5 Utilities

The Project would include connections to existing infrastructure within the Project vicinity as described in the following paragraphs. Utility connections would extend from the public right-of-way to the interior of the Project site. While the Project is designed to tie into existing storm drain lines and water mains, it also includes points of connection to future storm drain, watermain, and reclaimed water lines that are anticipated to be installed in O'Brien Drive as a separate and unrelated project, described below.

Water

Potable water service to the Project site is provided by Menlo Park Municipal Water (MPMW). The existing water system within the Project vicinity includes a 10-inch water main that runs along the O'Brien Drive frontage between the curb and property line.

The MPMW 2018 Water System Master Plan identified a deficiency regarding the volume of water provided by the existing water main and found that a 12-inch main would be required to serve the O'Brien Drive life sciences service area. Accordingly, the City is in the process of developing a plan with property owners/project sponsors in the vicinity of the Project site for upsizing the existing water main. The water main would be upsized prior to occupancy of any new buildings within the life sciences service area. The Proposed Project's participation would be ensured through Project Conditions of Approval. The potential impacts and effects of the upgraded waterline in O'Brien Drive were analyzed in the Final EIR for the 1350 Adams Court Project (SCH#2018122017; City of Menlo Park 2022a). The Final EIR, which included the upgraded waterline in O'Brien Drive, was certified by the City of Menlo Park Planning Commission on September 12, 2022, and is available for review on the City's website. No additional study or discussion of waterline construction is required or intended as part of the EIR for the Proposed Project, as the certified 1350 Adams Court Project EIR satisfies the requirements of CEQA as to the waterline.

As part of Project construction activities in Phases 1 and 2, multiple service connections to the existing buildings would be removed and new connections to the MPMW water main would be provided for the new buildings. This would include separate connections for fire service and domestic water. The new fire service connections include backflow preventers and two new sprinkler risers for each of the buildings and parking garage would be installed. In addition, purple pipe will be installed for connection to future recycled water service when it becomes available. The Proposed Project would include water-conserving plant material and irrigation systems, in compliance with the Water-Efficient Landscape Ordinance.

The Project is anticipated to result in a total water demand of 20,245 gallons per day (gpd) of potable water, which includes 13,585 gpd under Phase 1 and an additional 6,660 gpd with completion of Phase 2.

Wastewater

Wastewater collection and conveyance to and from the Project site is provided by West Bay Sanitary District. Existing wastewater infrastructure is located within O'Brien Drive, including an 18-inch sanitary sewer line, as well as an 8-inch sanitary sewer line in Willow Road. The Project would tie into this existing wastewater infrastructure. Project-generated wastewater is calculated as a percent of the daily water demand and is dependent on Project waste fixtures (i.e., sinks, toilets), irrigation, etc. Wastewater generation is calculated as a percentage of the daily water demand. The Project is estimated to generate 11,696 gpd of wastewater, which includes 7,906 gpd under Phase 1 and an additional 3,790 gpd with completion of Phase 2.

Stormwater

The Project site contains existing stormwater infrastructure that collects runoff from paved parking areas, building surfaces, and hardscape areas and discharges directly into existing storm drain mains. Specifically, there is an existing 10-inch storm drain located along the northeastern portion of the site and a 10-inch drainage easement located along the eastern border of the existing 965 O'Brien Drive building.

Currently, approximately 98 percent of the Project site is covered with impervious surface. The Project would reduce the extent of impervious surfaces by approximately 23,346 square feet in Phase 1 and a total of 9,620 square feet in Phase 2. Of the impervious surface reduction that would occur during construction of Phase 2, 6,264 square feet would be located within the Phase 2 area while 3,356 square feet would be located within the Phase 1 area (Tarlton Properties 2023). This additional reduction in the Phase 1 area would result from replacing a portion of the building at 1320 Willow Road with landscaping as shown in Figures 5 and 6.

Stormwater and water runoff generated at the Project site would be drained by a new on-site storm drain system, which is required to meet stormwater quality control requirements outlined in the C.3 Regulated Projects Guide of the San Mateo County Water Pollution Prevention Program. Additionally, under Menlo Park Municipal Code Section 16.44.120, landscaping is required to be provided within a minimum of 25 percent of the setback area for the Project site frontages on O'Brien Drive and Willow Road, and to provide green infrastructure through on-site infiltration of stormwater runoff, such as bioretention basins and planters, within at least 50 percent of these landscaped areas. As part of this requirement, the Project would incorporate green infrastructure and stormwater treatment measures (i.e., bioretention basins, planters) within landscaped portions of the Project's off-site frontages that would treat runoff within the public right-of-way.

The proposed on-site storm drain system would collect runoff from the limited areas of surface parking on the eastern side of the Project, drive aisles, building roofs, and hardscape areas and convey it to bioretention basins/planters for stormwater treatment. After treatment, stormwater would be routed to the existing storm drain network surrounding the Project site (Tarlton Properties 2023). Because the Project would reduce the amount of impervious surface within the Project site and would provide on-site infiltration of stormwater runoff, the volume and rate of stormwater runoff would also be reduced.

Energy and Natural Gas

The Project site is served by Pacific Gas and Electric Company (PG&E) for electrical service. There is an existing 2-inch natural gas line within Willow Road and an existing electric line located off of Willow Road. The Project would include construction of a new underground electrical system connecting to the existing service on Willow Road.

Solid Waste Disposal

Most residents in the City are served by Recology San Mateo County for solid waste, recyclables, and composting collection, and businesses may also elect to contract with Recology, although other providers are available for business contracts. The Project plans have already been reviewed by Recology and determined acceptable for service levels and locations (Recology 2022). Solid waste generated in the City is disposed of at a number of local landfills. The Project would implement a Zero Waste Management Plan to minimize solid waste generation. This would include providing sorting stations for garbage, recycling, and organics; installing refillable water bottle stations, providing reusable hand towels/racks and/or hand dyers; and installing dishwashers in any kitchen areas (if included).

2.4.6 Public Services

The Project site would be served by the City of Menlo Park Police Department from the Menlo Park Police Station, approximately 2 miles southwest of the Project site, at 701 Laurel Street. Fire protection would be provided by the Menlo Park Fire Protection District (MPFPD). The closest fire station to the Project site is Station 77, approximately 0.5 miles northwest, at 1467 Chilco Street. The fire district would review the proposed building plans, including fire hydrant placement and emergency vehicle access and circulation, prior to issuance of building permits.

2.4.7 Sustainability Features

The following sustainable features would be part of the Proposed Project:

- 5-kilowatt rooftop photovoltaic system on the 1005 O'Brien Drive building
- 1005 O'Brien Drive Building would achieve LEED Gold, 1320 Willow Road Building would achieve LEED Silver
- High-efficiency (LED) lighting
- Outlets for charging EVs
- Low volatile organic compound–emitting coatings and sealants
- Enhanced ventilation, filtration, and cleaning protocols for better indoor environmental quality
- Transportation Demand Management (TDM) Program
- 100% renewable electric power(subject to possible use of natural gas instead of renewable electricity for space conditioning, appliances, or laboratory equipment if permitted by the City pursuant to Municipal Code Chapter 12.16, which allows use of natural gas in non-residential buildings containing a scientific laboratory if documentation is provided that demonstrates electricity is not feasible for this purpose)
- Dual plumbed for use of recycled water when it becomes available
- Bioswales and on-site water infiltration to reduce stormwater runoff
- Low-water native plantings
- Zero-waste management plan

2.5 Construction Details, Phasing, and Timeline

The proposed site design accommodates sea-level rise, and all proposed ground-level building floors would be raised 2 feet above the 12.8 feet FEMA base flood elevation, per the requirements of Menlo Park Municipal Code Section 16.44.130(4).

Demolition, Grading, and Construction

All existing buildings on the Project site (1320 Willow Road, 985 O'Brien Drive, and 1001 O'Brien Drive) as well as site pavement would be demolished, and approximately 3.17-acres of the Project site would be graded. Construction debris, such as concrete building foundations, asphalt pavement, and building materials, would be collected and hauled off site for disposal in accordance with Chapter 12.48 of the Menlo Park Municipal Code which establishes landfill diversion requirements for construction and demolition debris. Approximately 8,400 cubic yards of demolition waste would be generated by the Project.

Up to 2,190 cubic yards of soils would be removed from the Project site for excavation, utility trenching, and foundations. A total of 7,690 cubic yards of soils would be imported to the Project site to raise the site elevation 2 feet above the base flood elevation. Excavation would be needed for construction of bioretention areas, which would typically be approximately 3 feet below the final floor elevation for each building, and for installation of elevator pits, which would typically be up to 5 feet below grade. Excavation would also occur when auger cast piles are drilled. These would extend approximately 85 feet below grade and for construction of the foundation mat slab. Impact pile driving would not be required.

Construction Phasing and Timeline

If approved, construction of Phase 1 of the Project is anticipated to begin immediately after Project approval and would last approximately 21 months. Phase 2 is anticipated to begin after the completion of Phase I as early as Spring 2025. However, an existing business would continue to occupy 1320 Willow Road for the duration of Phase 1 and could remain in place through 2034. Phase 2 could therefore begin as late as 2034, and a Development Agreement is requested to accommodate this future phasing. Phase 2 construction would occur over a duration of 15 months.

In Phase 1, building demolition is expected to require approximately 30 work days, followed by 10 days of site preparation (e.g., clearing and grubbing), then 30 days of grading, and 300 days of building construction. This phase would be completed with paving and application of architectural coatings requiring 20 days.

Under Phase 2, demolition of the remaining portion of the building on Willow Road is expected to require approximately 20 days, followed by 5 days of site preparation and 20 days of grading. Construction of the new Willow Road building and two additional levels of the parking garage would require 230 days. The first four levels of the garage would remain available for tenant and visitor use during Phase 2 construction. The surface parking lot and vehicle drive aisles would be resurfaced, requiring five days. Application of architectural coatings would require 15 days.

Construction staging would take place within the confines of each respective component; however, if a portion of the Project is not under construction, that component would be used for staging, which would include material and equipment storage, and construction trailer parking.

Construction fencing would be installed around the perimeter of each phase during its construction to prevent pedestrian and non-construction-related vehicle access. As aspects of the Project are completed, the construction fencing may be reduced to encompass only the parts of the site that remain under construction.

2.6 Discretionary Actions

City Approvals

As lead agency for consideration of the Proposed Project, the City would be responsible for many of the approvals required for Project development. The Project would require the following City discretionary approvals:

- **Use Permit**. Use permit for bonus-level development, per Menlo Park Municipal Code Chapter 16.82, and for the use and storage of hazardous materials for two diesel generators.
- **Architectural Control**. Per Menlo Park Municipal Code Chapter 16.68, architectural control review and approval of the specific building design.
- **Lot Line Adjustment and Lot Merger**. Lot line adjustment and lot merger to merge the existing 985 and 1001 O'Brien Drive parcels, alter the lot lines between 1001 O'Brien Drive and the neighboring 1035 O'Brien Drive, and to merge the newly created 1005 O'Brien Drive parcel with the 1320 Willow Road parcel.
- **Development Agreement**. A Development Agreement is requested to allow for Project phasing through 2034.
- **Heritage Tree Removal Permit**. A tree removal permit would be required for each heritage tree proposed for removal, per Menlo Park Municipal Code Section 13.24.040.
- **Community Amenity Approval.** Planning Commission approval of the proposed community amenity in-lieu fee payment as required by Menlo Park Municipal Code Section 16.44.070 to allow for bonus-level development within the LS-B zoning district.
- **Below-Market-Rate Housing In-Lieu Fee Approval**. Planning Commission approval of payment of the Below-Market-Rate Housing Program in-lieu fees per Menlo Park Municipal Code Section 16.96.03.
- **Natural Gas Usage Approval.** City approval for use of natural gas for space conditioning, appliances, or laboratory equipment per Menlo Park Municipal Code Section 12.16,010 which allows use of natural gas in non-residential buildings containing a scientific laboratory if documentation is provided that demonstrates use of electricity would be infeasible or not cost-effective.
- **Environmental Review**. This would include circulating a Notice of Preparation, including this Initial Study, for public review, and preparation, public review, and certification of a focused EIR, with approval of a Mitigation Monitoring and Reporting Program and possibly the need for a Statement of Overriding Considerations to the extent the Final EIR discloses any potentially significant impacts that cannot be mitigated to less-than-significant levels.

Responsible and Trustee Agencies

Section 21104 of the California Public Resources Code requires that all EIRs be reviewed by state responsible and trustee agencies (see also 14 CCR 15082 and 15086[a]). As defined by CEQA Guidelines Section 15381, "the term 'Responsible Agency' includes all public agencies other than the Lead Agency which have discretionary approval power over the project." A trustee agency is defined in CEQA Guidelines Section 15386 as "a state agency having jurisdiction by law over natural resources affected by a project which are held in trust for the people of the State of

California." There are no such resources that could be affected by this Project and thus there are no applicable trustee agencies.

Other Agency and Service District Reviews and Approvals

This EIR may be used by other agencies and service districts that have some approval authority over the Proposed Project (e.g., to issue a permit). The Project sponsor would obtain all permits, as required by law. The following list identifies the other agencies and service districts that may rely on this EIR when considering the Proposed Project and the general review and approval responsibilities for each entity.

- Bay Area Air Quality Management District: Permit for asbestos removal during demolition; permit for on-site generators;
- California Department of Transportation: Review of traffic circulation effects and consultation on potential traffic improvements that may affect state highway facilities, ramps, and intersections;
- California Regional Water Quality Control Board/San Mateo Countywide Water Pollution Prevention Program: Approval of National Pollutant Discharge Elimination System permit for stormwater discharge;
- City/County Association of Governments of San Mateo County: Review of potential effects on Routes of Regional Significance;
- Menlo Park Fire Protection District: Site Plan Review;
- Menlo Park Municipal Water: Approval of water hookups;
- PG&E: Approval of electric/natural gas improvements and connection permits;
- San Francisco Public Utilities Commission: Approval for encroachment into Hetch Hetchy aqueduct easement, if necessary based on final Project design and construction plans; no such encroachment is currently anticipated;
- San Mateo County Environmental Health Services Division: Review of on-site generators;
- San Mateo County Transportation Authority: Review of potential effects on public transit;
- San Mateo County Water Pollution Prevention Program: C.3 and C.6 Development Review Checklist; and
- West Bay Sanitary District: Approval of wastewater hookups.

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3 Initial Study Checklist

1. **Project title:**

   1005 O'Brien Drive and 1320 Willow Road Life Sciences Project

2. **Lead agency name and address:**

   City of Menlo Park
   701 Laurel Street
   Menlo Park, California 94025

3. **Contact person and phone number:**

   Chris Turner, Associate Planner
   650-330-6724

4. **Project location:**

   1005 O'Brien Drive and 1320 Willow Road, Menlo Park, CA 94025

5. **Project sponsor's name and address:**

   O'Brien Drive Portfolio, LLC
   c/o Tarlton Properties
   1530 O'Brien Drive, Suite C
   Menlo Park, CA 94025

6. **General plan designation:**

   Life Sciences (LS)

7. **Zoning:**

   Life Sciences/Bonus Available (LS-B)

8. **Description of project. (Describe the whole action involved, including but not limited to later phases of the project, and any secondary, support, or off-site features necessary for its implementation. Attach additional sheets if necessary):**

   Refer to Section 2, Project Description.

9. **Surrounding land uses and setting (Briefly describe the project's surroundings):**

   The Project site is surrounded by existing industrial and office uses to the south and east. The Hetch Hetchy aqueduct right-of-way owned by the San Francisco Public Utilities Commission (SFPUC) runs along the northern boundary. Mid-Peninsula High School is approximately 100 feet north of the Project site, with additional industrial and office buildings (including the Willow Village development) located north of the

school. Residential development is located west of the site, across Willow Road, as well as further south and east of the Project site (beyond industrial/office uses). The San Francisco Bay is located approximately 0.5 mile north and 1.25 miles east of the Project site.

10. Other public agencies whose approval is required (e.g., permits, financing approval, or agreement):

- City of Menlo Park: Use Permit, Architectural Control, Lot Line Adjustment, Development Agreement, Heritage Tree Removal Permit, Community Amenity Approval, Below-Market-Rate Housing In-Lieu Fee Approval, and Environmental Review.
- Bay Area Air Quality Management District: Job Number (J) Permit for asbestos removal during demolition; permits for on-site generators, boilers, and other utility equipment
- California Department of Transportation: Review of traffic circulation effects and consultation on potential traffic improvements that may affect state highway facilities, ramps, and intersections
- California Regional Water Quality Control Board/San Mateo Countywide Water Pollution Prevention Program: Approval of National Pollutant Discharge Elimination System permit for stormwater discharge
- City/County Association of Governments of San Mateo County: Review of potential effects on Routes of Regional Significance
- Menlo Park Fire Protection District: Site Plan Review
- Menlo Park Municipal Water: Approval of water hookups
- PG&E: Approval of electric/natural gas improvements and connection permits
- San Francisco Public Utilities Commission: Approval for encroachment into Hetch Hetchy aqueduct easement, if necessary based on final Project design and construction plans; no such encroachment is currently anticipated
- San Mateo County Environmental Health Services Division: Review of on-site generators
- San Mateo County Transportation Authority: Review of potential effects on public transit
- San Mateo County Water Pollution Prevention Program: C.3 and C.6 Development Review Checklist
- West Bay Sanitary District: Approval of wastewater hookups

11. Have California Native American tribes traditionally and culturally affiliated with the project area requested consultation pursuant to Public Resources Code section 21080.3.1? If so, is there a plan for consultation that includes, for example, the determination of significance of impacts to tribal cultural resources, procedures regarding confidentiality, etc.?

In accordance with Assembly Bill (AB) 52, the City provided notification of the Proposed Project to the following Native American tribes in November 2022:

- Amah Mutsun Tribal Band
- Costanoan Rumsen Carmel Tribe
- Indian Canyon Mutsun Band of Costanoan
- Muwekma Ohlone Indian Tribe of the San Francisco Bay Area
- Ohlone Indian Tribe
- Wuksache Indian Tribe/Eshom Valley Band, and
- Tamien Nation

The 30-day review period concluded in December 2022. As of May 2023, none of the above listed tribes have requested consultation and no responses to the notifications were received. Refer to Sections 3.5, Cultural Resources, and 3.18, Tribal Cultural Resources for more information.

Environmental Factors Potentially Affected

The environmental factors checked below would be potentially affected by this Project, involving at least one impact that is a "Potentially Significant Impact," as indicated by the checklist on the following pages. Mitigation measures have been included in this Initial Study to reduce significant or potentially significant impacts to cultural resources and tribal cultural resources to less-than-significant levels. Thus, those potential impacts have been fully addressed in this Initial Study and will not be further discussed in the focused EIR. The other environmental factors checked below will be addressed in the focused EIR.

☐ Aesthetics	☐ Agriculture and Forestry Resources	☒ Air Quality
☐ Biological Resources	☒ Cultural Resources	☐ Energy
☐ Geology and Soils	☒ Greenhouse Gas Emissions	☐ Hazards and Hazardous Materials
☐ Hydrology and Water Quality	☐ Land Use and Planning	☐ Mineral Resources
☒ Noise	☒ Population and Housing	☐ Public Services
☐ Recreation	☒ Transportation	☒ Tribal Cultural Resources
☐ Utilities and Service Systems	☐ Wildfire	☒ Mandatory Findings of Significance

Determination (To be completed by the Lead Agency)

On the basis of this initial evaluation:

☐ I find that the Proposed Project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☐ I find that although the Proposed Project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the Project have been made by or agreed to by the Project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☒ I find that the Proposed Project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the Proposed Project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect (1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and (2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the Proposed Project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier ENVIRONMENTAL IMPACT REPORT or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier ENVIRONMENTAL IMPACT REPORT or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the Proposed Project, nothing further is required.

Signature

6/1/23
Date

Evaluation of Environmental Impacts

3.1 Aesthetics

	Further Evaluation Needed in EIR	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
I. AESTHETICS – Except as provided in Public Resources Code Section 21099, would the project:					
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☐	☒
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☐	☒
c) In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	☐	☐	☐	☐	☒
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☐	☒	☐

Environmental Setting

As described in Section 2, Project Description, the Project site is located on the eastern side of the Bayfront Area of the City. The site comprises approximately 4.22 acres and is bounded on the north by the right-of-way for the Hetch-Hetchy water line and Mid-Peninsula High School beyond, Willow Road to the west, O'Brien Drive to the south and two adjoining properties on the east (1035 O'Brien Drive and 10 Kelly Court) which both support existing office uses. The Project site is characterized by existing industrial uses within a developed portion of the Bayfront Area and consists of three existing buildings that contain office, R&D, and warehouse uses.

As discussed in Section 2.2 and shown in Figure 2-1, the Proposed Project is located in the Bayfront Area of the City). The Bayfront Area has historically been developed with industrial, warehousing, and office uses but under ConnectMenlo, it is the focus of future land use changes (City of Menlo Park 2016a). Specifically, multi-family housing is currently permitted in some parts of the Bayfront Area but not in the LS district. The road network in the Bayfront Area includes US 101, divided arterial roads (e.g., Willow Road, Bayfront Expressway, Marsh Road), and local streets, which vary in width (many are without sidewalks). The local streets are laid out in an ad-hoc pattern to serve groups of parcels. Building placement and landscaping vary, but buildings are usually surrounded by parking or other paved areas on all sides; siting and landscaping do not fit a consistent pattern. Almost all buildings have flat roofs,

many are rectangular in form, and most have metal or cementitious exterior wall materials. In general, buildings in the Bayfront Area range from one to three stories in height. The contrast between the differing land uses and the natural setting of the Bay to the north provides limited unity and inconsistent visual patterns.

The City has not designated any scenic vistas or corridors within the Project vicinity. According to the ConnectMenlo EIR, views of the Santa Cruz Mountain Range and foothills, the Bay, and San Francisquito Creek are considered to be scenic vistas (City of Menlo Park 2016b). However, there are no views from the Bayfront Area to the Santa Cruz Mountain Range and foothills to the south or of San Francsiquito Creek to the west. The ConnectMenlo EIR also found that the relatively flat topography combined with the existing level of development throughout the Bayfront Area generally limits the opportunity for views of scenic vistas and other long-range views from street-level public viewing areas. In addition, mature trees and vegetation provide visual separation and screening between existing buildings and along streets. Visual resources to the north, such as the Bay, the hilly open space at Bedwell Bayfront Park (Bayfront Park), the salt marshes, Don Edwards San Francisco Bay National Wildlife Refuge, and Dumbarton Bridge, are generally not visible from the majority of vantage points in the vicinity of the Proposed Project; these resources are visible only from areas immediately adjacent to Bayfront Expressway. No scenic resources, such as rock outcroppings, cliffs, or knolls, are present in the Proposed Project's vicinity, although mature trees are present throughout the area.

The ConnectMenlo EIR identified seven distinct subareas within the Bayfront Area for the purpose of describing existing general characteristics and development patterns. The Project site is within the O'Brien Drive subarea. As explained in the ConnectMenlo EIR, the parcels and buildings fronting O'Brien Drive are relatively small compared with the rest of the commercial lots in the Bayfront Area, making it a unique subarea. Winding block patterns define O'Brien Drive and connect to Willow Road and University Avenue. Historically, this area has been developed with one-story tilt-up buildings, typified by utilitarian architecture and minimal windows/openings, with small parking areas located in the front setback and limited side and rear setbacks – smaller than similar types of development in other Bayfront subareas. However, recent development applications have proposed larger buildings up to the maximum Floor Area Ratio proposed under ConnectMenlo, with either structured parking or surface lots located towards the back of the properties. Newer buildings show more articulation and include mirrored or colored windows/openings on the ground and upper floors and typically range from two to three stories in height (City of Menlo Park 2016b). O'Brien Drive is generally lined with mature trees.

The Project site is also part of the Menlo Park Labs campus, which comprises a variety of life science and biotech companies. The entire campus provides approximately 1.4 million square feet of building space and includes landscaping, surface parking lots, onsite food services, and recreational facilities for tenants (Tarlton Properties 2021). The recently approved development at 1350 Adams Court is under construction and will add another 260,000 square feet of building space to the campus.

Existing industrial and office uses within this campus surround the Project site to the south and east. Some of the existing industrial buildings are leased for non-industrial uses, such as a church located directly west of the Project site. There are additional industrial and office buildings located north of Mid-Peninsula High School, however the City recently approved the Willow Village development for that location, which will redevelop the area with a mixed-use community to include residential, office, and industrial uses. Existing residential development is located west of the site, across Willow Road, as well as further south and east of the Project site (beyond intervening industrial/office uses). The San Francisco Bay is located approximately 0.5 mile north and 1.25 miles east of the Project site.

Scenic Highways, Corridors and Vistas

The California Department of Transportation has designated the segment of Interstate 280 (I-280) that runs from the Santa Clara County line to the San Bruno city limit as a scenic highway. This State-designated scenic highway runs approximately 1 mile along the southern edge of the city (City of Menlo Park 2016b). I-280 is located approximately 5.2 miles southwest of the Project site.

Scenic Corridors and vistas are viewed as a single entity that encompasses the total field of vision from a specific point, or series of points, along a linear transportation route. Public view corridors are areas where short-range, medium-range, and long-range views are available from publicly accessible viewpoints, such as city streets. As noted above, the relatively flat topography combined with the existing level of development and associated landscaping throughout the Bayfront Area generally limits the opportunity for scenic vistas and public view corridors in the short-range and medium-range. However, the majority of the city, particularly the Bayfront Area, is afforded views of the Santa Cruz Mountains. Scenic resources also include the Bay itself and its natural features, including the salt ponds and Bayfront Park, as viewed from the eastern and northern portions of the city. Per the ConnectMenlo EIR, the city has no designated scenic corridors or scenic vistas; however, the ConnectMenlo EIR considers views to the Santa Cruz Mountains, the Bay, and the foothills and San Francisquito Creek within the city as scenic vistas (City of Menlo Park 2016b).

Because of the relatively flat topography of the Project site and vicinity, as well as the prevalence of buildings and vegetation, views from at-grade locations are largely restricted. Views at the Project site consist mainly of onsite surface parking lots and buildings, perimeter landscaping, and immediately adjacent buildings and power lines. Views of the salt ponds, marshes, the Don Edwards San Francisco Bay National Wildlife Refuge, the Bay, and the Santa Cruz Mountains are obstructed from pedestrian-level viewpoints. The Project site is visible from Willow Road and O'Brien Drive.

Light and Glare

Light pollution refers to all forms of unwanted light in the night sky, including glare, light trespass or spill on adjacent sensitive receptors, sky glow, and over-lighting. Views of the night sky are an important part of the natural environment. Excessive light and glare can be visually disruptive to humans and nocturnal animal species. Although there is considerable development in the city, commercial development is concentrated in the downtown area and at intersections along major arterials; industrial uses are concentrated in the Bayfront Area (including the Project site). Light pollution in most of the city is minimal and restricted primarily to areas with lighting along major streets and freeways or areas with nighttime illumination within commercial and industrial buildings.

Light sources at the Project site include the fixtures on the buildings and positioned around the paved parking areas. Although there are three buildings at the Project site, the surrounding area is not brightly illuminated at night because of the limited number of windows and entrances. In addition, cobra-style street lighting is provided along O'Brien Drive and Willow Road. Although the buildings have glass doors and windows, the area of reflective surface is minimal because of the architectural style. Furthermore, vegetation blocks the reflective surfaces in many exterior areas.

General Plan Goals and Policies

The City of Menlo Park General Plan (General Plan) (specifically the Land Use Element and the Open Space/Conservation Element) contains general goals, policies, and programs that require local planning and

development decisions to consider impacts on aesthetics. The following General Plan goals and policies would serve to reduce impacts on the visual quality and character in the Bayfront Area: Goal LU-1, Policy LU-1.1, Goal LU-4, Policy LU-4.3, Policy LU-4.5, Goal LU-6, Policy LU-6.2, Policy LU-6.8, Goal OSC-1, Policy OSC-1.11, OSC-1.13, and OSC-1.15.

Environmental Checklist and Discussion

a) Would the project have a substantial adverse effect on a scenic vista?

Analysis in the ConnectMenlo EIR

This checklist item was analyzed in the ConnectMenlo EIR as Impact AES-1 and was determined to be less than significant because no publicly accessible views of scenic resources would be blocked or obstructed by increasing height limits in the Bayfront Area. Similar views would continue to be visible between buildings and over lower-intensity areas. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

The physical conditions, as they relate to scenic vistas, have not changed in the Project vicinity since preparation of the ConnectMenlo EIR. The Proposed Project would demolish three existing buildings, construct two new 4 and 5 story R&D buildings and a 7-story parking garage, and install 59,344 square feet of open space of which approximately 31,535 square feet would be accessible to the public. The open space would include landscaping, pedestrian paths, seating and gathering areas, and a sports court. Because of the relatively flat topography of the Project site and vicinity, as well as the presence of existing buildings and vegetation, views from locations at grade are largely restricted. Further, there are no long- or short-distance scenic views visible towards or from the Project site. Although the Project would include construction of new two buildings and a parking structure that would be taller than existing buildings at the site, there are no scenic vistas in the vicinity that the new site elements could interrupt.

Conclusion

The Proposed Project is consistent with the General Plan as amended by the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. Thus, there would be no new site-specific effects as a result of the Project. **No impact** would occur, and no further study is required.

b) Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

Analysis in the ConnectMenlo EIR

This checklist item was analyzed in the ConnectMenlo EIR as Impact AES-2. The EIR determined that impacts would be less than significant because none of the potential new development resulting from buildout of the ConnectMenlo General Plan would be within the I-280 viewshed. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

The physical conditions related to scenic resources adjacent to a scenic highway have not changed in the ConnectMenlo study area since preparation of the ConnectMenlo EIR. The Project site is not adjacent to, or visible from, a state scenic highway, including I-280. No additional highways have been designated as a scenic highway since preparation of the ConnectMenlo EIR.

Conclusion

The Proposed Project is consistent with the General Plan as amended by the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. Thus, there would be no new specific effects as a result of the Project. **No impact** would occur, and no further study is required.

c) In non-urbanized areas, would the Project substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the Project is in an urbanized area, would the Project conflict with applicable zoning and other regulations governing scenic quality?

Analysis in the ConnectMenlo EIR

This checklist item was analyzed in the ConnectMenlo EIR as Impact AES-3. The EIR concluded that the impacts would be less than significant. Although the General Plan changes adopted under ConnectMenlo permit more intense development with taller and larger buildings to occur in the Bayfront Area, the ConnectMenlo EIR found that future development would not result in a substantial change to the existing visual character of the Bayfront Area or its surroundings. No mitigation measures were required. It is noted that this checklist item has been revised since preparation of the ConnectMenlo EIR. For projects in urbanized areas, such as the City of Menlo Park, the impact analysis is now focused on consistency with zoning and other regulations related to scenic quality rather than the potential to degrade visual character and quality (City of Menlo Park 2016b).

Project-Specific Discussion

Construction

As described above, the Project site is not considered visually sensitive because of its urbanized and industrial surroundings with industrial and office buildings. Project construction would include demolition, grading, and construction activities on the Project site. These construction activities would occur in two phases, with the first phase requiring approximately 21 months and the second phase requiring approximately 15 months. The Project would remove ten existing trees from the Project site and adjacent parcel in Phase 1 and remove an additional three onsite trees in Phase 2, preserving one onsite heritage tree. Approximately 100 new trees would be planted within the site as part of Phase 1 and an additional 45 new trees would be planted onsite as part of Phase 2.

The construction activities would temporarily degrade the existing visual character of the Project site and the surrounding area but would not be inconsistent with the urbanized nature and extent of redevelopment planned for the Bayfront Area. Construction materials and equipment would be staged entirely onsite.

During construction of Phase 2, much of the material storage would occur within the upper levels of the parking structure. Construction fencing would provide visual screening of the Project site from sensitive users and passersby. Although construction would be visible from public view corridors (e.g., Willow Road and O'Brien Drive), construction activities would be temporary.

Operation

After construction, the proposed 4 and 5 story R&D buildings would be primarily used for and designed to accommodate life science tenants. The buildings would be clad with neutral-colored glass-fiber-reinforced concrete, reinforced metal, as well as tinted blue and clear (bird-safe) glass windows. Ceramic glass patterns would be applied to the building windows to reduce window glare, block sun/heat into the building, and reduce the potential for bird-strike occurrences. Rooftop heating, ventilation, and air-conditioning (HVAC) and other equipment would be housed within metal roof screens. The above-ground garage would be constructed from pre-cast concrete. Landscaping and open space would be incorporated throughout the site. Additional site amenities would include pedestrian pathways, seating and gathering spaces, bike racks, and main entry plazas to each of new R&D buildings.

Operation of the Project would result in visual changes to the existing Project site resulting from new site buildings, the parking garage, and landscaping/open space. The Project would be subject to the City's architectural control process, in accordance with Section 16.68.020 of the zoning ordinance. Through review of the Project's site and building plans, City staff would ensure that the Project design complies with applicable design standards established in the zoning ordinance and other City regulations governing scenic quality. Specifically, the Proposed Project would be subject to the zoning ordinance development regulations established in Section 16.44.050, design standards established in Section 16.44.120, and the Heritage Tree ordinance in Municipal Code Chapter 13.24. The development regulations address setbacks, building height, and onsite open space while the design standards address the site improvements relationship to the street (frontage uses and landscaping), building mass and scale, ground floor exterior (building façade considerations to enhance pedestrian experience and ensure visual continuity along the street), open space, building design (such as materials and colors, screening of equipment and trash/storage areas, and rooflines), and parking and access. At the time of preparation of this Initial Study, the Proposed Project application and site plans reflect consideration of these development regulations and design standards. City staff and reviewing bodies will ensure that compliance with the City's regulations related to scenic quality is attained as the Project design is refined throughout the planning and review process.

Conclusion

As noted previously, the ConnectMenlo EIR analysis of scenic quality focused on the degree to which projects could affect the visual character of the Project area, but revisions to the CEQA Guidelines made since preparation of the ConnectMenlo EIR now require the analysis of projects in an urbanized area to consider consistency with regulations governing scenic quality. The Proposed Project is consistent with the land use designations established under ConnectMenlo and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Project would be subject to the City's architectural control process and would be required to comply with applicable development regulations and design standards, as established in the zoning ordinance. In addition, General Plan goals and policies, as listed above, would serve to minimize potential adverse impacts on aesthetic resources. Therefore, there would be no new

specific effects as a result of the Project and the Project would have **no impact** due to conflicts with zoning and other regulations governing scenic quality. No further study is required.

d) Would the Project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

Analysis in the ConnectMenlo EIR

This checklist item was analyzed in the ConnectMenlo EIR as Impact AES-4 and the impact was determined to be less than significant because new development would be required to comply with general best management practices and General Plan policies. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

Existing exterior lighting at the Project site and areas surrounding the Project site is limited to building and parking lot accessibility and security lighting as well as street lighting along Willow Road. There is ambient nighttime lighting associated with the existing office, industrial, residential, and public uses in the vicinity, which affects views of the nighttime sky. As described in Section 2, Project Description, Project lighting would be incorporated for building and site security and accessibility. Exterior building and parking structure lights would be angled downward to prevent light pollution onto sensitive receptors, while security lighting throughout the site may consist of lighted pathways and gathering areas. New lighting associated with the parking garage would include interior illumination. No exterior mounted lighting would be installed. All new lighting associated with buildout of the Project would be required to comply with the City's Lighting Design Standards (Municipal Code Section 16.44.120), which outlines requirements related to lighting design, placement, safety, and energy efficiency. Ceramic glass patterns would be applied to the building windows, which would reduce the potential for the Project to create glare.

Conclusion

The physical conditions, as they relate to light and glare, have not changed in the Project vicinity since preparation of the ConnectMenlo EIR. The Proposed Project is consistent with the General Plan as amended by the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. Therefore, there would be no new specific effects as a result of the Project. When compared to existing conditions at the Project site, the Project would result in increased light and glare, which would adversely affect daytime and nighttime views. However, the Project would be subject to the City's architectural control process, in accordance with Section 16.68.020 of the zoning ordinance, and the City's development regulations and design standards. Through the architectural control process, the City would ensure that new light sources included in the Project would be consistent with the City's regulations that limit the potential for adverse light and glare effects. Thus, the Project's impact would remain **less than significant,** consistent with the findings of the ConnectMenlo EIR**.** No further study is required.

3.2 Agriculture and Forestry Resources

	Further Evaluation Needed in EIR	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☐	☒
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☐	☒
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☐	☒

Environmental Setting

The Project site does not contain Farmland, nor is it adjacent to any Farmland. The Project site is considered Urban and Built-Up Land (i.e., land that is occupied by structures with a building density of at least one unit to 1.5 acres) (DOC 2022). It is not used for agricultural production, nor does it support forestry resources. In addition, the Project site is not currently protected under the Williamson Act or zoned for agricultural uses (San Mateo County 2016). The Project site is zoned LS-B, which does not allow for agricultural uses.

There are currently 34 trees within or immediately adjacent to the Project site (Arbor Resources 2022). However, these are not considered to be forestry resources, per the definitions of Public Resources Code Section 12220(g); the site does not contain timberland as defined by Public Resources Code Section 4526; and the Project site is not zoned for Timberland Production. According to the Open Space/Conservation Element of the City General Plan,

Menlo Park includes several natural community types, including oak woodlands. However, per the Existing Vegetation map in the City General Plan, the Project site is in an urban area (City of Menlo Park 2016a).

General Plan Goals and Policies

No City General Plan goals or policies are applicable to evaluation of the Proposed Project's effects related to agriculture and forestry resources.

Environmental Checklist and Discussion

a) Would the Project convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?

Analysis in the ConnectMenlo EIR

This checklist item was analyzed in the ConnectMenlo EIR in the Impacts Found Not to be Significant discussion (Section 6); it was determined that the ConnectMenlo project would result in no impact to forest land or agriculture. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

The Proposed Project would demolish three existing office, R&D and warehouse buildings, construct two new four- and five-story R&D buildings and seven-story parking garage, and install 59,000 square feet of open space and landscaping. According to the 2010 Farmland Mapping and Monitoring Program from the State Department of Conservation, the Project site is located in an area that is designated as Urban and Built-Up Land, which is not considered Farmland (DOC 2022).

Conclusion

The physical conditions on and in the vicinity of the Project site related to agriculture have not changed since preparation of the ConnectMenlo EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. Development of the Proposed Project would not convert agricultural land to non-agricultural uses, would not result in the conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to a non-agricultural use. Therefore, there would be no new specific effects as a result of the Project. **No impact** would occur, and no further study is required.

b) Would the Project conflict with existing zoning for agricultural use, or a Williamson Act contract?

Analysis in the ConnectMenlo EIR

This checklist item was analyzed in the ConnectMenlo EIR in the Impacts Found Not to be Significant discussion; it was determined that there would be no impact to forest land or agriculture. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

The Project site is not zoned for agricultural use or under a Williamson Act contract (San Mateo County 2016). The Project site is designated under the General Plan as Life Sciences (LS) and is zoned LS-B. As described above, the Project would demolish two existing office buildings, construct two new 4 and 5 story R&D buildings and a 7-story parking garage, and install 59,000 square feet of open space and landscaping. There are no agricultural lands classified as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance within the City of Menlo Park (DOC 2022), and there are no lands under Williamson Act contract within the City (San Mateo County 2016).

Conclusion

The physical conditions related to agricultural zoning and Williamson Act contracts have not changed in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Project site is not zoned for agricultural uses and is not subject to a Williamson Act contract, therefore the Project would have **no impact**. No further study is required.

c) Would the Project conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?

Analysis in the ConnectMenlo EIR

This checklist item was analyzed in the ConnectMenlo EIR in the Impacts Found Not to be Significant discussion; it was determined that there would be no impact to forest land or agriculture. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

The Project site is not used to grow trees for commercial lumber or other forest products; therefore, the Project site is not considered timberland. There are 11 trees within landscape pockets on the Project site, and an additional 22 trees are located on adjacent parcels that support existing office and industrial uses (Appendix A2). Thus, the Project site is not considered forest land. The Project site also is not zoned for Timberland Production and there is no forest land, timberland, or lands zoned for Timberland Production within the Project vicinity. As such, the Project would not conflict with existing zoning for forest land or timberland or cause rezoning of any such land.

Conclusion

The physical conditions related to forest land, timberland and zoning for Timberland Production have not changed in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Project site and surrounding areas do not support forest land or

timberland and are not zoned for Timberland Production; therefore, the Project would have **no impact**. No further study is required.

d) Would the Project result in the loss of forest land or conversion of forest land to non-forest use?

Analysis in the ConnectMenlo EIR

This checklist item was analyzed in the ConnectMenlo EIR in the Impacts Found Not to be Significant discussion; it was determined that there would be no impact to forest land or agriculture. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

As discussed in response (c), above, there is no forest land within or near the Project site. The Project site and adjacent parcels support 33 trees (Appendix A2). However, these trees are part of the urban landscaping and do not constitute forest land.

Conclusion

The physical conditions related to forest land have not changed in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Project site and surrounding areas do not support forest land; therefore, the Project would have **no impact**. No further study is required.

e) Would the Project involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?

Analysis in the ConnectMenlo EIR

This checklist item was analyzed in the ConnectMenlo EIR in the Impacts Found Not to be Significant discussion; it was determined that there would be no impact to forest land or agriculture. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

As discussed in responses (a), (b), and (c), above, there is no farmland, agricultural uses, or forest land within or near the Project site. Further, the Project site is located within an existing urban environment and the Proposed Project would not require extension of infrastructure into an undeveloped area, development of urban uses on a previously undeveloped greenfield site, or other physical changes that would result in the conversion of farmland to non-agricultural uses or forest land to non-forest uses.

Conclusion

The physical conditions related to farmland, agricultural uses, and forest land have not changed in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR

would occur. The Proposed Project would not adversely affect agricultural or forestry resources; therefore, the Project would have **no impact**. No further study is required.

3.3 Air Quality

	Further Evaluation Needed in EIR	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
III. AIR QUALITY – Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations. Would the project:					
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☐	☒	☐
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?	☒	☐	☐	☐	☐
c) Expose sensitive receptors to substantial pollutant concentrations?	☒	☐	☐	☐	☐
d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☐	☐	☐	☒	☐

Environmental Setting

As discussed in more detail, below, two of these checklist items are evaluated in this Initial Study and impacts are determined to be less than significant, while the other two checklist items will be analyzed in the focused EIR for this Project. The focused EIR will include a description of the existing air quality setting for the Project area.

General Plan Goals and Policies

General Plan goals and policies related to evaluation of the Project's potential air quality impacts will be outlined and discussed in the focused EIR.

Environmental Checklist and Discussion

a) Would the Project conflict with or obstruct implementation of the applicable air quality plan;

Analysis in the ConnectMenlo EIR

This checklist item was analyzed in the ConnectMenlo EIR as Impact AQ-1 and the impact was determined to be less than significant. No mitigation measures were required. The EIR found that with implementation

of the policies identified in ConnectMenlo, ongoing development under the General Plan would not hinder implementation of the Bay Area Air Quality Management District's (BAAQMD's) Clean Air Plan. These policies include requirements for projects to develop a Transportation Demand Management (TDM) program to reduce the number of vehicle trips associated with the Project, which would also reduce the per capita vehicle miles traveled (VMT) citywide, comply with the City's Green Building requirements, comply with zoning requirements for provision of electric vehicle charging stations and infrastructure, comply with onsite renewable and clean energy requirements, and develop a Zero Waste Management Plan (City of Menlo Park 2016b).

Project-Specific Discussion

The air quality plan applicable to the Project site is the *Spare the Air: Cool The Climate - Final 2017 Clean Air Plan* (BAAQMD 2017a). The *2017 Clean Air Plan* contains 85 control measures aimed at reducing air pollution in the Bay Area. Projects that incorporate all feasible and applicable air quality plan control measures are considered consistent with the Clean Air Plan. The control strategies of the *2017 Clean Air Plan* include measures in the categories of stationary sources, the transportation sector, the buildings sector, the energy sector, the agriculture sector, natural and working lands, the waste sector, the water sector, and super-GHG measures.

The Project would be consistent with the type and intensity of development established for the Project site under ConnectMenlo. Specifically, the Project site is designated LS and the Project would demolish the existing buildings at the site and construct two new four- and five-story R&D buildings. Because the Project is consistent with the land use designation for the site, it is expected that the amount of new employment that the Project would generate and associated induced residential population would be consistent with the employment and population projections assumed in the ConnectMenlo EIR.

The Project would be required to adhere to relevant ConnectMenlo policies, including developing a TDM program that would be expected to reduce vehicle trips and VMT and the resulting emissions, complying with the City's Green Building requirements, providing EV charging stations and infrastructure, providing onsite renewable energy generation, and developing a Zero-Waste Management Plan. As discussed in Section 3.6, Energy, the Project would include a variety of features that are expected to reduce the number of vehicles traveling to and from the site during operation. When viewed on a regional scale, the Project is an urban infill project located within a large population center that serves an existing demand for R&D uses and would replace existing uses on the property. Section 3.6 also notes that the energy use per square foot of building space at the Project site would decrease in comparison with the existing buildings because of the energy-efficient design of the proposed buildings and the sustainability features, as identified in Section 2, Project Description.

Conclusion

Because the Project would be consistent with the land use designation for the site established under ConnectMenlo, would comply with City policies and ordinances related to air quality, energy efficiency, and transportation and with all applicable BAAQMD air quality rules, and would meet or exceed state and federal standards and/or local building codes, the Project would not conflict with any applicable control measures from the *2017 Clean Air Plan.* Thus, the Proposed Project is consistent with the General Plan as amended by ConnectMenlo and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur.

Thus, there would be no new site-specific effects as a result of the Project. The impact would remain **less than significant**, and no further study is required.

b-c) ***Would the Project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard; or expose sensitive receptors to substantial pollutant concentrations?***

Analysis in the ConnectMenlo EIR

These checklist items were analyzed in the ConnectMenlo EIR as Impacts AQ-2 and AQ-3. Impacts related to criteria air pollutants and exposure to pollutant concentrations were determined to result in significant and unavoidable impacts and ConnectMenlo EIR Mitigation Measures AQ-2a, AQ-2b, and AQ-2b2 were required (City of Menlo Park 2016b).

Project-Specific Discussion

Although the physical conditions related to air quality have not changed substantially in the ConnectMenlo EIR study area since preparation of the ConnectMenlo EIR, the ConnectMenlo EIR requires that additional technical analysis be performed. This analysis could identify impacts that were not previously disclosed. This required technical analysis will be included in the focused EIR to evaluate the Project's potential air quality impacts associated with air pollutant emissions and potential health risks for sensitive receptors. The focused EIR will demonstrate compliance with ConnectMenlo Mitigation Measures AQ-2a (preparation of a technical assessment evaluating potential operational impacts), AQ-2b1 (compliance with BAAQMD's basic control measures for reducing construction-related emissions), and AQ-2b2 (preparation of a technical assessment evaluating construction-related impacts). The focused EIR will also identify additional mitigation measures if necessary to reduce significant impacts.

Conclusion

These checklist items require **further environmental review** and will be addressed in the focused EIR. As noted in Chapter 1, Introduction, the terms of the 2017 *City of East Palo Alto v. City of Menlo Park* Settlement Agreement requires that a project-level EIR be prepared to evaluate potential effects related to population and housing and transportation, regardless of whether this Proposed Project is within the scope of the ConnectMenlo EIR. The analysis of the Project's potential air quality impacts associated with air pollutant emissions and potential health risks for sensitive receptors requires detailed modeling based in part on the Project's Transportation Impact Analysis. Thus, the required additional technical analysis of these two air quality checklist items will also be presented in the focused EIR.

d) ***Would the project result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?***

Analysis in the ConnectMenlo EIR

This checklist item was analyzed in the ConnectMenlo EIR as Impact AQ-4 and it was determined that implementation of the ConnectMenlo General Plan Update would have no impact related to other emissions, such as odors. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

The occurrence and severity of potential odor impacts depends on numerous factors. The nature, frequency, and intensity of the source; the wind speeds and direction; and the sensitivity of receiving location each contribute to the intensity of the impact. Although offensive odors seldom cause physical harm, they can be annoying and cause distress among the public and generate citizen complaints.

Odors would be potentially generated from vehicles and equipment exhaust emissions during construction of the Project. Potential odors produced during construction would be attributable to concentrations of unburned hydrocarbons from tailpipes of construction equipment, architectural coatings, and asphalt pavement application. Such odors would disperse rapidly from the Project site and generally occur at magnitudes and durations that would not affect substantial numbers of people. Therefore, impacts associated with odors during construction would be less than significant.

Common sources of odors include manufacturing plants, rendering plants, coffee roasters, wastewater treatment plants, sanitary landfills, and solid waste transfer stations (BAAQMD 2017b). The Project would not result in the creation of a land use that is commonly associated with odors.

Conclusion

The Proposed Project is consistent with the General Plan as amended by the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant odor effects than those originally analyzed in the ConnectMenlo EIR would occur. Thus, there would be no new site-specific effects as a result of the Project. The Project could generate some odors during construction, but these would not affect substantial numbers of people. This impact would remain **less than significant**, and no further study is required.

3.4 Biological Resources

	Further Evaluation Needed in EIR	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
IV. BIOLOGICAL RESOURCES – Would the project:					
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☐	☒	☐	☐

	Further Evaluation Needed in EIR	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☐	☐	☐	☒
c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☐	☒
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☒	☐	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒	☐
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☐	☒

Environmental Setting

A Biological Resources Assessment (BRA) for 985–1005 O'Brien Drive was prepared by H.T. Harvey & Associates and is included as Appendix A1. Preparation of the BRA included background review and field survey to assess the potential for the Project site to support sensitive biological resources, consistent with the requirements of ConnectMenlo Mitigation Measure BIO-1. Specifically, the Project site and adjacent areas were assessed to identify sensitive habitats and habitat for special-status species that could be impacted either directly or indirectly by construction and operation of the Project, including the potential for adjacent areas to support populations of sensitive species that could then disperse onto the Project site. In addition, a Tree Survey Report was prepared by Arbor Resources to inventory and evaluate the existing trees within the Project site. This report is included as Appendix A2.

Topography and Soils

The Project site is located in an urbanized area that primarily supports dense commercial and industrial development. The Project site is relatively flat, with elevations ranging between 11 and 13 feet above mean sea level. The Natural Resources Conservation Service has mapped two soil units on the Project site: urban land-

orthents reclaimed complex, 0–2% slopes, and urban land. The orthents soils are typically very shallow; they are young soils that lack horizon development due to either steep slopes or parent materials that lack weatherable minerals The urban land soil unit is associated with areas that lack native soils and where more than 85 percent of the surface is covered by asphalt, concrete, buildings, and other structures. The soil types at the Project site are not native or hydric, resulting in a high runoff rate (Appendix A1).

Land Cover

The entire Project site has been modified for human use and does not support any natural plant communities. The 4.22-acre Project site consists of three contiguous parcels containing three existing buildings and associated parking and walkways. The site is composed almost entirely of impervious surfaces. There are 11 street trees along the Project site frontages on Willow Road and O'Brien Drive. Tree species present at the site include Chinese pistache, Columbia London plane, forest pansy redbud, Italian stone pine, marina madrone, Modesto ash, Monterey pine, and silver dollar gum (Appendix A2).

Wildlife Corridors

A wildlife corridor is defined as "any space, usually linear in shape, that improves the ability of organisms to move among patches of wildlife habitat that join two or more larger areas of wildlife habitat." Although corridors can be viewed over broad spatial scales, most wildlife corridors analyzed within the context of land use planning, including those in this Initial Study, are moderate in scale and used to facilitate local and regional wildlife movement among habitat patches and through human dominated landscapes.

The Project site is not within or adjacent to any wildlife corridors or movement of any native resident or migratory fish or wildlife species (Appendix A1). As described in the ConnectMenlo EIR, most urbanized portions of Menlo Park preclude the dispersal and movement by terrestrial wildlife, with the exception of unchannelized creeks (e.g., San Francisquito Creek), unobstructed ridgelines, and the shoreline of San Francisco Bay. None of these features occur on or adjacent to the Project site.

Migratory Birds and Bird Nests

In California, all native active bird nests (with eggs or young) are protected by provisions in the federal Migratory Bird Treaty Act of 1918 and Sections 3503 and 3503.5 of the California Fish and Game Code. The existing buildings and structures on site, and ornamental trees within and adjacent to the Project site, provide suitable nesting habitat for several native local and migratory bird species. Several native bird species have the potential to nest on the site (Appendix A1).

General Plan Goals and Policies

The City General Plan—specifically, the Land Use Element, Open Space/Conservation Element, Noise Element, and Safety Element—contains goals, policies, and programs that require local planning and development decisions to consider impacts on biological resources. The following City General Plan goals, policies, and programs would minimize potential adverse impacts on biological resources: Goal LU-4, Policy LU-4.5; Goal LU-6, Policy LU-6.8, Policy LU-6.11, and Program LU-6.D; and Goal OSC-1, Policy OSC-1.1, Policy OSC-1.3, Policy OSC-1.4, Policy OSC-1.5, Policy OSC-1.11, Policy OSC-1.12, Policy OSC-1.13, and Policy OSC-1.15.

Environmental Checklist and Discussion

a) Would the Project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

Analysis in the ConnectMenlo EIR

This checklist item was analyzed in the ConnectMenlo EIR as Impact BIO-1 and was determined to be a potentially significant impact due to possible conflicts with special status species at individual Project sites. ConnectMenlo EIR Mitigation Measure BIO-1 requires project applicants to prepare and submit a project-specific assessment of biological resources and identify additional measures as necessary to reduce or avoid significant impacts (City of Menlo Park 2016b).

Project-Specific Discussion

A substantial adverse effect would occur if construction and/or operation of the Project would lead to the destruction of or cause harm to special status species listed under local or regional plans, policies or regulations, or by the California Department of Fish and Wildlife or the U.S. Fish and Wildlife Service.

Special-Status Species

The BRA prepared for the Project determined that there is no potential for the Project site to support special-status plant species and that special-status wildlife species are not expected to nest, roost, breed, or forage on or immediately adjacent to the Project site. Further, regional conservation plans do not indicate the presence of special-status wildlife on the Project site. Thus special-status plants and wildlife are not expected to be affected by the Proposed Project (Appendix A1).

Nesting and Migratory Birds

The BRA prepared for the Project identifies that the Project site and adjacent areas have habitat that is "of low quality for most native birds found in the region due to the scarcity of vegetation, the lack of any native vegetation, the absence of well-layered vegetation (e.g., with ground cover, shrub, and canopy tree layers in the same areas), the small size of the vegetated habitat patches, and the amount of human disturbance by vehicular traffic and occupants of buildings." The BRA concluded that the Project site and adjacent areas have the potential to support nesting native birds and raptors, which are protected under the Migratory Bird Treaty Act and California Fish and Wildlife Code, but that "no bird species are expected to occur on the site in large numbers, and all of the species expected to occur regularly are regionally abundant species. No special-status birds (i.e., species of conservation concern) are expected to nest or occur regularly on the site" (Appendix A1).

The BRA notes that the more natural lands north of the Bayfront Area, such as the managed ponds in the Don Edwards National Wildlife Refuge and the tidal marsh of Ravenswood Open Space Preserve support much higher bird diversity and abundance because they provide foraging and breeding habitat for a wide variety of waterbirds. However, because these birds are closely tied to aquatic habitats, which are not present in the Project vicinity, "these waterbirds are not expected to use the project site, or to move south of Bayfront Expressway toward the project site" (Appendix A1).

Given the potential for nesting birds to occur on the Project site that could be destroyed or disturbed during Project construction, the Project would have a **potentially significant** impact to special status species. Implementation of Mitigation Measure BIO-A would ensure that the Project complies with the Migratory Bird Treaty Act, California Fish and Wildlife Code, and ConnectMenlo EIR Mitigation Measure BIO-1 by avoiding impacts to nesting birds. Thus, implementation of Mitigation Measure BIO-A would reduce this impact to a less-than-significant level.

Mitigation Measure BIO-A: Construction Timing and Pre-construction Survey for Nesting Birds. To the extent feasible, demolition and the initiation of construction activities should be scheduled to avoid the nesting season (generally February 1 to August 31). If demolition and construction activities are scheduled to take place outside the nesting season, all impacts to nesting birds protected under the Migratory Bird Treaty Act and California Fish and Game Code would be avoided.

If it is not possible to schedule demolition and initiation of construction activities between September 1 and January 31, a pre-construction nesting bird survey shall be conducted by a qualified biologist no more than 7 days prior to initiation of demolition or construction activities, including tree removal and pruning. The biologist shall inspect all trees and other potential nesting habitats (e.g., trees, shrubs, and buildings) in and adjacent to the Project site for nests. Adjacent areas to be surveyed include areas within 300 feet of Project activities for raptors and 100 feet for non-raptors. If an active nest is found sufficiently close to work areas to be disturbed by these activities, the biologist shall determine a suitable avoidance buffer to be established around the nest (typically 300 feet for raptors and 100 feet for other species, but potentially lower depending on site-specific factors such as existing activity and screening of nests by existing vegetation or buildings), to ensure that no nests of species protected by the Migratory Bird Treaty Act and California Fish and Game Code are disturbed during Project implementation. The avoidance buffer shall be maintained until the chicks have fledged and the nests are no longer active as determined by the qualified biologist.

Conclusion

The physical conditions related to special status species have not changed in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Project site does not have the potential to support special status species other than nesting and migratory birds. Demolition and tree removal during Project construction could adversely affect nesting birds. This impact would be avoided with implementation of Mitigation Measure BIO-A; therefore, the Project would have a **less than significant impact with mitigation incorporated,** consistent with the findings of the ConnectMenlo EIR. No further study is required.

b) Would the project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?

Analysis in the ConnectMenlo EIR

This checklist item was analyzed in the ConnectMenlo EIR as Impact BIO-2 and was determined to be a potentially significant impact due to possible degradation in coastal salt marsh vegetation and riparian habitats. The ConnectMenlo EIR found that implementation of Mitigation Measure BIO-1 (i.e., preparation of a project-specific assessment of biological resources and identification of additional measures as necessary to reduce or avoid significant impacts) (City of Menlo Park 2016b).

Project-Specific Discussion

The BRA prepared for the Proposed Project found that the site and adjacent areas are heavily urbanized and developed and do not contain any riparian habitat or sensitive natural communities (Appendix A1). As stated in the ConnectMenlo EIR, sensitive natural communities within the City consist of areas of coastal salt marsh vegetation in the Baylands, native valley oaks in Saint's Patrick's Seminary, and possibly areas of riparian scrubs and woodland along San Francisquito Creek and other drainages. The Project site is not located within or in the immediate vicinity of one of these areas. The BRA concluded that the Project would not result in impacts to riparian habitat or other sensitive habitats such as jurisdictional wetlands or other waters of the U.S./State (Appendix A1).

Conclusion

The physical conditions related to riparian habitat and other sensitive natural communities have not changed in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Project site does not contain any sensitive natural communities and no such communities are located in the Project vicinity. Therefore, the Project would have **no impact** to sensitive natural communities and no new or more severe impacts would occur beyond those examined in the ConnectMenlo EIR. No further study is required.

c) Would the project have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

Analysis in the ConnectMenlo EIR

This checklist item was analyzed in the ConnectMenlo EIR as Impact BIO-3 and was determined to be a potentially significant impact because some locations within the ConnectMenlo project area contain or are proximate to sensitive habitats that once acted as wetlands. The ConnectMenlo EIR found that implementation of Mitigation Measure BIO-1, which requires preparation of a project-specific assessment of biological resources and implementation of avoidance measures, would reduce the impact to a less-than-significant level by ensuring that project-specific biological resources would be identified, and

additional measures would be incorporated to reduce or avoid significant impacts (City of Menlo Park 2016b).

Project-Specific Discussion

The Project site is currently developed with office, R&D and warehouse uses. No state or federally protected wetlands or non-wetland waters of the United States occur on or adjacent to the site (Appendix A1). Compliance with all applicable requirements associated with the protection of water quality in stormwater runoff (discussed in Sections 3.7, Geology and Soils, and 3.10, Hydrology and Water Quality) would further ensure that the Proposed Project does not result in indirect impacts to wetlands.

Conclusion

The physical conditions related to state and federally protected wetlands have not changed in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Project site does not contain any wetlands and there are no wetlands adjacent to the site. The Proposed Project would result in **no impact** related to wetlands. No new or more severe impacts would occur beyond those examined in the ConnectMenlo EIR. No further study is required.

d) Would the project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

Analysis in the ConnectMenlo EIR

This checklist item was analyzed in the ConnectMenlo EIR as Impact BIO-4 and the project was determined to have a potentially significant impact on corridors used by migratory bird species within undeveloped land. To reduce this potential harm, the ConnectMenlo EIR requires implementation of Mitigation Measure BIO-1, which would reduce the impact to less than significant by requiring a project-specific assessment of biological resources and additional measures to minimize or avoid significant impacts (City of Menlo Park 2016b).

Project-Specific Discussion

The Project site is currently developed with office, R&D and warehouse uses and does not contain any natural habitat. There are 11 street trees present along the Project site's frontages on Willow Road and O'Brien Drive. The Project site could support nesting and foraging by migratory birds but does not contain natural habitat that could support other wildlife movement or nursery sites. The BRA prepared for the Project found that the Project would not interfere with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors because it would not fragment any natural habitats or create any constraints on the movement capabilities of urban-adapted wildlife following construction.

Conclusion

The physical conditions related to wildlife migration and movement have not changed in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Proposed Project would implement bird-safe design measures to minimize potential impacts to migratory birds. Demolition and tree removal during Project construction could adversely affect nesting birds, which may include migratory birds. This impact would be avoided with implementation of Mitigation Measure BIO-A; therefore, the Project would have a **less than significant impact with mitigation incorporated,** consistent with the findings of the ConnectMenlo EIR. No further study is required.

e) Would the project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

Analysis in the ConnectMenlo EIR

This checklist was analyzed in the ConnectMenlo EIR as Impact BIO-5 and the impact was determined to be less than significant. While changes to the landscape would occur, all construction and projects would be required to adhere to the goals and policies outlined in the City of Menlo Park General Plan and the City Zoning Ordinance (City of Menlo Park 2016b).

Project-Specific Discussion

Heritage Tree Ordinance

There are a total of 11 existing trees on the Project site, 10 of those are considered heritage trees (Appendix A2), as defined by Menlo Park Municipal Code Chapter 13.24 and one non-heritage tree. Nine of the heritage trees and the one non-heritage tree on the site plus three non-heritage trees on adjacent property are proposed to be removed during Project construction.

The City's Tree Preservation Ordinance requires that a tree survey be conducted by an International Society of Arboriculture-certified arborist, and a tree report and map be prepared to show the locations of all pertinent trees prior to initiation of construction activities. Any work performed within an area 10 times the diameter of a tree that is not being removed (i.e., the tree protection zone) requires submittal of a tree protection plan prepared by a certified arborist for review and approval by the Community Development Director or their designee prior to issuance of any permit for grading or construction. Removal of heritage trees requires an appropriate permit from the Director of Public Works or their designee. City-owned trees (such as street trees) are required to be replaced at a 1:1 ratio while heritage trees are required to be replaced according to their appraised values when removal is related to development. The ordinance also requires that notice of heritage tree removal be posted by the applicant on the property containing the heritage tree and that notice be provided to property owners within 300 feet of the property containing the heritage tree prior to the City's approval of the proposed tree removal. The Tree Survey Report prepared for the Project is provided in Appendix A2.

As described in Section 2, Project Description, the Proposed Project would include the planting of 100 new trees during construction of Phase 1 and an additional 45 trees during construction of Phase 2. Therefore,

it is expected that the Project would not conflict with the City's Tree Preservation Ordinance. Verification that the proposed tree planting plan complies with the City's Tree Preservation Ordinance would be provided through review and approval of that plan by the Community Development Director or their designee prior to issuance of any permit for grading or construction. As shown in Figures 2-4 and 2-6, landscaping would generally consist of public open spaces (e.g., flex turf space, meandering pedestrian walkways/paths, and gathering/seating space) and would be provided throughout the site. Drought tolerant plantings and trees would be incorporated as part of site landscaping in compliance with Municipal Code Chapter 12.44, Water-Efficient Landscaping.

Bird Safe Design

The Project is located near the San Francisco Bay which provides high-quality avian habitat; additionally, there are a variety of birds that are adapted to the urbanized environment in the Bayfront Area. In the Project vicinity, natural habitats for birds are limited but landscape elements can provide foraging and nesting habitat for some bird species. Although birds may nest within landscaped areas, the BRA prepared for the Project found that "the number of individual birds that inhabit and regularly use the site at any given time is low under existing conditions" given the urbanized nature of the site, the limited extent of vegetation at the site, and the predominance of non-native vegetation (Appendix A1). However, there is a potential for occasional collisions involving urban-adapted passerine species to increase as a result of the Proposed Project compared to existing conditions, which is a ***potentially significant*** impact of the Proposed Project.

Through the development review and Architectural Control process, the City would ensure that the Proposed Project complies with the bird-safe building design requirements established in Municipal Code Section 16.44.130. The BRA prepared for the Project found that compliance with these bird-safe design requirements would reduce the number of bird collisions with the proposed buildings and would ensure that impacts resulting from bird collisions would be reduced to a less than significant level; (Appendix A1). As detailed in the following list, these requirements include use of façade, window, and lighting design that make buildings and building elements more visible to birds as physical barriers and eliminate conditions that create confusing reflections to birds. The bird-safe design measures that the Project must implement include:

- No more than 10 percent of a façade's surface area shall have non-bird-friendly glazing (bird-friendly glazing includes, but is not limited to, opaque glass, clear glass with patterns, paned glass with fenestration patterns, and external screens over non-reflective glass).
- Occupancy sensors or other switch control devices shall be installed on non-emergency lights and programmed to shut off during non-work hours and between 10:00 p.m. and sunrise.
- Placement of buildings shall avoid the potential funneling of flight paths toward a building façade.
- Glass skyways or walkways, freestanding glass walls, and transparent building corners shall not be allowed.
- Transparent glass shall not be allowed at the rooflines of buildings, including in conjunction with green roofs.
- Use of rodenticides shall not be allowed.

Additionally, new lighting introduced within the Project site would comply with the Menlo Park Municipal Code and would therefore limit any potential disorientation or attraction from nearby high-use avian habitat. (See response (d) under Section 3.1, Aesthetics.)

Conclusion

The physical conditions related to heritage trees and bird safe design have not changed in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Proposed Project would comply with the City's tree preservation ordinance by replacing heritage trees removed during construction activities at 1:1 ratio for street trees and the appraised value of heritage trees; the Project would also comply with the City's bird-safe design requirements. Therefore, the Project would have **no impact** due to conflicts with local policies and ordinances protecting biological resources and would not result in any new or more severe impacts beyond those examined in the ConnectMenlo EIR. No further study is required.

f) Would the project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

Analysis in the ConnectMenlo EIR

This checklist item was analyzed in the ConnectMenlo EIR as Impact BIO-6 and it was determined that there would be a potentially significant impact on sensitive natural communities, including those listed in the Stanford Habitat Conservation Plan (Stanford HCP). As noted in the ConnectMenlo EIR, portions of Menlo Park are within the Stanford Habitat Conservation Plan (HCP) (Stanford University 2013). However, the Stanford HCP only applies to land owned by Stanford University. Implementation of ConnectMenlo Mitigation Measure BIO-6, which requires implementation of ConnectMenlo Mitigation Measure BIO-1, would reduce impacts to less than significant (City of Menlo Park 2016b).

Project-Specific Discussion

The BRA prepared for the Project states that there are no regional conservation plans that apply to the Project site. As noted above the Stanford HCP only applies to land owned by Stanford University. The Project site is not owned by Stanford University and is not within their jurisdiction. The BRA also identifies that no species protected under the Marine Mammal Protection Act or the Magnuson-Stevens Fishery Conservation and Management Act are present or adjacent to the Project site and there are no areas subject to the jurisdiction of the San Francisco Bay Conservation and Development Commission present or directly adjacent to the Project site. Therefore, the Project site is not within a geographic area covered by an adopted HCP or natural community conservation plan and as a result, would not conflict with such plans (Appendix A1).

Conclusion

The physical conditions related to HCPs have not changed in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Project site is not located within the boundaries of any HCPs or other conservation plans and therefore, the Project would have **no impact** due to conflicts with any conservation plans. The Project would not result in any new or more severe impacts beyond those examined in the ConnectMenlo EIR and no further study is needed.

3.5 Cultural Resources

	Further Evaluation Needed in EIR	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
V. CULTURAL RESOURCES – Would the project:					
a) Cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?	☐	☐	☐	☐	☒
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	☐	☒	☐	☐
c) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	☒	☐	☐

Environmental Setting

Historic Resources

Section 4.4, Cultural Resources, of the ConnectMenlo EIR identifies eight designated historic resources within the ConnectMenlo study area. A Built Environment Inventory and Evaluation Report was prepared for the Project site by Dudek in October 2022. This report is included in this Initial Study as Appendix B. The report included an in-person field survey by a qualified architectural historian; building development and archival research; development of an appropriate historic context; and completion of a built environment study area to assess potential impacts to historic era buildings and structures. Three buildings that are more than 45 years old (historic era) were identified in the Project site and subject to formal evaluation under the National Register of Historic Places (NRHP) and the California Register of Historical Resources (CRHR). The findings of the report indicate that the properties located within the Project site are ineligible for listing in the NRHP and CRHR. Therefore, none of the properties located in the study area contain historical resources under CEQA (Appendix B).

Pre-Historic and Historic-Era Archaeological Resources

Archaeological resources may be considered to be either "unique archaeological resources" or "historical resources." CEQA Section 21083.2, defines a "unique archaeological resource" as an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it:

- Contains information needed to answer important scientific research questions, and there is a demonstrable public interest in that information;
- Has a special and particular quality, such as being the oldest of its type or the best available example of its type; and/or
- Is directly associated with a scientifically recognized important prehistoric or historic event or person.

As described in the ConnectMenlo EIR, the potential for archeological resource discovery exists during development and redevelopment of developed or highly disturbed sites within the Bayfront Area. Further, as described in Section

3.18, Tribal Cultural Resources, Native American remains were found in the ConnectMenlo study area at a construction site along Willow Road in Menlo Park as recently as 2012. Other recent development projects in the Bayfront Area, including those within the vicinity of the Project site, have identified the known presence of pre-historic and historic-era archaeological resources as well as the potential to encounter subsurface archaeological features and/or deposits through construction activities (City of Menlo Park 2023).

General Plan Goals and Policies

The City's General Plan, specifically the Land Use Element, Open Space/Conservation Element, Noise Element, and Safety Element, contains goals, policies, and programs that require local planning and development decisions to consider impacts on cultural resources. The following General Plan goals, policies, and programs would serve to minimize impacts on cultural resources: Goal LU-7, Policy LU-7.8, Policy OSC-3, Policy OSC-3.1, Policy OSC-3.2, Policy OSC-3.3, Policy OSC-3.4, Policy OSC-3.4, Policy OSC-3.5, and Policy OSC-3.6.

Environmental Checklist and Discussion

a) Would the project cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?

Analysis in the ConnectMenlo EIR

This topic was analyzed in the ConnectMenlo EIR as Impact CULT-1. It was determined that a project could have a significant impact on historic resources if it would lead to demolition of historic architectural resources or alteration of such resources where those alterations would have the potential to change the historic fabric or setting. Mitigation Measure CULT-1 requires an individual project that is proposed on or adjacent to a site with a building that is more than 50 years old to prepare a site-specific evaluation (City of Menlo Park 2016b).

Project-Specific Discussion

A Built Environment Inventory and Evaluation Report was prepared for the Project site, in compliance with ConnectMenlo EIR Mitigation Measure CULT-1. This report found that the properties that comprise the Project site are ineligible for listing in the NRHP and CRHR. Therefore, none of the properties located in the study area contain properties considered historical resources under CEQA (Appendix B) and the Project does not have the potential to affect any historical resources.

Conclusion

The physical conditions related to historic resources have not changed in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Project site does not contain any historic resources and would have **no impact** to such resources. Thus, no new or more severe impacts beyond those examined in the ConnectMenlo EIR would occur. No further study is required.

b) Would the project cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?

Analysis in the ConnectMenlo EIR

This topic was analyzed in the ConnectMenlo EIR as Impact CULT-2 and was determined to be less than significant with implementation of Mitigation Measures CULT-2a and CULT-2b. Mitigation Measure CULT-2a identifies protocols to be followed in the event that archeological resources are found during construction (City of Menlo Park 2016b). At the time that the ConnectMenlo EIR was certified, Mitigation Measure CULT-2b defined Native American notification requirements that applied only to projects that propose a General Plan Amendment and/or land use policy changes, which this Proposed Project does not include. However, under AB 52, the City is required to notify Native American tribes about each project subject to CEQA to provide the tribes with an opportunity to request consultation with the City. If consultation is requested, tribal representatives may identify resources of concern and provide recommendations for treatment and management of those resources to minimize or avoid significant impacts. The Housing Element Update Subsequent EIR replaced the ConnectMenlo EIR Mitigation Measures CULT-2a and CULT-2b with Mitigation Measures CR-2a and CR-2b (City of Menlo Park 2023a); however, the Subsequent EIR Mitigation Measure CR-2a only applies to multi-family housing development projects and thus only Subsequent EIR Mitigation Measure CR-2b is applicable to the Proposed Project.

Project-Specific Discussion

As noted in Section 3, Initial Study Checklist, the City notified Native American tribes that are traditionally and culturally affiliated with the Project area of this Proposed Project in November 2022. No responses to the City's notifications were received. Although there are no known cultural resources on the Project site, it is possible that cultural resources could be discovered during Project construction earthmoving activities. Compliance with existing federal, state, and local laws and regulations, including Housing Element Update Subsequent EIR Mitigation Measure CR-2b, as well as the General Plan goals and policies listed above, would protect any archaeological resource that may be discovered at the Project site by requiring archaeological assessment of discovered finds, cessation of work, appropriate notification to affiliated tribes, implementation of proper data recovery, and/or preservation procedures upon discovery of previously unknown resources.

Given the potential for archaeological resources to occur on the Project site that could be destroyed or disturbed during Project construction, the Project would have a **potentially significant** impact to archaeological resources. Implementation of Housing Element Update Subsequent EIR Mitigation Measure CR-2b, in addition to the Project specific Mitigation Measures CULT-A and CULT-B, provided below, would ensure that impacts to archaeological resources are avoided and/or reduced to a less-than-significant level. Mitigation Measures CULT-A and CULT-B are measures that the City has developed through consultation with Native American tribes regarding other development projects in the Bayfront Area and are applied to this Proposed Project to ensure protection of archaeological resources that may be encountered during construction.

Housing Element Update Subsequent EIR Mitigation Measure CR-2b: If pre-contact or historic-era archaeological resources are encountered during Project construction and implementation, the Project applicant shall halt all construction activities within 100 feet and notify the City. Pre-contact archaeological materials might include obsidian and chert

flaked-stone tools (e.g., projectile points, knives, scrapers) or toolmaking debris; culturally darkened soil ("midden") containing heat-affected rocks, artifacts, or shellfish remains; and stone milling equipment (e.g., mortars, pestles, handstones, or milling slabs): and battered stone tools, such as hammerstones and pitted stones. Historic-era materials might include stone, concrete, or adobe footings and walls; filled wells or privies; and deposits of metal, glass, and and/or ceramic refuse. An archaeologist meeting the U.S. Secretary of the Interior's (Standards (SOIS) for Archeology shall inspect the findings and work shall be stopped within 100 feet of the potential archaeological resources until the material is either determined by the archaeologist to not be an archaeological resources or appropriate treatment has been enacted, with appropriate consultation, as needed.

If the City determines that the resource qualifies as a historical resource or a unique archaeological resource (as defined pursuant to the CEQA Guidelines) and that the Project has potential to damage or destroy the resource, mitigation shall be implemented in accordance with PRC Section 21083.2 and CEQA Guidelines Section 15126.4, with a preference for preservation in place. If preservation in place is feasible, this may be accomplished through one of the following means: (1) siting improvements to completely avoid the archaeological resource; (2) incorporating the resource into a park or dedicated open space, by deeding the resource into a permanent conservation easement; (3) capping and covering the resource before building the Project on the resource site after the resource has been thoroughly studied by a SOIS qualified archaeologist and a report written on the findings.

If preservation in place is not feasible, the City shall consult with California Native American tribes identified by the Native American Heritage Commissions (NAHC) to be affiliated with Menlo Park for the purposes of tribal consultation under Chapter 905, California Statutes of 2004 (if the resource is pre-contact or indigenous) to determine treatment measures to avoid, minimize, or mitigate any potential impacts to the resource pursuant to PRC Section 21083.2, and CEQA Guidelines Section 15126.4. This shall include documentation of the resource and may include data recovery (according to PRC Section 21083.2), if deemed appropriate by the archaeologist, in consultation with the City, or other actions such as treating the resource with culturally appropriate dignity and protecting the cultural character and integrity of the resource (according to PRC Section 21084.3).

Mitigation Measure CULT-A Worker Environmental Training. Because of the potential for the discovery of unknown buried cultural, tribal cultural, archeological, and paleontological resources, prior to commencement of each phase, the general contractor and those engaged in ground-disturbing activities shall be given environmental training regarding cultural and paleontological resource protection, resource identification and protection, and the laws and penalties governing such protection. Specifications for archeological and tribal cultural resources sensitivity training for construction workers and superintendents shall meet the following standards:

- Occurs prior to the start of any ground-disturbing activity or site work on the Project Site or for off-site improvements.

- Training shall be required for all construction personnel participating in ground disturbing construction to alert them to the archaeological and tribal cultural sensitivity of the area and provide protocols to follow in the event of a discovery of archaeological materials or tribal cultural resources. Training shall be provided en masse to such personnel at the start of construction of the Project, and training shall be repeated when new personnel participating in ground-disturbing site work start work.
- Includes, for job site posting, a document ("ALERT SHEET") that summarizes the potential finds that could be exposed, the protocols to be followed, and the points of contact to alert in the event of a discovery that is presented as part of the training.
- Requires the contractor to ensure that all workers requiring training are in attendance.
- Requires training for all contractors and sub- contractors that is documented for each permit and/or phase of a permit that requires ground-disturbing activities onsite.

This training may be administered by the Project archaeologist and/or paleontologist as stand-alone training or included as part of the overall environmental awareness training required as a result of the Proposed Project. The training shall include, at minimum, the following:

- The types of cultural resources that are likely to be encountered,
- The procedures to be taken in the event of an inadvertent cultural resource discovery,
- The penalties for disturbing or destroying cultural resources,
- The types of fossils that could occur at the Project site,
- The types of lithologies in which the fossils could be preserved,
- The procedures that should be taken in the event of a fossil discovery; and
- The penalties for disturbing cultural, tribal cultural, archeologic, and palaeontologic resources.

Mitigation Measure CULT-B Perform Construction Monitoring, Evaluate Uncovered Archaeological Features, and Mitigate Potential Disturbance for Identified Significant Resources at the Project Site. Prior to demolition, excavation, grading, or other construction-related activities on the Project site, the Project sponsor shall hire a qualified professional archaeologist (i.e., one who meets the Secretary of the Interior's professional qualifications for archaeology or one under the supervision of such a professional) to monitor, to the extent determined necessary by the archaeologist, Project related earth-disturbing activities (e.g., grading, excavation, trenching). In the event that precontact or historic period subsurface archaeological features or deposits, including locally darkened soil (midden), that could conceal cultural deposits, animal bone, obsidian, and/or mortars are discovered during demolition or construction-related earthmoving activities, Housing Element Update Subsequent EIR Mitigation Measure CR-2b shall be followed. In addition, if the resource is a historic-era archaeological site or historic-era architectural feature and the archaeologist is not a historical archaeologist, the archaeologist shall notify the City Community Development Department and a historical archaeologist or architectural historian who meets the Secretary of the Interior's professional qualifications for archaeology and/or architectural history and that person shall follow the requirements of

Housing Element Update Subsequent EIR Mitigation Measure CR-2b. Impacts on significant resources would be mitigated to a less-than-significant level through preservation in place, capping, data recovery or other methods determined adequate by the City that are consistent with the Secretary of the Interior's standards for archaeological documentation.

If Native American archaeological, ethnographic, or spiritual resources are discovered, all identification and treatment of the resources shall be conducted by a qualified archaeologist. The archaeologist shall notify persons who represent tribal governments on the City's Assembly Bill 52 list and consult a representative of any tribe that responds to the notice within seven working days. In the event the archaeologist and tribe(s) disagree regarding treatment after good-faith consultation, the City shall make the final decision, considering the provisions of Public Resources Code Section 21084.3(b).

Conclusion

The physical conditions related to archaeological resources have not changed in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. There are no known archaeological resources within the Project site, however there is a potential for archaeological resources to be encountered during grading and excavation activities. Project construction could adversely affect such resources if they are encountered. This impact would be avoided with implementation of Housing Element Update Subsequent EIR Mitigation Measure CR-2b as well as Project specific Mitigation Measures CULT-A and CULT-B; therefore, the Project would have a **less than significant impact with mitigation incorporated,** consistent with the findings of the ConnectMenlo EIR. No further study is required.

c) Would the project disturb any human remains, including those interred outside of formal cemeteries?

Analysis in the ConnectMenlo EIR

This checklist item was analyzed in the ConnectMenlo EIR as Impact CULT-4 and determined to be less than significant with implementation of Mitigation Measure CULT-4. Mitigation Measure CULT-4 provides protocol and notification requirements in the event that human remains are encountered during ground disturbing activities (City of Menlo Park 2016b).

Project-Specific Discussion

Although no archaeological or Native American resources are known to exist at the Project site, the potential exists for previously undiscovered human remains to be encountered during Project demolition and/or construction. This impact would be **potentially significant**. Implementation of ConnectMenlo EIR Mitigation Measure CULT-4, provided below, would ensure that impacts associated with disturbance of human remains, if human remains are encountered at the site, would be avoided or reduced to a less-than-significant level.

ConnectMenlo EIR Mitigation Measure CULT-4: Procedures of conduct following the discovery of human remains have been mandated by Health and Safety Code Section 7050.5, Public Resources

Code Section 5097.98 and the California Code of Regulations Section 15064.5l (CEQA). According to the provisions in CEQA, if human remains are encountered at the site, all work in the immediate vicinity of the discovery shall cease and necessary steps to ensure the integrity of the immediate area shall be taken. The San Mateo County Coroner shall be notified immediately. The Coroner shall then determine whether the remains are Native American. If the Coroner determines the remains are Native American, the Coroner shall notify the NAHC within 24 hours, who will, in turn, notify the person the NAHC identifies as the Most Likely Descendant (MLD) of any human remains. Further actions shall be determined, in part, by the desires of the MLD. The MLD has 48 hours to make recommendations regarding the disposition of the remains following notification from the NAHC of the discovery. If the MLD does not make recommendations within 48 hours, the owner shall, with appropriate dignity, reinter the remains in an area of the property secure from further disturbance. Alternatively, if the owner does not accept the MLD's recommendations, the owner or the descendent may request mediation by the NAHC.

Conclusion

The physical conditions related to human remains have not changed in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. There are no known human remains within the Project site, however there is a potential for human remains to be encountered during grading and excavation activities. Project construction could adversely affect such resources if they are encountered. This impact would be avoided with implementation of ConnectMenlo EIR Mitigation Measure CULT-4; therefore, the Project would have a **less than significant impact with mitigation incorporated,** consistent with the findings of the ConnectMenlo EIR. No further study is required.

3.6 Energy

	Further Evaluation Needed in EIR	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
VI. Energy – Would the project:					
a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	☐	☐	☐	☒	☐
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	☐	☒	☐

Environmental Setting

Energy resources include electricity as well as natural gas and other fuels. The production of electricity requires consumption or conversion of energy resources, including water, wind, oil, gas, coal, solar, geothermal, and nuclear resources, into energy. Energy production and energy use both result in the depletion of nonrenewable resources, such as oil, natural gas, and coal, and the emission of pollutants.

Grid electricity and natural gas service in Menlo Park are provided from either the Pacific Gas and Electric Company (PG&E) or the Peninsula Clean Energy Authority (PCE). PCE is a Community Choice Aggregator that was created as a Joint Powers Agency in 2016 to serve all areas of San Mateo County. PCE is the default energy provider throughout San Mateo County, including each of the 20 incorporated cities within this County, but residents and business customers may opt-out of obtaining energy from PCE and instead obtain it from PG&E. Energy supplied through PCE is transmitted to customers through transmission lines and other infrastructure owned and maintained by PG&E. In 2020, a total of 4,168 million kWh of electricity was consumed in San Mateo County, with 2,516 million kWh being used by non-residential customers and 1,652 million kWh being used by residential customers. In 2021, the non-residential energy consumption within San Mateo County decreased slightly to approximately 2,497 million kilowatts of electricity while residential energy consumption increased slightly to approximately 1,661 million kWh (California Energy Commission 2022). As described in Section 2, Project Description, the Project site is currently served by PG&E for electrical and natural gas service.

General Plan Goals and Policies

The City General Plan, specifically, the Land Use Element, Open Space/Conservation Element, and Circulation Element, contains goals, policies, and programs that require sustainable development and energy efficiency. The following City General Plan goals, policies, and programs would minimize potential adverse risks specifically associated with the wasteful, inefficient, or unnecessary consumption of energy resources: Goal LU-4, Policy LU-4.5; Goal LU-6; Goal LU-7, Policy LU-7.1, Policy LU-7.9, Program LU-7.A, Program LU-7.C, Program LU-7.D, and Program LU-7.E; Goal OSC-4, Policy OSC-4.1, Policy OSC-4.2, Policy OSC-4.3, Policy OSC-4.4, and Policy OSC-4.5; Goal CIRC-1, Policy CIRC-2.11; Goal CIRC-5, Policy CIRC-5.1; and Goal CIRC-6, Policy CIRC-6.1 and Policy CIRC-6.3.

Environmental Checklist and Discussion

a) Would the project result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

Analysis in the ConnectMenlo EIR

This topic was analyzed in the ConnectMenlo EIR as Impact UTIL-13. It was determined that impacts related to the wasteful, inefficient, or unnecessary consumption of energy resources would be less than significant. No mitigation measures were required. Further, energy conservation was evaluated in Section 4.15.5 of the ConnectMenlo EIR, consistent with CEQA Guidelines Appendix F. The ConnectMenlo EIR did not quantify energy demand associated with buildout of ConnectMenlo; however, a brief discussion of energy use and conservation, including the City's Climate Action Plan, was included in Section 4.6, Greenhouse Gas Emissions (City of Menlo Park 2016b).

Project Specific Discussion

As described in Section 2, Project Description, the Project site is currently served by PG&E and would continue to be served by PG&E during Project construction. During Project operation, energy would be provided by either PG&E or PCE. The Proposed Project would demolish three existing office, R&D and warehouse buildings, construct two new 4 and 5 story R&D buildings and a 7-story parking garage, and install 59,344 square feet of open space and landscaping.

Implementation of the Project would result in the demand for electricity and natural gas at the Project site and gasoline and diesel consumption in the Project area during construction and operation. However, the existing uses of the Project site also currently demand energy. The one-time construction energy demand and the operational net change in energy demand are evaluated below. The estimated energy demand was determined through use of the California Emissions Estimator Model (CalEEMod) Version 2020.4.0. Modeling data is provided in Appendix C.

Construction

Energy use during construction associated of each R&D building and the parking garage would primarily occur in association with fuel use by vehicles and other equipment to conduct construction activities.

Electricity

The electricity demand at any given time would vary throughout the Project construction period based on the construction activities being performed and would cease upon completion of construction. When not in use, electric equipment would be powered off to avoid unnecessary energy consumption. The electricity used for construction activities would be temporary and minimal; it would be within the supply and infrastructure service capabilities of PG&E and PCE and it would not require additional local or regional capacity. Construction activities would occur in two phases, with the first phase requiring approximately 21 months and the second phase requiring approximately 15 months. The electricity demand during construction is anticipated to be minimal because the Project would be built during the approximately 21-month and 15-month construction periods. The electricity used for Project construction activities would be temporary and minimal.

Natural Gas

Natural gas is not anticipated to be required during Project construction because construction of new buildings and facilities typically does not consume natural gas. Peak energy demand specifically applies to electricity; because natural gas and petroleum are liquid, these energy resources do not have the same constraints as electricity supply. Nonetheless, if any natural gas is needed, it would be sufficiently served by existing supply from PG&E and would not require additional local or regional capacity. Any minor amounts of natural gas that may be consumed as a result of construction would be temporary and negligible and would not have an adverse effect.[1]

[1] While no natural gas is anticipated to be used during construction because construction equipment is typically diesel fueled, the possibility of natural gas use is acknowledged in the event a natural-gas-fueled piece of equipment is used. However, the CalEEMod modeling assumed all equipment would be diesel fueled.

Petroleum

Off-road equipment used during Project construction would primarily rely on diesel fuel, as would vendor trucks involved in delivery of materials, haul trucks exporting demolition material, and haul trucks importing or exporting soil, tree debris, and other materials to and from the Project site. In addition, construction workers would travel to and from the Project site throughout the duration of construction. It is assumed in this analysis that construction workers would travel in gasoline-powered light-duty vehicles. As required by ConnectMenlo EIR Mitigation Measure AQ-2b1, energy efficiency during construction would be increased through compliance with the current BAAQMD basic control measures for reducing construction emissions, including restricting equipment idling times to 5 minutes or less and require construction workers to shut off idle equipment.

The estimated diesel fuel usage from construction equipment, haul trucks, and vendor trucks and the estimated gasoline fuel usage from worker vehicles are shown in Table 3.6-1. Appendix C lists the assumed equipment usage and vehicle trips.

Table 3.6-1. Total Proposed Project Construction Petroleum Demand

Project	Off-Road Equipment (Diesel)	Haul Trucks (Diesel)	Vendor Trucks (Diesel)	Worker Vehicles (Gasoline)
	Gallons			
Phase 1	44,518	13,660	2,364	3,473
Phase 2	22,484	1,009	1,360	1,998
Total	**67,002**	**14,669**	**3,724**	**5,471**

Source: Appendix C

In summary, Project construction associated is estimated to consume a total of approximately 5,471 gallons of gasoline and 85,394 gallons of diesel. In total, Project construction fuel consumption would total approximately 90,865 gallons of petroleum. Overall, the Project would not be unusual as compared to overall local and regional demand for energy resources and would not involve characteristics that require equipment that would be less energy efficient than at comparable construction sites in the region or state.

The Project would be subject to the California Air Resources Board (CARB) In-Use Off-Road Diesel Vehicle Regulation that applies to certain off-road diesel engines, vehicles, or equipment greater than 25 horsepower. The regulation (1) imposes limits on idling, requires a written idling policy, and requires a disclosure when selling vehicles; (2) requires all vehicles to be reported to CARB (using the Diesel Off-Road Online Reporting System) and labeled; (3) restricts the adding of older vehicles into fleets starting on January 1, 2014; and (4) requires fleets to reduce their emissions by retiring, replacing, or repowering older engines or installing Verified Diesel Emission Control Strategies (i.e., exhaust retrofits). The fleet must either show that its fleet average index was less than or equal to the calculated fleet average target rate, or that the fleet has met the Best Achievable Control Technology requirements.

Because petroleum use during Project construction would be temporary and would not be wasteful or inefficient, impacts would be less than significant.

Operation

Electricity

Project operation would require electricity for multiple purposes including, but not limited to, HVAC equipment, lighting, appliances, and electronics. Additionally, the supply, conveyance, treatment, and distribution of water would indirectly result in electricity usage. CalEEMod was used to estimate the Project electricity use (see Appendix C for calculations). Default electricity generation rates in CalEEMod were used based on the proposed land use and climate zone.

Title 24 of the California Code of Regulations serves to enhance and regulate California's building standards. The Project would be subject to the 2022 California Building Energy Efficiency Standards (24 CCR, Part 6). The Project's operational energy emissions were assumed to meet the 2019 Title 24 Standards, because the 2019 Title 24 Standards are reflected in the default assumptions in CalEEMod Version 2020.4.0. According to these estimates, buildout of the Project would consume approximately 2,987,950 kWh per year during operation. The existing uses are estimated to consume approximately 1,441,305 kWh per year. As such, electricity demand at the Project site would increase by 1,557,646 kWh per year with buildout of the Project. The increase in electricity use at the Project site is due to the change in land use and increase in building square footage.

Although total energy use at the Project site would increase, the energy use per square foot would decrease in comparison with the existing buildings because of the energy-efficient design of the proposed buildings and the sustainability features, as identified in Section 2, Project Description. Further, the energy demand calculations presented above do not consider all of the Project's energy-saving design features that would result from attainment of 2022 Title 24 Standards and other exceedances of the code requirements because many of these requirements are not reflected in the CalEEMod data and assumptions. The Proposed Project would include a 5-kW rooftop photovoltaic system on the 1005 O'Brien Drive building, the 1005 O'Brien building is proposed to attain the LEED Gold certification, and the 1320 Willow building is proposed to attain LEED Silver certification. Further, consistent with the requirements of Menlo Park Municipal Code Section 16.44.130, the Proposed Project would meet 100 percent of its energy demand (natural gas and electric) through any combination of the following measures: onsite energy generation, purchase of 100 percent renewable electricity through PCE or PG&E in an amount equal to the annual energy demand of the Proposed Project, purchase of local renewable energy generated within the city of Menlo Park in an amount equal to the annual energy demand of the Proposed Project, purchase of certified renewable energy credits and/or certified renewable energy offsets annually in an amount equal to the annual energy demand of the Proposed Project. The Project's electricity use would be more efficient than what is assumed in the CalEEMod modeling due to the onsite photovoltaic generation, compliance with the Municipal Code, and compliance with more stringent regulations than are assumed in the modeling. Thus, electricity demand would likely be lower than the calculations presented above.

Although electricity consumption would increase at the Project site, the Project is consistent with the land use and zoning designations for the Project site and thus would support the City's goals as established under the ConnectMenlo project, and the Project would incorporate energy-efficiency measures and onsite renewable energy generation. For these reasons, the Project's electricity consumption would not be considered inefficient, wasteful, or unnecessary, and impacts would be less than significant.

Natural Gas

Menlo Park Municipal Code Chapter 12.16, approved September 2019, requires that most newly constructed buildings be "all-electric," meaning they must be built without a natural gas supply. However, Chapter 12.16 includes an exception that allows the use of natural gas in non-residential buildings containing a scientific laboratory for space conditioning, appliances, or laboratory equipment , subject to submittal of evidence that use of electricity is infeasible or non-cost-effective and subject to approval by the City for the particular project.

Default natural gas generation rates in CalEEMod for the proposed land use and climate zone were used and adjusted based on compliance with 2019 Title 24 for hospital uses (see Appendix C for calculations). The CalEEMod modeling indicates that the Project would consume approximately 5,611,640 thousand British thermal units (kBTU) per year after full Project buildout. The existing buildings at the Project site were estimated to use approximately 2,137,990 kBTU of natural gas in 2022. As such, upon implementation of the Project, natural gas demand at the Project site would increase by approximately 3,473,750 kBTU per year.

Although natural gas consumption would increase due to the implementation of the Project, the building envelope; HVAC; lighting; and other systems are required to be designed to maximize energy performance. The Project is subject to statewide mandatory energy requirements as outlined in Title 24, Part 6, of the California Code of Regulations. Title 24, Part 11, also contains voluntary energy measures that are applicable to the Project under the California Green Building Standards Code. Each building at the Project site would be required to meet the Title 24 requirements in effect at the time that a building permit is issued. In addition, as noted previously, the 1005 O'Brien building is proposed to attain LEED Gold certification and the 1320 Willow building is proposed to attain LEED Silver certification. The increased energy efficiency required to attain these LEED certifications would further reduce the Project's natural gas consumption. For these reasons, the natural gas consumption of the Project would not be considered inefficient or wasteful, and impacts would be less than significant.

Petroleum

During Project operation, the majority of fuel consumption would involve the use of motor vehicles traveling to and from the Project site, as well as fuels used for alternative modes of transportation that may be used by employees of and visitors to the Project buildings.

Petroleum fuel consumption associated with motor vehicles traveling to and from the Project site is a function of the operational VMT. The annual VMT attributable to buildout of the Project is estimated in CalEEMod to be 4,850,028 miles (Appendix C). This estimate does not reflect the effects of the TDM plan that the Project would be required to implement under Municipal Code Section 16.44.090, which mandates that the TDM plan be sufficient to reduce the number of Project-generated vehicle trips by 20%. The VMT estimate will be refined as part of the Transportation Impact Analysis being prepared for the Project. The following analysis of the Project's petroleum consumption is based on the initial CalEEMod-generated VMT estimate. The following analysis is considered to be conservative because the VMT estimate is expected to decrease as a result of implementation of the TDM plan which would also reduce petroleum consumption.

The Project is estimated to result in consumption of an estimated 155,479 gallons of gasoline per year and 4,117 gallons of diesel per year during operations from vehicles traveling to and from the Project site, or

159,596 gallons of petroleum per year. The existing uses at the Project site are estimated to result in 1,596,855 VMT per year (Appendix C). The existing uses would consume an estimated 57,886 gallons of gasoline per year and 1,452 gallons of diesel per year during operations from vehicles traveling to and from the Project site, or 59,338 gallons of petroleum per year. As such, Project operation would increase petroleum consumption by 100,258 gallons of petroleum per year due to the increased number of vehicles traveling to and from the Project site.

Over the lifetime of the Project, the fuel efficiency of the vehicles being used by the visitors and employees of the Project is expected to increase. As such, the amount of gasoline consumed as a result of vehicular trips to and from the Project site during operation would decrease over time. Furthermore, there are numerous regulations in place that require and encourage increased fuel efficiency. For example, CARB has adopted a new approach to passenger vehicles by combining the control of smog-causing pollutants Cand greenhouse gas (GHG) emissions into a single coordinated package of standards. The new approach also includes efforts to support and accelerate the numbers of plug-in hybrids and zero-emissions vehicles in California (CARB 2021). Additionally, in response to Senate Bill 375, CARB has adopted the goal of reducing per capita GHG emissions from 2005 levels by 10% by the year 2020 and 19% by the year 2035 for light-duty passenger vehicles in the Metropolitan Transportation Commission (MTC) and Association of Bay Area Governments (ABAG) planning area (MTC and ABAG 2021). This reduction would occur by reducing VMT through the integration of land use planning and transportation. As such, operation of the Project is expected to use decreasing amounts of petroleum over time, due to advances in fuel economy and use of TDM strategies. Several of these reductions are not reflected in the CalEEMod data and assumptions and thus have not been quantified here.

Due to the urban setting of the Project site, which is served by passenger rail and bus services, it is expected that employees and guests may use transit or non-vehicular modes of transportation to travel to and from the site. The Caltrain commuter rail system serves the Menlo Park Station, located at 1120 Merrill Street, approximately 2.6 miles southwest of the Project site. The study area is also served by the Menlo Park Shuttle Service and the SamTrans bus service, which collectively provide local and regional public transit within the Project area. Also, use of transit and non-vehicular modes of transportation is anticipated to increase over time, as local and regional plans and policies facilitating increased use and development of transit and non-vehicular transportation modes are implemented. Additionally, Project-specific sustainable design features would include EV charging infrastructure consistent with State and Local requirements as identified at the time of plan check submittal and other transportation features.

In summary, Project implementation would result in an increase in petroleum use during operation compared with the existing uses. However, the Project would include a variety of features that are expected to reduce the number of vehicles traveling to and from the site during operation. When viewed on a regional scale, the Project is an urban infill project located within a large population center that serves an existing demand for R&D uses. When compared with new development projects sited on previously undeveloped land and away from population centers, infill projects are generally expected to involve fewer VMT during operation. Given these considerations, the petroleum consumption associated with the Project would not be considered inefficient or wasteful, and impacts would be less than significant.

Renewable Energy Potential

Given the Project site's location in an urban area and the nature of the Project (i.e., R&D development on an approximately 4.22-acre site), there are considerable site constraints, including limited land availability,

incompatibility with on-site and surrounding land uses for large-scale power generation facilities, unknown interconnection feasibility, compatibility with utility provider systems, and no known water or geothermal resources to harness, that would eliminate the potential for biomass, geothermal, and hydroelectric renewable energy to be installed on site.

Regarding wind power, due to the urban nature of the site and surrounding land uses, wind turbines are generally not feasible because they would represent an incompatible use. Specifically, a general rule of thumb is to install a wind turbine on a tower with the bottom of the rotor blades at least 30 feet above anything within a 500-foot horizontal radius and to be sited upwind of buildings and trees (APA 2011; NREL 2015), which the Project site cannot accommodate. Secondly, ideal places for wind turbines are where the annual average wind speed is at least 9 miles per hour (4 meters per second) for small wind turbines and 13 miles per hour (5.8 meters per second) for utility-scale turbines (EIA 2022). Per the latest 5-year meteorological data (2011–2015) for the San Carlos Airport station, which is considered to be the most representative data set for the Project site, shows an average wind speed of 3.3 meters per second. As such, wind power was not determined to be feasible for the Project.

As noted previously, the Project would include a 5-kW rooftop photovoltaic system on the 1005 O'Brien Drive building. While the Project does not propose battery storage at the time, the Project does not preclude installation of battery storage in the future if it is determined to be a feasible and compatible land use of the site. As stated under the Electricity subheading above, under Municipal Code Section 16.44.130 the Project is required to meet 100 percent of its energy demand (natural gas and electric) through any combination of the following measures: onsite energy generation, purchase of 100 percent renewable electricity through PCE or PG&E in an amount equal to the annual energy demand of the Proposed Project, purchase of local renewable energy generated within the City of Menlo Park in an amount equal to the annual energy demand of the Proposed Project, purchase of certified renewable energy credits, and/or certified renewable energy offsets annually in an amount equal to the annual energy demand of the Proposed Project. PCE is the default energy provider throughout San Mateo County. Customers of PCE have two electricity options to choose from, ECOplus which is 50% renewable energy (default option) and ECO100, which is 100% renewable energy (PCE 2022). It is expected that the Project would use the ECO100 option. However, if the ECOplus option is used, the Project would be required to purchase certified renewable energy credits in an amount equal to the 50% of the Project's electricity demand. Additionally, if the City grants approval for the Project to use natural gas under Municipal Code Section 12.16.010, the Project would be required to purchase certified renewable energy credits to offset 100% of the natural gas use for the life of the Project.

In summary, the Project includes the on-site renewable energy source (i.e., solar) that was determined to be feasible for the site and does not include the on-site renewable energy sources that were determined to be infeasible.

Conclusion

The physical conditions related to the wasteful, inefficient, or unnecessary consumption of energy resources have not changed in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project, and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Proposed Project would result in a **less-than-significant impact** with respect to the wasteful, inefficient, or unnecessary consumption of energy resources. No further study is required.

b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

Analysis in the ConnectMenlo EIR

This topic was analyzed in the ConnectMenlo EIR as Impact UTIL-13 and the impact was determined to be less than significant because future development would be required to comply with existing City regulations such as General Plan policies and building and zoning regulations, which have been enacted to promote energy conservation and efficiency through sustainable building practices and reduced automobile dependency. In addition, energy conservation was evaluated in Section 4.15.5 of the ConnectMenlo EIR, consistent with CEQA Guidelines Appendix F. The ConnectMenlo EIR did not quantify energy demand associated with buildout of ConnectMenlo; however, a brief discussion of energy use and conservation, including the City's Climate Action Plan, was included. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

The Project would be subject to and would comply with, at a minimum, the California Building Energy Efficiency Standards (24 CCR, Part 6). Part 6 of Title 24 establishes energy efficiency standards for residential and non-residential buildings constructed in California in order to reduce energy demand and consumption. As such, the Project would exceed California code requirements for energy efficiency, as demonstrated below.

Part 11 of Title 24 sets forth voluntary and mandatory energy measures that are applicable to the Project under the California Green Building Standards Code. As discussed in response (a) above, the Project would result in an increased demand for electricity, natural gas, and petroleum. In accordance with CALGreen's Title 24 Part 11 Tier 2 voluntary efficiency measures, the Project would have at least 75% of its construction and demolition waste diverted from landfills.

In addition, as described in the ConnectMenlo EIR, new development within the City would be constructed using modern, energy-efficient building materials and construction practices, in accordance with CALGreen, the California Public Utility Commission's Long-Term Energy Efficiency Strategic Plan, Chapter 12.18 of the Menlo Park Municipal Code, which contains the City's Green Building Ordinance, and Municipal Code Section 16.44.130, which identifies additional green and sustainable building standards applicable to development within the LS zone district. Under the Municipal Code, all new buildings within the Bayfront Area are required to comply with specific green building requirements for LEED certification, provide outlets for EV charging, provide onsite renewable energy generation, and enroll in EPA's Energy Star Building Portfolio Manager. The ConnectMenlo EIR found that new buildings would also use new, modern appliances and equipment, in accordance with the 2006 Appliance Efficiency Regulations. These requirements would ensure that new buildings are more energy efficient than existing buildings, and the average energy efficiency of buildings in the area would increase as redevelopment occurs throughout the Bayfront Area.

Consistent with ConnectMenlo requirements, the Proposed Project would comply with specific green building requirements for LEED certification, comply with City Zoning Ordinance requirements regarding renewable energy generation/purchases and credits/offsets for exceptions granted by the City for the use of natural gas, provide outlets for EV charging, use modern appliances and equipment, and comply with current CALGreen standards, which would help to reduce energy consumption. The Proposed Project would also comply with the City's local amendments to the California Energy Code (reach codes), which would further reduce energy

consumption beyond CALGreen requirements, and would comply with the City's requirement to implement a TDM plan, which would help reduce transportation energy usage.

The Project would also be consistent with the energy use and efficiency strategies of the City's Climate Action Plan. As previously discussed, the Project would include solar-power-generation equipment and would meet LEED Gold and Silver standards. Furthermore, the City is a partner agency with PCE, a Community Choice Aggregator, which is the default electric energy provider in the City and the ECO100 option for PCE service sources 100% of its energy from renewable and/or carbon-free sources. Under Municipal Code Section 16.44.130, if the City grants approval for the Project to use natural gas and/or if the Project uses the ECOplus option for PCE service, the Project would be required to purchase certified renewable energy credits to offset 100% non-renewable energy use for the life of the Project. Therefore, the Project would include renewable energy as part of the power content mix and would be consistent with the City's renewable energy commitment.

Conclusion

The physical conditions related to conflicts with a state or local plan for renewable energy and energy efficiency have not changed in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. Because the Project would comply with and exceed the existing energy standards and regulations, the Project would result in a **less-than-significant** impact associated with the potential to conflict with energy standards and regulations, consistent with the findings of the ConnectMenlo EIR. No further study is required.

3.7 Geology and Soils

	Further Evaluation Needed in EIR	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
VII. GEOLOGY AND SOILS – Would the project:					
a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:					
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☐	☒	☐
ii) Strong seismic ground shaking?	☐	☐	☐	☒	☐
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☐	☒	☐

	Further Evaluation Needed in EIR	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
iv) Landslides?	☐	☐	☐	☐	☒
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☐	☒	☐
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☐	☒	☐
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	☐	☐	☐	☒	☐
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☐	☒
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☒	☐	☐

Environmental Setting

Seismicity

The Project site is on the western margin of the San Francisco Bay. This location is known to be one of the most active seismic regions in the United States. Within the Bay Area, three faults belong to the San Andreas fault system: the San Andreas, Hayward, and Calaveras faults. Trending in a northwest direction, the faults generate about 12 earthquakes each century that are large enough to cause major structural damage. However, no known fault crosses the Project site (City of Menlo Park 2016b, California Geological Society [CGS] 2022).

Due to the Project site being in a seismically active area, strong to very strong ground shaking can be expected to occur at the site over the life of the Proposed Project. Seismologic and geologic experts conclude that there is a 72 percent probability for at least one large earthquake of magnitude 6.7 or greater in the San Francisco Bay Area before 2044 (City of Menlo Park 2021).

Liquefaction

Liquefaction occurs when partially saturated soil enters a liquid state, resulting in the soil's inability to support overlying structures. Liquefaction typically occurs in areas where the groundwater is less than 30 feet from the surface and where the soils are composed of poorly consolidated fine to medium sand and/or fill material. Liquefaction most often occurs when soils are subject to strong seismically induced ground shaking but can also occur due to improper grading and landslides. Liquefaction is a serious hazard because land in areas that

experience liquefaction may experience cyclic densification (when non-saturated, cohesionless soil is compacted by earthquake vibrations, causing ground-surface settlement) which can cause major structural damage to buildings and other improvements. The ConnectMenlo EIR states that liquefaction potential in all of the Bayfront Area is high (City of Menlo Park 2016b). The Project site is within a designated liquefaction hazard zone (CGS 2022).

Lateral spreading is liquefaction-related ground failure that involves horizontal or lateral movement of gently to steeply sloping saturated soil deposits. The Project site is generally flat and does include areas of exposed soil. There is no historical documentation of lateral spreading in the Project vicinity, thus, the risk of lateral spreading is low (City of Menlo Park 2021).

Landslides and Subsidence

Landslides occur when rock, soil, unconsolidated sediment, or combinations of such materials shift towards lower elevations due to gravity. Several factors influence the potential for a given location to be subject to landslide, including slope steepness, slope material, water content, and vegetative cover. The Project site and surrounding areas are generally flat and there is no risk of landslide within or adjacent to the site.

The ConnectMenlo EIR identifies that the Bayfront Area has been subject to historical subsidence due to the highly compressible nature of the fill and sediments that underlie the area and historical groundwater overdraft conditions between the 1920s and mid-1960s. The construction of the Hetch Hetchy aqueduct allowed for imported water to largely replace groundwater as a source of drinking water, which in turn led to increased groundwater levels and effectively stopped the land settlement trends (City of Menlo Park 2016b).

Expansive Soil

Expansive soils are soils that experience swelling (expansion) when moisture content increases and shrinking (contracting) when moisture content decrease. Expansive soils are typically very fine-grained with a high to very high percentage of clay, which can retain a lot of moisture. Soils on the northeastern Baylands edge are known to be clay-rich, poorly drained, and likely to possess high shrink-swell potential (City of Menlo Park 2016b).

Paleontological Resources

Paleontological resources are objects that are more than 10,000 years old and provide evidence of and information about past life on earth. They can include remains, traces, and imprints of once-living organisms preserved in rocks and sediments. An individual vertebrate fossil specimen may be considered unique or significant if it is identifiable and well preserved. The ConnectMenlo EIR reports that vertebrate fossils have been identified at eight locations within San Mateo County, including locations along the Pacific coast, along Skyline Drive in South San Francisco, and along Middlefield Road in unincorporated San Mateo County (City of Menlo Park 2016b). The Project site is underlain by artificial fill material that was imported to the site during development of the existing buildings. Artificial fill does not typically contain any significant fossil records that could contribute to science or natural history, and thus typically does not contain unique or significant paleontological resources. However, there may be Pleistocene-age alluvium deposits below the artificial soil. These deposits are old enough to have stiffened and preserved the remains of Pleistocene organisms; therefore, could have high potential for producing paleontologically significant resources (City of Menlo Park 2016b).

The natural geology of the Project area is comprised of Holocene (from less than 10,000 years ago) and Pleistocene-age alluvium. These geologic deposits underlie artificial fill or disturbed soil in the developed areas of

Menlo Park. These geologic units include artificial fill (poorly consolidated to well-consolidated gravel, sand, silt, and rock fragments), bay mud (very poorly consolidated to well-consolidated organic clay and silt, with lenses of sand, shells, and layers of peat), Holocene fine-grained alluvium (unconsolidated and poorly sorted plastic organic clay or silty clay that is found in basins), Holocene medium-grained alluvium (unconsolidated to moderately consolidated, moderately sorted fine sand, silt, and clayey silt deposited at the edge of coarse-grained alluvial fans), Holocene coarse-grained alluvium (unconsolidated to consolidated, moderately sorted fine sand and silt), Holocene and Pleistocene alluvial and basin deposits (undivided, underlies in Holocene deposits at the ground surface, and there is potential for them to contain paleontological resources) (City of Menlo Park 2021).

General Plan Goals and Policies

The City's General Plan (specifically the Land Use Element, Open Space/Conservation Element, Noise Element, and Safety Element) contains general goals, policies, and programs that would require local planning and development decisions to consider impacts related to strong seismic ground shaking, seismically related ground failure (including liquefaction), and landslides. The following General Plan goals, policies, and programs would serve to minimize potential adverse risks specifically associated with strong seismic ground shaking, seismically related ground failure, liquefaction, and landslides: Goal LU-4, Policy LU-4.5, Goal S-1, Policy S-1.1, Policy S-1.3, Policy S-1.5, Policy S-1.7, Policy S-1.13, Policy S-1.14, Program S-1.D, and Program S-1.H.

Environmental Checklist and Discussion

a) Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:

i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.

Analysis in the ConnectMenlo EIR

This topic was examined in the ConnectMenlo EIR as Impact GEO-1. The impact was determined to be less than significant because there are no Alquist-Priolo Earthquake Fault Zones mapped within the City and the potential for ground rupture is therefore considered low. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

The Project site is not located on or near any known fault lines identified in the Alquist-Priolo Earthquake Fault Zoning Map nor has it been subject to any sizable seismic activity in recent history. Overall, the San Francisco Bay Area, including the Project site, is considered to be a seismically active area. The most prominent active fault near the Project site is the San Andreas Fault System, specifically the North San Andreas fault, which is located approximately 6.2 miles to the southwest. The nearest known fault is the Monte Vista-Shannon fault, which is approximately 5.7 miles southwest of the Project site (City of Menlo Park 2016b). The Proposed Project could experience substantial ground shaking during moderate and large magnitude earthquakes that may occur along the San Andreas Fault or other active fault zones in the Bay Area. Given the proximity of the Project site to active earthquake faults, in the event of an earthquake, the Project site would have a high potential to experience strong seismic ground shaking which could have

adverse effects to people or structures within the site. The Proposed Project would not change existing seismic hazards and, therefore, would not exacerbate the potential for seismic ground shaking to occur.

The Proposed Project would comply with the requirements set forth in the California Building Standards Code (CBC) related to excavation, grading, construction earthwork, fill embankments, foundation investigations, liquefaction potential, and soil strength loss. Additionally, per the City of Menlo Park General Plan Programs S-1D and S-1H and Policy S-1.13, the Project would be required to conduct a site-specific geotechnical investigation prior to construction. To ensure the safety of people and structures within the Project site, compliance with the Geotechnical Investigation recommendations and CBC would be addressed through the City's Conditions of Approval for the Proposed Project.

Conclusion

The physical conditions related to the exposure of people to an earthquake fault rupture have not changed in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur; therefore, there would be no new site-specific effects as a result of the Project. The Project would neither exacerbate the potential for seismic shaking to occur nor increase seismic-related risks for the existing population in the Project area. Because risks associated with seismic hazards represent an effect of the environment on the Proposed Project, the potential for the proposed buildings to be exposed to seismic hazards is not considered an adverse environmental effect under CEQA. Thus, this impact is considered **less than significant**. No further study is required.

ii) Strong seismic ground shaking?

Analysis in the ConnectMenlo EIR

This topic was examined in the ConnectMenlo EIR as Impact GEO-1. The impact was determined to be less than significant because future development projects would be required to comply with the CBC and the Menlo Park Municipal Code, which both contain provisions intended to reduce the potential for major structural damage and loss of life in the event of an earthquake. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

The Project site is in the proximity of active faults that have the potential to produce large earthquakes and substantial ground shaking, including the Monte Vista-Shannon fault and the San Andreas fault (City of Menlo Park 2016b). Therefore, the potential exists for a large earthquake to induce strong to very strong ground shaking at the site during the life of the Project. The Proposed Project would be designed and constructed to meet the standards outlined in the CBC, the Municipal Code, and any recommendations provided in the site-specific geotechnical analysis regarding building design and construction methods to minimize hazards associated with seismic activity.

Conclusion

The physical conditions related to the exposure of people to strong seismic ground shaking have not changed in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. To ensure the safety of people and structures within the Project site, compliance with the Geotechnical Investigation recommendations and CBC would be addressed through the City's Conditions of Approval for the Proposed Project. The Project would neither exacerbate the potential for seismic shaking to occur nor increase seismic-related risks for the existing population in the Project area. Because risks associated with seismic hazards represent an effect of the environment on the Proposed Project, the potential for the proposed buildings to be exposed to seismic hazards is not considered an adverse environmental effect under CEQA. Thus, this impact is considered **less than significant**, consistent with the findings of the ConnectMenlo EIR. No further study is required.

iii) Seismic-related ground failure, including liquefaction?

Analysis in the ConnectMenlo EIR

This topic was evaluated in the ConnectMenlo EIR as Impact GEO-1. The impact was determined to be less than significant because compliance with site-specific geotechnical investigation recommendations, the CBC, and the Municipal Code would ensure that buildings and other site improvements are designed to withstand potential seismic-related ground failure. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

As noted above, the Project site, along with most of the Bayfront Area, is within a designated liquefaction seismic hazard zone (CGS 2022). The Proposed Project would not exacerbate the potential for either seismic-related ground failure, including liquefaction to occur.

The Proposed Project would comply with existing regulations, including General Plan Policies listed above that have been adopted to minimize impacts related to strong seismic ground shaking, including liquefaction. Consistent with General Plan Policy S-1.13 and General Plan Programs S-1D and S-1H, a Geotechnical Investigation would be prepared prior to Project construction to provide recommendations on the engineering requirements necessary to achieve safe structures given conditions on the site. Recommendations would be implemented to limit the potential for buildings and other site improvements to be damaged in the event that liquefaction occurs at the Project site. Project design and construction would also comply with the CBC and the Municipal Code, which include standards to reduce potential damage from ground failure.

Conclusion

The physical conditions related to the exposure of people to seismically related ground failures, including liquefaction, have not changed in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those

originally analyzed in the ConnectMenlo EIR would occur. To ensure the safety of people and structures within the Project site, compliance with the Geotechnical Investigation recommendations, CBC, and Municipal Code would be verified through the City's project review process and Conditions of Approval. The Project would not exacerbate the potential for liquefaction to occur. Because risks associated with liquefaction represent an effect of the environment on the Proposed Project, the potential for the proposed buildings to be exposed to such risks is not considered an adverse environmental effect under CEQA. Thus, this impact is considered **less than significant**, consistent with the findings of the ConnectMenlo EIR**.** No further study is required.

iv) Landslides?

Analysis in the ConnectMenlo EIR

This topic was examined in the ConnectMenlo EIR as Impact GEO-1. The impact was determined to be less than significant because the Bayfront Area is typically not subject to landslides and projects would be required to comply with related provisions of the CBC and Municipal Code where a potential landslide risk is present. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

According to the CGS Seismic Hazards Map, the Proposed Project is not located within a landslide zone (CGS 2022). Additionally, the ConnectMenlo EIR determined that landslide hazards are typically low in the Bayfront Area (which includes the Project site) due to the flat topography in the area (City of Menlo Park 2016b). Construction of the Proposed Project would include importing soil to raise the ground elevation at least 2 feet above the base flood elevation, but the final grade of the Project site would remain level. No steep slopes would be formed that could create a potential for landslides to occur.

Conclusion

The physical conditions related to landslides have not changed in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Project would not create a potential for landslides to occur. This impact is considered **less than significant**, consistent with the findings of the ConnectMenlo EIR**.** No further study is required.

b) Would the project result in substantial soil erosion or the loss of topsoil?

Analysis in the ConnectMenlo EIR

This topic was analyzed in the ConnectMenlo EIR as Impact GEO-2. The impact was determined to be less than significant because development would be concentrated on sites that are already developed, and thus do not have extensive areas of exposed soil, and compliance with regulatory requirements, such as implementation of erosion control measures as specified in the City of Menlo Park Engineering Division's Grading and Drainage Control Guidelines, would reduce the potential for erosion and the loss of topsoil to occur. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

The soil at the Project site is categorized as urban land-orthents reclaimed complex, 0–2% slopes and urban land under mapping by the Natural Resource Conservation Service (Appendix A1), meaning that essentially no exposed topsoil is preset at the site. Redevelopment of the Project site would involve demolition and construction activities, such as grading and excavation, which could result in temporary soil erosion when the disturbed soils are exposed to wind or rainfall. The Project would be required to comply with the City's Grading and Drainage Control Guidelines, which would reduce the impacts from erosion and the loss of topsoil to the extent practicable. In addition, as described in Section 3.10, Hydrology and Water Quality, all construction activities would comply with the NPDES Construction General Permit, which contains standards to protect water quality. As part of this permit, standard erosion control measures and best management practices (BMPs) would be identified in the Stormwater Pollution Prevention Program (SWPPP) and implemented during construction to reduce sedimentation in waterways and any loss of topsoil. The SWPPP and BMPs would minimize erosion and runoff during construction. These BMPs could include, but would not be limited to, using drainage swales or lined ditches to control stormwater flow and protecting storm drain inlets (with gravel bags or catch basin inserts). Upon completion of construction, the Project site would be covered with structures, pavement, and landscaping and would not include areas of exposed soil, thus there would be no potential for soil erosion to occur.

Conclusion

The physical conditions related to the potential for soil erosion and loss of topsoil to occur have not changed in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Project would implement erosion control measures as required by the City's Grading and Drainage Guidelines and the Project's SWPPP. This impact is considered **less than significant**, consistent with the findings of the ConnectMenlo EIR**.** No further study is required.

c) Would the project be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?

Analysis in the ConnectMenlo EIR

This topic was analyzed in the ConnectMenlo EIR as Impact GEO-3. The impact was determined to be less than significant because compliance with site-specific geotechnical investigation recommendations, the CBC, and the Municipal Code would ensure that buildings and other site improvements are designed to withstand potential risks associated with geologic and soil stability. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

The Proposed Project would comply with existing regulations, including General Plan Policies listed above that have been adopted to minimize impacts related to geologic and soil stability. Consistent with General Plan Policy S-1.13 and General Plan Programs S-1D and S-1H, a Geotechnical Investigation would be prepared prior to Project construction. Recommendations would be implemented to ensure that any

existing geologic or soil stability could expose the buildings and other site improvements to potential damage from events such as lateral spreading, subsidence, liquefaction, or collapse. Project design and construction would also comply with the CBC and the Municipal Code, which include standards to ensure building and site safety where geologic or soil instability is present. The Proposed Project is expected to be constructed using auger-cast piles, which would be drilled to a depth of 85 feet. This type of foundation support transfers structural building loads to deeper, dense supporting strata below the soft, compressible clay layers onsite, which minimizes the potential for the proposed structures to be affected by geologic and soil instability.

Conclusion

The physical conditions related to geologic and soil stability have not changed in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. Compliance with the Geotechnical Investigation recommendations, CBC, and Municipal Code would be verified through the City's project review process and Conditions of Approval; this would ensure the safety of people and structures within the Project site and surrounding areas and that the Project would not exacerbate any existing geologic or soil instability concerns. This impact is considered **less than significant**, consistent with the findings of the ConnectMenlo EIR**.** No further study is required.

d) Would the project be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code(1994), creating substantial direct or indirect risks to life or property?

Analysis in the ConnectMenlo EIR

This topic was analyzed in the ConnectMenlo EIR as Impact GEO-4. The impact was determined to be less than significant because although expansive soil is known to occur in the Bayfront Area, future development would be required to be designed in compliance with the recommendations of a site-specific Geotechnical Investigation as well as the CBC and the Menlo Park Municipal Code, which include standards to address potential hazards associated with expansive soil. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

If structures are not properly designed, cyclic expansion and contraction can affect structural stability. To reduce impacts related to expansive soils, the Proposed Project would be designed and constructed to meet or exceed standards established in the CBC and Municipal Code. Additionally, as required by General Plan Policy S-1.13, a site-specific Geotechnical Investigation would be prepared, and all recommendations of that investigation would be incorporated in the Project's design and construction plans and Conditions of Approval.

Conclusion

The physical conditions related to expansive soils have not changed in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant

effects than those originally analyzed in the ConnectMenlo EIR would occur. Compliance with the Geotechnical Investigation recommendations, CBC, and Municipal Code would be verified through the City's project review process and Conditions of Approval; this would ensure that appropriate measures are taken to minimize the potential for structures and site improvements to be damaged due to soil expansion and contraction. This impact is considered **less than significant**, consistent with the findings of the ConnectMenlo EIR**.** No further study is required.

e) Would the project have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?

Analysis in the ConnectMenlo EIR

This topic was analyzed in the ConnectMenlo EIR as Impact GEO-5. The impact was determined to be less than significant because no use of septic tanks or alternative waste water disposal systems was expected to occur. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

As discussed in Section 3.19, Utilities and Service Systems, wastewater generated at the Project site would be conveyed to by the West Bay Sanitary District through the Menlo Park Pumping Station located at the entrance to Bedwell Bayfront Park to the Silicon Valley Clean Water Wastewater Treatment Plant in Redwood City. The Project does not propose use of septic tanks or alternative wastewater disposal system.

Project-Specific Discussion

The physical conditions related to wastewater disposal have not changed in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Proposed Project would not require the use of septic tanks or alternative wastewater disposal systems and thus would result in **no impacts** associated with such infrastructure. No new or more severe impacts than those evaluated in the ConnectMenlo EIR would occur. No further study is required.

f) Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

Analysis in the ConnectMenlo EIR

This topic was discussed in the ConnectMenlo EIR as Impact CULT-3. The impact was determined to be less than significant with implementation of Mitigation Measure CULT-3, which requires that ground-disturbing activities be halted if paleontological resources are discovered (City of Menlo Park 2016b).

Project-Specific Discussion

Although no known fossils or unique paleontological resources or unique geologic features are present within the Bayfront Area, the area is underlain by Pleistocene-age alluvium deposits, which could have high potential for producing paleontologically significant resources (City of Menlo Park 2016b). During grading and excavation activities onsite, there is a potential to encounter paleontological resources, which could be destroyed or disturbed. Thus, the Project has a **potentially significant** impact to paleontological

resources. Implementation of ConnectMenlo EIR Mitigation Measure CULT-3, provided below, would ensure that impacts to paleontological resources are avoided and/or reduced to a less-than-significant level.

ConnectMenlo EIR Mitigation Measure CULT-3: In the event that fossils or fossil bearing deposits are discovered during ground disturbing activities, excavations within a 50-foot radius of the find shall be temporarily halted or diverted. Ground disturbance work shall cease until a City-approved qualified paleontologist determines whether the resource requires further study. The paleontologist shall document the discovery as needed (in accordance with Society of Vertebrate Paleontology standards [Society of Vertebrate Paleontology 2010]), evaluate the potential resource, and assess the significance of the find under the criteria set forth in CEQA Guidelines Section 15064.5. The paleontologist shall notify the appropriate agencies to determine procedures that would be followed before construction activities are allowed to resume at the location of the find. If avoidance is not feasible, the paleontologist shall prepare an excavation plan for mitigating the effect of construction activities on the discovery. The excavation plan shall be submitted to the City of Menlo Park for review and approval prior to implementation, and all construction activity shall adhere to the recommendations in the excavation plan.

Conclusion

The physical conditions related to paleontological resources have not changed in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. There are no known paleontological resources within the Project site, however there is a potential for paleontological resources to be encountered during grading and excavation activities. Project construction could adversely affect such resources if they are encountered. This impact would be avoided with implementation of ConnectMenlo EIR Mitigation Measure CULT-3; therefore, the Project would have a **less than significant impact with mitigation incorporated,** consistent with the findings of the ConnectMenlo EIR. No further study is required.

3.8 Greenhouse Gas Emissions

	Further Evaluation Needed in EIR	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
VIII. GREENHOUSE GAS EMISSIONS – Would the project:					
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☒	☐	☐	☐	☐
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☒	☐	☐	☐	☐

Environmental Setting

As discussed in more detail, below, this topic will be analyzed in the focused EIR for this Project. The focused EIR will include a description of the existing GHG emissions setting for the Project area.

General Plan Goals and Policies

General Plan goals and policies related to evaluation of the Project's potential impacts associated with GHG emissions will be outlined and discussed in the focused EIR.

Environmental Checklist and Discussion

a) Would the project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment, or conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

Analysis in the ConnectMenlo EIR

These checklist items were analyzed in the ConnectMenlo EIR as impacts GHG-1 and GHG-2. Impacts were determined to be significant and unavoidable, despite the implementation of Mitigation Measures GHG-1 and GHG-2 (City of Menlo Park 2016b).

Project-Specific Discussion

Although the physical conditions within the study area have not substantially changed since preparation and adoption of the ConnectMenlo EIR, project specific GHG emission impacts were not evaluated. Furthermore, on April 20, 2022, BAAQMD adopted updated GHG thresholds. Consistent with CEQA Guidelines Sections 15064.4 and 15183.5 which address the analysis and determination of significant impacts from a proposed project's GHG emissions, projects that would comply with either option A) or option B) in the BAAQMD updated GHG thresholds would result in a less than cumulatively considerable contribution to GHG emissions and no further action would be required.

- Option A) requires the following design elements for buildings. Projects are not to include natural gas appliances or natural gas plumbing (in both residential and nonresidential development). In addition, projects are not to result in any wasteful, inefficient, or unnecessary electrical usage as determined by the analysis required under CEQA Section 21100(b)(3) and Section 15126.2(b) of the CEQA Guidelines.
- Option B) requires projects be consistent with a local GHG Reduction Strategy that meets the criteria under CEQA Guidelines Section 15183.5(b).

As discussed previously, the Project proposes to include natural gas infrastructure, subject to approval by the City, and therefore may not comply with Option A. The City does not have a GHG Reduction Strategy that meets the CEQA Guidelines Section 15183.5(b) criteria; thus the Project cannot comply with Option B. Thus, additional Project-specific analysis will be provided in the focused EIR to evaluate potential impacts related to GHG generation relative to the updated GHG thresholds and potential conflicts with applicable plans, policies, and regulations.

In April 2023, the United States Ninth Circuit ruled that Federal law preempts the City of Berkeley's prohibition on natural gas in new construction (*California Restaurant Association v. City of Berkeley*). The result may be to void both the City of Menlo Park prohibition and the BAAQMD threshold, in which case the Project could use natural gas without requiring a special City exception and such use would not constitute a conflict with BAAQMD's threshold. The decision ultimately may be revised or overturned on appeal. Until the final status becomes clear, the City will assume the Municipal Code restriction and BAAQMD threshold still apply.

Conclusion

The Project's potential to result in significant GHG impacts requires **further environmental review** and will be addressed in the focused EIR. As noted in Chapter 1, Introduction, the terms of the 2017 *City of East Palo Alto v. City of Menlo Park* Settlement Agreement requires that a project-level EIR be prepared to evaluate potential effects related to population and housing and transportation, regardless of whether this Proposed Project is within the scope of the ConnectMenlo EIR. The analysis of the Project's potential GHG impacts requires detailed modeling based in part on the Project's Transportation Impact Analysis. Thus, the required additional technical analysis of GHG emissions and impacts will also be presented in the focused EIR.

3.9 Hazards and Hazardous Materials

	Further Evaluation Needed in EIR	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
IX. HAZARDS AND HAZARDOUS MATERIALS – Would the project:					
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐	☐
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☒	☐	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒	☐
d) Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☐	☒

	Further Evaluation Needed in EIR	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?	☐	☐	☐	☐	☒
f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒	☐
g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?	☐	☐	☐	☒	☐

Environmental Setting

Phase I and II Environmental Site Assessments

Phase I and II Environmental Site Assessments (ESAs) were prepared for the Project site by Farallon Consulting and are included in Appendix D. These ESAs found that there are no recognized environmental conditions at the Project site that would affect the Project and concluded that the Project site is suitable for the proposed land uses (Appendix D).

The site appeared to have been used for agricultural purposes from at least 1930 through at least 1948. the existing onsite buildings fronting on O'Brien Drive were constructed by 1958 and the building on Willow Road was constructed by 1968 and expanded by 1974. Given the ages of the buildings, asbestos-containing materials (ACM) and lead based paint (LBP) were likely to have been used in their construction (Appendix D).

Current and past tenants of the Project site were identified as handlers and/or generators of hazardous materials or waste. At the time of the site reconnaissance, Farallon observed "minor amounts of hazardous materials, including janitorial cleaning supplies, alcohols and acids, and maintenance-related products. The materials were observed to be properly labeled and stored in designated areas of the Site buildings" (Appendix D). Farallon's review of records for the Project site found that only minor violations of hazardous materials storage regulations occurred, and there were no listings for the Project site in the California State Water Resources Control Board (SWRCB) online GeoTracker database and the California Department of Toxic Substances Control (DTSC) online EnviroStor database. Thus, there is no evidence that a substantial spill or release of hazardous materials has occurred on the Project site.

The property adjacent to the southwest corner of the Project site, at 1300 Willow Road, supported a gasoline service station from at least 1957 through at least 1967. Analysis of groundwater samples collected as part of the Phase II ESA prepared for the Proposed Project found that the samples contained "low concentrations of total petroleum hydrocarbons and benzene, which did not exceed the applicable Water Board Environmental Screening Levels."

The Phase II ESA concluded that the potential migration of hazardous substances to the Project due to the prior gasoline service station represents a de minimis environmental condition and does not represent any risk of vapor intrusion at the site (Appendix D).

The GeoTracker and EnviroStor databases identify other releases of hazardous materials at several other facilities proximate to the Project site. However, the Phase II ESA concludes that based on these sites' current regulatory status, topographic location relative to the Project site, and/or relative distance from the Project site, these facilities do not represent a recognized environmental condition that could affect the Project (Appendix D).

Hazardous Waste Sites

Combined, the SWRCB GeoTracker website and the DTSC Envirostor website provide a comprehensive list of the facilities and sites identified as meeting the "Cortese List" requirements pursuant to Government Code Section 65962.5. These databases were reviewed during preparation of the Phase I and II ESA; they were queried again in preparation of this Initial Study to ensure no new information had been developed since preparation of the ESA. The SWRCB Geotracker website provides data relating to leaking underground storage tanks and other types of soil and groundwater contamination, along with associated cleanup activities. A total of 18 hazardous materials sites were identified within 0.5 miles of the Project site, all of which have previously undergone site investigation, remediation, and closure (SWRCB 2022). As such, no active hazardous materials sites were identified within the Project vicinity. The DTSC Envirostor website provides data related to hazardous materials spills and clean ups. Two voluntary cleanup sites are located within 0.5 miles of the Project site. Meta's Menlo Park West Campus located at 312-314 Constitution Drive, approximately 2,000 feet north of the Project site, formerly operated as a facility that manufactured high technology plastic and electrical insulation products and also engaged in management of hazardous waste pursuant to a hazardous waste facility permit. A Remedial Action Plan for the West Campus was implemented in 2012 and the site continues to undergo remedial maintenance (DTSC 2022a). The Willow Office Park, located approximately 900 feet northeast of the Project site, was formerly used as a helicopter testing and manufacturing, and production of reconnaissance satellites site. A voluntary cleanup agreement was initiated in 2018 to address possible contamination at the site. In 2022, a Removal Action Workplan was submitted to DTSC to excavate areas of contamination within the site. The workplan is currently under review by DTSC (DTSC 2022b).

Schools

Mid-Peninsula High School is approximately 100 feet north of the Project site. It is separated from the Project site by the right-of-way for the Hetch Hetchy aqueduct. There are several other schools in the vicinity:

- Open Mind School, a private kindergarten through 12th grade campus, is approximately 900 feet east of the Project site,
- Cesar Chavez Ravenswood Middle School is approximately 1,500 feet southeast of the Project site,
- Belle Haven Elementary School is approximately 2,100 feet west of the Project site,
- Bright Angel Montessori Academy, a private preschool and kindergarten, is approximately 3,200 feet southwest of the Project site,
- Costano Elementary School is approximately 3,350 feet northeast of the Project site, and
- KIPP Valiant Community Preparatory School, a public charter school serving transitional kindergarten through 8th grade, is approximately 4,880 feet south of the Project site.

Airport Hazards

Palo Alto Airport, a general aviation field that is owned and operated by the City of Palo Alto, is approximately four miles southeast of the Project site. The Project site is not located within the Palo Alto Airport's Airport Influence Area nor within the noise contours of the airport. Further, the Project site is also not located within any airport safety zones (Santa Clara County 2020). No airports or private airstrips are located within two miles of the Project site.

Menlo Park Emergency Operations Plan

The City of Menlo Park 2014 Emergency Operations Plan describes how the City will manage and coordinate resources and personnel responding to a range of "extraordinary" emergency situations including natural disasters and technological incidents. The operational concepts reflected in the Emergency Operations Plan focus on potential large-scale disasters which can generate unique situations requiring expanded emergency responses. It uses principles from the Federal National Incident Management System, the California Standardized Emergency Management System, and the Incident Command System to ensure a comprehensive and effective strategy for providing a coordinated and efficient response to major emergencies. The Emergency Operations Plan defines emergency response phases and emergency levels; specifies policies and general procedures, including protocols for communication between emergency service providers and for communication with the public; defines and delegates tasks for emergency staff; and provides for coordination of planning efforts (City of Menlo Park 2014).

Fire Hazard

According to the California Department of Forestry and Fire Protection's (CAL FIRE) Fire and Resource Assessment Program, the Project site is within a Local Responsibility Area (LRA) because it is within the city limits, served by the MPFPD, and designated Non-Very High Fire Hazard Severity Zone (FHSZ) (CAL FIRE 2008). Therefore, the risk of wildfire at the Project site is considered very low. Further, the ConnectMenlo General Plan Update indicates that there are no areas designated as moderate, high, or very high FHSZs within the city or the LRA (City of Menlo Park 2016b).

General Plan Goals and Policies

The City's General Plan (specifically the Land Use Element, Safety Element, and Circulation Element) contains general goals, policies, and programs that require local planning and development decisions to consider impacts related hazardous materials. The following General Plan goals, policies, and programs would serve to minimize potential adverse risks associated with the routine transport, use, or disposal of hazardous materials: Goal LU-4, Policy LU-4.5, Policy LU-7.7, Goal S-1, Policy S-1.1, Policy S-1.3, Policy S-1.5, Policy S-1.5, Policy S-1.16, Policy S-1.18, Policy S-1.29, Policy S-1.30, Program S-1.J, and Policy CIRC-2.14.

Environmental Checklist and Discussion

a) Would the project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

Analysis in the ConnectMenlo EIR

This topic was analyzed in the ConnectMenlo EIR as Impact HAZ-1. The EIR determined that impacts would be less than significant because as part of the City's project approval process, future development would be required to comply with regulations, including General Plan policies, that have been adopted to minimize impacts

related to transport, use, and disposal of hazardous materials. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

Construction

The Proposed Project would demolish three existing office, R&D and warehouse buildings, construct two new 4 and 5 story R&D buildings and a 7-story parking garage, and install approximately 59,344 square feet of open space and landscaping. Project construction would involve the routine transport, use, and disposal of hazardous materials, such as fuel, solvents, paints, oils, grease, and caulking, and comply with applicable regulations. Although small amounts of solvents, paints, oils, grease, and caulking would be transported, used, and disposed of during Project construction, these materials are commonly used in construction and are not considered acutely hazardous.

Any disposal of hazardous materials would occur in a manner consistent with applicable regulations and at an appropriate off-site disposal facility. This includes a requirement to notify San Mateo County Environmental Services if evidence of previously undiscovered soil or groundwater contamination (e.g., stained soil, odorous groundwater) is encountered during Project construction and ground-disturbing activities. Compliance with existing regulations that govern the transportation of hazardous materials and the use and disposal of such materials would minimize the potential for the Proposed Project to result in spills or leaks that could create a significant hazard to the public or the environment, and that if spills or leaks do occur, they are properly and promptly cleaned up and the materials disposed of at an appropriate waste-handling facility.

No known hazardous materials are present on the Project site; therefore, the transport of materials removed from the site is not expected to include transport of hazardous materials. However, the Phase I and II ESA recommended that the demolition and development phase be informed by a Site Mitigation Plan that addresses environmental issues, including soil profiling for offsite disposal if required, and construction phase environmental monitoring. This recommendation is similar to ConnectMenlo EIR Mitigation Measure HAZ-4a, however that measure applies to sites where a recognized environmental condition or known contamination has been identified, which is not the case for the Proposed Project (Appendix D). Thus, a Project-specific measure, Mitigation Measure HAZ-A is recommended instead.

Mitigation Measure HAZ-A: Site Mitigation Plan. Prior to commencement of any demolition or construction activities, the Project sponsor shall prepare a Site Mitigation Plan that identifies required practices and procedures to protect the general public and construction workers from potentially hazardous materials and accidental release of hazardous materials. The practices and procedures shall include spill prevention, cleanup and evacuation procedures, and procedures to be followed in the event that previously undiscovered hazardous materials are encountered during construction. The Site Mitigation Plan shall demonstrate compliance with California Code of Regulations, Title 8, Chapter 4: Subchapter 4: Construction Safety Orders; Subchapter 5: Electrical Safety Orders; and Subchapter 7: General Industry Safety Orders as well as California Health and Safety Code, Section 25100 et seq.: Hazardous Waste Control Act.

The Site Mitigation Plan shall also include provisions for completion of a comprehensive survey within each existing building to identify asbestos-containing materials (ACM) and lead-based paints (LBP) prior to any demolition activities and shall define procedures for managing demolition activities such that ACM and LBP are not released into the air and worker exposure to ACM and LBP is avoided. These procedures shall be sufficient to ensure that demolition of buildings containing ACM and/or LBP and disposal of these materials will be conducted in accordance with local, state and federal regulations, including the U.S. Environmental Protection Agency's (EPA's) Asbestos National Emissions Standards for Hazardous Air Pollutants, the California Occupational Safety and Health Administration's Construction Lead Standard (8 CCR 1532.1), California Department of Toxic Substances Control and EPA requirements for disposal of hazardous waste, and Bay Area Air Quality Management District (BAAQMD) Regulation 11, Hazardous Pollutants Rule 2: Asbestos Demolition, Renovation And Manufacturing. At least 10 days prior to demolition, the Project applicant and/or construction contractor shall submit an Asbestos Notification to BAAQMD and obtain an Asbestos Demolition/Renovation job number. Disposal of any ACM and/or LBP found on the site shall be carried out by a contractor trained and qualified to conduct lead- or asbestos-related construction work and in accordance with the appropriate state and federal standards to ensure that these materials are not released into the air in the Project vicinity.

Operation

It is anticipated that the Project would use, store, generate, and dispose of hazardous materials due to the proposed life science uses that the Project is designed to accommodate. In addition, the Project would use hazardous materials that are typical of office use (e.g., cleaning products, building maintenance products, fertilizers and pesticides used in landscaping). However, none of these products is expected to be generated or stored in large quantities. Any transport of these materials would be subject to California Department of Transportation regulations.

The San Mateo County Environmental Health Department (SMCEHD) regulates hazardous materials under its Certified Unified Program Agency (CUPA) and related Unified Programs, which are enforced by the MPFPD. Further, the City has an administrative permit process for the use and storage of hazardous materials. Any future tenants proposing to use hazardous materials would require issuance of a permit. The permit process requires that companies submit a Hazardous Material Business Plan to the City, SMCEHD, and MPFPD. The Hazardous Material Business Plan must include the type and quantity of hazardous materials, a site map showing storage locations of hazardous materials and where they may be used and transported from, risks of using these materials including material safety data sheets for each material, a spill prevention plan, an emergency response plan, employee training consistent with Occupational Safety and Health Administration guidelines, and emergency contact information. The permit application would be reviewed by the MPFPD, West Bay Sanitary District, SMCEHD, and the City's Building Division for compliance with applicable standards relevant to each reviewing agency. These agencies may impose conditions to their approval in order to ensure compliance with applicable standards and regulations.

The ConnectMenlo EIR describes in more detail the existing regulatory program that is in place at the local, state, and federal level to govern transport, use, and disposal of hazardous materials. Specific to laboratory uses, projects must comply with guidelines promulgated by the United States Department of Health and

Human Services, Centers for Disease Control and Prevention, and National Institutes of Health that determine the level of safety precautions that must be used for four tiers of relative hazards.

Biosafety Level 1 is for the least hazardous biological agents, and Biosafety Level 4 is for the most hazardous biological agents. Biosafety Levels for infectious agents are based on the characteristics of the agent (virulence, ability to cause disease, routes of exposure, biological stability and communicability), the quantity and concentration of the agent, the procedures to be followed in the laboratory, and the availability of therapeutic measures and vaccines. The Project has not identified a tenant yet, so the Biosafety level of the building is unknown at this time. Laboratories in Menlo Park are typically Biosafety Level 1 or 2; there has not been a Level 3 or 4 laboratory on Menlo Park Labs campus during its 40 years of operation. Level 3 laboratories are relatively rare and predominantly in academic settings or large pharmaceuticals. The closest Level 3 laboratory is at Stanford University, and they represent approximately 2-3% of labs in the Bay Area. There are approximately a dozen Level 4 laboratories in the United States, and none in California.

Biosafety Level 1 agents pose minimal or no known potential hazards to individuals and the environment. Biosafety Level 2 agents are considered to be of ordinary potential hazard and may produce varying degrees of disease through accidental inoculation but may be effectively contained by ordinary laboratory techniques and specific laboratory equipment. Biosafety Level 3 agents pose a more substantial risk, and work with these agents must be conducted in contained facilities for which airflow is directed into the laboratory and access is controlled separately from public areas. Biosafety Level 4 includes all of the requirements and precautions of Biosafety Level 3 but adds additional requirements including authorization for material acquisition and handling from the CDC through the Select Agent Program or the Import Permit Program.

Occupational and public safety is protected by selecting the appropriate biological and physical containment levels for each biological material handled. Standard microbiological practices, such as limiting facility access, washing hands after handling, de-contaminating work surfaces, wearing gloves and other safety equipment, using biosafety cabinets, and proper disposal reduce risks resulting from exposure to biohazardous materials.

Current state testing, monitoring and disposal regulations, as well as required internal programs pertaining to the management of biohazardous materials (including infectious agents), further ensure that risks associated with use of biohazardous substances remain less than significant.

Medical wastes are managed by laboratory users as a biohazardous material, in accordance with Section 117635 of the California Health and Safety Code and with United States Department of Health and Human Services guidelines and Department of Health Services regulations. Biohazardous medical waste is generally regulated in the same manner as hazardous waste, except that special provisions apply to storage, disinfection, containment, transportation and disposal.

Additional state regulation applies to laboratory uses including as codified in Titles 8, 14, 17, 19 and 22 of the California Code of Regulations as well as in the California Building and Fire Code, Chapters 6.5 and 6.95 of the California Health and Safety Code and the California Vehicle Code. At a local level, ConnectMenlo includes goals and policies in the Land Use and Safety Elements that pertain to transportation, use and disposal of hazardous materials. California requirements are administered by the DTSC and California Division of Occupational Safety and Health, as well as through the City's administrative use permit process, which includes review by MPFPD, West Bay Sanitary District, SMCEHD, and the City's

Building Division for compliance with applicable standards relevant to each reviewing agency, and inspection of facilities by SMCEHD and requirement for redress of any violation during operations by appropriate agencies (e.g., SMCEHD, DTSC, California Division of Occupational Safety and Health).

Conclusion

The physical conditions related to transport, use, or disposal of hazardous materials have not changed substantially in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. Existing local, state, and federal regulatory requirements related to hazardous materials would apply to use of hazardous materials at the Project site and would ensure that standard management practices are implemented to minimize the potential for the Project to cause a release or spill of such materials. Although there are no recognized environmental conditions at the Project site, it is likely that the existing buildings contain ACM and LPB, and there is a potential for soil and/or groundwater contamination to be present. Release of such materials to the environment would be avoided with implementation of Mitigation Measure HAZ-A. Thus, this impact is determined to be **less than significant with mitigation incorporated.** With implementation of Mitigation Measure HAZ-A, the impact of the Proposed Project would be consistent with the findings of the ConnectMenlo EIR. No further study is required.

b) Would the project create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

Analysis in the ConnectMenlo EIR

This topic was analyzed in the ConnectMenlo EIR as Impact HAZ-2 and the impact was determined to be less than significant because future development would be required to comply with existing regulations that have been adopted to minimize impacts related to accidents and spills of hazardous materials. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

Construction

As mentioned above in response (a), above, construction-related hazardous materials would be used during construction of the Project, such as fuel, solvents, paints, oils, and grease. It is not expected that substances listed in 40 CFR 355 Appendix A, Extremely Hazardous Substances and Their Threshold Planning Quantities would be used. It is possible that construction-related hazardous materials could be released during construction activities. However, compliance with federal, state, and local regulations, in combination with temporary construction BMPs (as part of the Construction General Permit requirements) would ensure that all hazardous materials are used, stored, and disposed properly, which would minimize potential impacts related to a hazardous materials release during construction of the Project. In addition, as required by Mitigation Measure HAZ-A, provided above, the Project would include implementation of a Site Mitigation Plan that identifies required practices and procedures to protect the general public and construction workers from potentially hazardous materials and accidental release of hazardous materials.

No releases are anticipated from excavation because no contamination has been identified at the Project site.

Operation

As discussed in response (a) above, it is anticipated that the Project would generate hazardous materials as a result of tenant activities (i.e., life science uses). In addition, the Project would use hazardous materials typical of office use (e.g., cleaning products, building maintenance products, fertilizers and pesticides used in landscaping). It is possible that these materials could be accidentally released into the environment. San Mateo County Environmental Health Department regulates waste generated by biotechnology through its Medical Waste Program, and other hazardous materials through its Hazardous Materials Business Plan Program. Both programs regulate use, storage, and disposal of the respective materials. Enforcement of these programs is managed by the MPFPD. As described in more detail above and in the ConnectMenlo EIR, these programs, along with other federal, state, and local regulations regarding use, storage, and disposal of hazardous materials would minimize potential impacts related to a hazardous materials release during Project operation.

Conclusion

The physical conditions related to reasonably foreseeable upset and accident conditions involving the release of hazardous materials have not changed in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. Existing local, state, and federal regulatory requirements related to hazardous materials would apply to use of hazardous materials at the Project site and would ensure that standard management practices are implemented to minimize the potential for the Project to cause a release or spill of such materials. There are no conditions specific to the Proposed Project or the Project site that indicate the Project would have a greater potential than other life sciences development to result in an accidental release of hazardous materials. Compliance with federal, state, and local regulations regarding use, storage, and transport of hazardous materials and implementation of Mitigation Measure HAZ-A would be sufficient to ensure that this impact is **less than significant with mitigation incorporated,** consistent with the findings of the ConnectMenlo EIR. No further study is required.

c) Would the project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

Analysis in the ConnectMenlo EIR

This topic was analyzed in the ConnectMenlo EIR as Impact HAZ-3. The impact was determined be less than significant impact because while storage, use, and handling of hazardous materials could occur proximate to schools, such activities would be subject to existing federal, State, and local regulations that limit the potential for such materials to be released. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

As described above, two schools are located within 0.25 miles of the Project site, a third school is located approximately 0.28 miles of the site, and four other schools are located within one mile of the site. Implementation of the Project would involve the use of hazardous materials during construction and operation of the Project, as discussed in responses (a) and (b) above. However, use of substantial amounts of acutely hazardous materials is not expected and no boilers, incinerators, or other equipment that generate onsite emissions are proposed. Further, the Project site and surrounding properties currently support office and light industrial uses that use, store, and transport hazardous materials. Thus, the Proposed Project would not result in a substantial change from the existing conditions.

Conclusion

The physical conditions related to exposure of schools to hazardous emissions and materials have not changed substantially in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Project would comply with all federal, state, and local regulations regarding hazardous materials which would ensure that standard management practices are implemented to minimize the potential for the Project to cause a release or spill of such materials and the Project is not expected to create hazardous emissions. The impact on schools due to hazardous substances would be **less than significant**, consistent with the findings of the ConnectMenlo EIR. No further study is required.

d) Would the project be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

Analysis in the ConnectMenlo EIR

This topic was analyzed in the ConnectMenlo EIR as Impact HAZ-4. It was determined that future development could occur on sites with known hazardous materials and, as a result, create a significant hazard for the public or the environment, resulting in a potentially significant impact. The ConnectMenlo EIR found that implementation of Mitigation Measures HAZ-4a and HAZ-4b, together with compliance with applicable laws and regulations regarding cleanup and reuse of a listed hazardous material site, would ensure that impacts with respect to development on sites with known hazardous materials would be less than significant (City of Menlo Park 2016b).

Project-Specific Discussion

As discussed in the Environmental Setting section above, the Project site is not a hazardous materials site but there are two voluntary cleanup sites located within 0.5 miles of the Project site. None of these sites represent a recognized environmental condition that could affect the Project due to their regulatory status and/or their topographic location and/or distance relative to the Project site (Appendix D). Because there is no evidence of hazardous material contamination at the Project site, ConnectMenlo EIR Mitigation Measure HAZ-4b is not applicable to the Project. As discussed in response (a) above, the Project-specific Mitigation Measure HAZ-A would be implemented in place of ConnectMenlo EIR Mitigation Measure HAZ-4a.

Conclusion

The physical condition of the Project site related to known presence of hazardous material contamination has not changed since preparation of the ConnectMenlo EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Project site is not included on a list of hazardous materials sites and the Project site is not expected to be affected by any of the nearby properties that are include on such lists. With implementation of Mitigation Measure HAZ-A as identified in this Initial Study, there would be no new specific effects as a result of the Project and this impact would be **less than significant**. No further study is required.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?

Analysis in the ConnectMenlo EIR

This topic was analyzed in the ConnectMenlo EIR as Impact HAZ-5. The EIR determined there would be no impact because the study area is subject to any airport safety hazards and implementation of ConnectMenlo would not affect aviation safety or flight patterns. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

As described above, the Project site is located approximately four miles northwest of the Palo Alto Airport and is located outside of the airport's Airport Influence Area and noise contours of the airport. Further, the Project site is also not located within any airport safety zones (Santa Clara County 2020). As such, implementation of the Project would not result in a safety or noise hazard associated with proximity to an existing airport or within an airport land use plan.

Conclusion

The physical conditions related to airport hazards have not changed since preparation of the ConnectMenlo EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. Thus, the Project would have **no impact** related to airport hazards, consistent with the findings of the ConnectMenlo EIR. No further study is required.

f) Would the project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

Analysis in the ConnectMenlo EIR

This topic was analyzed in the ConnectMenlo EIR as Impact HAZ-7. The EIR determined that impacts would be less than significant because there would be no land use changes that would impair or physically interfere with the ability to implement the City's Emergency Operation Plan or obstruct emergency evacuation routes. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

The Project proposes uses for the Project site that are consistent with the site's land use and zoning designations as established under ConnectMenlo. Emergency access to the site would be maintained during Project construction activities, and provisions for emergency access during Project operation have been incorporated in the Project design. Through the City's project review process, the City would ensure that the Project design complies with Safety Element Policy S-1.29, which requires that high-occupancy structures provide adequate access and clearance for fire equipment, fire suppression personnel, and evacuation.

Conclusion

The physical conditions related to emergency response and evacuation have not changed substantially in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Project would not conflict with an adopted emergency response or evacuation plan and the impact would remain **less than significant,** consistent with the findings of the ConnectMenlo EIR. No further study is required.

g) Would the project expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?

Analysis in the ConnectMenlo EIR

This topic was analyzed in the ConnectMenlo EIR as Impact HAZ-8. The EIR found that the impact would remain less than significant because the City is located in a highly urbanized area, is not surrounded by woodlands or vegetation, and does not contain areas designated moderate, high, or very high FHSZ for either the LRA or the SRA. Additionally, future development within the City would minimize potential fire risks through compliance with the CBC, California Fire Code, and the MPFPD Code. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

The Project site is located within the ConnectMenlo EIR study area, which is an urban area that is not located within or adjacent to a wildland fire hazard area. The Project would be required to comply with applicable regulations, including those noted above as well as Safety Element Policy S-1.29, which requires that high-occupancy structures provide adequate access and clearance for fire equipment, fire suppression personnel, and evacuation. The Project would not expose people or structures to a significant loss, injury, or death involving wildland fires.

Conclusion

The physical conditions related to wildfire hazards have not changed substantially in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. This impact would

remain **less than significant,** consistent with the findings of the ConnectMenlo EIR. No further study is required.

3.10 Hydrology and Water Quality

	Further Evaluation Needed in EIR	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
X. HYDROLOGY AND WATER QUALITY – Would the project:					
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	☐	☐	☐	☒	☐
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	☐	☐	☐	☐	☒
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:					
i) result in substantial erosion or siltation on- or off-site;	☐	☐	☐	☒	☐
ii) substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;	☐	☐	☐	☐	☒
iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or	☐	☐	☐	☒	☐
iv) impede or redirect flood flows?	☐	☐	☐	☒	☐
d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	☐	☐	☒
e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	☐	☒	☐

Existing Setting

The City of Menlo Park, including the Project site, is located within the San Francisquito Creek Watershed. The headwaters of the watershed are in the Santa Cruz Mountains above Menlo Park, and it flows into southwest

San Francisco Bay. The Project site is within the southern end of the San Mateo Plain Groundwater Subbasin of the Santa Clara Valley Groundwater Basin. The San Mateo subbasin is bounded by the Santa Cruz Mountains to the west-southwest, the Bay to the north-northeast, San Francisquito Creek to the south-southwest, and the Westside basin to the north-northwest. A relatively shallow water table aquifer overlies confined and semi-confined aquifers near the margins of the Bay, with most wells constructed to draw from the deeper portions. Recharge of the groundwater occurs through infiltration into streambeds and through percolation of rain on the valley floor.

Although the San Mateo subbasin was used as a water source for irrigation needs in the first half of the twentieth century, use of the Hetch Hetchy reservoir beginning in 1940 and surface water deliveries from the State of California beginning in 1965 have reduced the region's demand for groundwater, and water levels within the basin have returned to pre-1960 conditions (DWR 2004). This subbasin is not considered critically overdrafted and is designated as low priority under the California Sustainable Groundwater Management Act. There are approximately 348 wells operating within the subbasin, 10 of which are used for water supply. The subbasin accounts for approximately 10 percent of the water supply in the region (Groundwater Exchange 2022).

The City's storm drain system is maintained by the Menlo Park Public Works Department and consists of 17 individual systems that serve 17 drainage areas. The Project site consists of a total of 183,755 square feet (approximately 4.22 acres), of which 179,825 square feet are covered with impervious surfaces (Tarlton Properties 2023). The Project site does not have a known underground storm drain system. In the Phase 1 portion of the site, runoff from building roofs, surface parking lots, and other hardscape areas flows overland across the site "to a long valley gutter system internal to the property. The on-site storm water is collected via the valley gutter and drained from the south and west toward and outfalls to an off-site existing inlet near the northeast corner of the property. Run-off for the site ultimately drains to a 48-inch storm drain line located west of 1315 O'Brien Drive" (Appendix E). Similarly, runoff in the Phase 2 portion of the site flows overland to the west, discharging to "the curb flowline along Willow Road. Stormwater flows along the flowline until it is collected by a catch basin north of the property. The catch basin is directly connected to a 66-inch storm drain main in Willow Road" (Appendix E).

The Project site is located in Federal Emergency Management Agency Flood Zone AE, which is considered a 100-year flood zone with a base flood elevation level (FEMA 2022).

The ConnectMenlo EIR found that the Governor's Office of Emergency Services inundation maps show that all of the Bayfront Area, including the Project site, are outside of an inundation zone associated with potential dam failure or tsunami. While it is possible that a seiche could occur within the Bay as a result of an earthquake event or other disturbance, any flooding associated with a seiche event would occur within areas susceptible to other hydrologic flooding (i.e., dam or tsunami). Because the Bayfront area, including the Project site, is located outside of mapped tsunami and dam-inundation zones, it is not expected that this area would be exposed to any potential flooding resulting from a seiche. Similarly, there is no potential for the Project site to be affected by mudflow due to the generally flat topography of the Bayfront Area and throughout much of the city and because there are no areas within the City designated to be potentially affected by rainfall-induced landslides and debris flow source areas (City of Menlo Park 2016b).

General Plan Goals and Policies

The City's General Plan (specifically the Land Use Element, Open Space/Conservation Element, and Safety Element) contains general goals, policies, and programs that would require local planning and development decisions to consider impacts on hydrology and water quality. The following General Plan goals, policies, and programs would serve to minimize potential adverse impacts related to water quality, groundwater resources, flooding, levee/dam

break, sea-level rise, and seiche, tsunami, and mudflows: Goal LU-4, Policy LU-4.5, Goal LU-6, Policy LU-6.11, Goal LU-7, Policy LU-7.7, Program LU-7.H, Goal OSC-5, Policy OSC-5.1, Goal S-1, Policy S-1.5, Policy S-1.10, Program S-1.10, Program S-1.D, Policy S-23, Policy S-1.26, Policy S-1.27, and Policy S-1.28.

Environmental Checklist and Discussion

a) Would the project violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?

Analysis in the ConnectMenlo EIR

This topic was analyzed in the ConnectMenlo EIR as Impact HYDRO-1. It was determined that impacts to water quality would remain less than significant because individual development projects would be required to comply with existing federal, state, and local regulations, including General Plan goals, policies, and design standards. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

Construction

Project construction has the potential to adversely affect water quality in the Lower San Francisco Bay by temporarily discharging sediment from soil erosion and hazardous materials used in construction activities, such as paints, solvents, fuels, and lubricants. If sediment is discharged from the Project site, water quality could be further degraded if other pollutants, such as nutrients, trace metals, and hydrocarbons, attach to that sediment and are transported to downstream locations.

The City of Menlo Park lies within the jurisdiction of San Francisco Bay RWQCB (Region 2) and the city is a co-permittee of the Municipal Regional Stormwater Permit (MRP; Order No. R2-2015-0049) and NPDES Permit No. CAS612008. Under Provision C.3 of the MRP, the co-permittees use their planning authorities to include appropriate source control, site design, and stormwater treatment measures in new development and redevelopment projects to address both soluble and insoluble stormwater runoff pollutant discharges and prevent increases in runoff flows from new development and redevelopment projects. The Proposed Project is subject to the MRP requirements because it meets the definition of a regulated project under MRP section C.3.b.ii.(3)(a).

Water quality in stormwater runoff is regulated locally by the San Mateo Countywide Water Pollution Prevention Program, which includes the C.3 provisions set by the RWQCB under the San Francisco Bay Municipal Separate Storm Sewer System Permit. These regulations require redevelopment projects to incorporate stormwater treatment measures into the project design and provide for their maintenance, and to implement other appropriate source control and site design features that reduce pollutants in runoff to the maximum extent practicable.

The Project site is greater than one acre and therefore the Proposed Project would be required to develop and implement a SWPPP in compliance with the Construction General Permit, local stormwater ordinances, and other related regulations. Construction BMPs for the Project would control and prevent discharge of potential pollutants, such as pavement cutting wastes, paints, concrete, petroleum products, chemicals, wastewater or sediments, and non-stormwater discharges to storm drains and watercourses. These BMPs could include,

but would not be limited to, restricting earthmoving and clearing activities to occurring during dry weather, using drainage swales or lined ditches to control stormwater flow, and protecting storm drain inlets (with gravel bags or catch basin inserts). Temporary erosion controls would be implemented to stabilize disturbed areas until permanent erosion controls are established. In addition, construction materials and wastes would be stored, handled, and disposed of properly to prevent contact with stormwater.

Construction dewatering in areas with shallow groundwater (due to the low water table within the Bayfront Area) could be required during excavation and trenching. According to the Project's Phase I and II ESA, groundwater at the Project site is encountered at a depth of approximately 15 feet below ground surface (Appendix D). Coverage under the Construction General Permit typically includes authorization for dewatering activities as a non-stormwater discharge, provided that dischargers prove the quality of the water to be adequate and not likely to affect beneficial uses. As reported in the Project's Phase I and II ESA, the groundwater beneath the Project site is not affected by chemicals associated with the gasoline service station that previously existed adjacent to the southwest corner of the site, the plume of groundwater north of the site that is known to contain high levels of volatile organic compounds, or any of the hazardous waste sites identified in the GeoTracker and Envirostor databases (Appendix D). Any dewatering activities during Project construction would occur in compliance with requirements of the San Francisco Bay RWQCB as well as the NPDES Construction General Permit, including discharge sampling and reporting.

The City of Menlo Park Public Works Department also requires redevelopment projects that replace more than 10,000 square feet of impervious surfaces to prepare a Hydrology Report that identifies site design measures that maximize pervious areas, source control measures to keep pollutants out of stormwater, use of construction BMPs, and use of post construction treatment measures.

Operation

The Project would include operation of two 4 and 5 story R&D buildings and a 7-story aboveground parking garage. Upon completion of construction, the Project site would be covered with structures, pavement, and landscaping and would not include areas of exposed soil. Currently, approximately 99 percent of the Project site is covered with impervious surface. The Project would reduce the extent of impervious surfaces by approximately 23,346 square feet in Phase 1 and a total of 9,620 square feet in Phase 2. Of the impervious surface reduction that would occur during construction of Phase 2, 6,264 square feet would be located within the Phase 2 area while 3,356 square feet would be located within the Phase 1 area (Tarlton Properties 2023). This additional reduction in the Phase 1 area would result from replacing a portion of the building at 1320 Willow Road with landscaping as shown in Figures 5 and 6. Stormwater and water runoff generated at the Project site would be drained by a new on-site storm drain system (Tarlton Properties 2023). Consistent with the San Mateo Countywide Water Pollution Prevention Program C.3 stormwater requirements and Municipal Code Chapter 7.42, the proposed on-site storm drain system would collect runoff from the limited areas of surface parking on the eastern side of the Project, drive aisles, building roofs, and hardscape areas and convey it to bioretention basins/planters for stormwater treatment (Appendix E and Tarlton Properties 2023), After treatment, stormwater would be routed to the existing storm drain network surrounding the Project site. Because the Project would reduce the amount of impervious surface within the Project site, the volume and rate of stormwater runoff would also be reduced (Appendix E).

Preliminary Hydrology Reports were prepared in March 2022 for Phase 1 of the Proposed Project and in February 2023 for Phase 2 of the Proposed Project. These reports are provided in Appendix E. They

document the existing drainage conditions in and around the Project site as well as the design of storm water conveyance and management facilities per the City of Menlo Park Drainage Guidelines. The reports indicate that the regional drainage pattern in the vicinity of the Project site appears to be from south to north. The Project site itself does not have a known underground storm drain system but instead uses overland flow to direct the majority of the storm water run-off to a long valley gutter system internal to the property. Run-off for the site ultimately drains to a 48-inch storm drain line located west of 1315 O'Brien Drive and a 66-inch storm drain line in Willow Road (Appendix E).

As shown in Table 3.10-1, approximately 4,490 square feet of stormwater treatment areas would be provided in the Phase 1 portion of the Project site, while Phase 2 would introduce an additional 1,020 square feet of stormwater treatment areas (Tarlton Properties 2023). These bioretention areas would be designed as vegetated basins and swales incorporated into the landscaping along the Project site frontages on O'Brien Drive (Phase 1) and Willow Road (Phase 2). The size and design of these areas were determined based on the size of the drainage basin each serves and the extent of impervious surfaces within that basin, and each would be sized slightly larger than the required size under the San Mateo County C.3 Manual guidelines (Appendix E and Tarlton Properties 2023). By incorporating the on-site stormwater treatment measures into the site design, the Project demonstrates compliance with Chapter 7.42, Storm Water Management Program, of the Menlo Park Municipal Code as well as General Plan Policies OSC-5.1, S-1.26, and S-1.27.

The Project plan set sheets C3.1A through C3.3 depict the existing impervious surface and drainage conditions and the proposed stormwater management treatment plan. Under the Proposed Project, runoff would flow from impervious surfaces into adjacent vegetated areas. As shown in Table 3.10-1, after Project construction, there would be four drainage management areas within the site. A bioretention basin is proposed to be provided in each area for stormwater treatment. Drainage Management Area 1 consists of the majority of the eastern portion of the Project site, surrounding the proposed building at 1005 O'Brien Drive and associated hardscape and landscape/open space areas. Drainage Management Area 2 consists of the proposed parking garage. Drainage Management Area 3 consists of the northern half of the western and central portions of the building at 1320 Willow Drive. Drainage Management Area 4 consists of the southern half of the western and central portions of the building at 1320 Willow Drive as well as the driveway to Willow Road and the drive aisle south of this building (Tarlton Properties 2023).

Construction of Phase 1 involves demolition of the easternmost portion of the existing building at 1320 Willow Drive. At completion of Phase 1, the easternmost extent of the remaining portion of this building would be located in Drainage Management Area 1, and thus would constitute a portion of the total impervious surface within this area. Under Phase 2, the remaining portion of this building would be demolished and much of the impervious surface associated with the building would be replaced with landscaping, as shown in Figure 6. Table 3.10-1 reflects the amount of impervious and pervious surfaces and sizes of treatment areas at full buildout of the Project.

The bioretention basins are proposed to be located in the vegetated areas along the Project site frontages on O'Brien Drive and Willow Road. Specifically, the bioretention basins would be located:

- at the eastern end of the landscaped area south of the building at 1005 O'Brien Drive,
- between the generator enclosure west of the building at 1005 O'Brien Drive and the sidewalk,
- in the landscaped area immediately north of the Willow Road driveway into the Project site, and

- in the landscaped area north of the paved pedestrian entrance to the building at 1320 Willow Road.

Table 3.10-1, Proposed Stormwater Treatment, identifies the sizes of each Drainage Management Area, the extent of impervious and pervious surfaces in each area under the Proposed Project, and the required and proposed treatment area sizes.

Table 3.10-1. Proposed Stormwater Treatment

Drainage Management Area	Total Area (Square Feet)	Impervious Surfaces (Square Feet)	Pervious Surfaces (Square Feet)	Treatment Area Required (Square Feet)	Treatment Area Proposed (Square Feet)
1	112,165	87,028	25,137	2,611	3,290
2	34,390	31,507	2,883	960	1,200
3	19,170	13,394	5,776	423	500
4	18,030	14,930	3,100	462	520
Totals	**183,755**	**146,859**	**36,896**	**4,456**	**5,510**

Source: Tarlton Properties 2023

Conclusion

The physical conditions related to water quality have not changed substantially in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. Compliance with existing stormwater control regulations, preparation of a SWPPP, and implementation of site design measures, source control measures, and BMPs would reduce potential construction and operation phase impacts on water quality to a **less-than-significant** level, consistent with the findings of the ConnectMenlo EIR. No further study is required.

b) Would the project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

Analysis in the ConnectMenlo EIR

This topic was analyzed in the ConnectMenlo EIR as Impact HYDRO-2. The impact was determined to be less than significant because future development projects would be required to comply with existing federal, state, and local regulations, including General Plan policies, regarding groundwater management. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

Although dewatering may be necessary during Project construction, the groundwater beneath the Project site is not used for municipal water supply purposes. Should dewatering occur, it would be conducted on an as-needed basis during the construction phase and would not result in a loss of water that would deplete groundwater supplies. In addition, the water supply for construction activities (e.g., dust control, concrete mixing, material washing) would come from nearby hydrants and existing surface supplies for the site and/or be trucked to the site. Once operational, water service to the Project would be provided by Menlo Park Municipal Water (MPMW), which currently relies entirely on surface water and is in the process of

developing emergency groundwater wells to supplement surface water supplies in specific conditions, as discussed further in Section 3.19, Utilities and Service Systems. The Project would not increase groundwater demand.

As discussed in response (a) above, the Project would reduce the extent of impervious surfaces by approximately 23,346 square feet in Phase 1 and a total of 9,620 square feet in Phase 2 (Tarlton Properties 2023). As noted above, a portion of the Phase 2 reduction in impervious surface would be located within the Phase 1 footprint. The Project site currently includes 179,825 square feet of impervious surface and 3,930 square feet of pervious surfaces. After Project implementation, the site would support 146,859 square feet of impervious surface and 36,896 square feet of pervious surface. Thus, the Project would increase, rather than decrease, the ability for the site to contribute to regional groundwater recharge.

Conclusion

The physical conditions related to groundwater management have not changed substantially in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Project would not increase groundwater demand or decrease groundwater recharge and thus would have **no impact** on groundwater management. Thus, there would be no new specific effects as a result of the Project. No further study is needed.

c) Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:

i) Result in substantial erosion or siltation on- or off-site?

Analysis in the ConnectMenlo EIR

This topic was analyzed in the ConnectMenlo EIR as Impact HYDRO-3. The impact was determined to be less than significant because future development would comply with regulatory requirements (e.g., BMPs, erosion control plans, SWPPPs), the Menlo Park Municipal Code, and the City's General Plan policies. No mitigation measures were required.

Project-Specific Discussion

Project construction activities would temporarily alter existing drainage patterns and could result in temporary onsite erosion and siltation. As described above, the regional drainage pattern in the vicinity of the Project site appears to be from south to north and run-off from the site ultimately drains to a 48-inch storm drain line located west of 1315 O'Brien Drive and a 66-inch storm drain line in Willow Road (Appendix E). The Proposed redevelopment of the Project site would reduce the extent of impervious surfaces, as described in responses (a) and (b)the Project would implement a SWPPP to minimize the potential for erosion and sedimentation in nearby storm drains, and the Project would construct four bioretention basins to provide onsite treatment of stormwater. As shown in Table 3.10-1, each of the basins would be sized slightly larger than the required size under the San Mateo County C.3 Manual guidelines. Preparation and implementation of the SWPPP and BMPs would reduce the potential for substantial erosion or siltation onsite or offsite or a substantial increase

in the rate or amount of runoff through source control measures (i.e., silt fencing, fiber rolls). Further, the Project would comply with existing NPDES permits and Municipal Code Chapter 7.42 regarding construction and stormwater management. Once operational, drainage within the Project site would be directed towards the bioretention basins within landscaped areas before being discharged to the City drainage facilities that currently serve the Project site. New stormwater conveyance and management facilities would be designed per the City's Drainage Guidelines.

Conclusion

The physical conditions related to erosion and siltation have not changed substantially in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. Through use of BMPs as required under the MRP and Municipal Code the Project would not alter the existing drainage pattern of the site in a manner that would result in substantial erosion or siltation. This impact would be **less than significant**, consistent with the findings of the ConnectMenlo EIR. No further study is required.

ii) Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite?

Analysis in the ConnectMenlo EIR

This topic was analyzed in the ConnectMenlo EIR as Impact HYDRO-4. The impact was determined to be less than significant impact because future development projects would comply with City stormwater measures in the Municipal Code, the C.3 provisions of the MRP, and other applicable General Plan policies. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

The Project site drains to the City's storm drainage system. During construction activities, water would be used to control dust, but would not be used in great enough quantities to result in substantial runoff or to alter drainage patterns. As discussed in the previous responses, the Project would reduce the extent of impervious surfaces within the Project site by approximately 23,346 square feet in Phase 1 and 9,620 square feet in Phase 2, and stormwater within the site would be routed to bioretention basins/planters for treatment prior to discharge to the existing storm drain network surrounding the Project site. Because the Project would reduce the amount of impervious surface within the Project site, the volume and rate of stormwater runoff would also be reduced (Appendix E).

Conclusion

The physical conditions related to surface runoff and flooding have not changed substantially in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. Project implementation would not increase surface runoff such that on or offsite flooding would occur. This impact would be **less than significant**, consistent with the findings of the ConnectMenlo EIR. No further study is required.

iii) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?

Analysis in the ConnectMenlo EIR

This topic was analyzed in the ConnectMenlo EIR as Impact HYDRO-5. The impact was determined to be less than significant because future development would be required to provide onsite infiltration for stormwater runoff, consistent with the City's General Plan and Municipal Code. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

As discussed in the previous responses, the Project site drains to the City's storm drainage system and the Project would reduce the amount of impervious surface within the Project site, which would reduce the volume and rate of stormwater runoff from the site compared to existing conditions (Appendix E). Thus, the Project would not contribute runoff water that would exceed the City's storm drainage system capacity.

Construction BMPs would be implemented for erosion and sediment control and to minimize the potential for adverse effects to water quality, which would reduce erosion and sediment transport into surface waters and prevent pollution in site runoff during construction. The NPDES General Construction permit also requires dischargers to consider the use of post-construction permanent BMPs that remain in service to protect water quality throughout the life of the Project. The proposed permanent BMPs consist of four bioretention basins within landscaped areas, each of which would be sized larger than the minimum treatment area size requirement under the San Mateo County C.3 Manual guidelines. All NPDES permits also include inspection, monitoring, and reporting requirements. Further, the City of Menlo Park has stringent stormwater requirements that exceed the C.3 provisions of the MRP.

Conclusion

The physical conditions related to stormwater drainage capacity and stormwater runoff quality have not changed substantially in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Project would not create or contribute runoff water that would exceed the capacity of stormwater drainage systems or provide additional sources of polluted runoff. This impact would be **less than significant**, consistent with the findings of the ConnectMenlo EIR. No further study is required.

iv) Impede or redirect flood flows?

Analysis in the ConnectMenlo EIR

This topic was analyzed in the ConnectMenlo EIR as Impact HYDRO-8. The impact was determined to be less than significant because future development projects would comply with federal and Municipal Code requirements and related General Plan policies. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

As described above, the Project site is located within the 100-year flood zone. Construction within Special Flood Hazard Areas is governed by Menlo Park Municipal Code Section 12.42.51, Standards of Construction, which establishes development standards to minimize flood risks. The standards include anchoring and flood-proofing; limiting uses for structures below the base flood elevation; using utility equipment and materials that resist flood damage; requiring electrical, heating, ventilation, plumbing, and air-conditioning equipment and service facilities to be designed and/or located so as to prevent water from entering or accumulating within the components during flood conditions; and requiring that all new and replacement water supply and sanitary sewage systems be designed to minimize or eliminate infiltration of floodwaters into the systems (as well as discharges from systems into floodwaters).

As required by Menlo Park Municipal Code Section 16.44.130(4), all proposed ground-level building floors would be raised at least 2 feet above the FEMA base flood elevation. Further, the total amount of building footprint within the site would be approximately the same as under the existing condition, and the Project would reduce the extent of impervious surfaces within the Project site by approximately 23,346 square feet in Phase 1 and 9,620 square feet in Phase 2. These elements would ensure that the Proposed Project would not impede flood flows or redirect flood flows.

Conclusion

The physical conditions related to flood zones and potential flood flows have not changed substantially in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Project would comply with existing requirements related to flood hazards and would not exacerbate flooding or cause flooding to occur. The Project would not impede or redirect flood flows. This impact would be **less than significant**, consistent with the findings of the ConnectMenlo EIR. No further study is required.

D) In flood hazard, tsunami, or seiche zones, would the project risk release of pollutants due to project inundation?

Analysis in the ConnectMenlo EIR

This topic was analyzed in the ConnectMenlo EIR as Impact HYDRO-10. It was determined that impacts on future development related to flooding from tsunamis, seiches, and mud flows would be less-than-significant through compliance with existing regulations, including the City's General Plan policies. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

As previously described, the Project site is located in FEMA Flood Zone AE, which is considered a 100-year flood zone with a base flood elevation level (FEMA 2022). Project construction activities would involve importing fill soil to raise the site elevation sufficient to ensure that proposed ground-level building floors would be raised 2 feet above the 12.8 feet FEMA base flood elevation, per the requirements of Menlo Park Municipal Code Section 16.44.130(4).

The northern portion of the City, which consists mainly of sloughs and undeveloped land, is located within a tsunami inundation zone. According to the Governor's Office of Emergency Services tsunami and dam inundation maps for emergency planning, all areas planned for future development, including the Bayfront Area, are outside of an inundation zone associated with potential dam failure or tsunami. While it is possible that a seiche could occur within the Bay as a result of an earthquake event or other disturbance, any flooding associated with a seiche event would occur within areas susceptible to other hydrologic flooding (i.e., dam or tsunami). Because the Bayfront area, including the Project site, is located outside of mapped tsunami and dam-inundation zones, it is not expected that this area would be exposed to any potential flooding resulting from a seiche. Similarly, there is no potential for the Project site to be affected by mudflow due to the generally flat topography of the Bayfront Area and most of the city and because there are no areas within the City designated to be potentially affected by rainfall-induced landslides and debris flow source areas (City of Menlo Park 2016b).

In the event of a potential flood hazard, compliance with local water quality programs and associated municipal stormwater related NPDES permit requirements (e.g., municipal separate storm sewer system permit, Municipal Regional Permit) as well as City General Plan policies to manage flood risk and water quality would reduce risks associated with pollutant release due to Project inundation in a flood hazard, tsunami, or seiche zone.

Conclusion

The physical conditions related to flood hazard, tsunami, and seiche zones have not changed in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Project would comply with existing requirements related to flood hazards and the Project site is not subject to tsunami and seiche hazards. This impact would be **less than significant**, consistent with the findings of the ConnectMenlo EIR. No further study is required.

e) Would the project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

Analysis in the ConnectMenlo EIR

This topic was not directly addressed within the ConnectMenlo EIR. Impacts related to water quality were analyzed in the ConnectMenlo EIR as Impact HYDRO-1 and impacts related to groundwater supply were analyzed in the ConnectMenlo EIR as Impact HYDRO-2. Impacts were determined to be less than significant, and no mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

Water Quality Plans that the Project would be required to comply with include the Water Quality Control Plan for the San Francisco Bay Basin, the San Mateo Countywide Water Pollution Prevention Program, and the City of Menlo Park Storm Water Management Program. Construction activities associated with Project implementation would be required to adhere to a SWPPP, under the SWRCB's General Construction Stormwater Permit; therefore, BMPs would be implemented to reduce the amount of soil disturbance, erosion and sediment transport into receiving waters, and pollutants in site runoff during construction. As

stated above, throughout operation of the Project, site drainage would be collected and treated in on-site bioretention basins that would be incorporated in the site landscaping. As shown in Table 3.10-1, each bioretention basin would be sized larger than the minimum treatment area required under the San Mateo County C.3 Manual guidelines. As discussed in response (a) above, the Project would not substantially contribute to water pollution or water quality degradation and thus it would not conflict with or obstruct implementation of the region's water quality control plan.

The Project lies within the San Mateo Plain Groundwater Subbasin of the Santa Clara Valley Groundwater Basin, which is not in critical overdraft and no sustainable groundwater management plan has been adopted for the region. Further, the Project would obtain water from MPMW and would not use groundwater, other than in the case of MPMW utilizing an emergency groundwater well to supplement surface water supply, as discussed further in Section 3.19, Utilities and Service Systems, of this Initial Study.

Conclusion

The physical conditions related to water quality and groundwater management have not changed in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Project would comply with local, regional, and state regulations regarding water quality and would not conflict with or obstruct implementation of the region's water quality control plan. There is no adopted groundwater management plan applicable to the Project area. This impact would remain **less than significant,** consistent with the findings of the ConnectMenlo EIR. No further study is required.

3.11 Land Use and Planning

		Further Evaluation Needed in EIR	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XI.	**LAND USE AND PLANNING** – Would the project:					
a)	Physically divide an established community?	☐	☐	☐	☐	☒
b)	Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒	☐

Environmental Setting

The Project site currently supports three existing commercial and industrial buildings that were constructed as part of an approximately 100-acre industrial park between the late 1950s and mid-1970s (Appendix C). Under the ConnectMenlo project, the Life Sciences land use and zoning designations were applied to the Project site and many nearby properties. Mid-Peninsula High School is located approximately 100 feet north of the Project site, separated from the site by the Hetch Hetchy aqueduct right-of-way. The Project site is located north of US 101,

State Route (SR) 84, the Dumbarton Rail Corridor, tidal mudflats and marshes along the Bay, the Don Edwards San Francisco Bay National Wildlife Refuge, and Ravenswood Slough.

The Project site is in the vicinity of several East Palo Alto neighborhoods. Land uses in the Project vicinity include single-family residences, multi-family residential buildings, neighborhood retail, the 4 Corners Civic Hub, four elementary/middle school districts, and one high school district within the City of Menlo Park. Public schools within the Project vicinity include the Belle Haven and Costano elementary schools, Caesar Chavez Ravenswood Middle School, and KIPP Valiant Community Preparatory School (a public charter school). The two public high schools nearest the site are TIDE Academy, located at 150 Jefferson Drive, approximately 1.4 miles west of the Project site, and Menlo-Atherton High School, located at 555 Middlefield Road in Atherton, located approximately 1.7 miles southwest of the Project site.

General Plan Goals and Policies

All development in Menlo Park must conform to the land use designations outlined in the City General Plan. Goals, policies, and programs contained in the Land Use Element of the City General Plan provide guidance on how land use designations should be developed to contribute to the overall character of Menlo Park. The following City General Plan goals and policies would serve to promote cohesive neighborhoods and ensure consistency with applicable plans: Goal LU-1, Policy LU-1.1; Goal LU-4, Policy LU-4.5; Goal LU-6, Policy LU-6.7 and Policy LU-6.11; Goal CIRC-1, Policy CIRC-1.8; Goal CIRC-2, Policy CIRC-2.7, Policy CIRC-2.11, and Policy CIRC-2.14; Program CIRC-2.G and Program CIRC-2.H; Goal OSC-5, Policy OCS-5.1; and Goal S-1, Policy S-1.26 and Policy S-1.27.

Environmental Checklist and Discussion

a) Would the project physically divide an established community?

Analysis in the ConnectMenlo EIR

This topic was analyzed in the ConnectMenlo EIR as Impact LU-1 and the impact was determined to be less than significant because buildout under the ConnectMenlo project was not expected to include construction of any new major roadways or other physical features through parcels or communities that would create new barriers or divide any established communities. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

The Project site is already developed. The Project site is adjacent to two major roadways and other existing commercial and industrial development. The Proposed Project does not include construction of new roadways or other offsite physical features that could divide established communities. It also would not cause the removal of a means to access that would impair mobility and connectivity for existing communities in the Project vicinity. The Project would create publicly accessible open space within the Project site, which would expand local mobility and connectivity in the vicinity. Further, the Proposed Project is consistent with the land use and zoning designations applied to the Project site.

Conclusion

The physical conditions related to cohesive communities have not changed in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and

there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Project would not construct any physical barriers or features that would divide an existing community or limit mobility and connectivity in the area. The Project would have **no impact** related to dividing established communities. No further study is required.

b) Would the project cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?

Analysis in the ConnectMenlo EIR

This topic was analyzed in the ConnectMenlo EIR as Impact LU-2. The impact was determined to be less than significant with mitigation incorporated. Mitigation Measure LU-2 from the ConnectMenlo EIR requires that future development demonstrate consistency with the applicable goals, policies, and programs in the City General Plan and the supporting zoning standards (City of Menlo Park 21016b).

Project-Specific Discussion

The site is designated by the General Plan as LS. One purpose of ConnectMenlo was to create live/work/play environments within the Bayfront Area and encourage office, R&D, residential, and commercial uses, as well as hotels, in proximity to and integrated with one another. The LS designation provides for new life sciences and R&D uses, along with high-tech office services and supportive sales and personal services. Specifically, City Ordinance No. 1025, which added the LS zoning district to the Menlo Park Municipal Code, states that the purposes of the LS district are to:

(1) Attract research and development and light industrial and uses particularly those that support bioscience and biomedical product development, and manufacturing and/or are potentially revenue generating businesses;
(2) Allow administrative and professional office uses and other services that support light industrial and research development sites and nearby;
(3) Provide opportunities for quality employment and development of emerging technology, entrepreneurship, and innovation;
(4) Facilitate the creation of a thriving business environment with goods and services that support adjacent neighborhoods as well as the employment base.

The Proposed Project would be consistent with the development goals outlined in ConnectMenlo. Additionally, the Project would be required to comply with all City goals and policies outlined in the General Plan and Municipal Code. Specifically, the Proposed Project would adhere to the following policies regarding land use, circulation, open space, safety, and environmental quality because it would be designed in accordance with the City's goals, policies, programs and regulations, as discussed throughout this Initial Study:

Goal LU-1: Promote the orderly development of Menlo Park and its surrounding area.

Policy LU-1.1: **Land Use Patterns.** Cooperate with the appropriate agencies to help assure a coordinated land use pattern in Menlo Park and the surrounding area.

Policy LU-1.2: **Transportation Network Expansion.** Integrate regional land use planning efforts with development of an expanded transportation network focusing on mass transit rather than freeways, and support multimodal transit development that coordinates with Menlo Park land uses.

Goal LU-4: Promote the development and retention of business uses that provide goods or services needed by the community that generate benefits to the City, and avoid or minimize potential environmental and traffic impacts.

Policy LU-4.1: **Priority Commercial Development.** Encourage emerging technology and entrepreneurship and prioritize commercial development that provides fiscal benefits to Menlo Park, local job opportunities, and/or goods or services needed by the community.

Policy LU-4.3: **Mixed-Use and Nonresidential Development.** Limit parking, traffic, and other impacts of mixed-use and nonresidential development on adjacent uses and promote high-quality architectural design and effective transportation options.

Policy LU-4.4: **Community Amenities.** Require mixed-use and nonresidential development of a certain minimum scale to support and contribute to programs that benefit the community and Menlo Park, including education, transit, transportation infrastructure, sustainability, neighborhood-serving amenities, child care, housing, job training, and meaningful employment for Menlo Park youth and adults.

Policy LU-4.5: **Business Uses and Environmental Impacts.** Allow modifications to business operations and structures that promote revenue generating uses for which potential environmental impacts can be mitigated.

Goal LU-6: Preserve open-space lands for recreation; protect natural resources and air and water quality; and protect and enhance scenic qualities.

Policy LU-6.2: **Open Space in New Development.** Require new nonresidential, mixed use, and multiple dwelling development of a certain minimum scale to provide ample open space in the form of plazas, greens, community gardens, and parks whose frequent use is encouraged through thoughtful placement and design.

Policy LU-6.3: **Public Open Space Design.** Promote public open space design that encourages active and passive uses, and use during daytime and appropriate nighttime hours to improve quality of life.

Policy LU-6.8: **Landscaping in Development.** Encourage extensive and appropriate landscaping in public and private development to maintain the City's tree canopy and to promote sustainability and healthy living, particularly through increased trees and water-efficient landscaping in large parking areas and in the public right-of-way.

Policy LU-6.9: **Bicycle and Pedestrian Facilities.** :Provide well-designed bicycle and pedestrian facilities for safe and convenient multi-modal activity through the use of access easements along linear parks or paseos.

Policy LU-6.11: **Baylands Preservation.** Allow development near the Bay only in already-developed areas.

Goal CIRC-2: Increase accessibility for and use of streets by pedestrians, bicyclists, and transit riders.

Policy CIRC-2.11: **Design of New Development.** Require new development to incorporate a design that prioritizes safe bicycle and pedestrian travel and accommodates senior citizens, people with mobility challenges, and children.

Policy CIRC-2.14: **Impacts of New Development.** Require new development to mitigate its impacts on the safety (e.g., collision rates) and efficiency (e.g., vehicle miles traveled (VMT) per capita) of the circulation system. New development should minimize cut-through and high-speed vehicle traffic on residential streets; minimize the number of vehicle trips; provide appropriate bicycle, pedestrian, and transit connections, amenities and improvements in proportion with the scale of proposed projects; and facilitate appropriate or adequate response times and access for emergency vehicles.

Goal OSC-5: Ensure health air and water quality.

Policy OSC-5.1: **Air and Water Quality Standards.** Continue to apply standards and policies established by the Bay Area Air Quality Management District, San Mateo Countywide Water Pollution Prevention Program, and City of Menlo Park Climate Action Plan through the California Environmental Quality Act process and other means as applicable.

Goal S-1: Ensure a safe community.

Policy S-1.26: **Erosion and Sediment Control.** Continue to require the use of best management practices for erosion and sediment control measures with proposed development in compliance with applicable regional regulations.

Policy S-1.27: **Regional Water Quality Control Board Requirements.** Enforce stormwater pollution prevention practices and appropriate watershed management plans in the RWQCB general National Pollutant Discharge Elimination System requirements, the San Mateo County Water Pollution Prevention Program, and the City's Stormwater Management Program. Revise, as necessary, City plans so they integrate water quality and watershed protection with water supply, flood control, habitat protection, groundwater recharge, and other sustainable development principles and policies.

In addition, the Project would contribute to attainment of several of the Guiding Principles established by ConnectMenlo, as described below:

- Citywide Equity – the Project proposes to use the City's bonus level development provisions, which requires providing community amenities. The Project proposes to pay the City's in-lieu fee to support off-site development of community amenities.
- Healthy Community – the Project would support the City's Healthy Community goals by implementing a TDM plan to reduce total traffic trips, particularly single-occupancy vehicle trips; providing approximately 59,344 square feet of open space, of which approximately 31,535 square

feet would be accessible to the public; providing landscaping throughout the site using drought tolerant plantings and trees, with a total of145 new trees planted; providing public water/drinking fountains, ornamental areas with natural rocks, and games such as ping pong and cornhole would also be incorporated throughout the site; and incorporating a range of sustainability features within the proposed buildings.

- Competitive and Innovative Business Destination – the Project would support increased economic and innovative business activity by replacing 90,631 square feet of single-story office, R&D, and storage buildings that were constructed in the 1960s with 228,081 square feet of modern R&D space that could attract new biotech and other life sciences employers to the city.
- Accessible Open Space – as noted above, the Project would provide approximately 59,344 square feet of open space, of which approximately 31,535 square feet would be accessible to the public. The publicly accessible open space would include flex turf space, meandering pedestrian walkways/paths, gathering/event space, a sports court, and seating on benches and at tables, public water/drinking fountains, ornamental areas with natural rocks, and games such as ping pong and cornhole. The private open space would include roof decks with trellises, seating and tables, and planting areas.
- Sustainable Environmental Planning – as discussed in Section 2.4.7, the Proposed Project would include a range of sustainability features, including a 5 kilowatt rooftop photovoltaic system; attaining LEED Gold and Silver standards; providing EV charging infrastructure and bicycle parking; using building coatings and sealants that are low volatile organic compound-emitting; providing enhanced ventilation, filtration and cleaning products to maintain high quality indoor environments; implementing a TDM plan and zero-waste management plan; compliance with the City's requirements for use of renewable energy and/or purchase of renewable energy credits; reducing the amount of impervious surface within the site and installing bioretention basins to treat stormwater; and using drought tolerant/low-water use planting materials.

Conclusion

The physical and regulatory conditions related to land use plans and policies have not changed in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. Through the City's project review and approval process, City staff and decision makers will ensure that the Project is consistent with all applicable General Plan and Municipal Code policies and regulations. This impact would be **less than significant,** consistent with the findings of the ConnectMenlo EIR. No further study is required.

3.12 Mineral Resources

	Further Evaluation Needed in EIR	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XII. MINERAL RESOURCES – Would the project:					
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☐	☒
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☐	☒

Environmental Setting

There are no known mineral resources within the vicinity of the Project site nor is it identified as a locally important site for mineral resources by the California Geological Survey (CGS). The CGS has classified the Project site as Mineral Resource Zone-1, which is an area "where adequate information indicates that no significant mineral deposits are present, or where it is judged that little likelihood exists for their presence" (CGS 1987).

General Plan Goals and Policies

There are no City General Plan goals or policies that are applicable to consideration of the Proposed Project's effects related to mineral resources.

Environmental Checklist and Discussion

a) Would the project result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?

Analysis in the ConnectMenlo EIR

This checklist item was analyzed in the ConnectMenlo EIR in the Impacts Found Not to be Significant discussion (Section 6); it was determined that the ConnectMenlo project would result in no impact to mineral resources. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

The Project site is currently developed and there are no known mineral resources on the site or within the vicinity of the Proposed Project. The Project site is not delineated as a locally important mineral resource by the CGS or on any County or City land use plan. Additionally, the City of Menlo Park has zoned this location for Life Science uses rather than designating it as a source of mineral resources.

Conclusion

The physical conditions related to mineral resources have not changed in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. There are no known mineral resources at or near the Project site and the Project would have **no impact,** consistent with the findings of the ConnectMenlo EIR. No further study is required.

*b) **Would the project result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?***

Analysis in the ConnectMenlo EIR

This checklist item was analyzed in the ConnectMenlo EIR in the Impacts Found Not to be Significant discussion; it was determined that there would be no impact to locally important mineral resource recovery sites. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

As discussed above, there are no known mineral resources at or near the Project site. The site is not identified as a locally important mineral resource recovery site in any local land use plans.

Conclusion

The physical conditions related to mineral resources have not changed in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Project site is not identified as a locally important mineral resource recovery site and the Project would have **no impact,** consistent with the findings of the ConnectMenlo EIR. No further study is required.

3.13 Noise

	Further Evaluation Needed in EIR	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XIII. NOISE – Would the project result in:					
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☒	☐	☐	☐
b) Generation of excessive groundborne vibration or groundborne noise levels?	☐	☒	☐	☐	☐

	Further Evaluation Needed in EIR	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☐	☒

Environmental Setting

As discussed in more detail, below, this topic will be analyzed in the focused EIR for this Project. The focused EIR will include a description of the existing noise setting for the Project area.

General Plan Goals and Policies

General Plan goals and policies related to evaluation of the Project's potential noise impacts will be outlined and discussed in the focused EIR.

Environmental Checklist and Discussion

a-b) ***Would the project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies; or result in generation of excessive groundborne vibration or groundborne noise levels?***

Analysis in the ConnectMenlo EIR

These checklist items were analyzed in the ConnectMenlo EIR as Impacts NOISE-1, NOISE-2, NOISE-3, and NOISE-7. Impacts related to generation of temporary or permanent ambient noise levels in excess of standards were determined to be less than significant with the application of Mitigation Measures NOISE-1a, NOISE-1b, and NOISE-1c in addition to compliance with City General Plan goals and policies. Impacts related to generation of groundborne vibration and noise were determined to be potentially significant. Implementation of Mitigation Measures NOISE-2a and NOISE-2b were determined to reduce potentially significant impacts to a less-than-significant level (City of Menlo Park 2016b).

Project-Specific Discussion

Although the physical conditions have not changed substantially in the ConnectMenlo EIR study area since preparation of the ConnectMenlo EIR, the ConnectMenlo EIR requires project-specific technical analysis to evaluate the potential noise impacts. The focused EIR will demonstrate compliance with ConnectMenlo Mitigation Measures NOISE-1a (preparation of acoustical studies), NOISE-1b (compliance with Municipal Code), NOISE-1c (implement construction-related noise measures), NOISE-2a (preparation of noise and

vibration analysis), and NOISE-2b (implement building location and design measures). The focused EIR will also identify additional mitigation measures if necessary to reduce significant impacts.

Conclusion

The Project's potential to result in significant noise impacts requires **further environmental review** and will be addressed in the focused EIR. As noted in Chapter 1, Introduction, the terms of the 2017 *City of East Palo Alto v. City of Menlo Park* Settlement Agreement requires that a project-level EIR be prepared to evaluate potential effects related to population and housing and transportation, regardless of whether this Proposed Project is within the scope of the ConnectMenlo EIR. The analysis of the Project's potential noise impacts requires detailed modeling based in part on the Project's Transportation Impact Analysis. Thus, the required additional technical analysis of GHG emissions and impacts will also be presented in the focused EIR.

c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

Analysis in the ConnectMenlo EIR

This checklist item was analyzed in the ConnectMenlo EIR as Impacts NOISE-5 and NOISE-6. Impacts related to exposure of excessive noise levels within the vicinity of a private airstrip, public airport, or airport land use plan area were determined to result in less-than-significant impacts. No mitigation measures were required (City of Menlo Park 2016b)

Project-Specific Discussion

The Project is not adjacent to a public use airport and conditions related to airports and airstrips have not changed in the ConnectMenlo EIR study area since preparation of the ConnectMenlo EIR. As stated in the ConnectMenlo EIR, there are no private airstrips located within Menlo Park. In addition, there are no areas of Menlo Park which fall within an airport land use plan for a nearby public use airport. The Project site is located approximately 4 miles from Palo Alto Airport; this area is not included in the airport's influence area, nor is it within the airport's 55-decibel (dB) noise contour.

Conclusion

The physical conditions related to the exposure of people to excessive noise from airports or airstrips have not changed in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur; therefore, there would be no new site-specific effects as a result of the Project. Implementation of the Proposed Project would therefore not expose people residing or working in the Project area to excessive noise levels and would have **no impact** associated with airport and airstrip noise, consistent with the findings of the ConnectMenlo EIR. No further analysis is required.

3.14 Population and Housing

	Further Evaluation Needed in EIR	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XIV. POPULATION AND HOUSING – Would the project:					
a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☒	☐	☐	☐	☐
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☒	☐	☐	☐	☐

Environmental Setting

As discussed in more detail, below, this topic will be analyzed in the focused EIR for this Project. The focused EIR will include a description of the existing population and housing setting for the Project area.

General Plan Goals and Policies

General Plan goals and policies related to evaluation of the Project's potential impacts related to population and housing will be outlined and discussed in the focused EIR.

Environmental Checklist and Discussion

a and b) Would the project induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)? Would the project displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?

Analysis in the ConnectMenlo EIR

These topics were analyzed in the ConnectMenlo EIR as Impacts POP-1, POP-2, and POP-3 and impacts were determined to be less than significant. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

The Project would construct two new 4 and 5 story R&D buildings, which would generate new employees. Although the Project would not result in onsite residential population increases, the new employees could generate households within the city and the region. Since adoption of the ConnectMenlo General Plan Update, redevelopment has occurred and is continuing throughout the Bayfront Area and in the Project

region, which has altered the population and housing conditions. In compliance with the 2017 City of East Palo Alto v. City of Menlo Park Settlement Agreement, a Housing Needs Assessment will be prepared for the Project and the focused EIR will evaluate population growth in more detail.

Conclusion

The Project's potential to result in significant population and housing impacts requires **further environmental review** and will be addressed in the focused EIR, as required by the 2017 *City of East Palo Alto v. City of Menlo Park* Settlement Agreement.

3.15 Public Services

	Further Evaluation Needed in EIR	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XV. PUBLIC SERVICES					
a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:					
Fire protection?	☐	☐	☐	☒	☐
Police protection?	☐	☐	☐	☒	☐
Schools?	☐	☐	☐	☒	☐
Parks?	☐	☐	☐	☒	☐
Other public facilities?	☐	☐	☐	☒	☐

Environmental Setting

Fire Protection

Fire protection services in the Project area are provided by the MPFPD. The MPFPD service boundary covers 30 square miles and includes Menlo Park, Atherton, and East Palo Alto plus some unincorporated areas in San Mateo County. The MPFPD currently serves approximately 90,000 people and in 2020, MPFPD responded to approximately 8,500 emergencies (MPFPD 2020a). MPFPD's adopted performance goal is to have a first-response unit arrive on the scene of all Code 3 (i.e., using warning lights and sirens) emergencies within 7 minutes from the time of the call to the dispatch center, 90 percent of the time. For the full response, the MPFPD's goal is to have all dispatched units arrive on the scene within 11 minutes from the time of the call to the dispatch center, 90 percent of the time (MPFPD 2020b). MPFPD's average response times fall under the currently adopted 7-minute standard for first-response units and 11-minute standard for all units (MPFPD 2021a).

In addition to fire prevention, the MPFPD is also responsible for providing emergency and disaster response, public education services, and community crisis management. The MPFPD includes the MPFPD Headquarters, located at 1700 Middlefield Road in the City of Menlo Park, as well as 7 stations which have been strategically placed

throughout the MPFPD's jurisdiction to provide the best response time. The nearest MPFPD station is Station 77, located approximately 0.5-mile northwest of the Project site.

The ConnectMenlo EIR stated that this Station 77 is in excellent condition, but MPFPD anticipated a need to expand or relocate the station to accommodate future fire protection and emergency service demand (City of Menlo Park 2016b). In MPFPD's fiscal year 2021/2022 budget, funding was allocated to construct a new mechanic shop and dorm at Station 77 (MPFPD 2021b). Station 77's primary response areas include the eastern portion of Menlo Park, the Belle Haven neighborhood, the Bayfront Area, and East Palo Alto. This station houses two units – Engine 77, which has a captain and two firefighters, one of which is a qualified engineer, and Rescue 77, which has one captain and one engineer. Each unit includes one licensed paramedic providing Advanced Life Support (MPFPD 2020a).

The MPFPD is organized into the following five Fire District Divisions: Administrative Services, Human Resources, Fire Prevention, Operations, and Support Services. MPFPD staff includes 12 chief officers, 30 captains, and 66 engineers/firefighters, for a total of 108 fire safety personnel, and 22 administrative support staff (MPFPD 2020a). MPFPD has a ratio of approximately 1.2 firefighters per 1,000 residents in the service area.

MPFPD receives approximately 91 percent of its general fund revenue from property taxes (MPFPD 2021b). Additionally, MPFPD adopted an Emergency Services and Fire Protection Impact Fee Program. If this program is adopted by the City, MFPFD could collect impact fees from developers to fund fire station improvements, additional apparatus and/or equipment, or other non-personnel requirements to ensure that MPFPD can maintain a high standard of service to properties within the district.

Police Protection

Police services in the vicinity of the Project site are provided by the Menlo Park Police Department (MPPD), which serves the city. The MPPD operates one station located at City Hall at 701 Laurel Street, approximately 2.0 miles southwest of the Project site and a substation and neighborhood service center located in the Belle Haven neighborhood approximately 1.4 miles east of the Project site. The MPPD station performs various law enforcement, code enforcement, traffic enforcement, investigative functions, and various administrative duties. The substation houses the MPPD's Code Enforcement Office and Community Safety Police Officer and provides officers a place to conduct interviews and meet with community members. MPPD has 43 sworn officers and 16.5 professional staff (City of Menlo Park 2019). With an estimated Citywide population in 2022 of 33,034 people, the current MPPD staffing ratio is 1.30 officers per 1,000 residents. MPPD also participates in a mutual-aid agreement with the local neighboring cities.

Schools

There are four elementary/middle school districts and one high school district within the City of Menlo Park. Public schools within the Project vicinity include Belle Haven and Costano elementary schools, Ceasar Chavez Ravenswood Middle School, and KIPP Valiant Community Preparatory School (a public charter school). The two public high schools nearest the site are TIDE Academy, located at 150 Jefferson Drive, approximately 1.4 miles west of the Project site, and Menlo-Atherton High School, located at 555 Middlefield Road in Atherton, located approximately 1.7 miles southwest of the Project site. In addition, the private Mid-Peninsula High School is located approximately 100 feet north of the Project site.

Parks

The Menlo Park Library and Community Services Department is responsible for providing recreational and cultural programs for residents of the city. Recreational facilities within the city currently include 17 parks, one recreation center, one public pool, three childcare centers, one gymnasium, and one gymnastics center. One new multiservice facility is currently under construction at 100 Terminal Ave and is scheduled to open in 2024; the new facility will include one gymnasium, one recreation center, one senior center and one aquatics center co-located in a single facility. The Menlo Park parks nearest the Project site are Hamilton Park, located approximately 1 mile driving distance to the northwest, and Karl E. Clark Park, located approximately 1.1 mile driving distance to the west. In addition, Jack Farrell Park is approximately 0.9 mile driving distance east in the City of East Palo Alto.

Libraries

The City has two libraries: the Belle Haven Branch Library on Ivy Drive, located approximately 0.5 mile west of the Project site, and Menlo Park Library, approximately 2 miles southwest of the site. The Belle Haven Branch Library will relocate to a newly constructed multiservice facility located at 100 Terminal Ave. in 2024.

General Plan Goals and Policies

The City's General Plan (specifically the Land Use Element, Open Space/Conservation Element, Noise Element, and Safety Element) contains general goals, policies, and programs that require local planning and development decisions to consider impacts on public services. The following General Plan goals, policies, and programs would serve to minimize potential adverse impacts on public services: Goal LU-1, Policy LU-1.1, Goal LU-4, Policy LU-4.5, Program LU-4.C, Goal LU-6, Policy LU-6.2, Goal LU-7, Policy LU-7.7, Goal CIRC-1, Policy CIRC-2.14, Goal CIRC-3, Goal S-1, Policy S-1.5, Policy S-1.29, Policy S-30, Policy S-1.38, Goal OSC-2, Policy OSC-2.1, Policy OSC-2.4, and Policy OSC-2.6.

Environmental Checklist and Discussion

a) ***Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:***

Fire protection?

Analysis in the ConnectMenlo EIR

This topic was analyzed in the ConnectMenlo EIR as Impact PS-1. The EIR determined that impacts related to the need for remodeled or expanded fire protection facilities in order to maintain acceptable service ratios, response times, or other performance standards would be less than significant. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

The Project site currently supports office and light industrial uses and the Proposed Project would replace the existing buildings with R&D buildings, with a net increase in building space of 137,450 square feet. Project implementation would increase employment at the Project site. At full buildout, it is estimated that

approximately 570 employees could occupy the Project site, assuming one employee for each 400 square feet of building space. Currently some of the existing building space at the Project site is vacant and other spaces are occupied by businesses that have a lower ratio of employees per square foot. However, using the same ratio, the square footage of existing buildings could accommodate up to 227 employees. Thus, the Project could increase the potential maximum onsite employment by approximately 343 people.

In addition, although the Proposed Project would not construct any housing and thus would not directly lead to increases in the City's residential population, the new employees at the site could generate additional households within the city and the MPFPD service area. Using the average of 1.85 workers per work household in San Mateo County, the Project would generate approximately 185 new households. On average, approximately 6.5 percent of the City's workforce also resides in the city; thus, the Project could generate 12 new households within the City limits. Based on the City's current household size of 2.5 persons, these 12 new households would accommodate approximately 30 new permanent residents. These population estimates will be refined in the Housing Needs Assessment that will be prepared for the Project and discussed in the focused EIR.

Combined, the new residents and new employees would constitute a new population within the MPFPD service area of approximately 373 people. This represents approximately 0.4 percent of the current population within the MPFPD service area and would not alter the current ratio of firefighters to population.

Further, construction and operation of the Project would be required to comply with all applicable MPFPD codes and regulations as well as standards related to fire hydrants (e.g., fire-flow requirements, spacing requirements), the design of driveway turnaround and access points, and other fire code requirements. For example, the MPFPD Fire Prevention Code, Section 903.2, requires automatic fire sprinkler protection for commercial occupancies that are more than 5,000 gross square feet if the building is 40 feet or taller. Because the Project is consistent with the land use and zoning designations for the site and the Project design would comply with existing fire codes and regulations, and because the population increase associated with the Project would not affect MPFPD staffing ratios, the Project would not require the provision of new or altered fire protection facilities. The Project would increase the amount of building space within the Project, replacing buildings that are more than 50 years old with modern R&D buildings and amenities. This would increase the property value and the associated property tax assessment for the site, A portion of the additional property taxes would contribute to the MPFPD General Fund, which could be used to support implementation of the MPFPD capital improvement plan.

Conclusion

The physical conditions related to fire protection services have not changed substantially in the Project vicinity since preparation of the ConnectMenlo EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Project would not result in substantial adverse environmental impacts associated with the provision of new or physically altered fire and emergency service facilities in order to maintain acceptable service ratios, response times, or other performance objectives. Fire service impacts as a result of the Project would be **less than significant**, consistent with the findings of the ConnectMenlo EIR. No further study is required.

Police protection?

Analysis in the ConnectMenlo EIR

This topic was analyzed in the ConnectMenlo EIR as Impact PS-3. The EIR determined that impacts related to police protection would be less than significant because the MPPD would be able to address issues related to maintaining adequate response times for the proposed development through staffing rather than facility expansion. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

As noted in the fire protection services discussion above, the Proposed Project would replace existing office and light industrial buildings at the site with larger R&D buildings, which would increase employment at the Project site. As discussed above, the Project could increase employment onsite by approximately 343 people. When calculating the service population, the MPPD considers employees who work in Menlo Park as one-third of a resident; thus, the Project would generate approximately 113 additional daytime residents. In addition, the new employees at the site could generate an estimated 12 additional households within the city accommodating approximately 30 new permanent residents, for a total population increase for the purposes of police protection services of 143 people. This would represent a 0.4 percent increase in the service population for MPPD and would not alter the current ratio of officers to population.

Police surveillance in the Project area would continue, including routine patrols and responses to calls for assistance. The Project would not require the MPPD to expand its current service boundary. Therefore, based on the existing service levels and the levels anticipated under the Proposed Project, it is not expected that new police facilities would be required.

Conclusion

The physical conditions related to police protection services have not changed substantially in the Project vicinity since preparation of the ConnectMenlo EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. Based on current service levels and the service levels expected to occur under the Project, Project would not require the provision of new or altered MPPD facilities. Police protection impacts as a result of the Project would be **less than significant**, consistent with the findings of the ConnectMenlo EIR. No further study is required.

Schools?

Analysis in the ConnectMenlo EIR

This topic was analyzed in the ConnectMenlo EIR as Impact PS-8 and impacts were determined to be less than significant impact because all future development would be required to pay adopted school impact fees. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

The Proposed Project would redevelop the Project site, demolishing 90,631 square feet of office and light industrial buildings and constructing 228,081 new square feet of R&D uses. The Sequoia Union High School District (SUHSD) and Ravenswood City School District have adopted developer impact fees that are applicable to residential and commercial land uses. As of 2022, the fee for commercial land uses is $0.78 per square foot, of which Ravenswood City School District receives $0.516 and SUHSD receives $0.264 (SUHSD 2022). State law mandates that payment of the adopted fees is sufficient to mitigate the demands for additional school space that may be attributed to population growth related to the Proposed Project.

Conclusion

The physical conditions related to school capacity and enrollment have not changed substantially in the Project area since preparation of the ConnectMenlo EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. At the time that building permits are issued, the Proposed Project would pay the adopted developer impact fees for both of the school districts in which the Project site is located. Consistent with State law, payment of these fees would ensure that that the Project's impacts related to school capacity and enrollment would be **less than significant**, consistent with the findings of the ConnectMenlo EIR. No further study is required.

Parks?

Analysis in the ConnectMenlo EIR

This topic was analyzed in the ConnectMenlo EIR as Impacts PS-5 and PS-6. The EIR determined that buildout under the ConnectMenlo project would result in less than significant impacts to parks. The EIR noted that future development would be required to comply with existing regulations to minimize impacts related to park and recreational services and facilities. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

As discussed above, the Project is estimated to generate 343 new employees and 30 new residents within the city. The ConnectMenlo EIR reported that there were approximately 31,920 jobs in the study area for that EIR in 2015 and projected that new Bayfront development under ConnectMenlo could accommodate 5,500 new jobs (City of Menlo Park 2016b). The increased employment capacity of the Proposed Project represents approximately 6 percent of the new Bayfront Area employment identified in the ConnectMenlo EIR. The Proposed Project would also increase the City's residential population by 0.1 percent. The minimal increase in employees and residents would not substantially increase use of parks in the Project area. Further, as described in Section 2, Project Description, the Project would include 59,334 square feet of open space of which approximately 31,535 square feet would be accessible to the public. As such, the Project is not anticipated to increase the use of existing parks and recreational resources within the city such that substantial physical deterioration would occur.

Conclusion

The physical conditions related to parks have not changed substantially in the Project vicinity since preparation of the ConnectMenlo EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Proposed Project would not substantially increase employment or residential population within the city and would include publicly accessible open space within the site. The Project would not substantially increase use of existing parks and would not require development of new parks. As such, the impact of the Project on existing park and recreational resources would be less than significant, consistent with the findings of the ConnectMenlo EIR. Refer to Section XV, Recreation, for additional analysis of impacts on parks. No further study is required.

Other public facilities?

Analysis in the ConnectMenlo EIR

This topic was analyzed in the ConnectMenlo EIR as Impact PS-10 and the impact was determined to be less than significant. The EIR stated that future development would be required to comply with existing regulations to minimize impacts related to other facilities, including library services. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

As discussed above, the Project is estimated to increase employment in the city by approximately 343 employees and increase the City's residential population by 30 people. This minimal increase is not expected to result in adverse impacts related to existing public library facilities. It is anticipated that the existing libraries within the city would continue to be able to serve City residents, including the minimal increase resulting from Project implementation.

Conclusion

The physical conditions related to libraries and other public facilities have not changed substantially in the ConnectMenlo EIR study area since preparation of the ConnectMenlo EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Proposed Project would not substantially increase employment or residential population within the city and thus would not substantially increase use of existing libraries and other public facilities or require development of new libraries and other public facilities. As such, the impact of the Project on other public facilities would be less than significant, consistent with the findings of the ConnectMenlo EIR. No further study is required.

3.16 Recreation

	Further Evaluation Needed in EIR	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XVI. RECREATION					
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒	☐
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☐	☒	☐

Environmental Setting

The Menlo Park Library and Community Services Department (Department) is responsible for providing recreational and cultural programs for City residents. The City has 17 parks and open spaces totaling approximately 222 acres and 10 recreational program facilities including a gymnastics center, a gymnasium, a recreation center, three child care centers, and one community pool. One new multiservice facility is currently under construction at 100 Terminal Ave and is scheduled to open in 2024; the new facility will include one gymnasium, one recreation center, one senior center and one aquatics center co-located in a single facility (Menlo Park Community Campus). The Belle Haven Child Development Center is located on Ivy Drive approximately 0.8 miles from the Project site. The City also has joint-use agreements with four school districts that allow use of sports fields, sports courts, and playgrounds at five schools.

Regional parks in the vicinity include Bedwell Bayfront Park, located at 1600 Marsh Road and consisting of approximately 160 acres, Don Edwards San Francisco Bay National Wildlife Refuge, which is located adjacent to Bedwell Bayfront Park, and the 26-acre Flood Park, which is a San Mateo County facility located on Bay Road. Bedwell Bayfront Park and the Don Edwards San Francisco Bay National Wildlife Refuge provide trails, wildlife viewing, and other passive recreation opportunities. Flood Park provides both passive and active recreation opportunities.

The City has adopted a goal of maintaining a ratio of 5 acres of developed parkland per 1,000 residents (City of Menlo Park 2016a).

General Plan Goals and Policies

The City's General Plan (specifically the Land Use Element, Open Space/Conservation Element, Noise Element, and Safety Element) contains general goals, policies, and programs that require local planning and development decisions to consider impacts on recreational resources. The following General Plan goals, policies, and programs would serve to minimize potential adverse impacts on recreational resources: Goal LU-4, Policy LU-4.5, Goal LU-6, Policy LU-6.2, Goal OSC-2, Policy OSC-2.1, Policy OSC-2.4, and Policy OSC-2.6.

Environmental Checklist and Discussion

a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

Analysis in the ConnectMenlo EIR

This topic was analyzed in the ConnectMenlo EIR as Impact PS-6. The EIR determined that impacts would be less than significant because at full buildout under ConnectMenlo, the City would have a parkland ratio of 5.2 acres per 1,000 residents, which would exceed the standard established in the City's General Plan Policy OSC-2.4 of maintaining a ratio of 5 acres of developed parkland per 1,000 residents, because all new development projects would be required to provide publicly-accessible open space within each project site, and the increased population in the area would not lead to substantial increases in the use of parks and recreation facilities that could lead of physical deterioration of those facilities. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

As discussed in Section 3.15, the Proposed Project is estimated to generate approximately 343 new employees at the Project site and could lead to 12 new residential households within the city, which would accommodate approximately 30 people. The ConnectMenlo EIR projected that new Bayfront development under ConnectMenlo could accommodate 5,500 new jobs (City of Menlo Park 2016b). The increased employment capacity of the Proposed Project represents approximately 6 percent of the new Bayfront Area employment identified in the ConnectMenlo EIR. The Proposed Project would also increase the City's residential population by 0.1 percent. These employees and residents could use nearby parks as well as other open space and recreation resources in and around Menlo Park, however the minimal increase in employees and residents would not substantially increase use of parks in the Project area and would not cause the City to fall below its adopted standard of providing 5 acres of parkland for every 1,000 residents. In addition, the Proposed Project would provide a total of 59,344 square feet of open space, of which 31,535 square feet would be publicly accessible. While Project implementation may result in minor increases in existing park/recreational users within the Project area, the Project includes open spaces that would be available to both building tenants as well as public users. As a result, the Project is not expected to increase the use of existing recreational facilities such that the physical deterioration of such facilities would occur or be accelerated.

Conclusion

The physical conditions relate to parks and recreation facilities have not changed substantially in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Project would not result in a substantial increase in recreational users such that the physical deterioration of recreational facilities would occur or be accelerated. Therefore, the impact of the Project on existing park and recreational resources would **be less than significant,** consistent with the findings of the ConnectMenlo EIR. No further study is required.

b) Does the project include recreational facilities or require the construction or expansion of recreational facilities, which might have an adverse physical effect on the environment?

Analysis in the ConnectMenlo EIR

This topic was analyzed in the ConnectMenlo EIR as Impact PS-6 and impacts were determined to be less than significant because at full buildout under ConnectMenlo, the City would have a parkland ratio of 5.2 acres per 1,000 residents, which would exceed the standard established in the City's General Plan Policy OSC-2.4 of maintaining a ratio of 5 acres of developed parkland per 1,000 residents. Thus, buildout under ConnectMenlo would not require new development or expansion of parks and recreational facilities. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

The Proposed Project would not construct any new or expanded park or recreational facilities. The Project would include approximately 59,344 square feet of open space and landscaping, of which 31,535 square feet would be publicly accessible. Environmental effects of construction and operation of the open space component is evaluated as part of the assessment of the overall Project impacts throughout this Initial Study. Further, because the Project would not cause substantial residential or employment growth in the city, it would not necessitate the construction of additional recreational facilities or expansion of existing recreational facilities within the Project area.

Conclusion

The physical conditions related to park and recreational facilities have not changed substantially in the Project vicinity since preparation of the ConnectMenlo EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Project would not result in a substantial increase in recreational users such that construction or expansion of recreational facilities would be necessary. The City's standard of maintaining 5 acres of parkland for every 1,000 residents would be attained. Therefore, the impact of the Project on existing park and recreational resources would **be less than significant,** consistent with the findings of the ConnectMenlo EIR. No further study is required.

3.17 Transportation

	Further Evaluation Needed in EIR	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XVII. TRANSPORTATION – Would the project:					
a) Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities?	☒	☐	☐	☐	☐

	Further Evaluation Needed in EIR	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
b) Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision(b)?	☒	☐	☐	☐	☐
c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☒	☐	☐	☐	☐
d) Result in inadequate emergency access?	☒	☐	☐	☐	☐

Environmental Setting

As discussed in more detail, below, this topic will be analyzed further in the focused EIR. The focused EIR will include a description of the existing transportation setting for the Project area.

General Plan Goals and Policies

General Plan goals and policies related to evaluation of the Project's potential transportation impacts will be outlined and discussed in the focused EIR.

Environmental Checklist and Discussion

a-d) ***Would the project conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities? Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)? Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)? Result in inadequate emergency access?***

Analysis in the ConnectMenlo EIR

The ConnectMenlo EIR identified significant and unavoidable impacts related to increased delays of peak hour motor vehicle traffic at some study intersections and to routes of regional significance. However, changes in the CEQA Statute and CEQA Guidelines that have been adopted since preparation of the ConnectMenlo EIR prohibit use of intersection delay and level of service metrics to identify environmental effects. Instead, the metric of vehicle miles traveled has been established as the appropriate metric for determining potentially significant environmental impacts related to transportation.

Project-Specific Discussion

A Transportation Impacts Analysis will be prepared for the Proposed Project and will be included in the focused EIR. The analysis will include consideration of vehicle miles traveled, public transit, and non-motorized transportation. For informational purposes and to evaluate consistency with City planning documents, the Transportation Impacts Analysis will also consider intersection delay and levels of service.

The Transportation Impacts Analysis is currently anticipated to include analysis of the following 2 roadway sections and 12 intersections:

Roadway Segments

- O'Brien Drive between Willow Road and Kavanaugh Drive
- O'Brien Drive between University Avenue and Kavanaugh Drive

Intersections

1. Willow Road and Bayfront Expressway (Menlo Park)
2. Willow Road and Hamilton Avenue (Menlo Park)
3. Willow Road and Ivy Drive (Menlo Park)
4. Willow Road and O'Brien Drive (Menlo Park)
5. Willow Road and Newbridge Street (Menlo Park)
6. Willow Road and US 101 Northbound Off-ramp (Menlo Park)
7. Willow Road and US 101 Southbound Off-ramp (Menlo Park)
8. O'Brien Drive and Kavanaugh Drive (Menlo Park)
9. University Avenue and Bayfront Expressway (East Palo Alto)
10. University Avenue and Adams Drive (East Palo Alto)
11. University Avenue and O'Brien Drive (East Palo Alto)
12. University Avenue and Kavanaugh Drive (East Palo Alto)

Conclusion

The Project's potential to result in significant population and housing impacts requires **further environmental review** and will be addressed in the focused EIR, as required by the 2017 *City of East Palo Alto v. City of Menlo Park* Settlement Agreement.

3.18 Tribal Cultural Resources

	Further Evaluation Needed in EIR	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XVIII. TRIBAL CULTURAL RESOURCES					
Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:					

	Further Evaluation Needed in EIR	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or	☐	☐	☒	☐	☐
b) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1? In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☐	☒	☐	☐

Environmental Setting

The Project site and the surrounding area has been developed since the 1960s. The Project site currently features office and light industrial uses. Implementation of the Project would require the demolition of existing buildings as well as importing fill soil to raise the site elevation sufficient to ensure that proposed ground-level building floors would be raised 2 feet above the 12.8 feet FEMA base flood elevation, per the requirements of Menlo Park Municipal Code Section 16.44.130(4).

CEQA defines a tribal cultural resource as a site, feature, place, cultural landscape, sacred place, or object with cultural value to a California Native American tribe that is either included in or determined eligible for inclusion in the CRHR or a qualifying local historical register or determined by the lead agency to be significant pursuant to the criteria for listing in the CRHR, based on substantial evidence (Public Resources Code Section 20174[a]). A cultural landscape that meets this definition is a tribal cultural resource to the extent that the landscape is geographically defined in terms of size and scope (Section 20174[b]). A historical resource or archaeological resource that meets this definition may also be a tribal cultural resource (Section 20174[c]). As discussed in Section 3.5, Cultural Resources, no archaeological or historic resources have been identified within the Project site, but there is a potential for archaeological resources, which could be considered Tribal Cultural Resources, to be encountered during excavation and grading activities that would occur as part of Project construction.

The following tribes are traditionally and culturally affiliated with the Project region:

- Amah Mutsun Tribal Band;
- Costanoan Rumsen Carmel Tribe;
- Indian Canyon Mutsun Band of Costanoan;
- Muwekma Ohlone Indian Tribe of the San Francisco Bay Area
- Ohlone Indian Tribe

- Wuksache Indian Tribe/Eshom Valley Band; and
- Tamien Nation

The City provided notification of the Proposed Project to each of these tribes in November 2022. None of the tribes have requested consultation and no responses to the notifications were received.

The Bayfront Area of Menlo Park has been identified as archaeologically sensitive. The ConnectMenlo EIR notes that "artifacts from the lives of these early residents of what is now Menlo Park are still being discovered today. As recently as 2012, Native American remains were found at a construction site along Willow Road, in Menlo Park. Additionally, Native American remains were found at the Prologis commercial development site in the Bayfront Area" (City of Menlo Park 2016b). In addition, archival record searches indicate that there is a previously recorded multi-component (historic and pre-European contact) archaeological resource, referred to as the Hiller Mound, located within the Willow Village project site, which is approximately 500 feet north of the Proposed Project. The Willow Village Final EIR identifies that Basin Research Associates (Basin) prepared a Cultural Resources Assessment Report for that project, which included archival records reviews, literature review, and an enhanced archaeological identification program involving subsurface probing. Basin reported that the Hiller Mound has been extensively studied. The central portion of the resource site, referred to as the Core, represents the most archaeologically intact component of the resource. The Perimeter component is characterized by the presence of alluvial midden which reflects archaeological material has been displaced from the core through erosion, slope wash, and leveling of the Core that occurred during prior development activities at the site. Basin also noted that Native American remains were encountered at the Willow Village site during construction activities that occurred in 2017 (City of Menlo Park 2022b).

General Plan Goals and Policies

The City's General Plan (specifically the Land Use Element, Open Space/Conservation Element, Noise Element, and Safety Element) contains general goals, policies, and programs that require local planning and development decisions to consider impacts on cultural resources. The following General Plan goals, policies, and programs would serve to minimize impacts on cultural resources: Goal LU-7, Policy LU-7.8, Policy OSC-3, Policy OSC-3.1, Policy OSC-3.2, Policy OSC-3.3, Policy OSC-3.4, Policy OSC-3.4, Policy OSC-3.5, and Policy OSC-3.6.

Environmental Checklist and Discussion

Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

a) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k)?

Analysis in the ConnectMenlo EIR

Tribal cultural resources, as defined by Public Resources Code Section 21074, were analyzed in the ConnectMenlo EIR as Impact CULT-1. Impacts were determined to be less than significant with implementation of ConnectMenlo EIR Mitigation Measures CULT-2a, CULT-2b, and CULT-4, which define protocols to be followed in the event that archeological resources are found during construction, requirements for the City to notify Native American tribes about individual projects that propose a General

Plan Amendment and/or land use policy changes and consult with tribes when requested, and protocols to be followed in the event that human remains are encountered during construction (City of Menlo Park 2016b). At the time that the ConnectMenlo EIR was certified, Mitigation Measure CULT-2b defined Native American notification requirements that applied only to projects that propose a General Plan Amendment and/or land use policy changes, which this Proposed Project does not include. The Housing Element Update Subsequent EIR replaced the ConnectMenlo EIR Mitigation Measures CULT-2a and CULT-2b with Mitigation Measures CR-2a and CR-2b (City of Menlo Park 2023a); however, the Subsequent EIR Mitigation Measure CR-2a only applies to multi-family housing development projects and thus only Subsequent EIR Mitigation Measure CR-2b is applicable to the Proposed Project.

Project-Specific Discussion

The ConnectMenlo EIR identified that there are no resources listed in the CRHR or any local registers within the Project site. Further, as discussed in Section 3.5, a Built Environment Inventory and Evaluation Report (Appendix C) was prepared for the Project site, in compliance with ConnectMenlo EIR Mitigation Measure CULT-1. This report found that the properties that comprise the Project site are ineligible for listing in the NRHP and CRHR. Further, as noted above, the City provided notification of the Proposed Project in November 2022, in compliance with AB 52, to the Native American tribes that are traditionally and culturally affiliated with the Project area and no responses or requests for consultation were received. Thus, there are no known Tribal Cultural Resources or resources that are listed or eligible for listing in the CRHR within or adjacent to the Project site. However, as described in Section 3.5, Cultural Resources, Native American remains were found in the ConnectMenlo study area at a construction site along Willow Road in Menlo Park as recently as 2012. Other recent development projects in the Bayfront Area, including those within the vicinity of the Project site, have identified the known presence of pre-historic and historic-era archaeological resources as well as the potential to encounter subsurface archaeological features and/or deposits through construction activities (City of Menlo Park 2023). As such, it is possible that cultural resources and/or human remains of Native American descent could be discovered during Project construction earthmoving activities, and such resources would require evaluation to determine if they are eligible for listing in the CRHR.

Three of the Native American tribes that are traditionally and culturally affiliated with the Project region requested consultation with the City in regard to the Willow Village project and two tribes requested consultation with the City in regard to the 1125 O'Brien Drive project. Through those consultation processes, the tribes and the City developed mitigation measures that establish protocols to be followed during construction of the projects for which consultation occurred. Although no consultation was requested for the Proposed Project, this Initial Study incorporates the mitigation measures that were developed through the prior consultation processes as Mitigation Measures CULT-A and CULT-B. Implementation of these measures in addition to Housing Element Update Subsequent EIR Mitigation Measure CR-2b and ConnectMenlo EIR Mitigation Measure CULT-4 would ensure that significant impacts to cultural resources and tribal cultural resources are avoided.

Compliance with existing federal, state, and local laws and regulations, applicable ConnectMenlo EIR mitigation measures, the mitigation measures developed in prior tribal consultation processes, and the General Plan goals and policies listed above would protect any tribal cultural resources discovered at the Project site by requiring qualified professional assessment of discovered finds, cessation of work, appropriate notification to affiliated tribes, implementation of proper data recovery, and/or preservation procedures upon discovery of previously unknown resources.

Given the potential for resources that could be considered Tribal Cultural Resources and could be eligible for listing in the CRHR and/or could be Native American human remains to occur on the Project site that could be destroyed or disturbed during Project construction, the Project would have a **potentially significant** impact to Tribal Cultural Resources. Implementation of Housing Element Update Subsequent EIR Mitigation Measure CR-2b, ConnectMenlo EIR Mitigation Measure CULT-4, and Project-specific Mitigation Measures CULT-A and CULT-B, provided below and listed in Section 3.5, would ensure that impacts to Tribal Cultural Resources are avoided and/or reduced to a less-than-significant level.

Housing Element Update Subsequent EIR Mitigation Measure CR-2b: If pre-contact or historic-era archaeological resources are encountered during Project construction and implementation, the Project applicant shall halt all construction activities within 100 feet and notify the City. Pre-contact archaeological materials might include obsidian and chert flaked-stone tools (e.g., projectile points, knives, scrapers) or toolmaking debris; culturally darkened soil ("midden") containing heat-affected rocks, artifacts, or shellfish remains; and stone milling equipment (e.g., mortars, pestles, handstones, or milling slabs): and battered stone tools, such as hammerstones and pitted stones. Historic-era materials might include stone, concrete, or adobe footings and walls; filled wells or privies; and deposits of metal, glass, and and/or ceramic refuse. An archaeologist meeting the U.S. Secretary of the Interior's (Standards (SOIS) for Archeology shall inspect the findings and work shall be stopped within 100 feet of the potential archaeological resources until the material is either determined by the archaeologist to not be an archaeological resources or appropriate treatment has been enacted, with appropriate consultation, as needed.

If the City determines that the resource qualifies as a historical resource or a unique archaeological resource (as defined pursuant to the CEQA Guidelines) and that the Project has potential to damage or destroy the resource, mitigation shall be implemented in accordance with PRC Section 21083.2 and CEQA Guidelines Section 15126.4, with a preference for preservation in place. If preservation in place is feasible, this may be accomplished through one of the following means: (1) siting improvements to completely avoid the archaeological resource; (2) incorporating the resource into a park or dedicated open space, by deeding the resource into a permanent conservation easement; (3) capping and covering the resource before building the Project on the resource site after the resource has been thoroughly studied by a SOIS qualified archaeologist and a report written on the findings.

If preservation in place is not feasible, the City shall consult with California Native American tribes identified by the Native American Heritage Commissions (NAHC) to be affiliated with Menlo Park for the purposes of tribal consultation under Chapter 905, California Statutes of 2004 (if the resource is pre-contact or indigenous) to determine treatment measures to avoid, minimize, or mitigate any potential impacts to the resource pursuant to PRC Section 21083.2, and CEQA Guidelines Section 15126.4. This shall include documentation of the resource and may include data recovery (according to PRC Section 21083.2), if deemed appropriate by the archaeologist, in consultation with the City, or other actions such as treating the resource with culturally appropriate dignity and protecting the cultural character and integrity of the resource (according to PRC Section 21084.3).

ConnectMenlo EIR Mitigation Measure CULT-4: Procedures of conduct following the discovery of human remains have been mandated by Health and Safety Code Section 7050.5, Public Resources Code Section 5097.98 and the California Code of Regulations Section 15064.5(c) (CEQA). According to the provisions in CEQA, if human remains are encountered at the site, all work in the immediate vicinity of the discovery shall cease and necessary steps to ensure the integrity of the immediate area shall be taken. The San Mateo County Coroner shall be notified immediately. The Coroner shall then determine whether the remains are Native American. If the Coroner determines the remains are Native American, the Coroner shall notify the NAHC within 24 hours, who will, in turn, notify the person the NAHC identifies as the Most Likely Descendant (MLD) of any human remains. Further actions shall be determined, in part, by the desires of the MLD. The MLD has 48 hours to make recommendations regarding the disposition of the remains following notification from the NAHC of the discovery. If the MLD does not make recommendations within 48 hours, the owner shall, with appropriate dignity, reinter the remains in an area of the property secure from further disturbance. Alternatively, if the owner does not accept the MLD's recommendations, the owner or the descendent may request mediation by the NAHC.

Mitigation Measure CULT-A: Worker Environmental Training. Because of the potential for the discovery of unknown buried cultural, tribal cultural, archeological, and paleontological resources, prior to commencement of each phase of the Project, the general contractor and those engaged in ground-disturbing activities shall be given environmental training regarding cultural and paleontological resource protection, resource identification and protection, and the laws and penalties governing such protection. Specifications for archeological and tribal cultural resources sensitivity training for construction workers and superintendents shall meet the following standards:

- Occurs prior to the start of any ground-disturbing activity or site work on the Project Site or for off-site improvements.
- Training shall be required for all construction personnel participating in ground disturbing construction to alert them to the archaeological and tribal cultural sensitivity of the area and provide protocols to follow in the event of a discovery of archaeological materials or tribal cultural resources. Training shall be provided en masse to such personnel at the start of construction of each phase of the Project, and training shall be repeated when new personnel participating in ground-disturbing site work start work.
- Includes, for job site posting, a document ("ALERT SHEET") that summarizes the potential finds that could be exposed, the protocols to be followed, and the points of contact to alert in the event of a discovery that is presented as part of the training.
- Requires the contractor to ensure that all workers requiring training are in attendance.
- Requires training for all contractors and sub- contractors that is documented for each permit and/or phase of a permit that requires ground-disturbing activities onsite.

This training may be administered by the Project archaeologist and/or paleontologist as stand-alone training or included as part of the overall environmental awareness training required as a result of the Proposed Project. The training shall include, at minimum, the following:

- The types of cultural resources that are likely to be encountered,
- The procedures to be taken in the event of an inadvertent cultural resource discovery,
- The penalties for disturbing or destroying cultural resources,
- The types of fossils that could occur at the Project site,
- The types of lithologies in which the fossils could be preserved,
- The procedures that should be taken in the event of a fossil discovery; and
- The penalties for disturbing cultural, tribal cultural, archeologic, and palaeontologic resources.

Mitigation Measure CULT-B: Perform Construction Monitoring, Evaluate Uncovered Archaeological Features, and Mitigate Potential Disturbance for Identified Significant Resources at the Project Site. Prior to demolition, excavation, grading, or other construction-related activities on the Project site, the Project sponsor shall hire a qualified professional archaeologist (i.e., one who meets the Secretary of the Interior's professional qualifications for archaeology or one under the supervision of such a professional) to monitor, to the extent determined necessary by the archaeologist, Project-related earth-disturbing activities (e.g., grading, excavation, trenching). In the event that precontact or historic period subsurface archaeological features or deposits, including locally darkened soil (midden), that could conceal cultural deposits, animal bone, obsidian, and/or mortars are discovered during demolition or construction-related earthmoving activities, Housing Element Update Subsequent EIR Mitigation Measure CR-2b shall be followed. In addition, if the resource is a historic-era archaeological site or historic-era architectural feature and the archaeologist is not a historical archaeologist, the archaeologist shall notify the City Community Development Department and a historical archaeologist or architectural historian who meets the Secretary of the Interior's professional qualifications for archaeology and/or architectural history and that person shall follow the requirements of Housing Element Update Subsequent EIR Mitigation Measure CR-2b. Impacts on significant resources would be mitigated to a less-than-significant level through preservation in place, capping, data recovery or other methods determined adequate by the City that are consistent with the Secretary of the Interior's standards for archaeological documentation.

If Native American archaeological, ethnographic, or spiritual resources are discovered, all identification and treatment of the resources shall be conducted by a qualified archaeologist. The archaeologist shall notify persons who represent tribal governments on the City's AB 52 list and consult a representative of any tribe that responds to the notice within seven working days. In the event the archaeologist and tribe(s) disagree regarding treatment after good-faith consultation, the City shall make the final decision, considering the provisions of Public Resources Code Section 21084.3(b).

Conclusion

The physical conditions related to resources eligible for listing in the CRHR have not changed within or adjacent to the Project site since preparation of the ConnectMenlo EIR. New information has become available regarding Tribal Cultural Resources in the region, specifically that the Hiller Mound on the nearby Willow Village project site is considered to be a component of the ethnographic landscape associated with various mounds across the Bay Area region. However, there is no information showing that the Proposed Project site is a component of that landscape or supports any other Tribal Cultural Resources. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that this Project could result in more significant effects than those originally analyzed in the ConnectMenlo EIR. There are no known Tribal Cultural Resources within the Project site, however there is a potential for such resources to be encountered during grading and excavation activities. Project construction could adversely affect such resources if they are encountered. This impact would be avoided with implementation of ConnectMenlo EIR Mitigation Measure CULT-4 and Housing Element Update Subsequent EIR Mitigation Measure CR-2b in addition to Project-specific mitigation measures CULT-A and CULT-B; therefore, the Project would have a **less than significant impact with mitigation incorporated**, consistent with the findings of the ConnectMenlo EIR. No further study is required.

b) ***A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1? In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.***

Analysis in the ConnectMenlo EIR

This topic was analyzed in the ConnectMenlo EIR as Impact CULT-5. Impacts were determined to be less than significant with implementation of Mitigation Measures CULT-2a, CULT-2b, and CULT-4, as summarized above (City of Menlo Park 2016b). ConnectMenlo EIR Mitigation Measure CULT-2b does not apply to the Proposed Project because no General Plan Amendment or land use policy changes are proposed.

Project-Specific Discussion

As stated above, in compliance with AB 52, the City notified Native American tribes that are traditionally and culturally affiliated with the region of the Proposed Project and no responses have been received. Thus, there are no known Tribal Cultural Resources within or adjacent to the Project site. However, the potential exists for encountering as-yet unidentified resources during Project-related construction activities that could be considered a Tribal Cultural Resource by California Native American tribes. Thus, the Project would have a potentially significant impact to Tribal Cultural Resources. Implementation of ConnectMenlo EIR Mitigation Measure CULT-4 and Housing Element Update Subsequent EIR Mitigation Measure CR-2b in addition to Project-specific Mitigation Measures CULT-A and CULT-B, as provided in response (a) above, would ensure that impacts to Tribal Cultural Resources are avoided and/or reduced to a less-than-significant level.

Conclusion

The physical conditions related to Tribal Cultural Resources have not changed within or adjacent to the Project site since preparation of the ConnectMenlo EIR. New information has become available regarding Tribal Cultural Resources in the region, specifically that the Hiller Mound on the nearby Willow Village project site is considered to be a component of the ethnographic landscape associated with various mounds across the Bay Area region. However, there is no information showing that the Proposed Project site is a component of that landscape or supports any other Tribal Cultural Resources. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that this Project could result in more significant effects than those originally analyzed in the ConnectMenlo EIR. There are no known Tribal Cultural Resources within the Project site, however there is a potential for such resources to be encountered during grading and excavation activities. Project construction could adversely affect such resources if they are encountered. This impact would be avoided with implementation of ConnectMenlo EIR Mitigation Measure CULT-4 and Housing Element Update Subsequent EIR Mitigation Measure CR-2b in addition to the Project-specific Mitigation Measures CULT-A and CULT-B; therefore, the Project would have a **less than significant impact with mitigation incorporated,** consistent with the findings of the ConnectMenlo EIR. No further study is required.

3.19 Utilities and Service Systems

	Further Evaluation Needed in EIR	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XIX. UTILITIES AND SERVICE SYSTEMS – Would the project:					
a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	☐	☐	☐	☒	☐
b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry, and multiple dry years?	☐	☐	☐	☒	☐
c) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒	☐
d) Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☐	☐	☒	☐

	Further Evaluation Needed in EIR	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
e) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	☐	☐	☐	☒	☐

Environmental Setting

Water Service

MPMW is the water service provider in the Project area. MPMW's primary responsibilities are water distribution and maintenance. MPMW does not undertake water treatment because it purchases all of its potable water from the San Francisco Public Utilities Commission (SFPUC) as a member of Bay Area Water Supply and Conservation Agency (BAWSCA); water purchased from the SFPUC does not require further treatment (MPMW 2021). The MPMW distribution system consists of 59 miles of water mains, 4,200 metered connections, two reservoirs, and one pump station. The MPMW also maintains fire hydrants, flushing points, and service connections to the SFPUC, which controls access to water via the Hetch Hetchy aqueduct right-of-way through the City.

MPMW serves approximately 50 percent of the City's population. In 2020, this equated to about 18,276 residents in an approximately 9-square-mile area. The service territory is divided into the following three pressure zones, which are hydraulically disconnected from each other:

- The Lower Zone is generally located north and east of El Camino Real and includes part of the Belle Haven neighborhood, Bay Road, and Willows neighborhood. This area includes residential, commercial, and industrial land uses.
- The High Pressure Zone is located in the northern portion of the City between US 101 and the Bayfront Expressway. This zone serves multi-family residential, a mobile home park, commercial, and light industrial land uses.
- The Upper Zone is located in the southwest portion of the City near Interstate 280. It primarily serves the residential Sharon Heights neighborhood and business parks along Sand Hill Road (MPMW 2021).

MPMW is a member of BAWSCA, which represents MPMW and the 26 other water districts, cities, and private utilities in San Mateo, Santa Clara, and Alameda counties that purchase wholesale water from SFPUC. BAWSCA negotiates and coordinates with the SFPUC in the development of regional water demand and conservation projections and programs and long-term strategies and programs for improving water supply reliability, including SFPUC's efforts to develop alternative water supplies.

Water Supply and Demand

MPMW purchases all of its water supplies from the SFPUC. SFPUC owns and operates the Hetch Hetchy Regional Water System which serves 2.7 million customers in the San Francisco and Bay Area (SFPUC 2023). Currently, MPMW has a contractual supply of 4.456 million gallons per day (mgd), which is approximately 1,630 million gallons per year. This is expected to be sufficient to meet projected water demand through 2040 in normal water years

(MPMW 2021). The environmental impacts of supplying water within the Project region have been evaluated in other CEQA documents prepared by SFPUC and MPMW.

In its 2020 Urban Water Management Plan (UWMP), MPMW notes that its service area is largely built-out, thus population growth is expected to occur primarily through redevelopment projects, particularly within the Bayfront Area, consistent with the City's General Plan. MPMW also supplies water to commercial, industrial, and institutional customers and anticipates increases in the number of jobs in the service area. The UWMP projections for residential and employment growth through 2040 reflect the development potential established under ConnectMenlo, including anticipated growth in the commercial sector and declines in the industrial sector.

Total water demand within the MPMW service area was approximately 1,069 million gallons (MG) in 2020. Projected water demands are estimated to be 1,296 MG by 2025, 1,345 MG by 2030, 1,410 by 2035, and 1,483 MG by 2040. These estimates include both passive and active water conservation efforts (MPMW 2021). The 2020 UWMP indicates that, with water conservation measures implemented through its Water Shortage Contingency Plan (WSCP), the City would have water resources available to serve anticipated growth, which includes the growth anticipated as a result of buildout of the ConnectMenlo EIR. Table 3.19-1, Projected Water Demand and Supply, describes the projected future water demands and available supply through 2040 within the MPMW service area.

Table 3.19-1. Consecutive Dry Year Demand and Supply (million gallons per year)

		2025	2030	2035	2040
Total Base Demand		1,296	1,345	1,410	1,483
Total Supply/Shortage		—	—	—	—
Normal Year	Supply	1,678	1,750	1,750	1,750
First Dry Year	Supply	877	978	1,018	1,062
	Shortage	-419 (32 percent)	-367 (27 percent)	-392 (28 percent)	-422 (28 percent)
Second Dry Year	Supply	760	854	887	927
	Shortage	-536 (41 percent)	-491 (37 percent)	-523 (37 percent)	-557 (38 percent)
Third Dry Year	Supply	760	854	887	927
	Shortage	-536 (41 percent)	-491 (37 percent)	-523 (37 percent)	-557 (38 percent)
Fourth Dry Year	Supply	760	854	887	832
	Shortage	-536 (41 percent)	-491 (37 percent)	-523 (37 percent)	-652 (44 percent)
Fifth Dry Year	Supply	760	854	824	832
	Shortage	-536 (41 percent)	-491 (37 percent)	-585 (41 percent)	-652 (44 percent)

Source: MPMW 2021

Section 7 of the UWMP presents analysis of water supply reliability, including considerations of drought conditions, changes in water supply due to climate change, and uncertainties in water supply due to implementation of other water and environmental resource management efforts, such as the Bay-Delta Plan Amendment. The UWMP states that MPMW relied upon the water supply reliability projections provided by the SFPUC for this analysis.

A critical factor in this analysis is the future implementation of an amendment to the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (the Bay-Delta Plan Amendment), which was adopted to increase salmon populations in three San Joaquin River tributaries. However, as discussed further in the UWMP, several lawsuits have been filed challenging adoption of the Bay-Delta Plan Amendment, and the amendment is not self-implementing, meaning that water supply and river flow allocations would need to be developed through

other regulatory and/or adjudicatory proceedings. Thus, the actual and full effects of the Bay-Delta Plan Amendment is uncertain.

For regional planning, BAWSCA has developed water supply projections that reflect full implementation of the Bay-Delta Plan Amendment under the assumptions that a Voluntary Agreement between the SFPUC and the State Water Resources Control Board is not reached and that SFPUC's Alternative Water Supply Program is not implemented. Thus, the UWMP states that the water supply projections for single dry and multiple dry years reflect a worst-case scenario. Further, the UWMP notes that "without the Bay-Delta Plan Amendment SFPUC would be able to supply 100 percent of projected [Regional Water System] demands in all year types through 2045, except for the 4th and 5th consecutive dry year in 2045, during which 90 percent of projected" demands would be met. However, this is considered to be a "highly optimistic water supply reliability outcome" (MPMW 2021).

In addition, the UWMP recognizes that a variety of regional water planning efforts are currently underway that could affect water supply reliability (such as a potential Tuolumne River Voluntary Agreement and changes in BWSCA's and SFPUC's drought allocation methodology and plan). The UWMP states that modeling for scenarios that include the Tuolumne River Voluntary Agreement and SFPUC's Alternative Water Supply Program showed significantly improved water supply availability for the Regional Water System, however these elements are not incorporated in the water supply and demand projections in the UWMP. Additionally, the UWMP notes that "MPMW is working independently and with the other BAWSCA agencies to identify regional mitigation measures to improve reliability for regional and local water supplies and meet its customers' water needs. If conditions for large drought cutbacks to the [Regional Water System] persist, MPMW will need to implement additional demand management practices to invoke strict restrictions on potable water use and accelerate efforts to develop alternative supplies of water" (MPMW 2021).

To address the insufficient water supply for the single dry year and multiple dry year scenarios, the UWMP includes a Water Shortage Contingency Plan, which defines the policies and procedures to be implemented during dry years under specific water shortage level scenarios. The Water Shortage Contingency Plan includes six levels of actions that address shortage conditions associated with single and multiple dry years, including mandatory water use restrictions and supply augmentation actions tailored to each shortage condition level.

Based on the water demand and supply projections in the UWMP, MPMW has sufficient water in normal water years to meet projected demand through 2040. However, MPMW could experience water shortages at single dry years and in all years of a multiple dry year cycle. Water shortages would range from 27 percent to 44 percent. With implementation of MPMW's Water Shortage Contingency Plan, the shortages in multiple dry years would be managed through demand reductions sufficient to reduce the shortage amount by between 10 percent and 55 percent and supply augmentations and other policy actions that would reduce the shortage amount by between 5 percent to 45 percent (MPMW 2021).

This analysis of water supply reliability is confirmed in the Subsequent EIR for the City's Housing Element Update, which found that "while results of the projects, programs and plans and demand reductions cannot be quantified, it is reasonable to expect that many of the projects, programs and plans would be successful and additional water supplies and demand reductions can be obtained" (City of Menlo Park 2023a).

Groundwater

As discussed in Section 3.10, Hydrology and Water Quality, the Project region overlies the southern end of the San Mateo Plain Groundwater Subbasin of the Santa Clara Valley Groundwater Basin. MPMW does not utilize groundwater as a potable water source outside of emergency conditions. MPMW constructed one emergency

groundwater well facility in late 2020 and anticipates bringing this well online in 2023. MPMW also plans to construct an additional one or two wells to provide up to 3,000 gallons per minute of emergency potable and fire supply in the Lower Zone (MPMW 2021).

Wastewater

Wastewater collection services in the Project area are served by the West Bay Sanitary District (WBSD). The WBSD collection system conveys wastewater through the Menlo Park Pump Station located at the entrance to Bedwell Bayfront Park to the Silicon Valley Clean Water (SVCW) facilities in Redwood City for treatment and discharge to the San Francisco Bay (WBSD 2022). The Menlo Park Pump Station is located at the southernmost point of the SVCW conveyance system. SVCW is currently implementing planned rehabilitation for this station, the environmental effects of which were evaluated in an EIR that SVCW certified in 2017 (State Clearinghouse Number 2016022055). The planned rehabilitation includes replacing the pumps with lower pressure pumps that are appropriate for future flow rates and pressures, completing seismic upgrades to the existing structure, and upgrading the odor control electrical facilities control systems (SVCW 2017).

The SVCW wastewater treatment plant (WWTP) is jointly owned and operated by WBSD and the Cities of Redwood City, Belmont, and San Carlos as a joint powers authority. The SVCW WWTP is located at the northeastern end of Redwood Shores, approximately nine miles from the northeastern boundary of the MPMW service area. The treatment processes at the SVCW WWTP involve the following: primary sedimentation, dual secondary treatment with fixed film reactors and activated sludge, filtration, disinfection using sodium hypochlorite, and dechlorination with sodium bisulfide. Discharge of the advanced secondarily-treated effluent is permitted by the San Francisco Bay RWQCB (MPMW 2021).

A limited volume of wastewater is treated within the MPMW service area at the Sharon Heights Recycled Water Facility (RWF). The Sharon Heights RWF was constructed and managed by WBSD in coordination with MPMW. It is a 0.5 mgd satellite WWTP which produces tertiary-treated recycled water under Title 22 for reuse within MPMW's service area. In 2020, approximately 63 MG of wastewater was treated at the Sharon Heights RWF, among which 20 MG was recycled and the remaining 43 MG was conveyed to SVCW WWTP for discharge (MPMW 2021).

As discussed in the ConnectMenlo EIR, the SVCW WWTP has an existing dry weather capacity of 29 mgd and wet weather capacity of 71 mgd. The average monthly flow was 15.9 mgd, and the maximum daily flow was 48.8 mgd. Both rates are well within the 29 mgd average dry weather design flow and 71 mgd peak wet weather design flow. In 2020, WBSD conveyed 873 MG of water within the MPMW service area to the SVCW WWTP (City of Menlo Park 2016b).

Stormwater

As discussed in Section 3.10, Hydrology and Water Quality, the City's storm drain system is maintained by the Menlo Park Public Works Department and consists of 17 individual systems that serve 17 drainage areas. The Project site consists of a total of 146,555 square feet (approximately 4.22 acres), of which 145,237 square feet are covered with impervious surfaces. The site is drained by an existing on-site storm drain system that collects runoff from the building roofs, surface parking lots, and other hardscape areas into below-grade storm drains and discharges directly to storm drain mains within the adjacent streets. These existing mains include a 10-inch storm drain located along the northeastern portion of the site and a 10-inch drainage easement located along the eastern border of the existing 965 O'Brien Drive building.

Solid Waste

In 2019, a total of 34,913 tons of solid waste from the City were disposed of at 19 landfills, with the majority of waste being disposed of at the Ox Mountain Landfill. The Ox Mountain Landfill has a permitted throughput capacity of 3,598 tons per day. Its remaining permitted capacity is 22,180,000 cubic yards. The Ox Mountain Landfill has an estimated "cease operation date" of January 1, 2034 (CalRecycle 2021a).

The three landfills receiving the second, third and fourth largest amount of solid waste from Menlo Park in 2019 include:

Monterey Peninsula Landfill received 6,414 tons of Menlo Park solid waste in 2019 (CalRecycle 2019). The Monterey Peninsula landfill has a permitted throughput capacity of 3,500 tons per day, a remaining permitted capacity of 48,560,000 cubic yards, and an estimated "cease operation date" of February 28, 2107 (CalRecycle 2021b).

Altamont Landfill received 1,399 tons of Menlo Park solid waste in 2019 (CalRecycle 2019). The Altamont landfill has a permitted throughput capacity of 11,150 tons per day, a remaining permitted capacity of 65,400,000 cubic yards, and an estimated "cease operation date" of January 1, 2070 (CalRecycle 2021c).

John Smith Road Landfill received 1,298 tons of Menlo Park solid waste in 2019 (CalRecycle 2019). The John Smith Road landfill has a permitted throughput capacity of 1,000 tons per day, remaining permitted capacity of 1,921,000 cubic yards, and estimated "cease operation date" of August 1, 2025 (CalRecycle 2021d).

Energy and Natural Gas

The Project site is currently served by Pacific Gas and Electric Company (PG&E) for electrical and natural gas service. Existing electric infrastructure is located off of Willow Road. A 2- inch natural gas line is located along O'Brien Drive and Willow Road.

General Plan Goals and Policies

The City's General Plan (specifically the Land Use Element, Open Space/Conservation Element, Noise Element, and Safety Element) contains general goals, policies, and programs that require local planning and development decisions to consider impacts on utilities. The following General Plan goals, policies, and programs would serve to minimize potential adverse impacts on public stormwater and solid waste: Goal LU-4, Policy LU-4.5, Goal LU-6, Policy LU-6.11, Goal LU-7, Policy LU-7.1, Policy LUS-7.5, Goal OSC-4, Policy OSC-4.2, Policy OSC-4.6, Policy OSC-4.7, Policy OSC-4.8, Goal S-1, Policy S-1.26, and Policy S-1.27. Goals and policies related to water and wastewater will be discussed in the focused EIR.

Environmental Checklist and Discussion

a) Would the project require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?

Analysis in the ConnectMenlo EIR

These topics were analyzed in the ConnectMenlo EIR under Impacts UTIL-2, UTIL-4, UTIL-5, UTIL-11, and UTIL-13. Impacts were determined to be less than significant because no relocation or construction of new utility infrastructure and facilities would be needed to serve the growth in residential and employment

population accommodated by the development potential created under the ConnectMenlo project. It is expected that the City will implement General Plan programs that require expansion of MPMW conservation programs and future development to employ best practices for sustainable buildings and development to reduce water demand per capita. No mitigation measures were recommended. The ConnectMenlo EIR does not discuss impacts on telecommunication facilities.

Project-Specific Discussion

Water

As discussed in Section 2, Project Description, the MPMW 2018 Water System Master Plan identified a deficiency regarding the volume of water provided by the existing 10-inch water main within O'Brien Drive and found that a 12-inch main would be required to serve the O'Brien Drive life sciences service area. Accordingly, the City is in the process of developing a plan with property owners/project sponsors in the vicinity of the Project site for upsizing the existing water main. The water main would be upsized prior to occupancy of any new buildings within the life sciences service area. The Proposed Project's participation would be ensured through Project Conditions of Approval. The potential impacts and effects of the upgraded waterline in O'Brien Drive were analyzed in the Final EIR for the 1350 Adams Court Project (SCH#2018122017; City of Menlo Park 2022a), which was certified by the City in 2022 and is incorporated in this Initial Study by reference.

The Proposed Project would be consistent with the type and intensity of development and population projections assumed for the Project site in the ConnectMenlo EIR. The net increase in the number of employees (estimated to be 343 new employees as discussed in Section 3.15, Public Services) would not result in water use beyond the capacity of the existing water supply such that the need for expanded treatment facilities or regional water system conveyance and storage facilities would be required, however, the Project would be subject to the water-efficient landscaping and water efficiency measures in the Zoning Ordinance and Title 24.

Wastewater

As described in Section 2, Project Description, the site is currently served by existing wastewater infrastructure within the Project area. An existing 18-inch wastewater line is located within O'Brien Drive and an existing 8-inch wastewater line is located within Willow Road. Wastewater from the Project site would be conveyed through the Menlo Park Pump Station located at the entrance to Bedwell Bayfront Park to the SVCW WWTP in Redwood City for treatment and discharge to the San Francisco Bay (WBSD 2022). As previously discussed, multiple service connections to the new buildings would be made during construction of the Proposed Project.

The installation of new on-site service connections to the existing wastewater lines in O'Brien Drive and Willow Road would require excavation, trenching, soil movement, and other construction activities. Potential impacts related to Project construction are discussed in detail throughout this Initial Study and contemplated as part of overall Project implementation.

The ConnectMenlo EIR determined that the increase in wastewater flows from implementation of ConnectMenlo would add to the capacity demands on the WWTP and its conveyance system. However, the effect would not be substantial and would be integrated into ongoing planning and budgeting processes to

improve capacity, the conveyance system, and treatment processes (City of Menlo Park 2016b). As previously discussed, the Proposed Project would be consistent with the type and intensity of development and population projections assumed for the Project site in ConnectMenlo.

Stormwater

As described in Section 2, Project Description and discussed in Section 3.10, Hydrology and Water Quality, the site is currently served by existing stormwater infrastructure within the Project area. There is an existing 10-inch storm drain located along the northeastern portion of the site and a 10-inch drainage easement located along the eastern border of the existing 965 O'Brien Drive building. The Project would include construction of a new on-site storm drain system that would collect runoff from the limited areas of surface parking on the eastern side of the Project, drive aisles, building roofs, and hardscape areas and convey it to bioretention basins within landscaped areas for stormwater treatment prior to being discharged to the City's storm drain system. The Proposed Project would decrease the amount of impervious surfaces within the Project site by approximately 32,966 square feet, which would reduce the rate and volume of stormwater discharged from the site.

Installation of the new on-site stormwater treatment system would require excavation, trenching, soil movement, and other construction activities. Potential impacts related to Project construction are discussed in detail throughout this Initial Study and contemplated as part of overall Project implementation.

Energy and Natural Gas

As discussed in Section 3.6, Energy, electrical service to the Project site would be provided by either PCE or PG&E through existing infrastructure in the Project vicinity. As described in Section 2, Project Description, the site currently has an energy demand of 1,330 KW. Once operational, the Project site is expected to have an energy demand of 5,972 KW. As discussed in Section 2.4.7 of the Project Description, the Project would include sustainability features, including a 5-KW photovoltaic rooftop system, 100 percent renewable electric power (and/or purchase of renewable energy credits sufficient to meet Municipal Code requirements), as well as LEED Gold and LEED Silver building design for the 1005 O'Brien building and 1320 Willow Road building, respectively. These features would improve on-site energy efficiency. As demonstrated in Section 3.6, energy use at the site during construction and operation would not require new or expanded energy or natural gas infrastructure. Further, because the site is currently served and would continue to be served by PG&E and/or PCE, no new or expanded infrastructure associated with energy or natural gas services would be required.

Conclusion

The physical conditions related to water, wastewater treatment facilities, stormwater, natural gas, and energy have not changed substantially in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Proposed Project would require construction of new water supply connections, wastewater connections, and stormwater drainage facilities but would not lead to significant environmental impacts beyond the construction impacts discussed throughout this document. Impacts would be **less than significant**, consistent with the findings of the ConnectMenlo EIR. No further study is required.

b) Would the project have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?

Analysis in the ConnectMenlo EIR

This topic was analyzed in the ConnectMenlo EIR under UTIL-1 and impacts were determined to be less than significant. Buildout of ConnectMenlo would result in an increase in water demand of 343 million gallons per year (mgy), which represented 21 percent of the planning-level water demand forecast in the 2015 UWMP (the adopted UWMP at the time of publication of the ConnectMenlo EIR). The ConnectMenlo EIR concluded that the water supply would be adequate and able to meet increased demands in normal years as well as the additional demand generated by the increase in development associated with implementation of ConnectMenlo. The EIR also noted that future development under ConnectMenlo would be required to comply with existing regulations, including City General Plan policies and zoning requirements, to minimize impacts related to water supplies. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

As shown in Table 3.19-1, during normal years, MPMW would have sufficient water supply to meet projected demands, including the additional demand generated from buildout of the Bayfront Area under ConnectMenlo. However, during single dry and multiple dry years, MPMW's total annual water demand is estimated to exceed the total annual supply in year 2040 by approximately 422 million gallons per year (MGY) in a single dry year and 652 MGY in a 5th consecutive dry year. Buildout of ConnectMenlo would result in a daily demand of 343 MGY, which represents 23 percent of the planning-level water demand forecast in the 2020 UWMP. However, with the WSCP in place, the shortages in multiple dry years would be managed through demand reductions of up to 50 percent. In addition, although not required for the Proposed Project, MPMW is currently evaluating the feasibility of several other water supply projects, such as additional emergency water supply wells, that would help to supplement the water supply during dry years.

The ConnectMenlo EIR assumed that buildout of the ConnectMenlo project would result in 5,500 new employees within the MPMW service area. As discussed in Section 3.15, it is expected that the Proposed Project would generate up to 343 new employees. The Proposed Project is consistent with ConnectMenlo and the new employees onsite in addition to new employees at other project sites in the Bayfront Area would be within the range of employment growth projected in the ConnectMenlo EIR and the MPMW UWMP. Therefore, the water supply demand that would be generated by the Proposed Project would not cause the total water supply demand on MPMW from buildout of the General Plan to exceed the anticipated water supply demand evaluated in the UWMP. Additionally, the Proposed Project would replace two buildings constructed in the 1960s with new buildings that would have more efficient water fixtures and would be landscaped with water-conserving plant material and irrigation systems, in compliance with the Water-Efficient Landscape Ordinance.

As described in Section 2, Project Description, the Project would have a total estimated water demand of 20,245 gpd (7.39 MGY). As shown in Table 3.19-1, MPMW projects a normal year supply of 1,678 MG with an overall projected demand of 1,296 MG in 2025. The Project's water demand would represent approximately 2 percent of the excess water supply during a normal year in 2025. In the year 2025, the Project's water demand would represent 0.44 percent of MPMW's available supply during a normal year and 0.57 percent of the overall projected water demand. In the year 2040, the Project's water demand

would represent 0.42 percent of MPMW's available supply during a normal year, 0.7 percent of the available supply during a single-dry year, 0.89 percent of the available supply during a multiple-dry year, and 0.5 percent of the overall projected water demand. Because the Proposed Project would redevelop the site, replacing the existing office and light industrial uses with R&D uses, a portion of Project-generated water consumption would be offset by the current water consumption at the site associated with the existing uses. The MPMW account information for the existing buildings at the Project site show that approximately 192,262 gallons of water were used in 2022, which equate to approximately 527 gpd (Tarlton Properties 2023). It is noted that the account for 985 O'Brien Drive shows no water consumption for the last six months in the 12-month period used to calculate the existing annual water demand. Tarlton Properties confirmed that in 2022, approximately half of the 985 O'Brien Drive was vacant for 6 months, the spaces addressed as 1001-1015 O'Brien were 70% vacant the full year, and the building at 1320 Willow Road was approximately 48% vacant the full year. Thus, the historic annual water demand at the Project site would have been substantially higher than it was in 2022. Based on the 2022 water consumption, the Proposed Project would result in a net increase in water consumption of approximately 7.2 MGY; this is considered to be a conservative estimate of the net increase relative to historic water consumption at the Project site.

The Proposed Project would contribute to the forecasted water supply shortages in single and multiple dry years but would not exacerbate the short-term or long-term shortages beyond what is forecast in the UWMP. To address the insufficient water supply for the single dry year and multiple dry year scenarios, the UWMP includes a Water Shortage Contingency Plan, which defines the policies and procedures to be implemented during dry years under specific water shortage level scenarios. The Water Shortage Contingency Plan includes six levels of actions that address shortage conditions associated with single and multiple dry years, including mandatory water use restrictions and supply augmentation actions tailored to each shortage condition level. In addition to this, the MPMW UWMP notes that "MPMW is working independently and with the other BAWSCA agencies to identify regional mitigation measures to improve reliability for regional and local water supplies and meet its customers' water needs. If conditions for large drought cutbacks to the [Regional Water System] persist, MPMW will need to implement additional demand management practices to invoke strict restrictions on potable water use and accelerate efforts to develop alternative supplies of water" (MPMW 2021).

In conclusion, based on the water demand and supply projections in the UWMP, MPMW has sufficient water in normal water years to meet projected demand through 2040. However, MPMW could experience water shortages at single dry years and in all years of a multiple dry year cycle. Water shortages would range from 27 percent to 44 percent. With implementation of MPMW's Water Shortage Contingency Plan, the shortages in multiple dry years would be managed through demand reductions sufficient to reduce the shortage amount by between 10 percent and 55 percent and supply augmentations and other policy actions that would reduce the shortage amount by between 5 percent to 45 percent (MPMW 2021). Thus, the Project would not require expansion of water supply sources.

Conclusion

The physical conditions related to water supply and demand have not changed substantially in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The water demand associated with the Project is consistent with the assumptions in the ConnectMenlo EIR and the MPMW UWMP. Further, the Project would comply with regulations intended to

reduce potable water use and would implement water efficiency and sustainability measures. MPMW has sufficient water supply to serve the Project and other approved, pending and reasonably foreseeable development through normal, single-, and multiple-dry years through 2040. The Project impacts would be **less than significant,** consistent with the findings of the ConnectMenlo EIR. No further study is required.

c) Would the project result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

Analysis in the ConnectMenlo EIR

This topic was analyzed in the ConnectMenlo EIR under UTIL-6 and the impact was determined to be less than significant. Future development is expected to tie into existing wastewater infrastructure and facilities. The installation of extension lines, where needed, would comply with applicable sewer permits, which require projects to reduce impacts on service capacity. Projects would be required to comply with existing regulations that promote water conservation and minimize impacts related to wastewater generation and buildout of the General Plan under ConnectMenlo would not result in a demand for wastewater treatment that exceeds the WWTP capacity. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

As identified in the Environmental Setting discussion above, the SVCW WWTP has an existing dry weather capacity of 29 mgd and wet weather capacity of 71 mgd and is planned to be expanded to achieve a wet weather capacity of 80 mgd. The MPMW UWMP identifies that in 2020, WBSD collected approximately 873 million gallons of wastewater, which is approximately 2.4 mgd, from within the MPMW service area (MPMW 2021).

The ConnectMenlo EIR reported that in 2016 the SVCW WWTP had an average dry-weather flow of 15.9 mgd and a maximum daily flow of 48.8 mgd. The ConnectMenlo EIR determined that full buildout of ConnectMenlo would result in a net increase in the wastewater generation rate of 3.9 mgd, which would not be significant relative to the available 13 mgd in excess dry-weather flow capacity (City of Menlo Park 2016b). The Proposed Project would be consistent with the type and intensity of development as well as the employment projections assumed for the Project site in the ConnectMenlo EIR, and thus would not create a demand for wastewater treatment that exceeds the demand evaluated in the ConnectMenlo EIR.

As described in Section 2, Project Description, the Project would generate 11,696 gpd (0.011 mgd) of wastewater. The Project's wastewater generation would represent 0.04 percent of the SVCW WWTP's dry-weather flow capacity, 0.07 percent of the average dry weather flow, and 0.09 percent of SVCW WWTP's excess dry weather flow capacity. Because the Proposed Project would redevelop the site, replacing the existing office and light industrial uses with R&D uses, a portion of Project-generated water consumption would be offset by the current water consumption at the site associated with the existing uses. However, a wastewater budget for the existing uses is not available and thus the net increase in wastewater treatment demand has not been determined. Based on the Project's estimated wastewater treatment demand, the estimated wastewater treatment demand associated with buildout of ConnectMenlo, and the existing capacity of the SVCW WWTP, there is adequate wastewater treatment capacity available to serve the Proposed Project's projected demand in addition to the provider's existing and projected commitments.

Conclusion

The physical conditions related to wastewater treatment demand and capacity have not changed substantially in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Proposed Project would be consistent with the type and intensity of development as well as the employment projections assumed for the Project site in the ConnectMenlo EIR, and thus would not create a demand for wastewater treatment that exceeds the demand evaluated in the ConnectMenlo EIR. There is sufficient wastewater treatment capacity to serve the Project and this impact would be **less than significant**, consistent with the findings of the ConnectMenlo EIR. No further study is required.

d, e) Would the project generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals? Would the project comply with federal, state, and local management and reduction statutes and regulations related to solid waste?

Analysis in the ConnectMenlo EIR

These topics were analyzed in the ConnectMenlo EIR under Impact UTIL-8 and Impact UTIL-9. Impacts were determined to be less than significant because future development would be required to comply with existing regulations to reduce solid waste generation and minimize the amount of material transported to the landfills that serve the area. There would be sufficient landfill capacity to accept solid waste generated in the Bayfront Area under buildout of ConnectMenlo, as well as from other communities throughout the region. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

The California Waste Management Act sets requirements for cities and counties throughout the state to divert 75 percent of all solid waste from landfills through waste reduction, recycling, and compost. Further, the California Green Building Standards Code ("CALGreen") is intended to enhance the design and construction of buildings through the use of building concepts that reduce negative environmental impacts and encourage sustainable construction practices, including material conservation and resource efficiency. Additionally, the City has adopted a Zero Waste Plan that calls for reducing solid waste generation per capita from 5.0 pounds in 2015 to 3.1 pounds by 2035.

As described in Section 2, Project Description, the Project is estimated to generate approximately 8,400 cubic yards (CY) of demolition waste. Up to 2,190 CY of soils would be removed from the Project site for excavation, utility trenching, and foundations, and a total of 7,690 CY of soils would be imported to the Project site to raise the site elevation 2 feet above the floodplain. All soil and debris would be off-hauled to the Dumbarton Quarry or a similar appropriate facility. The Proposed Project would be required to comply with the City's Construction and Demolition Recycling Ordinance, which requires salvaging or recycling of at least 60 percent of construction-related solid waste. Therefore, construction of the Proposed Project is not expected to have an impact on existing landfills. Operation of the Proposed Project would result in the generation of solid waste associated with operation of R&D uses and would continue to meet state and local standards for solid waste and recycling. The Proposed Project would generate waste associated with approximately 343 net new employees at the Project site as well as operation-related waste.

Consistent with City requirements, the Project applicant has submitted a Zero Waste Management Plan for the Project site, which is provided in Appendix F. The Zero Waste Management Plan outlines the applicant's plan to reduce, recycle, and compost waste from demolition, construction, and operational phases of the Project to ensure compliance with the City's waste reduction target of diverting 90 percent of non-hazardous waste from landfill and incineration by 2035.

Waste generated at the Project site would be collected by Recology San Mateo and mostly likely hauled to Ox Mountain Landfill. As described above, Ox Mountain Landfill is permitted to receive 3,598 tons per day and has a remaining permitted capacity of 22,180,000 CY through 2034. Solid waste generated by operation of the Proposed Project would represent a small percentage of the permitted capacity of the Ox Mountain landfill. As such, Ox Mountain landfill would have adequate capacity for the Proposed Project.

Waste from construction and demolition would be disposed of in accordance with Menlo Park Municipal Code Chapter 12.48 which establishes landfill diversion requirements for construction and demolition debris. Project applicants are required to submit the estimated tonnage of construction and demolition debris and plans for diverting 60 percent of these materials as part of the Project's building and demolition permit application and approval process. The Proposed Project would be required to comply with the state's statutes and City's regulations, including General Plan policies and Zoning regulations listed above in Section 4.16.2 intended to minimize impacts related to solid waste disposal. As described above, operationally, the Project is expected to comply with the City's requirements for waste reduction through the implementation of a Zero Waste Management Plan (Appendix F).

Conclusion

The physical conditions related to landfill capacity and compliance with solid waste regulations have not changed substantially in the ConnectMenlo EIR study area since preparation of the ConnectMenlo EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Proposed Project would implement a Zero Waste Management Plan (Appendix F) and would comply with the construction and demolition waste management requirements in Municipal Code Chapter 12.48. The Proposed Project would be served by a landfill with sufficient permitted capacity to accommodate its solid waste disposal needs. Impacts would be **less than significant**, consistent with the findings of the ConnectMenlo EIR. No further study is required.

3.20 Wildfire

	Further Evaluation Needed in EIR	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XX. WILDFIRE – If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:					
a) Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒	☐

	Further Evaluation Needed in EIR	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	☐	☐	☒
c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☐	☐	☐	☐	☒
d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	☐	☐	☒

Environmental Setting

According to the California Department of Forestry and Fire Protection's (CalFire) Fire and Resource Assessment Program, Menlo Park does not contain any areas of moderate, high, or very high Fire Hazard Severity Zone (FHSZ) for the Local Responsibility Area, nor does it contain any areas of moderate, high, or very high FHSZ for the State Responsibility Area (CalFire 2022). The Project area is in an urban environment that has historically been less likely to experience wildfires.

The Project is within the MPFPD service area. The MPFPD serves approximately 90,000 people, covering 30 square miles, including Atherton, Menlo Park, East Palo Alto, and some of the unincorporated areas of San Mateo County. The MPFPD has mutual aid agreements with the neighboring departments, including the cities of Palo Alto, Redwood City, Fremont, and Woodside Fire District, to provide automatic aid. The MPFPD operates seven stations within Menlo Park. Fire Station #77 would respond to fires in the vicinity of the Project site.

General Plan Goals and Policies

The City's General Plan (specifically the Land Use Element and Safety Element) contains general goals, policies, and programs that require local planning and development decisions to consider impacts to fire related concerns. The following General Plan goals, policies, and programs would serve to minimize potential adverse impacts to the environment and community caused by wildfire: Goal CIRC-1, Policy CIRC-1.6, Policy S-1.29, Policy S-1.30, Policy S-1.31, and Program H-4.K.

Environmental Checklist and Discussion

a) Would the project substantially impair an adopted emergency response plan or emergency evacuation plan?

As discussed in Section 3.9, Hazards and Hazardous Materials, response (f), this topic was analyzed in the ConnectMenlo EIR as Impact HAZ-7. The EIR determined that impacts would be less than significant because there would be no land use changes that would impair or physically interfere with the ability to implement the City's Emergency Operation Plan or obstruct emergency evacuation routes. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

As discussed in Section 3.9, Hazards and Hazardous Materials, response (f), the Proposed Project is consistent with the site's land use and zoning designations as established under the ConnectMenlo project. Emergency access to the site would be maintained during Project construction activities, and provisions for emergency access during Project operation have been incorporated in the Project design. The Proposed Project would be designed and built according to local fire district codes and the CBC. Building and site plans would be reviewed by the City Planning, Engineering, and Building divisions and MPFPD for compliance with zoning, engineering, building, and fire codes. Through this review, MPFPD and the City would ensure that the Project design and traffic patterns would not impair access for emergency services personnel.

Conclusion

The physical conditions related to emergency response and evacuation have not changed substantially in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Project would not conflict with an adopted emergency response or evacuation plan and the impact would remain **less than significant,** consistent with the findings of the ConnectMenlo EIR. No further study is required.

b) Due to slope, prevailing winds, and other factors, would the project exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?

Analysis in the ConnectMenlo EIR

The potential for the Bayfront Area to be subject to wildfire was analyzed in the ConnectMenlo EIR as Impact HAZ-8. The EIR found that the impact would remain less than significant because the City is located in a highly urbanized area, is not surrounded by woodlands or vegetation, and does not contain areas of moderate, high, or very high FHSZs for either the LRA or the State Responsibility Area. Additionally, future development within the City would minimize potential fire risks through compliance with the CBC, California Fire Code, and the MPFPD Code. No mitigation measures were required (City of Menlo Park 2016b).

Project-Specific Discussion

The Project site is located within the ConnectMenlo EIR study area and thus, are also in an urban area and not within or adjacent to a wildland fire hazard area. The Project would be required to comply with applicable regulations, including those noted above as well as Safety Element Policy S-1.29, which requires that high-

occupancy structures provide adequate access and clearance for fire equipment, fire suppression personnel, and evacuation. The Project would not expose people or structures to a significant loss, injury, or death involving wildland fires.

Conclusion

The physical conditions related to wildfire hazards have not changed substantially in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. This impact would remain **less than significant,** consistent with the findings of the ConnectMenlo EIR. No further study is required.

c) Would the project require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines, or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?

Analysis in the ConnectMenlo EIR

This topic was not directly addressed in the ConnectMenlo EIR. However, as noted above, the Bayfront Area, which includes the Project site, does not contain moderate, high, or very high FHSZs for either the LRA or the SRA. The ConnectMenlo EIR evaluated potential wildfire risk under Impact HAZ-8 and concluded that hazards associated with wildfire risk would be less than significant (City of Menlo Park 2016b).

Project-Specific Discussion

The Proposed Project site and all adjacent parcels are currently developed with office, light industrial, public/quasi-public land uses, and public infrastructure. The Project site is bound by O'Brien Drive on the south, Willow Road on the west, the Hetch Hetchy aqueduct right-of-way on the north, and other office and light industrial properties on the east. The Project does not require installation or maintenance of infrastructure. No fuel breaks exist in the vicinity, and none are required given the urban nature of the area.

Conclusion

The physical conditions related to wildfire hazards have not changed substantially in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Project would have **no impact** associated with the need for new infrastructure or maintenance of existing infrastructure that could exacerbate wildfire risks or a requirement to create a fuel break. Thus, no new or more severe impacts than those evaluated in the ConnectMenlo EIR would occur. No further study is required.

d) Would the project expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?

Analysis in the ConnectMenlo EIR

This topic was not directly addressed in the ConnectMenlo EIR. However, as noted above, the Bayfront Area, which includes the Project site, does not contain areas designated moderate, high, or very high FHSZ for the LRA or the SRA. The ConnectMenlo EIR evaluated potential wildfire risk under Impact HAZ-8 and concluded that hazards associated with wildfire risk would be less than significant (City of Menlo Park 2016b).

Project-Specific Discussion

The Project site is located within the ConnectMenlo EIR study area and thus, are also in an urban area and not within or adjacent to a wildland fire hazard area. The Project would be required to comply with applicable regulations, including those noted above as well as Safety Element Policy S-1.29, which requires that high-occupancy structures provide adequate access and clearance for fire equipment, fire suppression personnel, and evacuation. The Project would not expose people or structures to significant risks that could result from post-fire slope instability.

Conclusion

The physical conditions related to wildfire hazards have not changed substantially in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Project would have **no impact** associated with potential risks that could result from post-fire slope instability. Thus, no new or more severe impacts than those evaluated in the ConnectMenlo EIR would occur. No further study is required.

3.21 Mandatory Findings of Significance

	Further Evaluation Needed in EIR	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XXI. MANDATORY FINDINGS OF SIGNIFICANCE					
a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☐	☒	☐	☐
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)	☒	☐	☐	☐	☐
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☒	☐	☐	☐	☐

a) ***Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?***

Analysis in the ConnectMenlo EIR

Impacts related to biological resources and cultural resources were analyzed throughout the ConnectMenlo EIR. Potential impacts were mitigated in the ConnectMenlo EIR under the respective EIR topics. As a result,

applicable mitigation was applied to the Proposed Project, as further discussed in Section 3.4, Biological Resources, and Section 3.5, Cultural Resources in this document.

Project-Specific Discussion and Conclusion

The physical conditions related to degradation of the physical environment as it relates to biological and historical resources have not changed substantially in the ConnectMenlo EIR study area since preparation of the EIR. The Proposed Project is consistent with the ConnectMenlo project and there have been no changes in circumstances or development of new information showing that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur; therefore, the Proposed Project would be within the scope of the ConnectMenlo project covered by the ConnectMenlo EIR, and there would be no new specific effects as a result of the Proposed Project. As discussed in Section 3.4, the Project-specific Mitigation Measure BIO-A would be implemented to ensure impacts to special-status species would be avoided. As discussed in Section 3.5, ConnectMenlo EIR Mitigation Measures CULT-2a and CULT-4 and Project-specific Mitigation Measures CULT-A and CULT-B would be implemented to ensure protection and evaluation of any cultural resources and/or tribal cultural resources that may be discovered during construction. Therefore, impacts related to biological and cultural resources would be **less than significant with mitigation measures incorporated**, consistent with the findings of the ConnectMenlo EIR. No further study is required.

b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)

Analysis in the ConnectMenlo EIR

This checklist item was analyzed throughout the ConnectMenlo EIR, which considered cumulative impacts. Where feasible, such impacts were reduced to less-than-significant levels with incorporation of mitigation measures; however, some significant and unavoidable cumulative impacts remained (City of Menlo Park 2016b).

Project-Specific Discussion and Conclusion

As described throughout this Initial Study, the Proposed Project would have no impacts related to agriculture and forestry resources and mineral resources and thus would not contribute to any cumulative effects related to these topics.

This Initial Study demonstrates that the Proposed Project would have less than significant impacts in the following resource areas, consistent with the findings of the ConnectMenlo EIR, which also found that there would be no significant cumulative impacts associated with these resources: aesthetics, energy, geology and soils, hydrology and water quality, public services, and recreation (City of Menlo Park 2016b).

Additionally, this Initial Study demonstrates that implementation of mitigation measures identified in this document would reduce the Proposed Project's potentially significant impacts associated with biological resources, cultural resources, hazards and hazardous materials, and tribal cultural resources to less-than-significant levels. This is consistent with the findings of the ConnectMenlo EIR, which found that with implementation of mitigation measures the ConnectMenlo project would not result in significant cumulative impacts in these resource areas (City of Menlo Park 2016b). The mitigation measures identified in this Initial

Study for these resources include any applicable measures from the ConnectMenlo EIR and additional Project-specific measures necessary to ensure consistency with the conclusions of the ConnectMenlo EIR.

The ConnectMenlo EIR found that cumulative impacts associated with land use and planning would be less than significant with implementation of ConnectMenlo Mitigation Measure LU-2, which requires that future development in the City must demonstrate consistency with the applicable goals, policies, and programs in the General Plan and the supporting zoning standards (City of Menlo Park 2016b). The analysis in this Initial Study demonstrates that the Proposed Project would be consistent with the General Plan and Municipal Code, including zoning standards. Thus, the Proposed Project would not cause a new cumulative impact and no significant cumulative land use impact has been identified to which the Project could contribute.

With respect to utilities and service systems, the ConnectMenlo EIR found that project-specific and cumulative impacts related to all services other than solid waste would remain less than significant without implementation of mitigation measures (City of Menlo Park 2016b). The analysis in this Initial Study demonstrates that the Proposed Project's impacts to these services would also be less-than-significant, consistent with the findings of the ConnectMenlo EIR. The ConnectMenlo EIR identified a single mitigation measure to ensure that the ConnectMenlo project would not make a cumulatively considerable contribution to cumulative impacts associated with solid waste disposal (City of Menlo Park 2016b). The analysis in this Initial Study shows that the Proposed Project would have a less-than-significant impact associated with solid waste disposal because the amount of solid waste it would generate would be accommodated by the existing capacity at the Ox Mountain Landfill and the Project would comply with the state's statutes and City's regulations intended to minimize impacts related to solid waste disposal, including through implementation of a Zero Waste Management Plan (Appendix F). The ConnectMenlo EIR concluded that with implementation of the identified mitigation measure, the ConnectMenlo project would not make a cumulatively considerable contribution to a significant cumulative impact related to solid waste disposal (City of Menlo Park 2016b). The Proposed Project is consistent with the ConnectMenlo project and thus also would not make a cumulatively considerable contribution to a significant cumulative impact related to solid waste disposal.

Finally, the ConnectMenlo EIR evaluated wildfire risks as Impact HAZ-8 and concluded that impacts would remain less than significant and there would be no significant cumulative wildfire impact to which the ConnectMenlo project could contribute (City of Menlo Park 2016b). The analysis in Section 3.20 of this Initial Study demonstrates that the Proposed Project would have no impacts associated with three of the checklist questions associated with wildfire, consistent with the findings of the ConnectMenlo EIR. The analysis in Section 3.20 also demonstrates that the Project would have a less-than-significant impact associated with potential impairment of an adopted emergency response plan or emergency evacuation plan. The ConnectMenlo EIR evaluated this checklist question as Impact HAZ-7 and concluded that the impact would be less than significant (City of Menlo Park 2016b). Thus, the Proposed Project would be consistent with the findings of the ConnectMenlo EIR. No significant cumulative impacts associated with wildfire and emergency response and evacuation to which the Project could contribute have been identified and the Proposed Project would not cause a new cumulative impact associated with wildfire and emergency response and evacuation.

Therefore, the Proposed Project would not result in a substantial change compared to the ConnectMenlo project or change in circumstances, and no new information of substantial importance shows that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. The Proposed Project would be within the scope of the ConnectMenlo project covered by the ConnectMenlo EIR, and there would be no new specific cumulative effects as a result of the Proposed Project for the resource areas discussed above.

However, because Project-specific impacts related to air quality, greenhouse gas emissions, noise, population and housing, and transportation will be analyzed further in the focused EIR, cumulative impacts related to these resource topics will also be subject to **further environmental review** in the EIR.

c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?

Analysis in the ConnectMenlo EIR

This checklist item was analyzed throughout the ConnectMenlo EIR, which considered impacts associated with adverse effects on human beings. Where feasible, such impacts were reduced to less-than-significant levels with incorporation of mitigation measures; however, some significant and unavoidable impact remained (City of Menlo Park 2016b).

Project-Specific Discussion and Conclusion

As identified throughout this Initial Study, the Proposed Project would have no impacts or less than significant impacts in the following resource areas, and thus would not cause substantial adverse effects to humans related to aesthetics, agricultural and forestry resources, energy, geology and soils, hydrology and water quality, land use and planning, mineral resources, public services, recreation, utilities and service systems, and wildfire. Additionally, this Initial Study demonstrates that implementation of mitigation measures identified in this document would ensure that the Proposed Project would not directly or indirectly cause adverse effects on human beings related to biological resources, cultural resources, hazards and hazardous materials, and tribal cultural resources. Impacts of the Proposed Project related to air quality, greenhouse gas emissions, noise, population and housing, and transportation could have a substantial adverse effect on human beings and these topics will be evaluated in the focused EIR.

The physical conditions related to adverse effects on human beings and degradation of the environment have not changed substantially in the ConnectMenlo area since preparation of the ConnectMenlo EIR. For most topics, the Proposed Project would not result in a substantial change in the ConnectMenlo project or a substantial change in circumstances, and new information of substantial importance shows that more significant effects than those originally analyzed in the ConnectMenlo EIR would occur. Therefore, for these topics, the Proposed Project would be within the scope of the ConnectMenlo project covered by the ConnectMenlo EIR, and the Proposed Project would not result in new Project-specific effects. However, **further environmental review** will be required in the EIR related to air quality, greenhouse gas emissions, noise, population and housing, and transportation.

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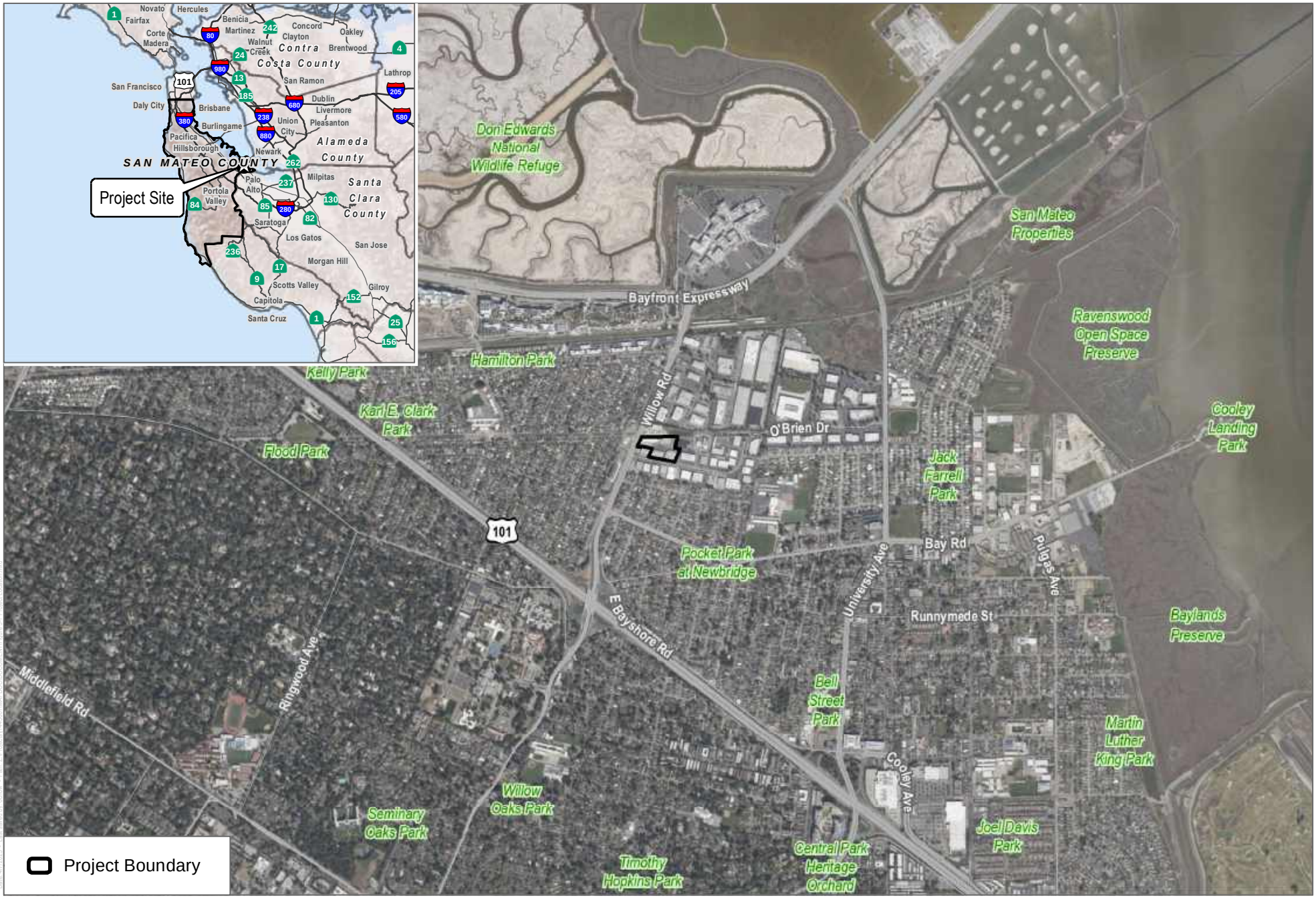
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SOURCE: Bing Imagery 2021

DUDEK

0 1,000 2,000 Feet

FIGURE 2-1

Project Location

1005 O'Brien Drive and 1320 Willow Road Life Science Project

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SOURCE: Bing Imagery 2021, City of Menlo Park 2020

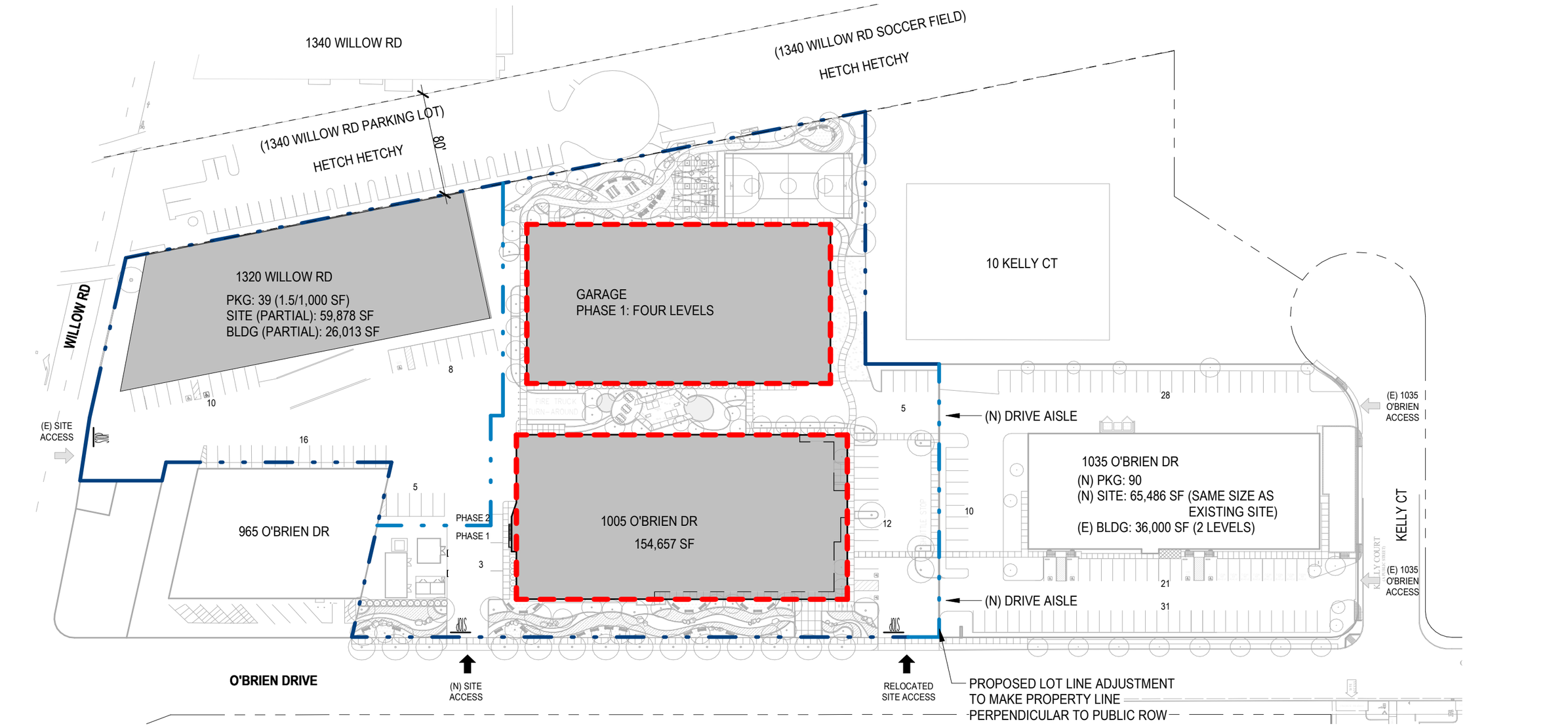
DUDEK 0 75 150 Feet

FIGURE 2-2

Project Site

1005 O'Brien Drive and 1320 Willow Road Life Science Project

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1 PHASE 1

1" = 80'-0"

PHASE 1 SITE: 123,738 SF

EXISTING PROPERTY LINES

LOT LINE ADJUSTMENT DURING PHASE 1

PHASE 1 BUILDINGS

N

SOURCE: DES, 2022

DUDEK

0 100 200 Feet

FIGURE 2-3

Phase 1 Construction

1005 O'Brien Drive and 1320 Willow Road Life Science Project

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KEY NOTES:

1. CANOPY TREE
2. ACCENT TREE
3. STREET TREE
4. SCREEN HEDGES
5. BIORETENTION AREA
6. COBBLE CREEK WITH BOULDERS
7. THEMED PLANTING STRIPS
8. PUBLIC GATHERING SPACE
9. PUBLIC EVENT PLAZA
10. STROLLING PATH
11. PUBLIC RESPITE SPACE WITH BENCHES
12. SMALL GROUP GATHERING SPACE
13. MAIN ENTRY PLAZA
14. BIKE RACKS
15. OUTDOOR DINING TERRACE
16. OUTDOOR ACTIVITY SPACE
17. FLEX TURF SPACE AND DRIVABLE SURFACE FOR FIRE TRUCK ACCESS
18. CATENARY LIGHT
19. DRINKING FOUNTAIN
20. TRASH RECEPTACLES (SOLID WASTE/RECYCLING/COMPOST)

MATERIAL KEY:

CONCRETE PAVING

DECOMPOSED GRANITE PATHS/PAVING, TYP.

FLAGSTONE PAVING, TYP.

SOURCE: DES, 2022

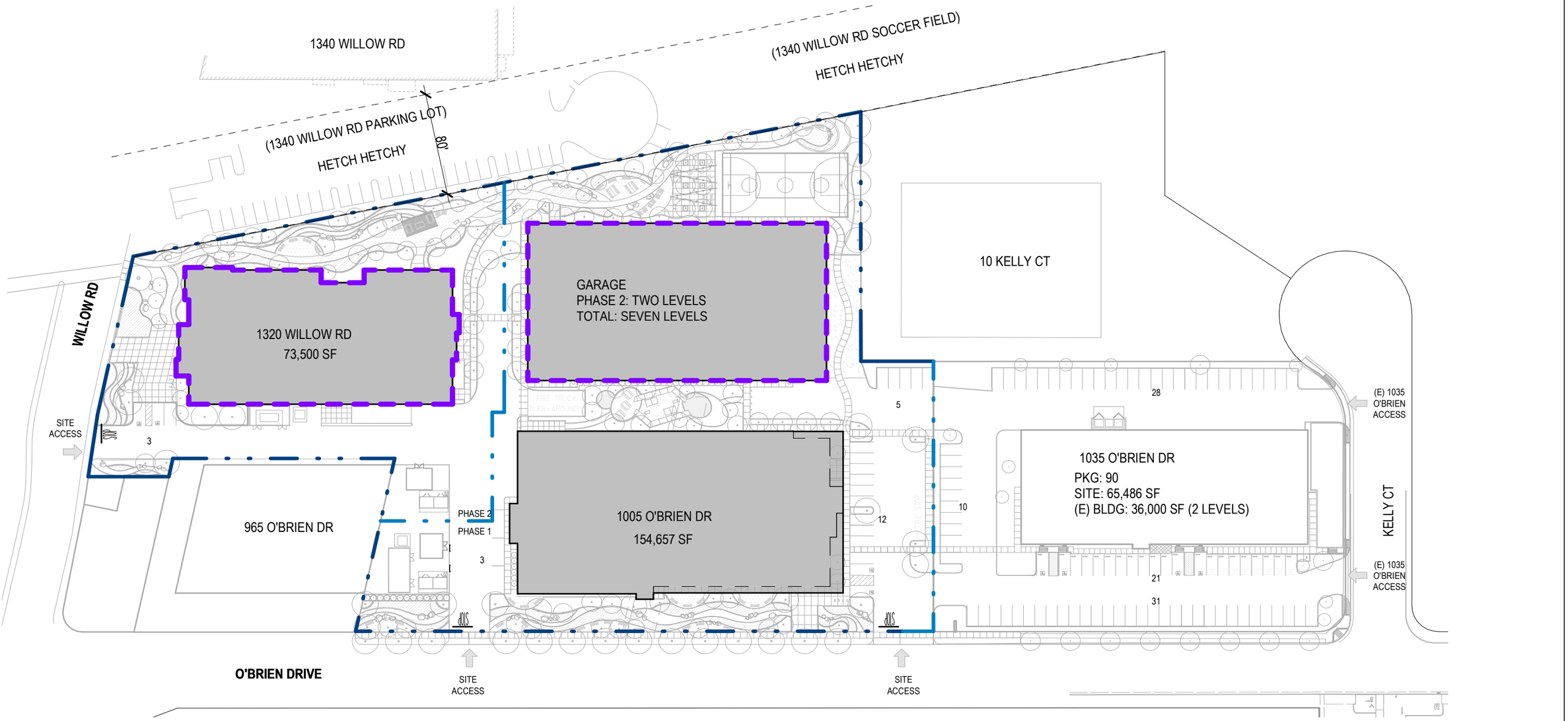
DUDEK 0 100 200 Feet

FIGURE 2-4

Phase 1 Landscape Plan

1005 O'Brien Drive and 1320 Willow Road Life Science Project

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1 PHASE 2

1" = 80'-0"

PHASE 2 SITE: 59,878 SF

EXISTING PROPERTY LINES

LOT LINE ADJUSTMENT DURING PHASE 1

PHASE 2 BUILDINGS

N

SOURCE: DES, 2022

DUDEK 0 100 200 Feet

FIGURE 2-5

Phase 2 Construction

1005 O'Brien Drive and 1320 Willow Road Life Science Project

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KEY NOTES:

1. CANOPY TREE
2. ACCENT TREE
3. STREET TREE
4. SCREEN HEDGES
5. BIORETENTION AREA
6. COBBLE CREEK WITH BOULDERS
7. THEMED PLANTING STRIPS
8. PUBLIC GATHERING SPACE
9. PUBLIC EVENT PLAZA
10. STROLLING PATH
11. PUBLIC RESPITE SPACE
12. SMALL GROUP GATHERING SPACE
13. MAIN ENTRY PLAZA
14. BIKE RACKS
15. OUTDOOR DINING TERRACE
16. OUTDOOR ACTIVITY SPACE
17. FLEX TURF SPACE AND DRIVABLE SURFACE FOR FIRE TRUCK ACCESS
18. CATENARY LIGHT
19. DRINKING FOUNTAIN
21. TRELLIS
20. TRASH RECEPTACLES (SOLID WASTE/RECYCLING/COMPOST)

MATERIAL KEY:

CONCRETE PAVING

DECOMPOSED GRANITE PATHS/PAVING, TYP.

FLAGSTONE PAVING, TYP.

SOURCE: DES, 2022

DUDEK 0 100 200 Feet

FIGURE 2-6

Phase 2 Landscape Plan

1005 O'Brien Drive and 1320 Willow Road Life Science Project

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Appendix G

NOP, Initial Study, and NOP Comments

Appendix G3 NOP Comments

TN-20230602-01

TAMIEN NATION
P.O. Box 8053, San Jose, California 95155
(707) 295-4011 tamien@tamien.org

June 12, 2023

Chris Turner, Community Development

City of Menlo Park

701 Laurel St., Menlo Park, CA 94025

Sent Via Email: crturner@menlopark.gov

RE: Formal Request for Tribal Consultation Pursuant to the California Environmental Quality Act (CEQA), Public Resources Code section 21080.3.1, subds. (b),(d) and (e),

Project: 1005 O'Brien Drive and 1320 Willow Road project

Dear Chris Turner

This letter constitutes a formal request for tribal consultation under the provisions of the California Environmental Quality Act (CEQA) (Public Resources Code section 21080.3.1 subdivisions (b), (d) and (e)) for the mitigation of potential project impacts to tribal cultural resource for the above referenced project. Tamien Nation requested formal notice and information for all projects within your agency's geographical jurisdiction on Nov 22, 2021 (find copy of the letter attached) and received project notification on June 2, 2023.

Tamien Nation requests consultation on the following topics checked below, which shall be included in consultation if requested (Public Resources Code section 21080.3.2

- ☑ Alternatives to the project
- ☑ Recommended mitigation measures
- ☑ Significant effects of the project

Tamien Nation also requests consultation on the following discretionary topics checked below (Public Resources Code section 21080.3.2(, subd. (a):

- ☑ Type of environmental review necessary
- ☑ Significance of tribal cultural resources, including any regulations, policies standards used by you agency or to determine significance of tribal cultural resources
- ☑ Significance of the project's impacts on tribal cultural resources

Project alternatives and/or appropriate measures for preservation or mitigation that we may recommend, including, but not limited to:

(1) Avoidance and preservation of the resources in place, pursuant to Public Resources Code section 21084.3, including, but not limited to, planning and construction to avoid the resources and protect the cultural and natural context, or planning greenspace, parks or other open space, to incorporate the resources with culturally appropriate protection and management criteria;
(2) Treating the resources with culturally appropriate dignity taking into account the tribal cultural values and meaning of the resources, including but not limited to the following:
    a. Protecting the cultural character and integrity of the resource;
    b. Protection the traditional use of the resource; and
    c. Protecting the confidentiality of the resource.
(3) Permanent conservation easements or other interests in real property,with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.
(4) Protecting the resource.

Additionally, Tamien Nation would like to receive any cultural resources assessments or other assessments that have been completed on all or part of the project's potential "area of project effect" (APE), including, but not limited to:

1. The results of any record search that may have been conducted at an Information Center of the California Historical Resources Information System(CHRIS), including, but not limited to:

    - A listing of any and all known cultural resources have already been recordedon or adjacent to the APE;

    - Copies of any and all cultural resource records and study reports that may have been provided by the Information Center as part of the records searchresponse;

    - If the probability is low, moderate, or high that cultural resources are locatedin the APE.

    - Whether the records search indicates a low, moderate or high probability that unrecorded cultural resources are located in the potential APE; and

    - If a survey is recommended by the Information Center to determine whether previously unrecorded cultural resources are present.

2. The results of any archaeological inventory survey that was conducted, including:

    - Any report that may contain site forms, site significance, and suggested mitigation measures.

All information regarding site locations, Native American human remains, andassociated funerary objects should be in a separate confidential addendum, and not be made available for public disclosure in accordance with Government Code Section 6254.10.

3. The results of any Sacred Lands File (SFL) check conducted through Native American Heritage Commission. The request form can be found at http://www.nahc.ca.gov/slf_request.html. USGS 7.5-minute quadrangle name, township, range, and section required for the search.

4. Any ethnographic studies conducted for any area including all or part of the potential APE; and

5. Any geotechnical reports regarding all or part of the potential APE.

We would like to remind your agency that CEQA Guidelines section 15126.4, subdivision (b)(3) states that preservation in place is the preferred manner of mitigating impacts to archaeological sites. Section 15126.4, subd. (b)(3) of the CEQA Guidelines has been interpreted by the California Court of Appeal to mean that "feasible preservation in place must be adopted to mitigate impacts to historical resources of an archaeological nature unless the lead agency determines that another form of mitigation is available and provides superior mitigation of impacts." *Madera Oversight Coalition v. County of Madera* (2011) 199 Cal.App.4th 48, disapproved on other grounds, *Neighbors for Smart Rail v. Exposition Metro Line Construction Authority* (2013) 57 Cal.4th 439.

Tamien Nation expects to begin consultation within 30 days of your receipt of this letter. Please contact Tamien Nation lead contacts:

Quirina Geary,
Chairwoman
PO Box 8053
San Jose, CA 95155
(707) 295-4011
qgeary@tamien.org

Johnathan Costillas
Tamien Nation, THPO
PO Box 866
Clearlake Oaks, CA 95423
(925) 336-5359
jcostillas@tamien.org

Please refer to identification number TN-20230602-01 in any correspondence concerning this project. Thank you for providing us with this notice and the opportunity to comment.

Sincerely,



Quirina Geary
Chairwoman

cc: Native American Heritage Commission

TAMIEN NATION
OF THE GREATER SANTA CLARA COUNTY
P.O. BOX 8053, SAN JOSE, CALIFORNIA 95155
(707) 295-4011 TAMIEN@TAMIEN.ORG

November 22, 2021

City of Menlo Park
Deanna Chow, Assistant Community Development Director
(650) 330-6702
planning@menlopark.org

Re: California Environmental Quality Act Public Resources Code section 21080.3, subd. (b) Request for Formal Notification of Proposed Projects Within the Tamien Nation's Geographic Area of Traditional and Cultural Affiliation

Dear Ms. Chow:

As of the date of this letter, in accordance with Public Resources Code Section 21080.3.1, subd. (b), the Tamien Nation which is traditionally and culturally affiliated with a geographic area within your agency's geographic area of jurisdiction, requests formal notice of and information on proposed projects for which your agency will serve as a lead agency under the California Environmental Quality Act (CEQA), Public Resources Code section 21000 et seq.

Please send all notices of proposed projects from your agency to the following tribal representatives:

Johnathan Costillas, Tribal Cultural Resource Officer
PO Box 866
Clearlake Oaks, CA 95423
(916) 336-5359, Email: jcostillas@tamien.org

Tamien Nation, Chairwoman Quirina Luna Geary
PO Box 8053
San Jose, CA 95155
(707) 295-4011, Email: qgeary@tamien.org

We request that all notices be sent via email and certified U.S. Mail with return receipt. Following receipt and review of the information your agency provides, within the 30-day period proscribed by Public Resources Code section 21080.3.1, subd. (d), the Tamien Nation may request consultation, as defined by Public Resources Code section 21080.3.1, subd. (b), pursuant to Public Resources Code section 21080.3.2 to mitigate any project impacts a specific project may cause to tribal cultural resources.

We thank you for your time and look forward to working with your agency. If you have any questions or need additional information, please do not hesitate to contact us.

Sincerely,

Quirina Luna Geary
Tribal Chairwoman

STATE OF CALIFORNIA Gavin Newsom, Governor

NATIVE AMERICAN HERITAGE COMMISSION

ACTING CHAIRPERSON
Reginald Pagaling
Chumash

SECRETARY
Sara Dutschke
Miwok

COMMISSIONER
Isaac Bojorquez
Ohlone-Costanoan

COMMISSIONER
Buffy McQuillen
Yokayo Pomo, Yuki, Nomlaki

COMMISSIONER
Wayne Nelson
Luiseño

COMMISSIONER
Stanley Rodriguez
Kumeyaay

COMMISSIONER
Vacant

COMMISSIONER
Vacant

COMMISSIONER
Vacant

EXECUTIVE SECRETARY
Raymond C. Hitchcock
Miwok, Nisenan

NAHC HEADQUARTERS
1550 Harbor Boulevard
Suite 100
West Sacramento,
California 95691
(916) 373-3710
nahc@nahc.ca.gov
NAHC.ca.gov

June 2, 2023

Christopher Turner
City of Menlo Park
701 Laurel St.
Menlo Park, CA 94025

Re: 2023060072, 1005 O'Brien Drive and 1320 Willow Road, San Mateo County

Dear Mr. Turner:

The Native American Heritage Commission (NAHC) has received the Notice of Preparation (NOP), Draft Environmental Impact Report (DEIR) or Early Consultation for the project referenced above. The California Environmental Quality Act (CEQA) (Pub. Resources Code §21000 et seq.), specifically Public Resources Code §21084.1, states that a project that may cause a substantial adverse change in the significance of a historical resource, is a project that may have a significant effect on the environment. (Pub. Resources Code § 21084.1; Cal. Code Regs., tit.14, §15064.5 (b) (CEQA Guidelines §15064.5 (b)). If there is substantial evidence, in light of the whole record before a lead agency, that a project may have a significant effect on the environment, an Environmental Impact Report (EIR) shall be prepared. (Pub. Resources Code §21080 (d); Cal. Code Regs., tit. 14, § 5064 subd.(a)(1) (CEQA Guidelines §15064 (a)(1)). In order to determine whether a project will cause a substantial adverse change in the significance of a historical resource, a lead agency will need to determine whether there are historical resources within the area of potential effect (APE).

CEQA was amended significantly in 2014. Assembly Bill 52 (Gatto, Chapter 532, Statutes of 2014) (AB 52) amended CEQA to create a separate category of cultural resources, "tribal cultural resources" (Pub. Resources Code §21074) and provides that a project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment. (Pub. Resources Code §21084.2). Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource. (Pub. Resources Code §21084.3 (a)). **AB 52 applies to any project for which a notice of preparation, a notice of negative declaration, or a mitigated negative declaration is filed on or after July 1, 2015.** If your project involves the adoption of or amendment to a general plan or a specific plan, or the designation or proposed designation of open space, on or after March 1, 2005, it may also be subject to Senate Bill 18 (Burton, Chapter 905, Statutes of 2004) (SB 18). **Both SB 18 and AB 52 have tribal consultation requirements.** If your project is also subject to the federal National Environmental Policy Act (42 U.S.C. § 4321 et seq.) (NEPA), the tribal consultation requirements of Section 106 of the National Historic Preservation Act of 1966 (154 U.S.C. 300101, 36 C.F.R. §800 et seq.) may also apply.

The NAHC recommends consultation with California Native American tribes that are traditionally and culturally affiliated with the geographic area of your proposed project as early as possible in order to avoid inadvertent discoveries of Native American human remains and best protect tribal cultural resources. Below is a brief summary of portions of AB 52 and SB 18 as well as the NAHC's recommendations for conducting cultural resources assessments.

Consult your legal counsel about compliance with AB 52 and SB 18 as well as compliance with any other applicable laws.

AB 52

AB 52 has added to CEQA the additional requirements listed below, along with many other requirements:

1. Fourteen Day Period to Provide Notice of Completion of an Application/Decision to Undertake a Project: Within fourteen (14) days of determining that an application for a project is complete or of a decision by a public agency to undertake a project, a lead agency shall provide formal notification to a designated contact of, or tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, to be accomplished by at least one written notice that includes:

- **a.** A brief description of the project.
- **b.** The lead agency contact information.
- **c.** Notification that the California Native American tribe has 30 days to request consultation. (Pub. Resources Code §21080.3.1 (d)).
- **d.** A "California Native American tribe" is defined as a Native American tribe located in California that is on the contact list maintained by the NAHC for the purposes of Chapter 905 of Statutes of 2004 (SB 18). (Pub. Resources Code §21073).

2. Begin Consultation Within 30 Days of Receiving a Tribe's Request for Consultation and Before Releasing a Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report: A lead agency shall begin the consultation process within 30 days of receiving a request for consultation from a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project. (Pub. Resources Code §21080.3.1, subds. (d) and (e)) and prior to the release of a negative declaration, mitigated negative declaration or Environmental Impact Report. (Pub. Resources Code §21080.3.1(b)).

- **a.** For purposes of AB 52, "consultation shall have the same meaning as provided in Gov. Code §65352.4 (SB 18). (Pub. Resources Code §21080.3.1 (b)).

3. Mandatory Topics of Consultation If Requested by a Tribe: The following topics of consultation, if a tribe requests to discuss them, are mandatory topics of consultation:

- **a.** Alternatives to the project.
- **b.** Recommended mitigation measures.
- **c.** Significant effects. (Pub. Resources Code §21080.3.2 (a)).

4. Discretionary Topics of Consultation: The following topics are discretionary topics of consultation:

- **a.** Type of environmental review necessary.
- **b.** Significance of the tribal cultural resources.
- **c.** Significance of the project's impacts on tribal cultural resources.
- **d.** If necessary, project alternatives or appropriate measures for preservation or mitigation that the tribe may recommend to the lead agency. (Pub. Resources Code §21080.3.2 (a)).

5. Confidentiality of Information Submitted by a Tribe During the Environmental Review Process: With some exceptions, any information, including but not limited to, the location, description, and use of tribal cultural resources submitted by a California Native American tribe during the environmental review process shall not be included in the environmental document or otherwise disclosed by the lead agency or any other public agency to the public, consistent with Government Code §6254 (r) and §6254.10. Any information submitted by a California Native American tribe during the consultation or environmental review process shall be published in a confidential appendix to the environmental document unless the tribe that provided the information consents, in writing, to the disclosure of some or all of the information to the public. (Pub. Resources Code §21082.3 (c)(1)).

6. Discussion of Impacts to Tribal Cultural Resources in the Environmental Document: If a project may have a significant impact on a tribal cultural resource, the lead agency's environmental document shall discuss both of the following:

- **a.** Whether the proposed project has a significant impact on an identified tribal cultural resource.
- **b.** Whether feasible alternatives or mitigation measures, including those measures that may be agreed to pursuant to Public Resources Code §21082.3, subdivision (a), avoid or substantially lessen the impact on the identified tribal cultural resource. (Pub. Resources Code §21082.3 (b)).

7. Conclusion of Consultation: Consultation with a tribe shall be considered concluded when either of the following occurs:

a. The parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource; or

b. A party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached. (Pub. Resources Code §21080.3.2 (b)).

8. Recommending Mitigation Measures Agreed Upon in Consultation in the Environmental Document: Any mitigation measures agreed upon in the consultation conducted pursuant to Public Resources Code §21080.3.2 shall be recommended for inclusion in the environmental document and in an adopted mitigation monitoring and reporting program, if determined to avoid or lessen the impact pursuant to Public Resources Code §21082.3, subdivision (b), paragraph 2, and shall be fully enforceable. (Pub. Resources Code §21082.3 (a)).

9. Required Consideration of Feasible Mitigation: If mitigation measures recommended by the staff of the lead agency as a result of the consultation process are not included in the environmental document or if there are no agreed upon mitigation measures at the conclusion of consultation, or if consultation does not occur, and if substantial evidence demonstrates that a project will cause a significant effect to a tribal cultural resource, the lead agency shall consider feasible mitigation pursuant to Public Resources Code §21084.3 (b). (Pub. Resources Code §21082.3 (e)).

10. Examples of Mitigation Measures That, If Feasible, May Be Considered to Avoid or Minimize Significant Adverse Impacts to Tribal Cultural Resources:

a. Avoidance and preservation of the resources in place, including, but not limited to:

i. Planning and construction to avoid the resources and protect the cultural and natural context.

ii. Planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.

b. Treating the resource with culturally appropriate dignity, taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following:

i. Protecting the cultural character and integrity of the resource.

ii. Protecting the traditional use of the resource.

iii. Protecting the confidentiality of the resource.

c. Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.

d. Protecting the resource. (Pub. Resource Code §21084.3 (b)).

e. Please note that a federally recognized California Native American tribe or a non-federally recognized California Native American tribe that is on the contact list maintained by the NAHC to protect a California prehistoric, archaeological, cultural, spiritual, or ceremonial place may acquire and hold conservation easements if the conservation easement is voluntarily conveyed. (Civ. Code §815.3 (c)).

f. Please note that it is the policy of the state that Native American remains and associated grave artifacts shall be repatriated. (Pub. Resources Code §5097.991).

11. Prerequisites for Certifying an Environmental Impact Report or Adopting a Mitigated Negative Declaration or Negative Declaration with a Significant Impact on an Identified Tribal Cultural Resource: An Environmental Impact Report may not be certified, nor may a mitigated negative declaration or a negative declaration be adopted unless one of the following occurs:

a. The consultation process between the tribes and the lead agency has occurred as provided in Public Resources Code §21080.3.1 and §21080.3.2 and concluded pursuant to Public Resources Code §21080.3.2.

b. The tribe that requested consultation failed to provide comments to the lead agency or otherwise failed to engage in the consultation process.

c. The lead agency provided notice of the project to the tribe in compliance with Public Resources Code §21080.3.1 (d) and the tribe failed to request consultation within 30 days. (Pub. Resources Code §21082.3 (d)).

The NAHC's PowerPoint presentation titled, "Tribal Consultation Under AB 52: Requirements and Best Practices" may be found online at: http://nahc.ca.gov/wp-content/uploads/2015/10/AB52TribalConsultation_CalEPAPDF.pdf

SB 18

SB 18 applies to local governments and requires local governments to contact, provide notice to, refer plans to, and consult with tribes prior to the adoption or amendment of a general plan or a specific plan, or the designation of open space. (Gov. Code §65352.3). Local governments should consult the Governor's Office of Planning and Research's "Tribal Consultation Guidelines," which can be found online at: https://www.opr.ca.gov/docs/09_14_05_Updated_Guidelines_922.pdf.

Some of SB 18's provisions include:

1. Tribal Consultation: If a local government considers a proposal to adopt or amend a general plan or a specific plan, or to designate open space it is required to contact the appropriate tribes identified by the NAHC by requesting a "Tribal Consultation List." If a tribe, once contacted, requests consultation the local government must consult with the tribe on the plan proposal. **A tribe has 90 days from the date of receipt of notification to request consultation unless a shorter timeframe has been agreed to by the tribe.** (Gov. Code §65352.3 (a)(2)).
2. No Statutory Time Limit on SB 18 Tribal Consultation. There is no statutory time limit on SB 18 tribal consultation.
3. Confidentiality: Consistent with the guidelines developed and adopted by the Office of Planning and Research pursuant to Gov. Code §65040.2, the city or county shall protect the confidentiality of the information concerning the specific identity, location, character, and use of places, features and objects described in Public Resources Code §5097.9 and §5097.993 that are within the city's or county's jurisdiction. (Gov. Code §65352.3 (b)).
4. Conclusion of SB 18 Tribal Consultation: Consultation should be concluded at the point in which:
    a. The parties to the consultation come to a mutual agreement concerning the appropriate measures for preservation or mitigation; or
    b. Either the local government or the tribe, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached concerning the appropriate measures of preservation or mitigation. (Tribal Consultation Guidelines, Governor's Office of Planning and Research (2005) at p. 18).

Agencies should be aware that neither AB 52 nor SB 18 precludes agencies from initiating tribal consultation with tribes that are traditionally and culturally affiliated with their jurisdictions before the timeframes provided in AB 52 and SB 18. For that reason, we urge you to continue to request Native American Tribal Contact Lists and "Sacred Lands File" searches from the NAHC. The request forms can be found online at: http://nahc.ca.gov/resources/forms/.

NAHC Recommendations for Cultural Resources Assessments

To adequately assess the existence and significance of tribal cultural resources and plan for avoidance, preservation in place, or barring both, mitigation of project-related impacts to tribal cultural resources, the NAHC recommends the following actions:

1. Contact the appropriate regional California Historical Research Information System (CHRIS) Center (https://ohp.parks.ca.gov/?page_id=30331) for an archaeological records search. The records search will determine:
    a. If part or all of the APE has been previously surveyed for cultural resources.
    b. If any known cultural resources have already been recorded on or adjacent to the APE.
    c. If the probability is low, moderate, or high that cultural resources are located in the APE.
    d. If a survey is required to determine whether previously unrecorded cultural resources are present.

2. If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
    a. The final report containing site forms, site significance, and mitigation measures should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum and not be made available for public disclosure.
    b. The final written report should be submitted within 3 months after work has been completed to the appropriate regional CHRIS center.

3. Contact the NAHC for:
   a. A Sacred Lands File search. Remember that tribes do not always record their sacred sites in the Sacred Lands File, nor are they required to do so. A Sacred Lands File search is not a substitute for consultation with tribes that are traditionally and culturally affiliated with the geographic area of the project's APE.
   b. A Native American Tribal Consultation List of appropriate tribes for consultation concerning the project site and to assist in planning for avoidance, preservation in place, or, failing both, mitigation measures.

4. Remember that the lack of surface evidence of archaeological resources (including tribal cultural resources) does not preclude their subsurface existence.
   a. Lead agencies should include in their mitigation and monitoring reporting program plan provisions for the identification and evaluation of inadvertently discovered archaeological resources per Cal. Code Regs., tit. 14, §15064.5(f) (CEQA Guidelines §15064.5(f)). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American with knowledge of cultural resources should monitor all ground-disturbing activities.
   b. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the disposition of recovered cultural items that are not burial associated in consultation with culturally affiliated Native Americans.
   c. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the treatment and disposition of inadvertently discovered Native American human remains. Health and Safety Code §7050.5, Public Resources Code §5097.98, and Cal. Code Regs., tit. 14, §15064.5, subdivisions (d) and (e) (CEQA Guidelines §15064.5, subds. (d) and (e)) address the processes to be followed in the event of an inadvertent discovery of any Native American human remains and associated grave goods in a location other than a dedicated cemetery.

If you have any questions or need additional information, please contact me at my email address: Cody.Campagne@nahc.ca.gov

Sincerely,

Cody Campagne

Cody Campagne
Cultural Resources Analyst

cc: State Clearinghouse

California Department of Transportation

DISTRICT 4
OFFICE OF REGIONAL AND COMMUNITY PLANNING
P.O. BOX 23660, MS–10D | OAKLAND, CA 94623-0660
www.dot.ca.gov

July 5, 2023

SCH #:2023060072
GTS #:04-SM-2023-00525
GTS ID: 29975
Co/Rt/Pm: SM/114/5.5

Christopher Turner, Associate Planner
701 Laurel Street
Menlo Park, CA 94025

Re: 1005 O'Brien Drive and 1320 Willow Road– Notice of Preparation (NOP) of a Draft Environmental Impact Report (DEIR)

Dear Christopher Turner:

Thank you for including the California Department of Transportation (Caltrans) in the environmental review process 1005 O'Brien Drive and 1320 Willow Road. We are committed to ensuring that impacts to the State's multimodal transportation system and to our natural environment are identified and mitigated to support a safe, sustainable, integrated and efficient transportation system.

The Local Development Review (LDR) Program reviews land use projects and plans to ensure consistency with our mission and state planning priorities. The following comments are based on our review of the June 2023 NOP.

Project Understanding
This project is located along State Route (SR)-114 and involves demolishing the exist buildings on the site and constructing two research and development buildings, a parking garage, and publicly accessible open space.

Travel Demand Analysis
With the enactment of Senate Bill (SB) 743, Caltrans is focused on maximizing efficient development patterns, innovative travel demand reduction strategies, and multimodal improvements. For more information on how Caltrans assesses Transportation Impact Studies, please review Caltrans' Transportation Impact Study Guide (*link*).

If the project meets the screening criteria established in the City's adopted Vehicle Miles Traveled (VMT) policy to be presumed to have a less-than-significant VMT impact and exempt from detailed VMT analysis, please provide justification to support the exempt status in alignment with the City's VMT policy. Projects that do not meet the screening criteria should include a detailed VMT analysis in the Draft Environmental Impact Report (DEIR), which should include the following:

- VMT analysis pursuant to the City's guidelines. Projects that result in automobile VMT per capita above the threshold of significance for existing (i.e. baseline) city-wide or regional values for similar land use types may indicate a significant impact. If necessary, mitigation for increasing VMT should be identified. Mitigation should support the use of transit and active transportation modes. Potential mitigation measures that include the requirements of other agencies such as Caltrans are fully enforceable through permit conditions, agreements, or other legally-binding instruments under the control of the City.

- A schematic illustration of walking, biking and auto conditions at the project site and study area roadways. Potential traffic safety issues to the State Transportation Network (STN) may be assessed by Caltrans via the Interim Safety Guidance (*link*).

- The project's primary and secondary effects on pedestrians, bicycles, travelers with disabilities and transit performance should be evaluated, including countermeasures and trade-offs resulting from mitigating VMT increases. Access to pedestrians, bicycle, and transit facilities must be maintained.

Traffic Signal Operations
If any intersection controls to be added at this location, either on in Caltrans Right-of-Way (ROW) or at nearby intersections, please specify how it would be coordinated with the adjacent signalized intersections.

Transportation Impact Fees
Please identify project-generated travel demand and estimate the costs of transit and active transportation improvements necessitated by the proposed project; viable funding sources such as development and/or transportation impact fees should also be identified. We encourage a sufficient allocation of fair share contributions toward multi-modal and regional transit improvements to fully mitigate cumulative impacts to regional transportation. We also strongly support measures to increase sustainable mode shares, thereby reducing VMT.

Construction-Related Impacts
Potential impacts to Caltrans' ROW from project-related temporary access points should be analyzed. Mitigation for significant impacts due to construction and noise should be identified. Project work that requires movement of oversized or excessive load vehicles on State roadways requires a transportation permit that is issued by Caltrans. To apply, please visit Caltrans Transportation Permits (*link*).

Prior to construction, coordination may be required with Caltrans to develop a Transportation Management Plan (TMP) to reduce construction traffic impacts to the STN.

Lead Agency
As the Lead Agency, the City of Menlo Park is responsible for all project mitigation, including any needed improvements to the STN. The project's fair share contribution, financing, scheduling, implementation responsibilities and lead agency monitoring should be fully discussed for all proposed mitigation measures.

Equitable Access
If any Caltrans facilities are impacted by the project, those facilities must meet American Disabilities Act (ADA) Standards after project completion. As well, the project must maintain bicycle and pedestrian access during construction. These access considerations support Caltrans' equity mission to provide a safe, sustainable, and equitable transportation network for all users.

Encroachment Permit
Please be advised that any permanent work or temporary traffic control that encroaches onto Caltrans' ROW requires a Caltrans-issued encroachment permit. As part of the encroachment permit submittal process, you may be asked by the Office of Encroachment Permits to submit a completed encroachment permit application package, digital set of plans clearly delineating Caltrans' ROW, digital copy of signed, dated and stamped (include stamp expiration date) traffic control plans, this comment letter, your response to the comment letter, and where applicable, the following items: new or amended Maintenance Agreement (MA), approved Design Standard Decision Document (DSDD), approved encroachment exception request, and/or airspace lease agreement. Your application package may be emailed to D4Permits@dot.ca.gov.

To obtain information about the most current encroachment permit process and to download the permit application, please visit Caltrans Encroachment Permits (*link*).

Thank you again for including Caltrans in the environmental review process. Should you have any questions regarding this letter, please contact Marley Mathews, Transportation Planner, via LDR-D4@dot.ca.gov.

For future early coordination opportunities or project referrals, please contact LDR-D4@dot.ca.gov.

Sincerely,



YUNSHENG LUO
Acting District Branch Chief
Local Development Review

c: State Clearinghouse

Turner, Christopher R

From: Wilson, Joanne <jwilson@sfwater.org>
Sent: Wednesday, June 28, 2023 6:18 PM
To: Turner, Christopher R
Cc: Natesan, Ellen; Rando, Casey; Wayne, Lisa B; Read, Emily; Russell, Rosanna S; Sandoval, Teresa
Subject: Notice of Preparation - Environmental Impact Report for the 1005 O'Brien Drive / 1320 Willow Road Life Sciences Project

CAUTION: This email originated from outside of the organization. Unless you recognize the sender's email address and know the content is safe, DO NOT click links, open attachments or reply.

Hello Chris: Thank you for this opportunity to comment on behalf of the San Francisco Public Utilities Commission (SFPUC) on the Notice of Preparation (NOP) of an Environmental Impact Report (EIR) for the above-referenced project. The drawings included with the NOP correctly show the SFPUC's fee-owned Hetch Hetchy right-of-way (ROW) adjacent to, and on the north side of the project site. Based on these drawings, It does not appear that any portion of the proposed project would encroach onto the SFPUC's ROW.

The SFPUC provides the following comments on the scope and content of the Project EIR.

1. If the proposed project scope changes such that construction/work is proposed on or within the SFPUC ROW (including utility connections, permanent access to the Project, construction access or use, or street/sidewalk modifications) as part of the Project or in the future, then the project sponsor is required to participate in the SFPUC's **Project Review Process** (further information below) prior to receiving written authorization from the SFPUC to implement any improvements within the SFPUC ROW.

2. In the absence of written SFPUC authorization for the use of its ROW, the project sponsor should implement appropriate measures during construction of the proposed project to prevent encroachment of construction vehicles, equipment, and materials onto the SFPUC ROW. In addition, access over or across the SFPUC ROW is not allowed without written authorization. Appropriate measures could include temporary construction fencing, tailgates for construction crews to communicate restrictions and prohibitions related to the SFPUC ROW during construction.

3. The project sponsor must provide proper grading and permanent drainage within the project site so that the Project site does not drain onto the SFPUC ROW. The project sponsor (and future owners of the Project property) must maintain its drainage systems in good working order.

4. If the proposed research and development (R&D) use of the project site includes the regular use or storage of significant amounts of hazardous materials, please include the SFPUC on any emergency contact list in the event of a chemical spill, hazard, or other emergency. The emergency contact for the SFPUC is: SFPUC Millbrae Dispatch, at (650) 872-5900. Please ask Millbrae Dispatch to inform the SFPUC ROW Manager and/or SFPUC Peninsula Watershed Manager of the emergency. Millbrae Dispatch operates 24-hours daily, 7 days a week.

5. Because the proposed project would include two back-up diesel-fueled generators for emergency use for each building, we request that the generators have secondary containment in the event of a hazardous fuel spill.

SFPUC Project Review Process

All proposed projects and activities on SFPUC lands must be reviewed by the SFPUC's Project Review Committee (committee) to determine whether a proposal is compatible with SFPUC adopted plans and policies ***prior*** to obtaining written authorization from the SFPUC. During Project Review, the committee may require modifications to the proposal and/or require implementation of avoidance and minimization measures to reduce negative impacts and to ensure that the proposal conforms to applicable plans and policies. Therefore, it is important to schedule projects for review at the earliest opportunity to address any potential project issues.

To initiate the Project Review process, project sponsors must visit the SFPUC's Project Review Committee webpage at https://sfpuc.org/construction-contracts/lands-rights-of-way/project-review-and-land-use-bay-area to download a copy of the current Project Review application. Once the application is completed, the project sponsor must email their application and supporting attachments (project description, maps, drawings and/or plans) to projectreview@sfwater.org. Completed applications with required attachments are scheduled in the order they are received for the next available Project Review Committee meeting date.

Future Project Public Notices

Please send electronic updates and public notices for the Project to me, with a copy to Teresa Sandoval (SFPUC Real Estate Services) at tsandoval@sfwater.org. Please mail paper notices to the following address:

San Francisco Public Utilities Commission
Real Estate Services
525 Golden Gate Avenue, 10th Floor
San Francisco, CA 94102

If you have any questions or need further information, please contact me. Again, thank you for this opportunity to provide comments on the proposed project.

Sincerely,

Joanne Wilson

Joanne Wilson
Senior Land and Resources Planner
Natural Resources and Lands Management Division
Water Enterprise
1657 Rollilns Road
Burlingame, CA 94010

Please consider the environment before printing this email.

Hetch Hetchy Regional Water System
Operated by San Francisco Water, Power and Sewer | Services of the San Francisco Public Utilities Commission

SIERRA CLUB
LOMA PRIETA CHAPTER

SAN MATEO, SANTA CLARA & SAN BENITO COUNTIES

June 29, 2023

Chris Turner, Associate Planner
Community Development, City of Menlo Park
701 Laurel Street, Menlo Park, CA 94025
Via email: crturner@menlopark.gov
Cc: planning.commission@menlopark.gov

Subject: Comment on NOP for 1005 O'Brien and 1320 Willow Road Project

Dear Mr. Turner,

The Sierra Club Loma Prieta Chapter's Sustainable Land Use Committee (SLU) advocates on land use issues in San Mateo and Santa Clara Counties. In that role, we have spent a lot of time researching the upsurge of Life Science / Biotech buildings and campuses in San Mateo County including Menlo Park. Thank you for considering these following public safety issues and environmental concerns in your NOP.

The Initial Study and the Notice of Preparation of an EIR will not properly assess the human health and environmental risks from locating this Life Sciences project in an area with seismic liquefaction potential and in a FEMA flood zone, adjacent to residences, schools and day care. This is because CEQA requires study of a project's impacts on the environment, but NOT the environment's impact on a project.

This public safety vulnerability is of particular concern as the rapid proliferation of biotech labs in heavily populated areas is an issue of nationwide concern[1] due to the inherent risks of research involving potentially lethal airborne pathogens that can escape into the community. This concern is exacerbated by the fact that the new Life Sciences district, created in Menlo Park, is located along an existing residential area of East Palo Alto with schools and day care centers and in close proximity to the Belle Haven neighborhood, a mature, existing working-class residential neighborhood.

[1] The National Institutes of Health (NIH) have formed an advisory committee, the National Science Advisory Board for Biosecurity (NSABB). The NSABB has held meetings in 2022 and 2023 on Biosafety, with specific focus on Potential Pandemic Pathogen Care and Oversight (PC3O) and Dual Use Research of Concern (DURC). In a transcript of a NSABB Sept 2022 meeting, a board member notes: "We have to deal with the problem of domestic research that's not funded by the US government. That's a big chunk right now, especially out here in the west with Silicon Valley."

For public safety, international protocols carefully differentiate between the dangers of different types of life sciences labs, dividing them into four biohazard safety levels[2] from biosafety level 1 (BSL-1), researching the least risky agents, to biosafety level 4 (BSL-4), so dangerous that there are no known cures for these diseases.

- BSL-1 facilities work only with biological agents that do not usually cause disease in humans.
- BSL-2 facilities work with agents that pose a moderate risk to human health, such as influenza and salmonella, with known cures, though people do die from these diseases.
- BSL-3 are high-containment facilities that work largely with air-borne infectious agents that can cause serious or lethal disease via inhalation, such as HSN1 flu, SARS-CoV2, anthrax and West Nile virus.
- BSL-4 high-containment facilities work with lethal, highly infectious agents with no known cures such as Ebola and Marburg Fever and are under strict federal control. There are currently no BSL-4 labs in California.

There are only BSL-1 and BSL-2 labs currently known to be on the Peninsula, though no one can be certain of this fact.[3] The exception is BSL-3 labs in the local universities. Menlo Park's Life Sciences ordinance, however, does not differentiate between the four biosafety levels. Human error, a predictable event, is easiest managed by avoiding courting danger.[4] For public safety reasons and because of the proximity of residential neighborhoods, San Carlos decided to ban the riskier high-containment BSL-3 and 4 labs. It was noted that the National Institutes of Health's guidelines for BSL labs are mandatory only for federally financed labs but are voluntary for private labs such as the speculative project envisioned at 1005 O'Brien/1320 Willow Road.

Describe how public safety impacts from the 3 proposed biosafety level labs will be avoided or mitigated. Would an appropriate mitigation be for the City to consider allowing BSL-1 and BSL-2 labs and a ban on BSL-3 and BSL-4, which are high-containment research labs, within city limits?

Describe whether the facilities will include live animal research (A-BSL labs) and testing, and if so, what special facilities are required to sustain the animals in the event of natural disasters and what the impact of these would be on the environment and residential neighbors.

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[2] CDC and NIH—Biosafety in Microbiological and Biomedical Laboratories—6th Edition https://www.selectagents.gov/

[3] There may be BSL-3 labs in some large companies but, since private BSL labs are not regulated, this information is not made available. Hospitals do not have any BSL labs except for university research labs associated with a university hospital.

[4] You should be afraid of the next "lab leak," NY Times Nov 23, 2021. "…. *In fact, the most concerning aspect about high containment biolabs is that, considered as a collective, they may only be as safe as the worst lab among them. A breach or a breakdown at one could imperil us all*."

Describe the potable water needs of the facilities. Biosafety facilities use large amounts of potable water.[5] Life Sciences labs may be unable to significantly minimize water use due to clean water requirements for lab operations and sterilization procedures. A similar proposed 410,000 square foot Life Science development in San Carlos projects using 27 million gallons of water per year.[6] The City of Menlo Park needs this information to determine, in advance, whether emergency water supplies are adequate, to determine the cumulative needs of the current approved life sciences projects and also needs of the build-out of the Life Sciences District. Will the cumulative demand require more emergency water storage, strain water allocations or potentially lead to rate increases for residents?

Describe the energy needs of the facilities. Biotech labs consume 5 to 10 times the amount of energy that office buildings consume.[7] This is because Life Sciences research is heavily dependent on electrically operated equipment such as refrigerators, centrifuges, biocontainment cabinets, fume hoods, freezers, hot plates, autoclaves, incubators, purifiers and a variety of analysis equipment. In addition, the HVAC systems service clean room conditions with single pass air to avoid contamination, and multiple exhaust systems for containment cabinets, therefore adding to the large energy loads. BSL-3 high containment labs are even more dependent on mechanical ventilation, exhausts and fail-safe backup systems.
Since this is a speculative development, make appropriate assumptions of office space versus labs space as well as the lab biosafety levels to make reasonable assessments of energy consumption requirements in order to determine the cumulative load requirements for the project, as well as Life Sciences buildings approved and in the pipeline. Will the building be all-electric except for lab research needs? What percentage of the energy load will be met by locally generated solar energy? How do the energy requirements of the Life Sciences project and the cumulative demands of the district impact the GHG reduction goal of the city's Climate Action Plan?

Describe the wastewater (sewer) demand for the facilities. Will high water usage result in high sewer use? Will this result in increased capacity requirements of the waste treatment facilities used by the City. Will gray water be able to be reused for flushing and irrigation to decrease wastewater treatment demand and for recharging the aquifer using low-impact development strategies (LID)? What is the cumulative effect of projects in the Life Sciences district at build out?

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[5] Water usage in the lab: we cannot do without this precious blue resource – but we can do a lot better https://www.starlabgroup.com/GB-en/water-usage-in-labs.html

[6] 642 Quarry Road Life Science Project City of San Carlos Response to Comments April 2023 https://www.cityofsancarlos.org/642%20Quarry%20Road_Response-To-Comments_202304011_Final_no%20attachments.pdf

[7] https://www.savills.com/research_articles/255800/345762-0 Pacific Gas and Electric Company estimates that, in the US, laboratories can consume five to ten times the amount of energy used in typical offices.
https://www.bisnow.com/national/news/life-sciences/energy-intensive-life-sciences-labs-havent-discovered-transparent-esg-reporting-117694

Describe and analyze the zero-waste strategies of the facilities. Zero waste is an important sustainability goal. Biotech labs usually have a high dependency on single use plastics, creating huge waste streams of single use plastics.[8] How will the cumulative waste stream affect the Climate Action Plan and sustainability goals of the City?

Describe how lighting will be controlled, considering lighting impacts from within the building, because labs often operate through the night and lights are often on 24/7. Can automatic blinds close off the glazed areas at night facing towards residences to allow rest at night? Parking structure lighting should be dimmed unless needed to be brightened by motion detection. Also describe how all exterior lighting will be controlled for dark sky considerations. Lights attract migratory birds at this location near the bay and controlling lighting is important for bird-safe design.

Describe how deliveries and noise or disturbance from deliveries will be contained since the site is close to residential neighborhoods. Biotech labs work around the clock and deliveries can be very disturbing for neighbors and children who need rest. Can deliveries be minimized, regulated and restricted to daylight working hours to avoid disturbance?

Describe the level of noise from HVAC systems and multiple tall exhaust stacks. Biotech labs are required to have very robust air handling systems and multiple exhausts. These are relatively very noisy compared to office buildings. The higher the biosafety level, the more demanding the air handling and exhausts. Would it be possible to establish measurable maximum noise levels to control noise? Can a mitigation be to replace mechanical equipment screens with solid concrete noise containment walls around the large mechanical equipment area housed on the rooftop?

Will there be pollutants in exhaust systems from labs? The exhaust systems use hepa filters which need maintenance. To avoid accidental releases of pollutants, will there be reporting requirements in place to ensure that filters are being replaced, cleaned and inspected regularly and are being effective in removing pollutants? Sensitive receptors are susceptible to pollutants and asthma and other respiratory diseases can be triggered by pollutants,[9] such as from improperly maintained exhaust systems from biolabs.[10]

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[8] https://cen.acs.org/environment/sustainability/laboratories-move-away-single-use/97/i43

[9] Residential Proximity to Environmental Hazards and Adverse Health Outcomes" December 2011, National Library of Medicine, National Center for Biotechnology Information.

[10] An example might be: Boston University, June 1, 2016: *"A malfunctioning network switch at BU's National Emerging Infectious Diseases Laboratories (NEIDL) resulted in a shutdown of parts of the lab's ventilation monitoring system …The University has suspended BSL-3 research until the outside engineers review recommended remedial work to prevent future ventilation system malfunctions*."

We greatly appreciate your thoughtful consideration of these critical public health and environmental safety issues.

Respectfully submitted,



Gita Dev, co-Chair
Sustainable Land Use Committee
Sierra Club Loma Prieta

Cc: Menlo Park Planning Commission

James Eggers,
Executive Director
Sierra Club Loma Prieta Chapter

Gladwyn d'Souza,
Conservation Chair
Sierra Club Loma Prieta Chapter

Turner, Christopher R

From: Eleazar Madrid <eleazar@mid-pen.org>
Sent: Wednesday, June 28, 2023 12:11 PM
To: Turner, Christopher R
Subject: Written Comments for Initial Study for proposed 1005 O'Brien Dr & 1320 Willow Rd Project
Attachments: 23-24 School Operations Schedules.pdf

CAUTION: This email originated from outside of the organization. Unless you recognize the sender's email address and know the content is safe, DO NOT click links, open attachments or reply.

Hello Chris,

My name is Eleazar and I am emailing you on behalf of Mid-Pen High School located at 1340 Willow Road in Menlo Park, CA 94025 in response to the Notice of Preparation and Initial Study released for proposed 1005 O'Brien Drive and 1320 Willow Road project.

Operating Schedule:
I wanted to make certain to send you a copy of our school operating schedule attached to this email. It includes;

- When school is in session
- School Holidays and breaks
- School events that take place throughout the year

Daily Schedule:
Additionally, our daily schedule reads as follows;

- School starts at 9:30 am
- Morning break is from 11:20 am - 11:35 am
- Lunch break is from 12:25 pm - 1:05 pm
- School ends at 3:15 pm Mon, Tues, Thur, and Fri
    - at 2:30 pm on Wen

Afterschool Programs:
Throughout the school year, we have several afterschool programs that take place from sports practices and games to events that require our families to come to campus to attend our yearly Back to School night, Night of the Arts, Theatre and Musical concert, and more.

School Concerns:
How will the proposed construction work on 1005 O'Brien Dr affect the daily logistics of our school?

- Traffic: How will this proposed work affect the morning and afternoon drop-off and pick-up of our families/students?
- Traffic: How will this proposed work affect the entering and exiting of our school property onto Willow Road?
- Noise/Smell: How will the proposed work affect students and staff while school is in session? In the building and outside on our patio and field?
- How will the school be notified in advance of any extra loud work or increased traffic restrictions?

These are just a few of the concerns and questions we have and would appreciate a response.

Thank you in advance for your attention to this matter. I look forward to hearing back from you soon.

Thank you,

Eleazar

--

Mid-Peninsul

Eleazar Madrid (he/him)
Director of Facilities

1340 Willow Road
Menlo Park, CA 94025
p: 650.321.1991 x.118 **f:** 650.321.9921
eleazar@mid-pen.org

Mid-Peninsula High School

2023-2024 Important Dates

Dates and times are subject to change. Please visit our online calendar to confirm.

AUGUST 2023

Monday, August 7-	
Tuesday, August 8	College App Boot Camp for Seniors applying to four-year colleges
Wednesday, August 9	Senior Leadership Workshop for all Seniors
Thursday, August 10	New Family Orientation
Monday, August 14-	
Tuesday, August, 15	Staffulty In-Service Days
Wednesday, August 16	First Day of School—Dismissal 2:30 pm

SEPTEMBER 2023

Monday, September 4	Labor Day—NO SCHOOL
Sunday, September 10	Back-To-School Day
Monday, September 25	Yom Kippur—NO SCHOOL
Wednesday, September 27, Thursday, September 28, & Friday, September 29	Family Conferences—Dismissal 12:45 pm

OCTOBER 2023

Monday, October 9	Indigenous Peoples' Day—NO SCHOOL

NOVEMBER 2023

Friday, November 10	Veterans Day holiday - NO SCHOOL
Monday, November 20-	
Friday, November 24	Thanksgiving Break—NO SCHOOL
Monday, November 27	Classes Resume

DECEMBER 2023

Monday, December 18	Finals: Period 1 and 2—Dismissal 12:20 pm
Tuesday, December 19	Finals: Period 3 and 4—Dismissal 12:20 pm
Wednesday, December 20	Finals: Period 5 and 6—Dismissal 12:20 pm
Thursday, December 21-	
Friday, December 22	Staffulty In-Service Days—NO SCHOOL FOR STUDENTS
Monday, December 25-	
Friday, December 29	Winter Break–NO SCHOOL

JANUARY 2024

Monday, January 1- Friday, January 5	Winter Break—NO SCHOOL
Monday, January 8	Classes Resume—Second Semester Begins
Monday, January 15	Martin Luther King Jr. Day—NO SCHOOL

FEBRUARY 2024

Thursday, February 15- Friday, February 16	Staffulty In-Service Days— NO SCHOOL FOR STUDENTS
Monday, February 19- Friday, February 23	Presidents' Week Break—NO SCHOOL
Monday, February 26	Classes Resume

MARCH 2024

Wednesday, March 13, Thursday, February 14, Friday, March 15	Family Conferences—Dismissal 12:45 pm
Monday, March 18- Friday, March 22	DragonWeek—Student Participation Required
Monday, March 25- Friday, March 29	Spring Break—NO SCHOOL

APRIL 2024

Monday, April 1	Classes Resume

MAY 2024

Friday, May 24	Last Day of School for Seniors & Graduation Rehearsal
Saturday, May 25	Graduation at 10:30 am
Monday, May 27	Memorial Day—NO SCHOOL
Tuesday, May 28	Finals: Periods 1 and 2—Dismissal 12:20 pm
Wednesday May 29	Finals: Periods 3 and 4—Dismissal 12:20 pm
Thursday, May 30	Finals: Periods 5 and 6—Dismissal 12:20 pm Last Day of School for Grades 9-11
Friday, May 31	Staffulty In-Service Day (Grading Day)

* Staff arrives 8am - 9am
* Morning drop-off 9am - 9:45am

Mid-Peninsula High School

2022-2023 Class Schedule

	Monday	Tuesday
9:30 - 10:20 am	Period 1	Period 6
10:25 - 11:20 am	Announcements/Period 2	Announcements/ Period 2
11:20 - 11:35 am	*Break*	*Break*
11:35 am - 12:25 pm	Period 3	Period 3
12:25 - 1:05 pm	*Lunch*	*Lunch*
1:05 - 1:25 pm	*Community Meeting*	*Core*
1:30 - 2:20 pm	Period 4	Period 4
2:25 - 3:15 pm	Period 5	Period 5

	Wednesday
9:30 - 10:20 am	Period 1
10:25 - 11:20 am	Announcements/Period 6
11:20 - 11:35 am	*Break*
11:35 am - 12:25 pm	Period 3
12:25 - 1:05 pm	*Lunch*
1:05 - 1:35 pm	*Dragon Workshops*
1:40 - 2:30 pm	Period 4
2:30 pm	*Student Dismissal*
2:45 pm	*Staffulty Meeting*

	Thursday	Friday
9:30 - 10:20 am	Period 1	Period 1
10:25 - 11:20 am	Announcements/ Period 2	Announcements/ Period 2
11:20 - 11:35 am	*Break*	*Break*
11:35 am - 12:25 pm	Period 6	Period 3
12:25 - 1:05 pm	*Lunch*	*Lunch*
1:05 - 1:25 pm	*Core*	*Core*
1:30 - 2:20 pm	Period 4	Period 6
2:25 - 3:15 pm	Period 5	Period 5

(1st) * Afternoon pick-up 3pm - 3:45pm
(2nd) * Afternoon pick-up (Sports program) 5pm - 6pm

v8.1.22

June 20, 2023

Chris Turner
Associate Planner
Community Development, City of Menlo Park
701 Laurel Street, Menlo Park, CA 94025
Via email: crturner@menlopark.gov

Subject: Comment on NOP for 1005 O'Brien and 1320 Willow Road Project

Mr. Turner,

The Initial Study and the Notice of Preparation of an EIR for this project fail to address the human health and environmental risks from siting this Life Sciences project in an area with moderate liquefaction susceptibility and in a FEMA flood zone, adjacent to residences, schools, and workplaces. This is a shortcoming of the CEQA process: an EIR is required to assess the impacts of a project on construction workers, residents, and the environment; it is not required to address the potential future impact of the environment (i.e., earthquakes, flooding, future sea level rise) on the risks after completion. Thus, those risks are classified as "no significant impact" even though such natural events are entirely predictable. This letter outlines my concerns and recommends steps to ensure public safety.

The rapid proliferation of millions of square feet of biotech labs in heavily populated areas is an issue of nationwide concern[1] due to the inherent risks of research involving potentially lethal pathogens. 1005 O'Brien and 1320 Willow Road is proposed as a life sciences laboratory/research and development facility. The future tenants of the buildings are unknown – this is a speculative development. There is no indication in the Initial Study of the types of research that will be conducted or of the Biosafety Levels (BSL)[2],[3] that the buildings will accommodate.

- BSL-1 facilities work only with biological agents that do not cause disease in humans.
- BSL-2 facilities work with agents that pose a moderate risk to human health, such influenza and salmonella.

[1] The National Institutes of Health (NIH) have formed an advisory committee, the National Science Advisory Board for Biosecurity (NSABB). The NSABB has held meetings in 2022 and 2023 on Biosafety, with specific focus on Potential Pandemic Pathogen Care and Oversight (PC3O) and Dual Use Research of Concern (DURC). In a transcript of a NSABB Sept 2022 meeting, a board member notes: *"We have to deal with the problem of domestic research that's not funded by the US government. That's a big chunk right now, especially out here in the west with Silicon Valley."*

[2] CDC and NIH—Biosafety in Microbiological and Biomedical Laboratories—6th Edition https://www.selectagents.gov/

[3] *Understanding biosafety levels* Sierra Club webinar: https://youtu.be/gHZIDwLk5Ak

- BSL-3 facilities work with agents that may cause serious or lethal disease via inhalation, such as SARS-CoV2, and West Nile virus, but for which medical interventions are available.
- BSL-4 facilities work with lethal, easily transmitted agents such as Ebola and Marburg Fever and are under strict federal control. There are currently no BSL-4 labs in California.[4]

Menlo Park does not have any processes in place to protect residents living near BSL-3 or -4 facilities, nor are there any other agencies with responsibility for ensuring public safety or for incident response if a hazardous release of a biological agent occurs.

- There is no mention of biohazards, biosafety, or biosecurity in the Menlo Park Draft Safety Element[5], in Connect Menlo[6], or in the zoning ordinance that established the Life Sciences District. The Fire Department does not have training or expertise to respond to releases of biological agents. The City is completely unprepared for a biohazard release incident.

- San Mateo County Environmental Health staff report[7] that they have no authority or responsibility for biohazard incidents, except for the Coronavirus pandemic. The State hazardous materials databases, which the fire department and emergency responders depend upon, include chemical and radiological hazards but do not include biological hazards.

- Other than licensing companies to work with select hazardous organisms, the federal government does not regulate private biotech labs. A Tarleton Properties representative implied in a study session for the *1025 O'Brien* project that the federal licensing process ensures community safety[8]. It does not. Those federal regulations apply only to a short list of livestock and plant toxins.[9] The National Institutes of Health guidelines for BSL levels 1-4 practices and building design are mandatory for federally financed labs but voluntary for private labs.

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[4] https://www.globalbiolabs.org/map Accessed 6/19/23.

[5] https://menlopark.gov/Government/Departments/Community-Development/Planning-Division/Comprehensive-planning/Housing-Element/2023-2031-Housing-Element-Update/Safety-Element

[6] https://menlopark.gov/Government/Departments/Community-Development/Planning-Division/Comprehensive-planning/ConnectMenlo

[7] In a meeting between the San Mateo County Office of Environmental Health and the Sierra Club Biosafety working group.

[8] Video of April 10, 2023 Menlo Park Planning Commission Meeting. https://youtu.be/1KbK-l4zesg

[9] 42 CFR 73, 7 CFR Part 331, and 9 CFR 121

With respect to the 1005 O'Brien and 1320 Willow Road NOP, which does not address the concerns expressed in this letter, I have the following request for topics to be added to the EIR:

1. Evaluate risks associated with the BSL levels proposed for the project in the case of an accidental release of hazardous bioagents.

    - Since future tenants are unknown, the EIR should evaluate the potential impacts on human health and the environment of an accidental release of the full spectrum of biological agents that the building infrastructure will be designed to accommodate. For example, if the HVAC system is sized to support negative air pressure and airflow requirements required by BSL-3 laboratory guidelines, the EIR should evaluate the consequences of a failure of that system, consequent release of BSL-3 infectious agents, and the resulting impact on nearby residents, including children at schools located within 1000 feet of the buildings.

    - Identify the public agencies that will respond to a release of a hazardous, contagious biological agent and list the specific training, equipment and supplies that will be required to support that response.

    - Provide details on how the buildings, systems and backup power will be designed to avoid release of biological agents after large earthquakes, liquefaction, or flooding. Assume that grid power will be unavailable for more than 48 hours after the event, as occurred during storms in 2023. If backup power will rely on diesel generators, evaluate how much fuel storage will be required and assess the health risks to nearby residents (including school children) from inhalation of diesel soot.

    - Describe whether the facilities will be designed to accommodate live animal testing, and if so, what types of test organisms is it designed to support.

2. Describe the potable water needs of the facilities

    Biosafety facilities use large amounts of potable water by nature of their operations. High-containment labs may be unable to significantly minimize water use due to clean water requirements for lab operations and sterilization procedures. One recently approved 410,000 square foot Life Science development in San Carlos will use 27 million gallons of water per year.[10] The City of Menlo Park needs this information to determine whether the

[10] 642 Quarry Road Life Science Project City of San Carlos Response to Comments April 2023, p.59 https://www.cityofsancarlos.org/642%20Quarry%20Road_Response-To-Comments_202304011_Final_no%20attachments.pdf

cumulative build-out of the Life Sciences District will strain water allocations or lead to rate increases for residents.

The CEQA process is insufficient to protect public health and safety from potential hazards of life sciences developments. Biosafety for private biotech labs and R&D facilities should properly be addressed at the federal, state or, at a minimum, the county level. However, Menlo Park cannot wait for that to happen – there are currently six proposed biotech developments in the Life Sciences District, each of which is a potential hazard to the community. I recommend that the City Council consider a temporary ban on BSL-3 and -4 research and development within city limits until an ordinance is developed. The ordinance should include auditing and record-keeping requirements to verify that tenants are complying. The city staff will need to evaluate whether expertise is available in house or would require a consultant.

Thank you for considering my comments.

Naomi Goodman, MSPH



Menlo Park, CA
nlgoodman@hotmail.com
650-322-2124

Cc: Menlo Park Planning Commission

Turner, Christopher R

From: John McKenna <jemsd8@gmail.com>
Sent: Monday, June 26, 2023 5:37 PM
To: _Planning Commission
Subject: 6.26.23 Planning Commission - Agenda Items F3 & G1

CAUTION: This email originated from outside of the organization. Unless you recognize the sender's email address and know the content is safe, DO NOT click links, open attachments or reply.

I serve on the Environmental Quality Commission but these comments are mine as an individual. I'm writing to strongly urge both the developer, Tarlton Properties, and the City to reconsider the gas infrastructure planned for this project. I point to a project in Millbrae that is being developed by Longfellow that is an all-electric science lab building. Buildings account for about 40% of a typical Bay Area city's GHG emissions. In order to meet the City of Menlo Park's climate action goals, 95% of its buildings need to be decarbonized by 2030. Removing the gas infrastructure from the currently existing buildings in the City will be a huge challenge. It would be terribly disappointing to add to this challenge by allowing gas infrastructure in new buildings when the option is available to build all-electric. I would also ask that the back-up power for these buildings be served by batteries as opposed to diesel generators.

Additionally, I ask that this project prohibit labs of Biosafety Level 3 and above.

Lastly, I ask that the project be designed in a way to preserve the heritage trees on-site. The Belle Haven community already lacks the tree canopy that the rest of the City enjoys. Removing existing heritage trees will only add to the disparity. And replacing heritage trees can not be equaled with the planting of new trees when it comes to carbon sequestration, shade cover, and reducing the urban heat island effect.

Thank you for your consideration.

Sincerely,

John McKenna
Menlo Park, CA
(650) 776-8548

Turner, Christopher R

From: Peter Altman <peteraaltman@gmail.com>
Sent: Saturday, June 3, 2023 9:05 AM
To: Turner, Christopher R
Subject: 1320 Willow

CAUTION: This email originated from outside of the organization. Unless you recognize the sender's email address and know the content is safe, DO NOT click links, open attachments or reply.

Hi Chris,
Reading about yet another large building going up at 1320 Willow Road.

I don't see how we can continue to expand population density without adding lanes to roads and more mass transit. The brand new willow 101 over cross is packed at rush hour and cars already back up onto 101 in the evening and all the way down willow road. Far better pedestrian and cycling options are also needed to reduce the vehicle traffic. There has to be some sort of model for what each additional car costs in terms of time to cross the bridge and when you multiply that increased time by all of the people who have to bear that extra time in their lives it gets pretty expensive. A six story parking garage is likely 300 to 600 additional cars and may still not be enough for all the people who will be going into these new buildings. If I as an MP citizen were allowed to vote on increased density in this area, I would vote no. The long term costs to our society of this increased density are going to be significant and hit us every day with reduced quality of life.

There is a lot we could do that would help us improve our already high density and congested City of Menlo Park and East Palo Alto. Do we have any new park developments as opposed to refurbishments? Efforts to protect green spaces? Efforts to enhance the Bay Trial for commuters? Efforts to enhance crossing the Dumbarton for cyclists? Efforts to create walking malls as opposed to strip malls? Efforts to enhance access to CalTrans?

While these are not the projects before us – any new developments should at minimum be putting serious tax dollars on the table every year to fund such work in the years ahead – as it is only going to get worse.

Regards,
Peter

Peter Altman
2056 Menalto Avenue
650-255-4532 cell

Appendix H

Project Plans (November 2025)



TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

04-15-2021	D.R.T. REVIEW	06-25 2024	PARKING UPDATE
06-23-2021	C.U.P. SUBMITTAL		
10-28-2021	C.U.P. RESPONSE 1		
06-22-2022	C.U.P. RESPONSE 2		
10-28-2022	C.U.P RESPONSE 3		
02-17-2023	C.U.P. RESPONSE 4		
07-12-2023	C.U.P. RESPONSE 5		
09-29-2023	C.U.P. RESPONSE 6		

COVER SHEET

G0

DES ARCHITECTS ENGINEERS

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985 & 1001 O'BRIEN DRIVE
1320 WILLOW ROAD
MENLO PARK, CA 94025

PROJECT DATA

BASE FLOOD ELEVATION: 12.8 FT

MUNICIPAL CODE:

CBC 2022
BUILDING OCCUPANCY: BUSINESS (B)
TYPE OF CONSTRUCTION: I-B
FIRE PROTECTION: FULLY SPRINKLERED
ALLOWABLE AREA: UNLIMITED
ALLOWABLE HEIGHT: 180 FT; 12 STORIES

ZONING REQUIREMENTS:

LEGAL JURISDICTION:	MENLO PARK, CA
ZONING DESIGNATION:	LS-B
MAXIMUM HEIGHT:	110 FT + 10 FT FLOOD ZONE
FAR MAX (1.25):	229,520 SF
COMMERCIAL FAR MAX (0.1):	18,361 SF

PARKING STANDARDS
R&D: 1.5 - 2.5 SPACES / 1000 SF

EV STALLS
10% OF TOTAL + 5% EV READY

BICYCLE: 1 PER 5,000 SF
SHORT TERM: 20% & LONG TERM: 80%

REQUIRED:
SHORT TERM: 9
LONG TERM: 38
TOTAL: 47

"FLOOD ZONE NOTE: PROJECT TO BE DESIGNED AND CONSTRUCTED IN COMPLIANCE WITH CURRENT FEMA REGULATIONS AND THE CITY'S FLOOD DAMAGE PREVENTION ORDINANCE.

PROJECT SITE AREA:	183,616 SF
PHASE 1:	
SITE:	123,738 SF
(N) 1005 O'BRIEN DR:	154,581 SF (1.25 FAR)
PHASE 2:	
SITE:	59,878 SF
(N) 1320 WILLOW RD:	73,817 SF (1.23 FAR)
SUMMARY:	
R&D AREA:	228,398 SF (1.24 FAR)

BUILDING HEIGHTS:
LEVEL 1 ELEVATION: 14.8 FT (2FT ABOVE BFE)
1005 O'BRIEN DR
SEE SHEETS A9.5 & A10.1 - A10.3
1320 WILLOW RD
SEE SHEETS A11.5 & - A12.1 - A12.3

PARKING:
CAR: SEE SHEET A13.1 FOR COUNT
SEE SHEET A6.1, A6.2 & A13.2 - A13.3 FOR LAYOUT
BICYCLE: SEE SHEET 13.4

SHOWERS

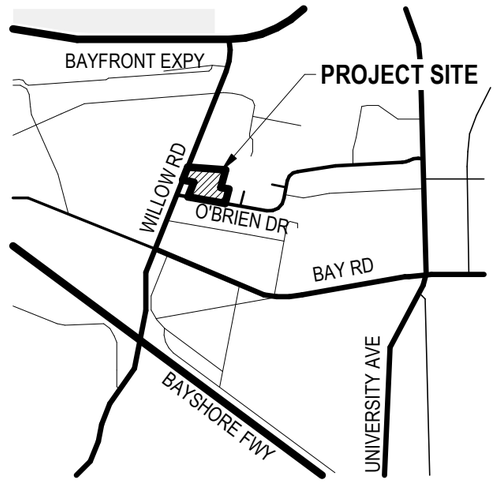
1005 O'BRIEN DR:	6	(PHASE 1)
1320 WILLOW RD:	2	(PHASE 2)
TOTAL:	**8**	

PROJECT TEAM

BUILDING OWNER:
O'BRIEN DRIVE PORTFOLIO
c/o TARLTON PROPERTIES
1530 O'BRIEN DRIVE, SUITE C
MENLO PARK, CA 94025
PHONE: 650.330.3600
CONTACT: RON KRIETEMEYER

ARCHITECT:
DES ARCHITECTS + ENGINEERS
399 BRADFORD STREET
REDWOOD CITY, CA 94063
PHONE: 650.364.6453
CONTACT: TOM HYDE

PROJECT LOCATION



TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

04-15-2021	D.R.T. REVIEW
06-23-2021	C.U.P. SUBMITTAL
10-28-2021	C.U.P. RESPONSE 1
06-22-2022	C.U.P. RESPONSE 2
10-28-2022	C.U.P RESPONSE 3
02-17-2023	C.U.P. RESPONSE 4
07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

PROJECT DATA

G1A

DES ARCHITECTS ENGINEERS

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G1C	SHEET INDEX
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G2.1B	1005 OBD - LEED BOUNDARY SITE PLAN
G2.2A	1302 WILLOW - LEED SCORECARD
G2.2B	1320 WILLOW - LEED BOUNDARY SITE PLAN
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A2	EXISTING SITE CONDITIONS - SITE PHOTOS
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A3.2	PHASING PLAN - PHASE 1
A3.3	PHASING PLAN - PHASE 2
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A4.2	1001 OBD EXISTING GROSS AREA
A4.3	1320 WILLOW EXISTING GROSS AREA
A5.1	985 O'BRIEN DR TOPOGRAPHIC SURVEY
A5.2	1001 O'BRIEN DR TOPOGRAPHIC SURVEY
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A6.2	PHASE 2 PROPOSED SITE PLAN
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A7.1	PHASE 1 OPEN SPACE DIAGRAM
A7.2	PHASE 2 OPEN SPACE DIAGRAM
A7.3	PHASE 1 & 2 FRONTAGE DIAGRAM
A7.4	OVERALL SITE LANDSCAPE AREA CALCS
A8	SITE SERVICE / EMERGENCY PLAN
A9	1005 O'BRIEN BLDG. MODULATION
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A9.1B	1005 O'BRIEN GROSS FLOOR AREA DIAGRAMS
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A9.3	1005 O'BRIEN LEVEL 2
A9.4	1005 O'BRIEN LEVEL 3-5
A9.5	1005 O'BRIEN ROOF DECK
A9.6	1005 O'BRIEN ROOF PLAN
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A10.1	1005 O'BRIEN BUILDING ELEVATIONS
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A10.6	1005 O'BRIEN 3D MASSING
A10.7	1005 O'BRIEN 3D MASSING
A10.8	1005 O'BRIEN 3D MASSING
A10.20	SPORTS COURT 3D MASSING
A10.21	SPORTS COURT 3D MASSING
A11	PHASE 1 HEIGHT CALCULATION
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A11.1A	1320 WILLOW GROSS FLOOR AREA DIAGRAMS
A11.1B	1320 WILLOW GROSS FLOOR AREA DIAGRAMS
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A11.4	1320 WILLOW LEVEL 3
A11.5	1320 WILLOW LEVEL 4 /ROOF DECK
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A12.8	1320 WILLOW 3D MASSING
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A13.2	GARAGE PLANS PHASE 1
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L2.1B	PHASE 2 PROPOSED LANDSCAPE PLAN
L2.1C	LANDSCAPE SPACE DIAGRAM
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L2.2B	PHASE 2 ENLARGED ROOF DECK PLAN
L2.3A	PHASE 1 PROPOSED PLANTING PLAN
L2.3B	PHASE 2 PROPOSED PLANTING PLAN
L3	PROPOSED LANDSCAPE IMAGERY
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C1.2	RECOLOGY TRUCK TURNING EXHIBIT
C1.3	DELIVERY TRUCK EXHIBIT
C1.4	PARKING CIRCULATION AND STRIPING EXHIBIT
C2.1	PHASE 1 PRELIMINARY GRADING PLAN
C2.2	PHASE 2 PRELIMINARY GRADING PLAN

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

06-23-2021	C.U.P. SUBMITTAL
10-28-2021	C.U.P. RESPONSE 1
06-22-2022	C.U.P. RESPONSE 2
10-28-2022	C.U.P RESPONSE 3
02-17-2023	C.U.P. RESPONSE 4
07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

SHEET INDEX

G1B

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SHEET LIST

Sheet Number	Sheet Name
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C3.1B	PHASE 1 OVERALL EXISTING PERVIOUS/IMPERVIOUS AREA
C3.1C	PHASE 1 OVERALL PROPOSED PERVIOUS/IMPERVIOUS AREA
C3.2A	PHASE 2 PRELIMINARY STORMWATER MANAGEMENT PLAN
C3.2B	PHASE 2 OVERALL EXISTING PERVOUS/IMPERVIOUS AREA
C3.2C	PHASE 2 OVERALL PROPOSED PERVIOUS/IMPERVIOUS AREA
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LP.2	PHASE 2 PHOTOMETRY PLAN

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TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

06-22-2022	C.U.P. RESPONSE 2
10-28-2022	C.U.P RESPONSE 3
02-17-2023	C.U.P. RESPONSE 4
07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25 2024	PARKING UPDATE

SHEET INDEX

G1C

DES ARCHITECTS ENGINEERS

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LEED v4 for BD+C: Core and Shell

Project Checklist

Project Name: 1005 O'Brien Drive
Date: 10/28/22

Y	?	N			
1			Credit	Integrative Process	1

7	3	10	Location and Transportation		20
			Credit	LEED for Neighborhood Development Location	20
2			Credit	Sensitive Land Protection	2
	3		Credit	High Priority Site	3
2		4	Credit	Surrounding Density and Diverse Uses	6
		6	Credit	Access to Quality Transit	6
1			Credit	Bicycle Facilities	1
1			Credit	Reduced Parking Footprint	1
1			Credit	Green Vehicles	1

5	2	4	Sustainable Sites		11
Y			Prereq	Construction Activity Pollution Prevention	Required
1			Credit	Site Assessment	1
	2		Credit	Site Development - Protect or Restore Habitat	2
1			Credit	Open Space	1
		3	Credit	Rainwater Management	3
1		1	Credit	Heat Island Reduction	2
1			Credit	Light Pollution Reduction	1
1			Credit	Tenant Design and Construction Guidelines	1

8	2	1	Water Efficiency		11
Y			Prereq	Outdoor Water Use Reduction	Required
Y			Prereq	Indoor Water Use Reduction	Required
Y			Prereq	Building-Level Water Metering	Required
1	1		Credit	Outdoor Water Use Reduction	2
4	1	1	Credit	Indoor Water Use Reduction	6
2			Credit	Cooling Tower Water Use	2
1			Credit	Water Metering	1

22	11		Energy and Atmosphere		33
Y			Prereq	Fundamental Commissioning and Verification	Required
Y			Prereq	Minimum Energy Performance	Required
Y			Prereq	Building-Level Energy Metering	Required
Y			Prereq	Fundamental Refrigerant Management	Required
3	3		Credit	Enhanced Commissioning	6
11	7		Credit	Optimize Energy Performance	18
1			Credit	Advanced Energy Metering	1
1	1		Credit	Demand Response	2
3			Credit	Renewable Energy Production	3
1			Credit	Enhanced Refrigerant Management	1
2			Credit	Green Power and Carbon Offsets	2

5	9		Materials and Resources		14
Y			Prereq	Storage and Collection of Recyclables	Required
Y			Prereq	Construction and Demolition Waste Management Planning	Required
	6		Credit	Building Life-Cycle Impact Reduction	6
1	1		Credit	Building Product Disclosure and Optimization - Environmental Product Declarations	2
1	1		Credit	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
1	1		Credit	Building Product Disclosure and Optimization - Material Ingredients	2
2			Credit	Construction and Demolition Waste Management	2

8	2		Indoor Environmental Quality		10
Y			Prereq	Minimum Indoor Air Quality Performance	Required
Y			Prereq	Environmental Tobacco Smoke Control	Required
2			Credit	Enhanced Indoor Air Quality Strategies	2
3			Credit	Low-Emitting Materials	3
1			Credit	Construction Indoor Air Quality Management Plan	1
1	2		Credit	Daylight	3
1			Credit	Quality Views	1

6			Innovation		6
1			Credit	Green Cleaning / IPM	1
1			Credit	Green Building Education	1
1			Credit	Active Tenant or EP Renewable Energy	1
1			Credit	Pilot: MRpc87 verified C&D Recycling Rate	1
1			Credit	EP: HPD, LEM, EPD or Enhance IAQ	1
1			Credit	LEED Accredited Professional	1

3		1	Regional Priority		4
		1	Credit	RP:Access to quality transit (5)	1
1			Credit	RP: Optimize Energy Performance (10)	1
1			Credit	RP: Indoor Water Use Reduction (4)	1
1			Credit	Regional Priority: BPDO-Raw Materials	1

65	29	16	TOTALS	Possible Points:	110

Certified: 40 to 49 points, **Silver:** 50 to 59 points, **Gold:** 60 to 79 points, **Platinum:** 80 to 110

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

10-28-2022	C.U.P RESPONSE 3
02-17-2023	C.U.P. RESPONSE 4
07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

1005 OBD - LEED SCORECARD

G2.1A

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1340 WILLOW RD

(1340 WILLOW RD PARKING LOT)

HETCH HETCHY

(1340 WILLOW RD SOCCER FIELD)

HETCH HETCHY

1320 WILLOW RD

WILLOW RD

GARAGE

10 KELLY CT

FIRE TRUCK TURN-AROUND

(E) SITE ACCESS

STOP

16

10

8

5

965 O'BRIEN DR

PHASE 2

PHASE 1

TXFR

TRASH ENCLOSURE

GENERATOR ENCLOSURE

CHEM.

3

1005 O'BRIEN DR

12

5

STOP

STOP

O'BRIEN DRIVE

(N) SITE ACCESS

RELOCATED SITE ACCESS

LEGEND

LEED BOUNDARY LINE

BIM 360://Tarlton - MenloParkLabs/10025002_A_1005OBD_SHELL_2020_Central.rvt

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

10-28-2022	C.U.P RESPONSE 3
02-17-2023	C.U.P. RESPONSE 4
07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

1005 OBD - LEED BOUNDARY SITE PLAN

G2.1B

DES ARCHITECTS ENGINEERS

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LEED v4 for BD+C: Core and Shell

Project Checklist

Project Name: 1320 Willow Road
Date: 10/28/22

Y	?	N			
1			Credit	Integrative Process	1

7	3	10	**Location and Transportation**		**20**
			Credit	LEED for Neighborhood Development Location	20
2			Credit	Sensitive Land Protection	2
	3		Credit	High Priority Site	3
2		4	Credit	Surrounding Density and Diverse Uses	6
		6	Credit	Access to Quality Transit	6
1			Credit	Bicycle Facilities	1
1			Credit	Reduced Parking Footprint	1
1			Credit	Green Vehicles	1

5	2	4	**Sustainable Sites**		**11**
Y			Prereq	Construction Activity Pollution Prevention	Required
1			Credit	Site Assessment	1
	2		Credit	Site Development - Protect or Restore Habitat	2
1			Credit	Open Space	1
		3	Credit	Rainwater Management	3
1		1	Credit	Heat Island Reduction	2
1			Credit	Light Pollution Reduction	1
1			Credit	Tenant Design and Construction Guidelines	1

6	2	3	**Water Efficiency**		**11**
Y			Prereq	Outdoor Water Use Reduction	Required
Y			Prereq	Indoor Water Use Reduction	Required
Y			Prereq	Building-Level Water Metering	Required
1	1		Credit	Outdoor Water Use Reduction	2
4	1	1	Credit	Indoor Water Use Reduction	6
		2	Credit	Cooling Tower Water Use	2
1			Credit	Water Metering	1

20	13		**Energy and Atmosphere**		**33**
Y			Prereq	Fundamental Commissioning and Verification	Required
Y			Prereq	Minimum Energy Performance	Required
Y			Prereq	Building-Level Energy Metering	Required
Y			Prereq	Fundamental Refrigerant Management	Required
3	3		Credit	Enhanced Commissioning	6
9	9		Credit	Optimize Energy Performance	18
1			Credit	Advanced Energy Metering	1
1	1		Credit	Demand Response	2
3			Credit	Renewable Energy Production	3
1			Credit	Enhanced Refrigerant Management	1
2			Credit	Green Power and Carbon Offsets	2

2	12		**Materials and Resources**		**14**
Y			Prereq	Storage and Collection of Recyclables	Required
Y			Prereq	Construction and Demolition Waste Management Planning	Required
	6		Credit	Building Life-Cycle Impact Reduction	6
	2		Credit	Building Product Disclosure and Optimization - Environmental Product Declarations	2
	2		Credit	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
	2		Credit	Building Product Disclosure and Optimization - Material Ingredients	2
2			Credit	Construction and Demolition Waste Management	2

6	4		**Indoor Environmental Quality**		**10**
Y			Prereq	Minimum Indoor Air Quality Performance	Required
Y			Prereq	Environmental Tobacco Smoke Control	Required
2			Credit	Enhanced Indoor Air Quality Strategies	2
1	2		Credit	Low-Emitting Materials	3
1			Credit	Construction Indoor Air Quality Management Plan	1
1	2		Credit	Daylight	3
1			Credit	Quality Views	1

6			**Innovation**		**6**
1			Credit	Green Cleaning / IPM	1
1			Credit	Green Building Education	1
1			Credit	Active Tenant or EP Renewable Energy	1
1			Credit	Pilot: MRpc87 verified C&D Recycling Rate	1
1			Credit	EP: HPD, LEM, EPD or Enhance IAQ	1
1			Credit	LEED Accredited Professional	1

2	1	1	**Regional Priority**		**4**
		1	Credit	RP:Access to quality transit (5)	1
	1		Credit	RP: Optimize Energy Performance (10)	1
1			Credit	RP: Indoor Water Use Reduction (4)	1
1			Credit	Regional Priority: BPDO-Raw Materials	1

55	37	18	**TOTALS**	Possible Points:	**110**

Certified: 40 to 49 points, **Silver:** 50 to 59 points, **Gold:** 60 to 79 points, **Platinum:** 80 to 110

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TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

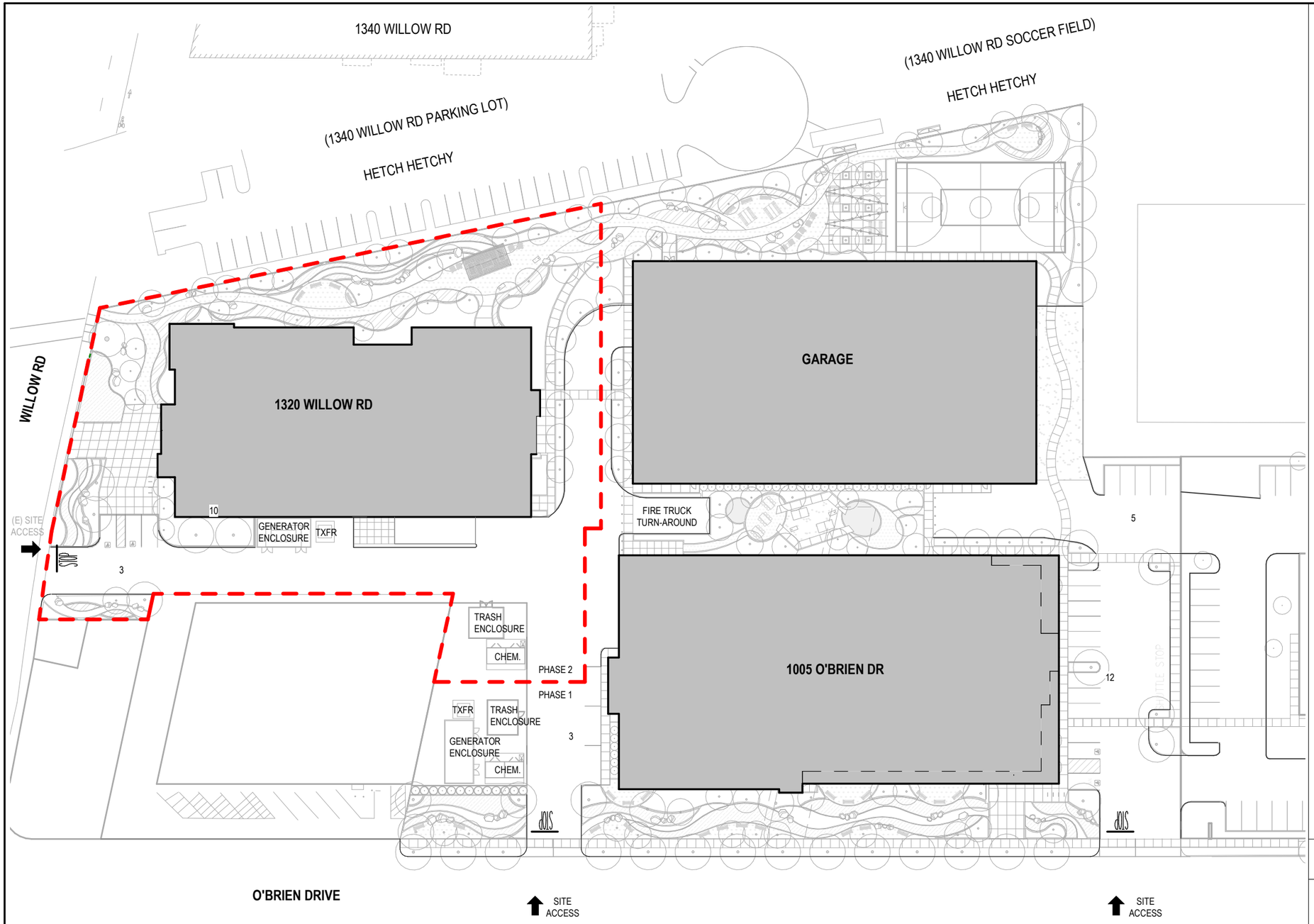
10-28-2022	C.U.P RESPONSE 3
02-17-2023	C.U.P. RESPONSE 4
07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

1302 WILLOW - LEED SCORECARD

G2.2A

DES ARCHITECTS ENGINEERS

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LEGEND

LEED BOUNDARY LINE

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TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

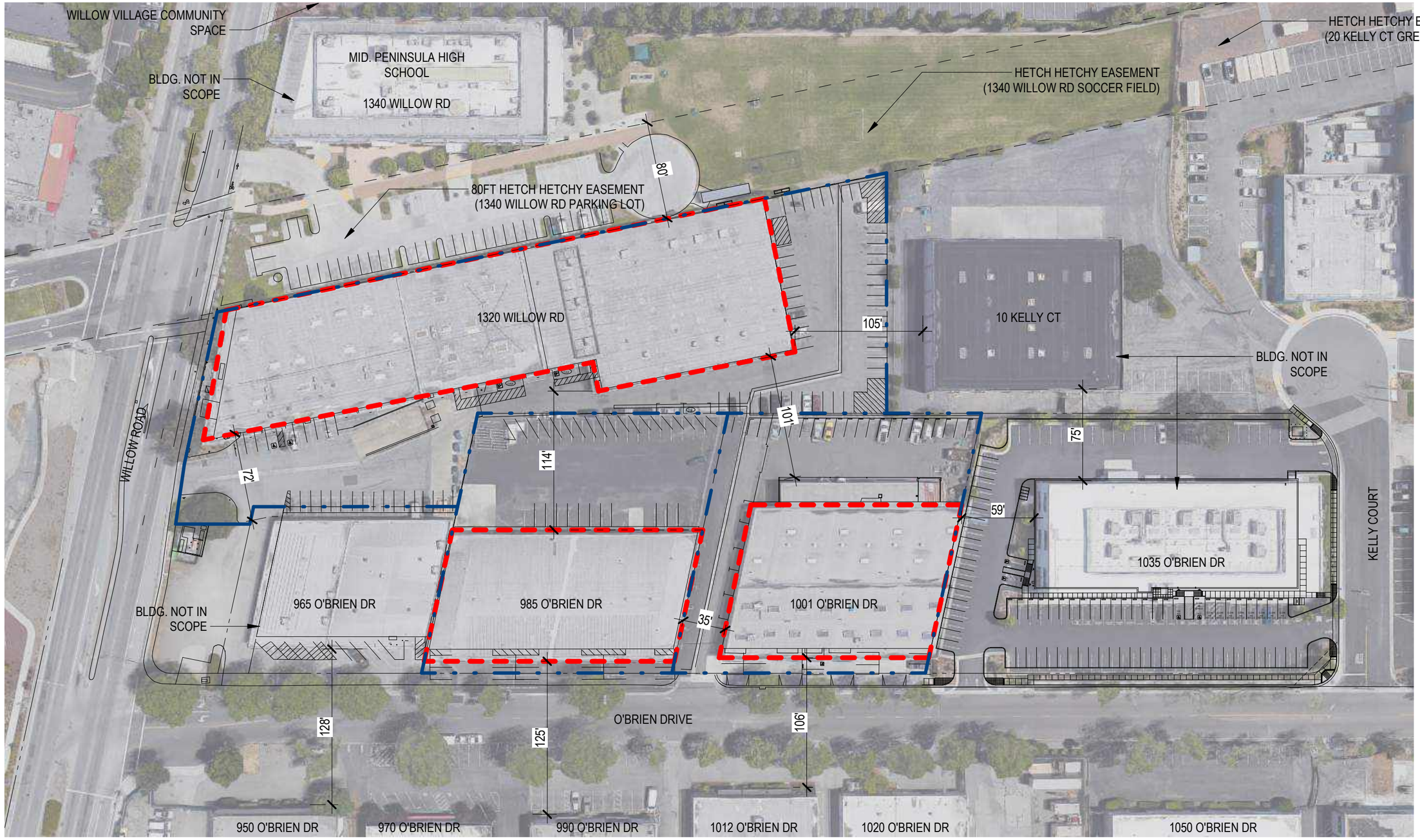
10-28-2022	C.U.P RESPONSE 3
02-17-2023	C.U.P. RESPONSE 4
07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

1320 WILLOW - LEED BOUNDARY
SITE PLAN

G2.2B

DES ARCHITECTS ENGINEERS

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TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

04-15-2021	D.R.T. REVIEW
06-23-2021	C.U.P. SUBMITTAL
10-28-2021	C.U.P. RESPONSE 1
06-22-2022	C.U.P. RESPONSE 2
10-28-2022	C.U.P RESPONSE 3
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07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25 2024	PARKING UPDATE

EXISTING SITE CONDITIONS - AERIAL PLAN

A1

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1A 1320 WILLOW RD - NW ELEVATION



1B 1320 WILLOW RD - SW ELEVATION



2A 1001 O'BRIEN DR - SW ELEVATION



2B 1001 O'BRIEN DR - S ELEVATION



2C 1001 O'BRIEN DR - SE ELEVATION



3A 985 O'BRIEN DR - S ELEVATION



3B 985 O'BRIEN DR - SE ELEVATION



4 10 KELLY CT - E ELEVATION



TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

04-15-2021	D.R.T. REVIEW
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07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25 2024	PARKING UPDATE

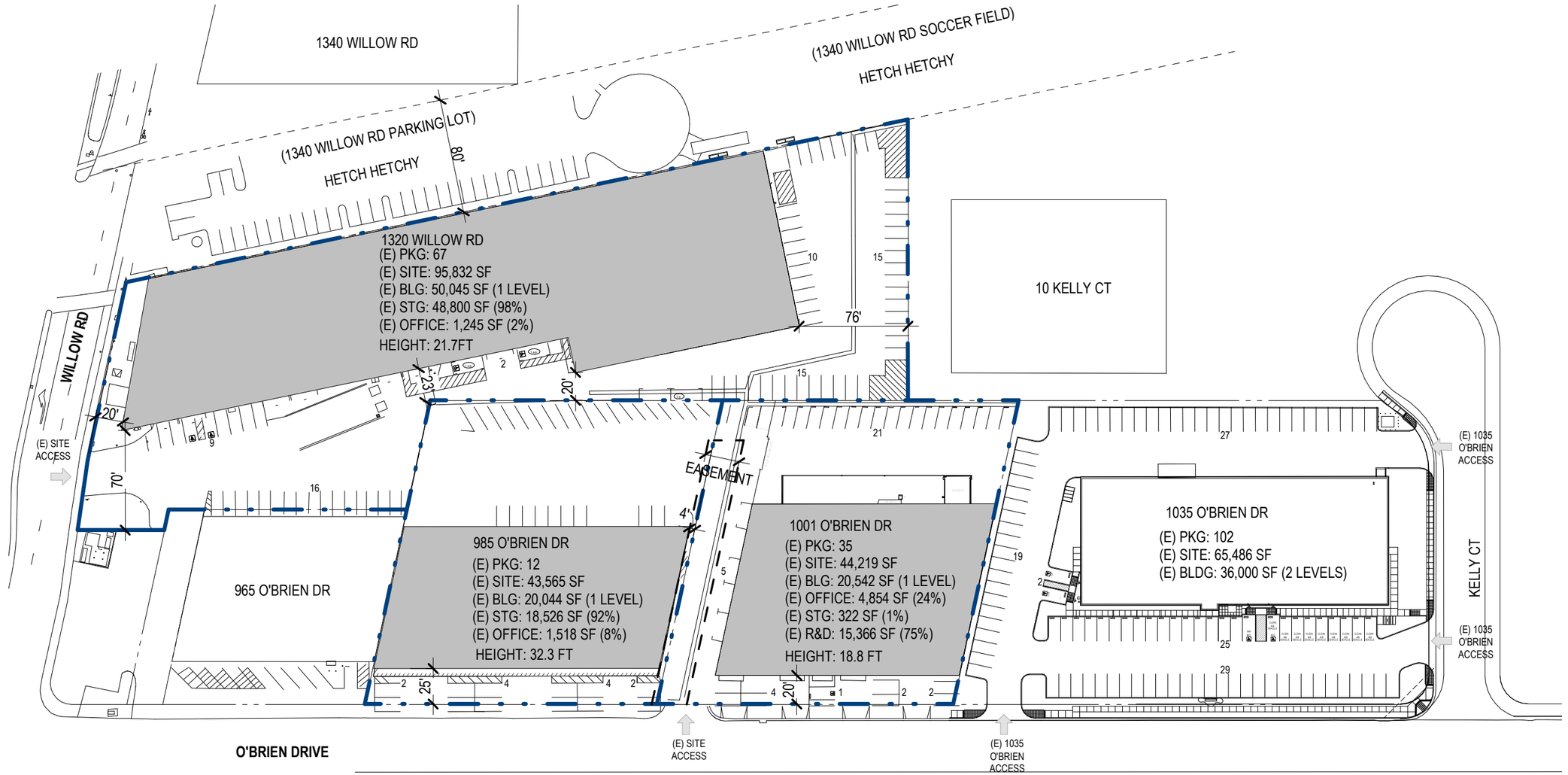
EXISTING SITE CONDITIONS - SITE PHOTOS

A2

DES ARCHITECTS ENGINEERS

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1 EXISTING SITE PLAN

1" = 80'-0"

EXISTING PROPERTY LINES

20.42' INGRESS EGRESS EASEMENT & NON-EXCLUSIVE DRAINAGE FOR RAIN WATER (TO BE REMOVED)

N

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

04-15-2021	D.R.T. REVIEW
06-23-2021	C.U.P. SUBMITTAL
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06-25-2024	PARKING UPDATE

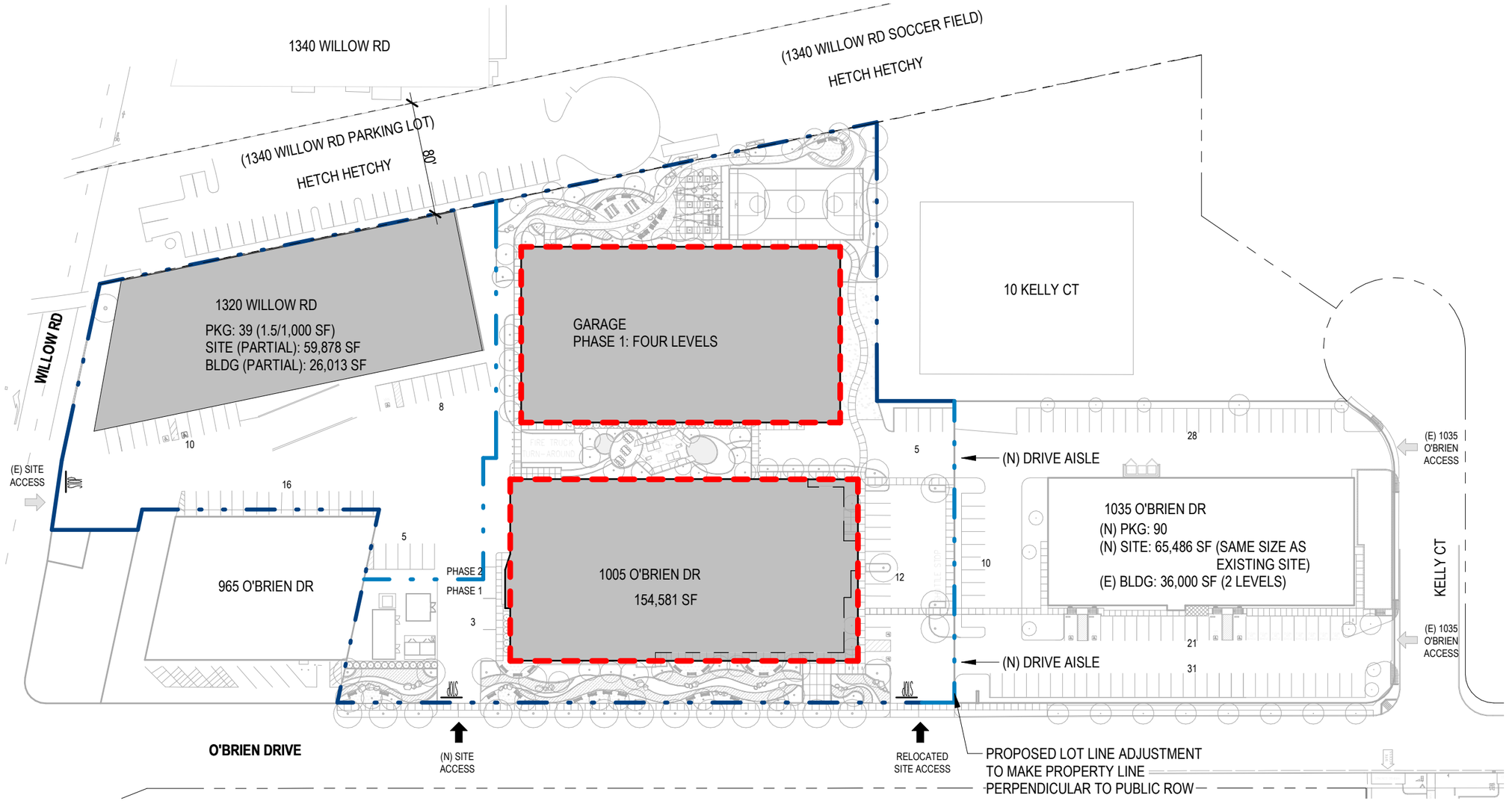
EXISTING SITE PLAN

A3.1

DES ARCHITECTS ENGINEERS

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1 PHASE 1
1" = 80'-0"

PHASE 1 SITE: 123,738 SF

EXISTING PROPERTY LINES
LOT LINE ADJUSTMENT DURING PHASE 1
PHASE 1 BUILDINGS

N

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

06-23-2021	C.U.P. SUBMITTAL
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06-25-2024	PARKING UPDATE

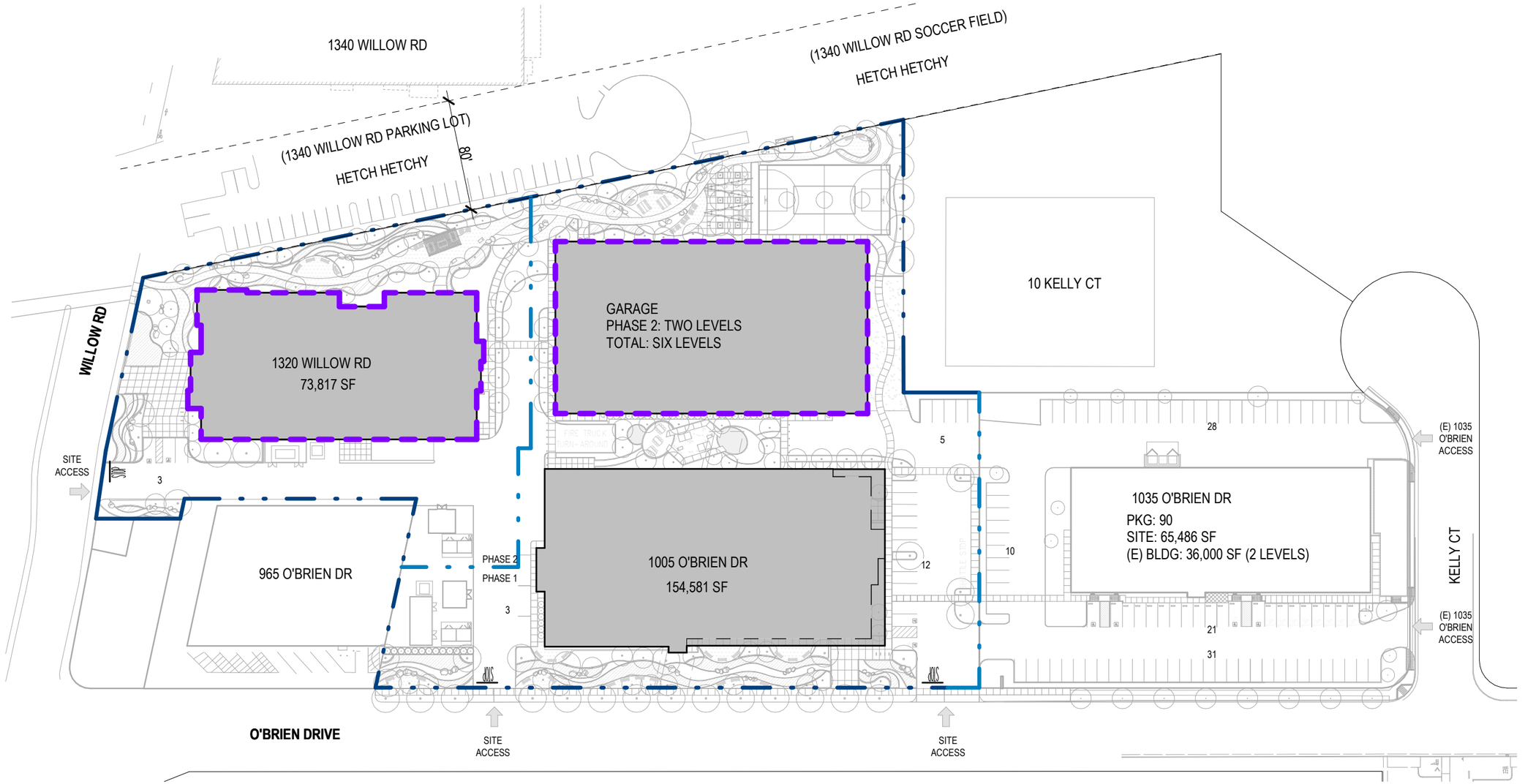
PHASING PLAN - PHASE 1

A3.2

DES ARCHITECTS ENGINEERS

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1 PHASE 2

1" = 80'-0"

PHASE 2 SITE: 59,878 SF

EXISTING PROPERTY LINES

LOT LINE ADJUSTMENT DURING PHASE 1

PHASE 2 BUILDINGS

N

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

10-28-2021	C.U.P. RESPONSE 1
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06-25-2024	PARKING UPDATE

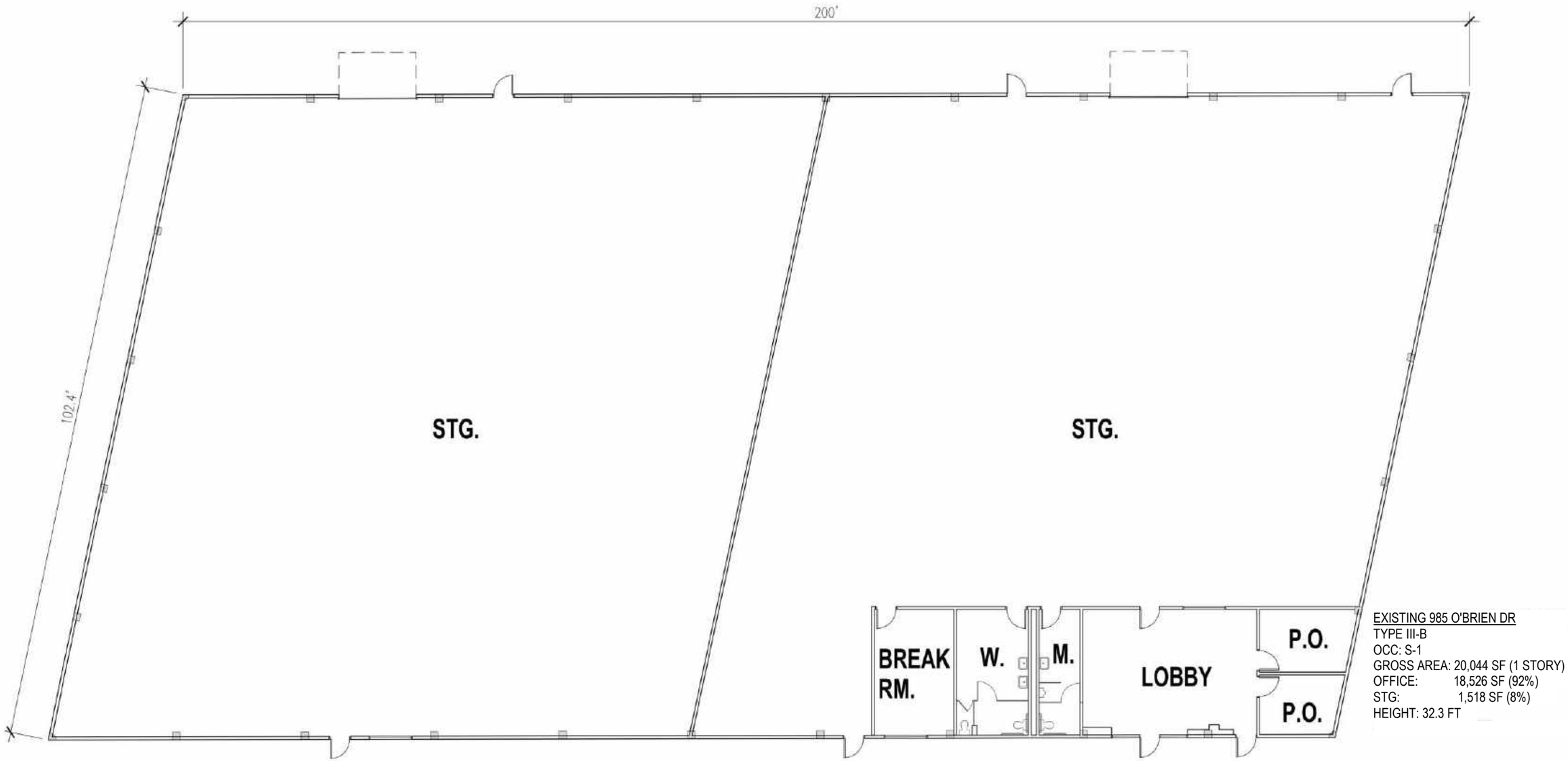
PHASING PLAN - PHASE 2

A3.3

DES ARCHITECTS ENGINEERS

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BLDG TO BE DEMOLISHED

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

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06-25-2024	PARKING UPDATE

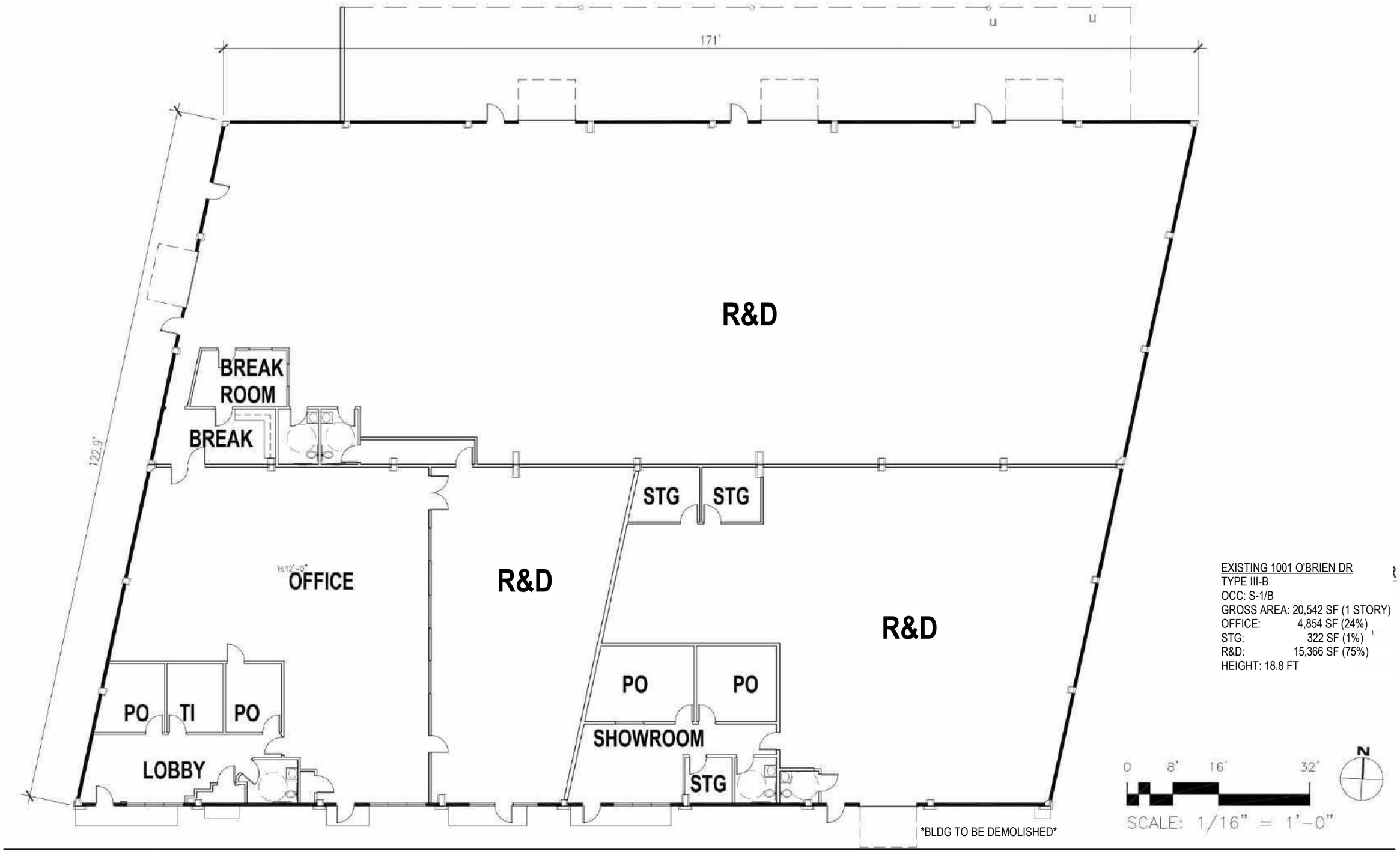
985 OBD EXISTING GROSS AREA

A4.1

DES ARCHITECTS ENGINEERS

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EXISTING 1001 O'BRIEN DR
TYPE III-B
OCC: S-1/B
GROSS AREA: 20,542 SF (1 STORY)
OFFICE: 4,854 SF (24%)
STG: 322 SF (1%)
R&D: 15,366 SF (75%)
HEIGHT: 18.8 FT

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

06-23-2021	C.U.P. SUBMITTAL
10-28-2021	C.U.P. RESPONSE 1
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09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

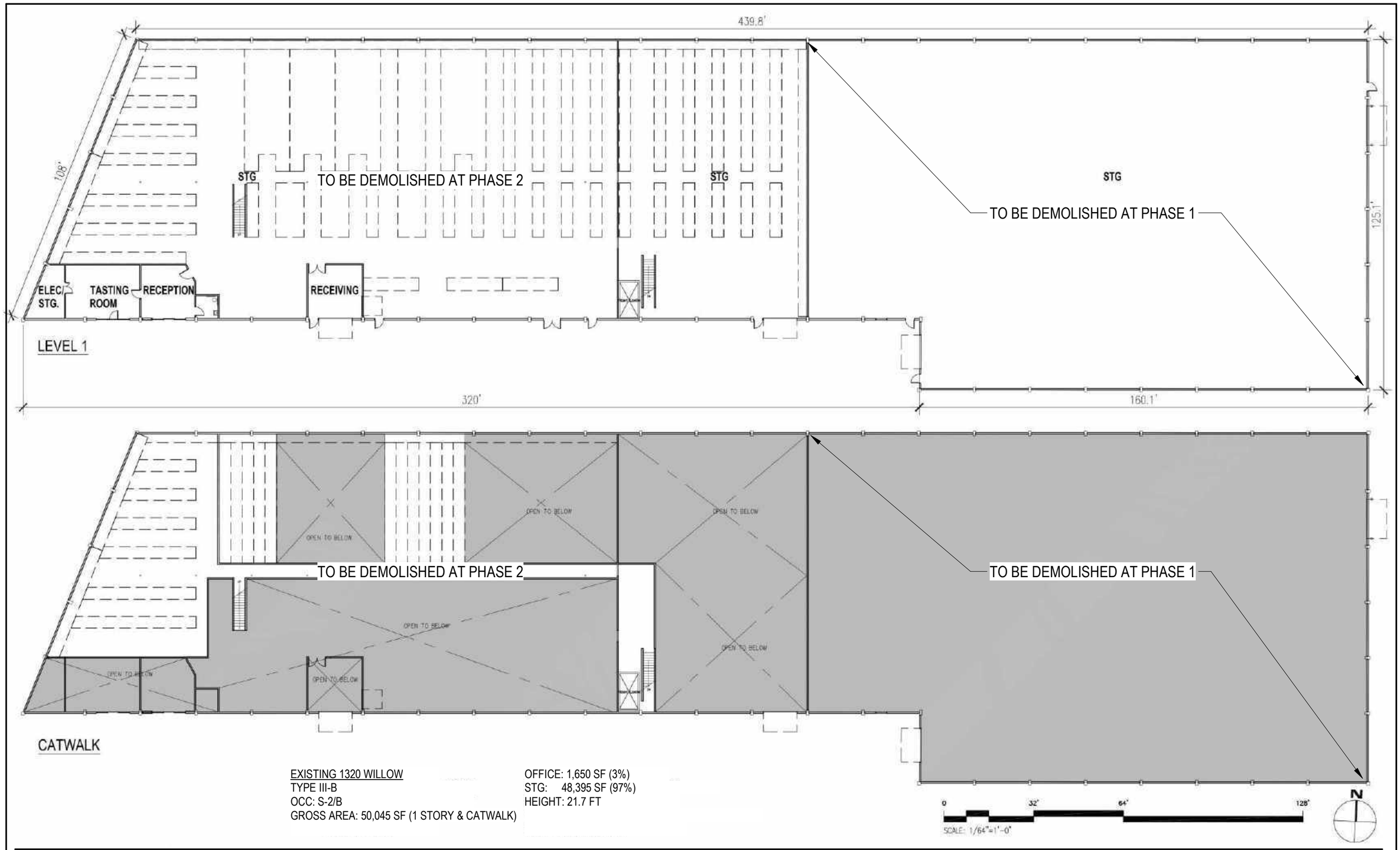
1001 OBD EXISTING GROSS AREA

A4.2

DES ARCHITECTS ENGINEERS

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EXISTING 1320 WILLOW
TYPE III-B
OCC: S-2/B
GROSS AREA: 50,045 SF (1 STORY & CATWALK)

OFFICE: 1,650 SF (3%)
STG: 48,395 SF (97%)
HEIGHT: 21.7 FT

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

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10-28-2021	C.U.P. RESPONSE 1
06-22-2022	C.U.P. RESPONSE 2
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06-25-2024	PARKING UPDATE

1320 WILLOW EXISTING GROSS AREA

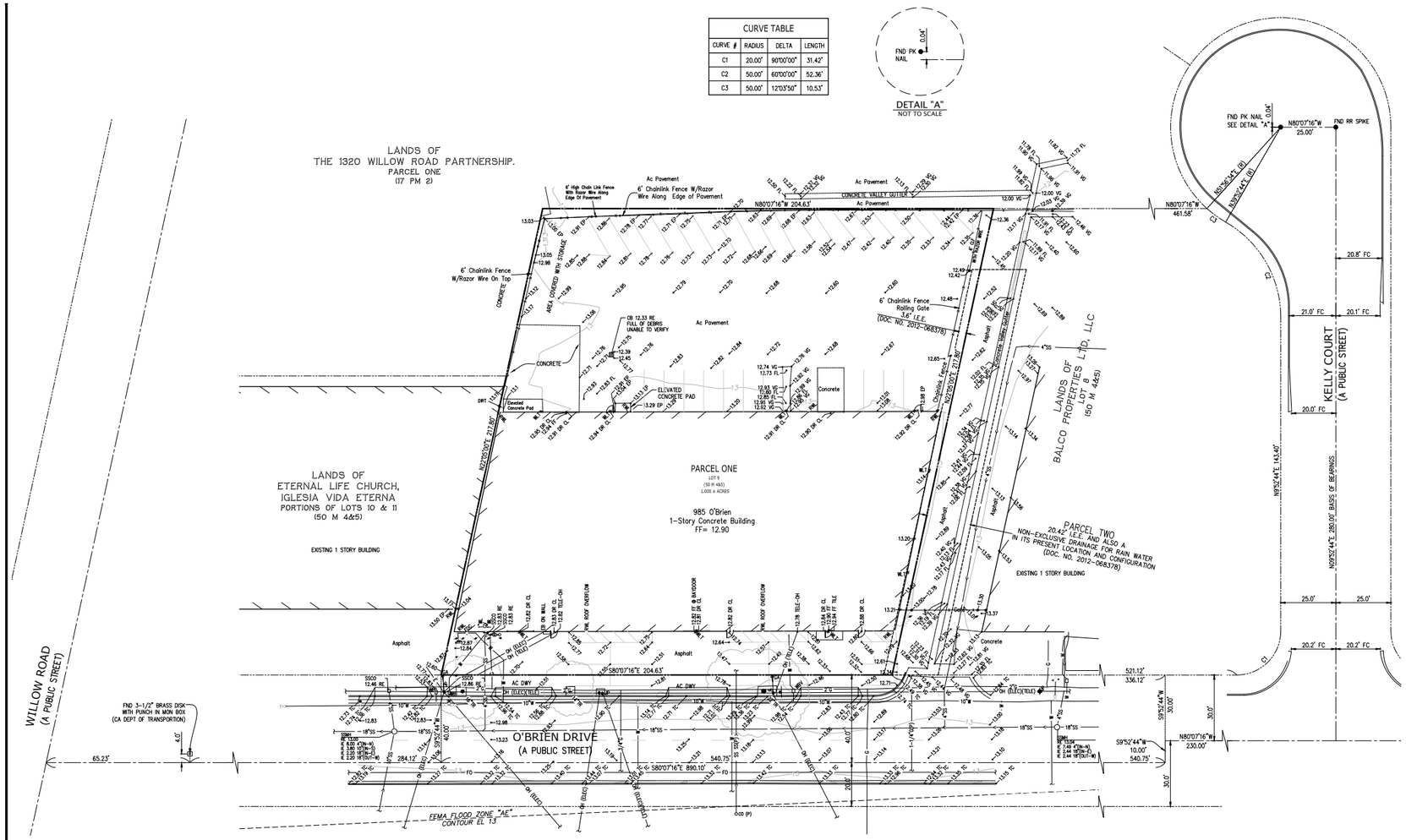
A4.3

DES ARCHITECTS ENGINEERS

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CURVE TABLE			
CURVE #	RADIUS	DELTA	LENGTH
C1	20.00'	90°00'00"	31.42'
C2	50.00'	60°00'00"	52.36'
C3	50.00'	12°03'50"	10.53'



LEGEND

- ASPHALT BERM
- BUILDING LINE
- CENTERLINE
- CONCRETE CURB & GUTTER
- MAJOR CONTOUR LINE
- MINOR CONTOUR LINE
- DRIVEWAY
- EASEMENT LINE
- EDGE OF PAVEMENT
- EDGE OF WATER/FLOWLINE
- ELECTRIC LINE
- FENCE LINE
- FEMA FLOOD ZONE CONTOUR (APPROXIMATE LOCATION)
- FIBER OPTICS LINE
- GAS LINE-VALVE & METER
- LOT LINE
- MONUMENT/MONUMENT LINE
- OVERHEAD POWER LINE
- PROPERTY LINE
- SANITARY SEWER LINE-MANHOLE & CLEANOUT
- SPOT ELEVATION
- STORM DRAIN LINE-MANHOLE & CATCH BASIN
- WATER LINE & VALVE
- ANODE
- AREA DRAIN
- AUTOMATIC SPRINKLER RISER
- BACKFLOW PREVENTION DEVICE
- BENCHMARK/TEMPORARY BENCHMARK
- BLOWOFF VALVE
- ELECTROLIER
- FIRE DEPARTMENT CONNECTION
- FIRE HYDRANT
- GAS METER
- GUY ANCHOR
- POWER POLE/JOINT POLE
- TRAFFIC SIGN
- TREE
- UTILITY BOX
- WATER VALVE
- WELL

ABBREVIATIONS

AC	ASPHALT CONCRETE
AD	AREA DRAIN
BEG	BEGIN
BL	BUILDING LINE
BLDG	BUILDING
BOL	BOLLARD
CB	CATCH BASIN
CL	CENTER LINE
CLF	CHAIN LINK FENCE
CO	CLEANOUT
DI	DRAIN INLET
DR	DOOR
DS	DOWN SPOUT
DWY	DRIVEWAY
E	EAST
EB	ELECTRIC BOX
ELEC	ELECTRICAL LINE
EP	EDGE OF PAVEMENT
FC	FACE OF CURB
FF	FINISH FLOOR
FH	FIRE HYDRANT
FL	FLOW LINE
FND	FOUND
FO	FIBER OPTICS
FW	FACE OF WALL
GA	GUY ANCHOR
GAS	GAS LINE
GV	GAS VALVE
GM	GAS MARKER/METER
GUY	GUY ANCHOR
GV	GAS VALVE
I.E.E.	INGRESS EGRESS EASEMENT
IE	INVERT ELEVATION
JP	JOINT POWER POLE
LIP	LIP OF GUTTER
LL	LANE LINE
LT	LIGHT
MON	MONUMENT
N	NORTH
OH	OVERHEAD
P	PAVEMENT
PG	PAGE
PM	PARCEL MAP
RE	RIM ELEVATION
ROOF	ROOF LINE
RR	RAILROAD RAIL
RWL	RAIN WATER LEADER
S	SOUTH
SDMH	STORM DRAIN MANHOLE
SS	SANITARY SEWER
SSCO	SANITARY SEWER CLEAN OUT
SSMH	SANITARY SEWER MANHOLE
TC	TOP OF CURB
TELE	TELEPHONE LINE
TR	TREE
VG	VALLEY GUTTER
W	WEST
WB	WATER BOX
WBV	WATER BOX WITH VALVE
WL	WATER LINE
WLT	WALL LIGHT
WV	WATER VALVE

NOTES

1. THIS PLOT WAS PREPARED FROM INFORMATION FURNISHED IN A PRELIMINARY TITLE REPORT, PREPARED BY FIRST AMERICAN TITLE INSURANCE COMPANY, DATED DECEMBER 16, 2020, ORDER NUMBER NCS-1049175-SM. NO LIABILITY IS ASSUMED FOR MATTERS OF RECORD NOT STATED IN SAID PRELIMINARY TITLE REPORT THAT MAY AFFECT THE TITLE LINES, OR EXCEPTIONS, OR EASEMENTS OF THE PROPERTY.
2. ALL DISTANCES AND ELEVATIONS SHOWN HEREON ARE IN FEET AND DECIMALS THEREOF.
3. THE TYPES, LOCATIONS, SIZES AND/OR DEPTHS OF EXISTING ON-SITE UNDERGROUND UTILITIES AS SHOWN ON THIS TOPOGRAPHIC SURVEY WERE OBTAINED BY FIELD LOCATING AND MAPPED BY SUBDYNAMIC LOCATING SERVICES, INC. ON 02-29-2021. THE CONTRACTOR IS CAUTIONED THAT ONLY ACTUAL EXCAVATION WILL REVEAL THE TYPES, EXTENT, SIZES, LOCATIONS AND DEPTHS OF SUCH UNDERGROUND UTILITIES. (A REASONABLE EFFORT HAS BEEN MADE TO LOCATE AND DELINEATE ALL KNOWN UNDERGROUND UTILITIES). HOWEVER, THE ENGINEER CAN ASSUME NO RESPONSIBILITY FOR THE COMPLETENESS OR ACCURACY OF ITS DELINEATION OF SUCH UNDERGROUND UTILITIES WHICH MAY BE ENCOUNTERED, BUT WHICH ARE NOT SHOWN ON THESE DRAWINGS.
4. THE SUBJECT PROPERTY IS SHOWN ON THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE MAP (FIRM) FOR SAN MATEO COUNTY, CALIFORNIA, MAP NUMBER 06081C0307E FOR COMMUNITY NUMBER 060321 (CITY OF MENLO PARK), WITH AN EFFECTIVE DATE OF OCTOBER 12, 2012, AS BEING LOCATED IN FLOOD ZONE "AE". ACCORDING TO FEMA THE DEFINITION OF ZONE "AE" IS:SPECIAL FLOOD HAZARD AREA WITH BASE FLOOD ELEVATIONS DETERMINED.
5. BENCHMARK: W-150; U.S. COAST GEODETIC SURVEY BENCHMARK DISK STAMPED "W 150", "1933" SET IN TOP OF CONCRETE MONUMENT. 0.8 MILE NORTHEAST ALONG WILLOW ROAD FROM THE INTERSECTION OF BAYSHORE HIGHWAY AT MENLO PARK, AT THE NORTHEAST CITY LIMITS OF MENLO PARK, AT THE CROSSING OF THE SOUTHERN PACIFIC COMPANY RAILROAD, 35 FEET WEST OF THE CENTER LINE OF THE ROAD, 19.5 FEET NORTH OF THE NORTH RAIL, 10.3 FEET NORTHWEST OF THE SOUTHWEST CORNER OF THE CONCRETE BASE OF A CROSSING SIGNAL, 1.0 FOOT EAST OF A WITNESS POST, ABOUT LEVEL WITH THE TRACK AND THE ROAD, FLUSH WITH THE GROUND, AND SET IN TOP OF A CONCRETE POST. ELEVATION: 9.884 FEET (NGVD 1988 DATUM)
7. BASIS OF BEARINGS:THE BEARING OF NORTH 09°52'44" EAST TAKEN ON THE CENTERLINE OF KELLY COURT AS SHOWN THAT CERTAIN PARCEL MAP FILED FOR RECORD ON FEBRUARY 27, 1991 IN BOOK 64 OF PARCEL MAPS AT PAGE 66, SAN MATEO COUNTY RECORDS WAS TAKEN AS THE BASIS OF ALL BEARINGS SHOWN HEREON.
8. CORNER RECORD NOTE:
   THE DEVELOPER AND/OR CONTRACTOR SHALL BE RESPONSIBLE FOR THE PREPARATION AND FILING OF PRE-CONSTRUCTION AND POST-CONSTRUCTION CORNER RECORDS FOR ANY MONUMENTS OR PROPERTY CORNERS SHOWN HEREON THAT MAY BE DESTROYED DURING IMPROVEMENTS TO THE SUBJECT PROPERTY AS DEFINED IN SECTION 8771(B) OF THE PROFESSIONAL LAND SURVEYORS ACT.

NOTE: THIS SITE HAS FIBER OPTIC LINES
LOCATED ON OR ADJACENT TO IT.

02-23-2021
PREPARED BY OR UNDER THE SUPERVISION OF DATE
JIMMY R. VIGIL P.L.S. 6256

LICENSED LAND SURVEYOR
JIMMY R. VIGIL
No. 6256
STATE OF CALIFORNIA

NO.	BY	REVISION

KIER+WRIGHT
2850 Collier Canyon Road
Livermore, CA 94551
Phone: (925) 245-4788
www.kierwright.com

TOPOGRAPHIC SURVEY
OF
985 O'BRIEN DRIVE
FOR
O'BRIEN DRIVE PORTFOLIO, LLC
MENLO PARK, CALIFORNIA

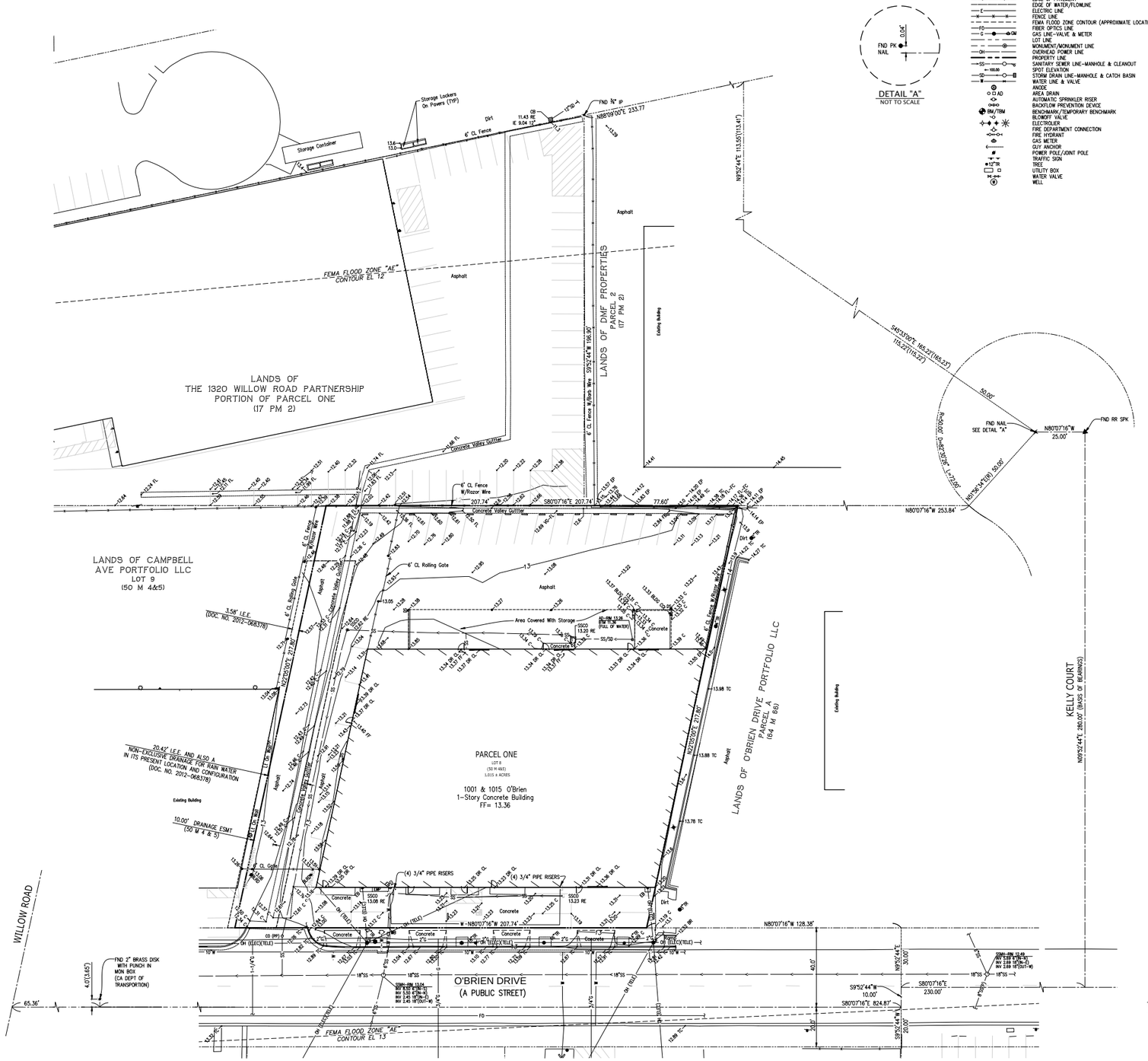
DATE	FEB., 2021
SCALE	AS SHOWN
SURVEYOR	JRV
DRAWN BY	DWA
JOB NO.	A13116-4
SHEET	C1.0
OF	1 SHEET

04-15-2021	D.R.T. REVIEW
06-23-2021	C.U.P. SUBMITTAL
10-28-2021	C.U.P. RESPONSE 1
03-08-2022	C.U.P. RESPONSE 2
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09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

A5.1
N.T.S.

SCALED TOPO AS AN
ATTACHMENT

\2013\A13116-4\DWG\SURVEY\TOPO\TS-A13116-4.dwg 2-23-21 03:02:43 PM swilkins

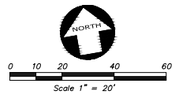


LEGEND

	ASPHALT BERM
	BUILDING LINE
	CENTERLINE
	CONCRETE CURB & GUTTER
100	MAJOR CONTOUR LINE
100	MINOR CONTOUR LINE
	DRIVEWAY
	EASEMENT LINE
	EDGE OF PAVEMENT
	EDGE OF WATER/FLOWLINE
E	ELECTRIC LINE
	FENCE LINE
	FEMA FLOOD ZONE CONTOUR (APPROXIMATE LOCATION)
FO	FIBER OPTICS LINE
G GM	GAS LINE-VALVE & METER
	LOT LINE
	MONUMENT/MONUMENT LINE
OH	OVERHEAD POWER LINE
	PROPERTY LINE
SS	SANITARY SEWER LINE-MANHOLE & CLEANOUT
100.00	SPOT ELEVATION
	STORM DRAIN LINE-MANHOLE & CATCH BASIN
W	WATER LINE & VALVE
AD	ANODE
	AREA DRAIN
	AUTOMATIC SPRINKLER RISER
	BACKFLOW PREVENTION DEVICE
BM/TBM	BENCHMARK/TEMPORARY BENCHMARK
	BLOWOFF VALVE
	ELECTROLIER
	FIRE DEPARTMENT CONNECTION
	FIRE HYDRANT
	GAS METER
	GUY ANCHOR
	POWER POLE/JOINT POLE
	TRAFFIC SIGN
12"IN	TREE
	UTILITY BOX
	WATER VALVE
	WELL

ABBREVIATIONS

AC	ASPHALT CONCRETE
AD	AREA DRAIN
BEG	BEGIN
BL	BUILDING LINE
BLDG	BUILDING
BOL	BOLLARD
BR	BOTTOM RAMP
CB	CATCH BASIN
CL	CENTER LINE
CLF	CHAIN LINK FENCE
CO	CLEANOUT
DI	DRAIN INLET
DR	DOOR
DS	DOWN SPOUT
DWY	DRIVEWAY
E	EAST
EB	ELECTRIC BOX
ELEC	ELECTRICAL LINE
EP	EDGE OF PAVEMENT
FC	FACE OF CURB
FF	FINISH FLOOR
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FL	FLOW LINE
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FO	FIBER OPTICS
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GA	GUY ANCHOR
GAS	GAS LINE
GM	GAS MARKER/METER
GUY	GUY ANCHOR
GV	GAS VALVE
I.E.E.	INGRESS EGRESS EASEMENT
IE	INVERT ELEVATION
IP	IRON PIPE
JP	JOINT POWER POLE
LIP	LIP OF GUTTER
LL	LANE LINE
LT	LIGHT
M	MAP
MON	MONUMENT
N	NORTH
OH	OVERHEAD
PC	PAGE
PM	PARCEL MAP
RE	RIM ELEVATION
ROOF	ROOF LINE
RR	RAILROAD RAIL
RWL	RAIN WATER LEADER
S	SOUTH
SDMH	STORM DRAIN MANHOLE
SS	SANITARY SEWER
SSCO	SANITARY SEWER CLEAN OUT
SSMH	SANITARY SEWER MANHOLE
TC	TOP OF CURB
TELE	TELEPHONE LINE
TREE	TREE
VG	VALLEY GUTTER
W	WEST
WB	WATER BOX
WBV	WATER BOX WITH VALVE
WDE	WIDE
WV	WATER VALVE



NOTES

1. THIS SURVEY WAS PREPARED FROM INFORMATION FURNISHED IN A PRELIMINARY TITLE REPORT, PREPARED BY FIRST AMERICAN TITLE INSURANCE COMPANY, DATED DECEMBER 17, 2020, ORDER NO. NCS-1049174-SM. NO LIABILITY IS ASSUMED FOR MATTERS OF RECORD NOT STATED IN SAID PRELIMINARY TITLE REPORT THAT MAY AFFECT THE TITLE LINES, OR EXCEPTIONS, OR EASEMENTS OF THE PROPERTY.

2. ALL DISTANCES AND ELEVATIONS SHOWN HEREON ARE IN FEET AND DECIMALS THEREOF.

3. THE TYPES, LOCATIONS, SIZES AND/OR DEPTHS OF EXISTING ON-SITE UNDERGROUND UTILITIES AS SHOWN ON THIS TOPOGRAPHIC SURVEY WERE OBTAINED BY FIELD LOCATING AND MAPPED BY SUBDYNAMIC LOCATING SERVICES, INC. ON 02-29-2021. THE CONTRACTOR IS CAUTIONED THAT ONLY ACTUAL EXCAVATION WILL REVEAL THE TYPES, EXTENT, SIZES, LOCATIONS AND DEPTHS OF SUCH UNDERGROUND UTILITIES. (A REASONABLE EFFORT HAS BEEN MADE TO LOCATE AND DELINEATE ALL KNOWN UNDERGROUND UTILITIES). HOWEVER, THE ENGINEER CAN ASSUME NO RESPONSIBILITY FOR THE COMPLETENESS OR ACCURACY OF ITS DELINEATION OF SUCH UNDERGROUND UTILITIES WHICH MAY BE ENCOUNTERED, BUT WHICH ARE NOT SHOWN ON THESE DRAWINGS.

4. THE SUBJECT PROPERTY IS SHOWN ON THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE MAP (FIRM) FOR SAN MATEO COUNTY, CALIFORNIA, MAP NUMBER 06081C0330'E FOR COMMUNITY NUMBER 060321 (CITY OF MENLO PARK), WITH AN EFFECTIVE DATE OF OCTOBER 12, 2012, AS BEING LOCATED IN FLOOD ZONE "AE", ACCORDING TO FEMA THE DEFINITION OF ZONE "AE" IS:SPECIAL FLOOD HAZARD AREA WITH BASE FLOOD ELEVATIONS DETERMINED.

   FEMA BASE FLOOD ELEVATIONS ARE BASED ON NAVD88 DATUM. SEE BENCHMARK NOTE FOR DATUM CONVERSIONS.

5. BENCHMARK:
   W-150; U.S. COAST GEODETIC SURVEY BENCHMARK DISK STAMPED "W 150", "1933" SET IN TOP OF CONCRETE MONUMENT. 0.8 MILE NORTHEAST ALONG WILLOW ROAD FROM THE INTERSECTION OF BAYSHORE HIGHWAY AT MENLO PARK, AT THE NORTHEAST CITY LIMITS OF MENLO PARK, AT THE CROSSING OF THE SOUTHERN PACIFIC COMPANY RAILROAD, 35 FEET WEST OF THE CENTER LINE OF THE ROAD, 19.5 FEET NORTH OF THE NORTH RAIL, 10.3 FEET NORTHWEST OF THE SOUTHWEST CORNER OF THE CONCRETE BASE OF A CROSSING SIGNAL, 1.0 FOOT EAST OF A WITNESS POST, ABOUT LEVEL WITH THE TRACK AND THE ROAD, FLUSH WITH THE GROUND, AND SET IN TOP OF A CONCRETE POST.
   ELEVATION: 9.884 FEET (NGVD 1988 DATUM)

6. BASIS OF BEARING
   THE BEARING OF NORTH 09°52'44" EAST TAKEN ON THE CENTERLINE OF KELLY COURT AS SHOWN ON THAT CERTAIN PARCEL MAP FILED FOR RECORD ON FEBRUARY 27, 1991 IN BOOK 64 OF PARCEL MAPS AT PAGE 66, SAN MATEO COUNTY RECORDS WAS TAKEN AS THE BASIS OF ALL BEARINGS SHOWN HEREON.

7. CORNER RECORD NOTE:
   THE DEVELOPER AND/OR CONTRACTOR SHALL BE RESPONSIBLE FOR THE PREPARATION AND FILING OF PRE-CONSTRUCTION AND POST-CONSTRUCTION CORNER RECORDS FOR ANY MONUMENTS OR PROPERTY CORNERS SHOWN HEREON THAT MAY BE DESTROYED DURING IMPROVEMENTS TO THE SUBJECT PROPERTY AS DEFINED IN SECTION 8771(B) OF THE PROFESSIONAL LAND SURVEYORS ACT.

NOTE: THIS SITE HAS FIBER OPTIC LINES LOCATED ON OR ADJACENT TO IT.

J. R. Vigil
02-23-2021
PREPARED BY OR UNDER THE SUPERVISION OF
JIMMY R. VIGIL P.L.S. 6256



NO.	BY	REVISION

KIER+WRIGHT
2850 Collier Canyon Road
Livermore, CA 94551
Phone: (925) 245-8788
www.kierwright.com

TOPOGRAPHIC SURVEY
OF
1001-1015 O'BRIEN DRIVE
FOR
O'BRIEN DRIVE PORTFOLIO, LLC
MENLO PARK, CALIFORNIA

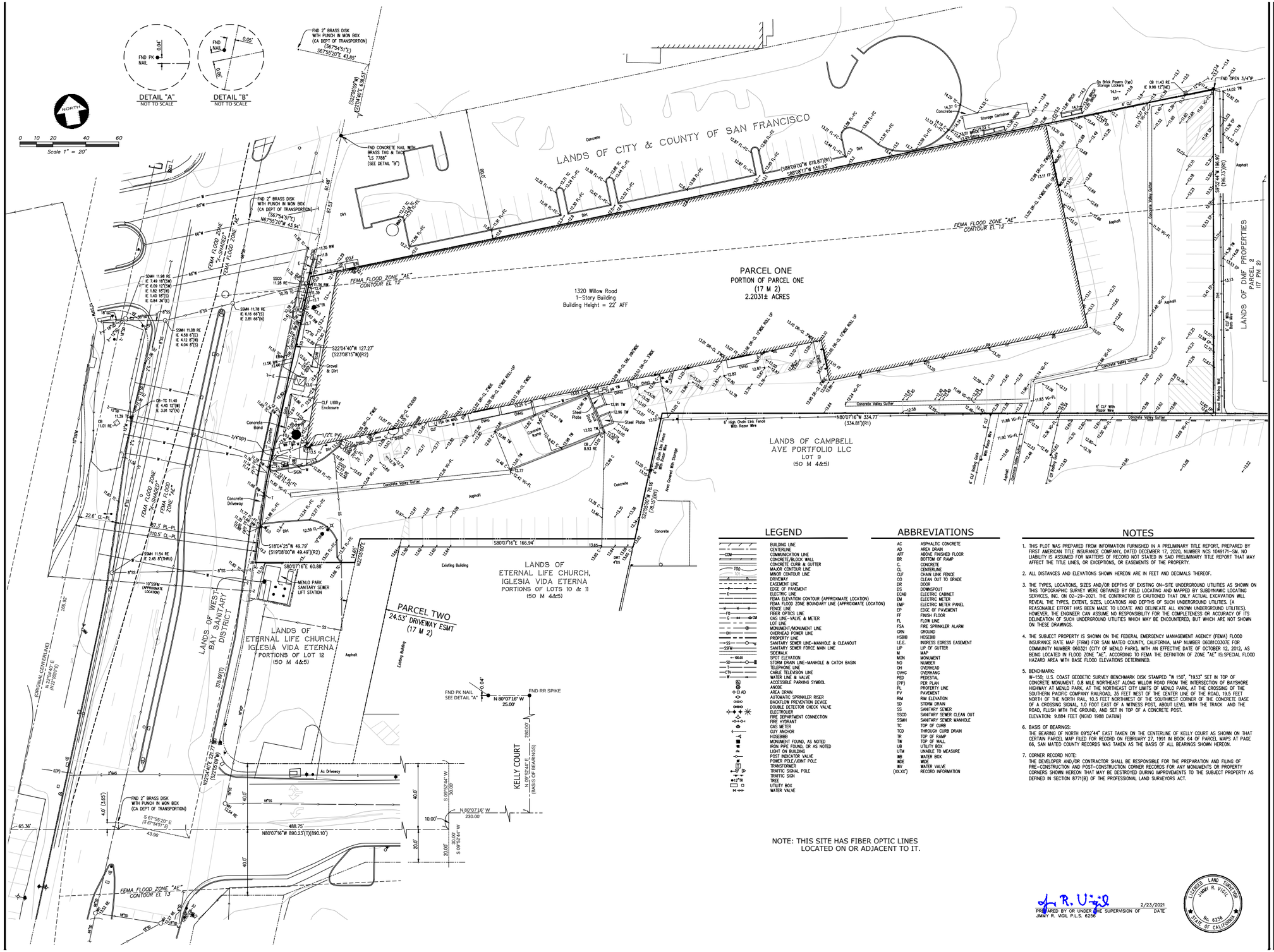
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07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25 2024	PARKING UPDATE

DATE	FEB., 2021
SCALE	AS SHOWN
SURVEYOR	JRV
DRAWN BY	DWA
JOB NO.	A15124-S
SHEET	C1.0
OF 1	SHEET

A5.2
N.T.S.

SCALED TOPO AS AN ATTACHMENT

J:\2015\A15124-S\DWG\SURVEY\TOPO\TS-A15124-S.dwg 2-23-21 03:05:00 PM kwilkes


DETAIL "A"
NOT TO SCALE
DETAIL "B"
NOT TO SCALE
FND PK NAIL
FND NAIL
0.04'
0.05'
NORTH
0 10 20 40 60
Scale 1" = 20'
FND 2" BRASS DISK WITH PUNCH IN MON BOX (CA DEPT OF TRANSPORTION) (S67°54'51"E) S67°55'20"E 43.85'
(S27°09'09"W) 42.72'(M) 43.85'(R)
FND CONCRETE NAIL WITH BRASS TAG & TACK "LS 7788" (SEE DETAIL "B")
LANDS OF CITY & COUNTY OF SAN FRANCISCO
(S88°09'00"W 618.87'(R1))
S88°08'17"W 559.93'
FND 2" BRASS DISK WITH PUNCH IN MON BOX (CA DEPT OF TRANSPORTION) (S67°54'51"E) N67°55'20"W 43.94'
FEMA FLOOD ZONE "X" SHADED
FEMA FLOOD ZONE "AE"
FEMA FLOOD ZONE "AE" CONTOUR EL 12'
PARCEL ONE
PORTION OF PARCEL ONE
(17 M 2)
2.2031± ACRES
1320 Willow Road
1-Story Building
Building Height = 22' AFF
LANDS OF DMF PROPERTIES
PARCEL 2
(17 PM 2)
S22°04'40"W 127.27'
(S23°08'15"W)(R2)
Gravel & Dirt
CLF Utility Enclosure
Concrete Band
1/2"ø PVC
Concrete Valley Gutter
6' High Chain Link Fence With Razor Wire
N80°07'16"W 334.77'
(334.81')(R1)
LANDS OF CAMPBELL AVE PORTFOLIO LLC
LOT 9
(50 M 44&5)
Storage Container
6' CLF With Razor Wire
Asphalt
Concrete
Concrete Driveway
Ac Driveway
Gravel
Steel Plate
Existing Building
Ann Cement Min. Storage
Concrete Band
Concrete Valley Gutter
6' CLF Valley Gate With Razor Wire
6' CLF Valley Gate
Asphalt
Concrete
FND 2" BRASS DISK WITH PUNCH IN MON BOX (CA DEPT OF TRANSPORTION) S 67°55'20"E (S 67°54'51"E) 43.96'
4.0' (1.65')
65.36'
488.75'
N80°07'16"W 890.23'(T)(890.10')
S 09°52'44" W 30.00'
10.00'
N 80°07'16" W 230.00'
KELLY COURT
N 09°52'44" E (BASIS OF BEARINGS) 280.00'
40.0'
20.0'
FEMA FLOOD ZONE "AE" CONTOUR EL 13'
FND PK NAIL SEE DETAIL "A"
FND RR SPIKE
N 80°07'16" W 25.00'
S18°04'25"W 49.79'
(S19°08'00"W 49.49')(R2)
S80°07'16"E 60.88'
MENLO PARK SANITARY SEWER LIFT STATION
LANDS OF ETERNAL LIFE CHURCH, IGLESIA VIDA ETERNA
PORTIONS OF LOTS 10 & 11
(50 M 44&5)
PARCEL TWO
24.53' DRIVEWAY ESMT
(17 M 2)
LANDS OF ETERNAL LIFE CHURCH, IGLESIA VIDA ETERNA
PORTIONS OF LOT 12
(50 M 44&5)
LANDS OF WEST BAY SANITARY DISTRICT
S80°07'16"E 166.94'
N12°39'00"E
S12°26'00"W 78.15'(R1)
(78.15')(R1)
S12°54'44"W 196.80'
(196.73')(R1)
(ORIGINAL CENTERLINE) N 23°04'40" E (N 23°04'40" E) (N 23°09'09" E)
165.82'
375.69'(T)
SDMH 11.98 RE
IE 7.49 18"(SW)
IE 6.09 12"(SW)
IE 1.82 18"(W)
IE 1.40 18"(S)
IE 0.84 36"(E)
SDMH 11.78 RE
IE 6.16 66"(E)
IE 2.81 66"(W)
SDMH 11.08 RE
IE 4.58 6"(E)
IE 4.12 8"(W)
IE 4.04 8"(S)
SDMH 11.54 RE
IE 2.45 8"(NW)
SSCO 11.28 RE
CB 11.01 RE
CB 11.43 RE
IE 9.98 12"(NE)
On Brick Pavers (typ) Storage Lockers
FND OPEN 3/4"ø
Asphalt
Concrete Valley Gutter
6' CLF With Razor Wire
6' CLF Valley Gate With Razor Wire
Asphalt
Concrete
Concrete Valley Gutter
Concrete Valley Gutter
Asphalt
Concrete
Concrete Valley Gutter
Concrete Valley Gutter
Concrete Valley Gutter

1340 WILLOW RD

(1340 WILLOW RD PARKING LOT)

HETCH HETCHY

80'

(1340 WILLOW RD SOCCER FIELD)

HETCH HETCHY

90'

1320 WILLOW RD
PKG: 39, INC. 2 ADA
(1.5/1,000 SF)

WILLOW RD

GARAGE

27'

10 KELLY CT

26'

PUBLICLY ACCESSIBLE
OPEN AREA WITH
MEANDERING WALKWAY /
FIRE TRUCK ACCESS

12' 5'

18' TYP

9' TYP

8

(E) SITE ACCESS

10

18' TYP

9' 5'

9' TYP

37'

31'

PHASE 1 (N) SURFACE PKG

29'

16

FIRE TRUCK
TURN-AROUND

40'

30'

28'

5

33'

26'

965 O'BRIEN DR

9' TYP

5

34'

18' TYP

PHASE 2

PHASE 1

1005 O'BRIEN DR

18' TYP

9' TYP

39'

12

TXFR

TRASH ENCLOSURE

GENERATOR ENCLOSURE

CHEM.

3

22' TYP

9' TYP

18' TYP

27'

9'

8'

9'

26'

30'

30'

45'

O'BRIEN DRIVE

(N) SITE ACCESS

SIDEWALK 5'-0"
PLANTING +/- 4'-6"
BIKE 5'-0"
BUFFER 3'-0"

RELOCATED SITE ACCESS

0' 32' 64' 128'

SCALE: 1'-0" = 60'-0"

N

SHEET NOTES

KEYNOTES

LEGEND

- EXISTING PROPERTY LINE
- PROPOSED LOT LINE ADJUSTMENT
- LS-ZONING SETBACKS
- FIRE LANE - NO PARKING
- SITE COVERAGE
- ENCLOSED LONG-TERM BICYCLE SEE SHEET A9.2 & A13.4
- EXTERIOR LOOPS SHORT-TERM SEE SHEET A13.4 FOR BIKE PARKING COUNT
- TXFR TRANSFORMER

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

06-23-2021	C.U.P. SUBMITTAL
10-28-2021	C.U.P. RESPONSE 1
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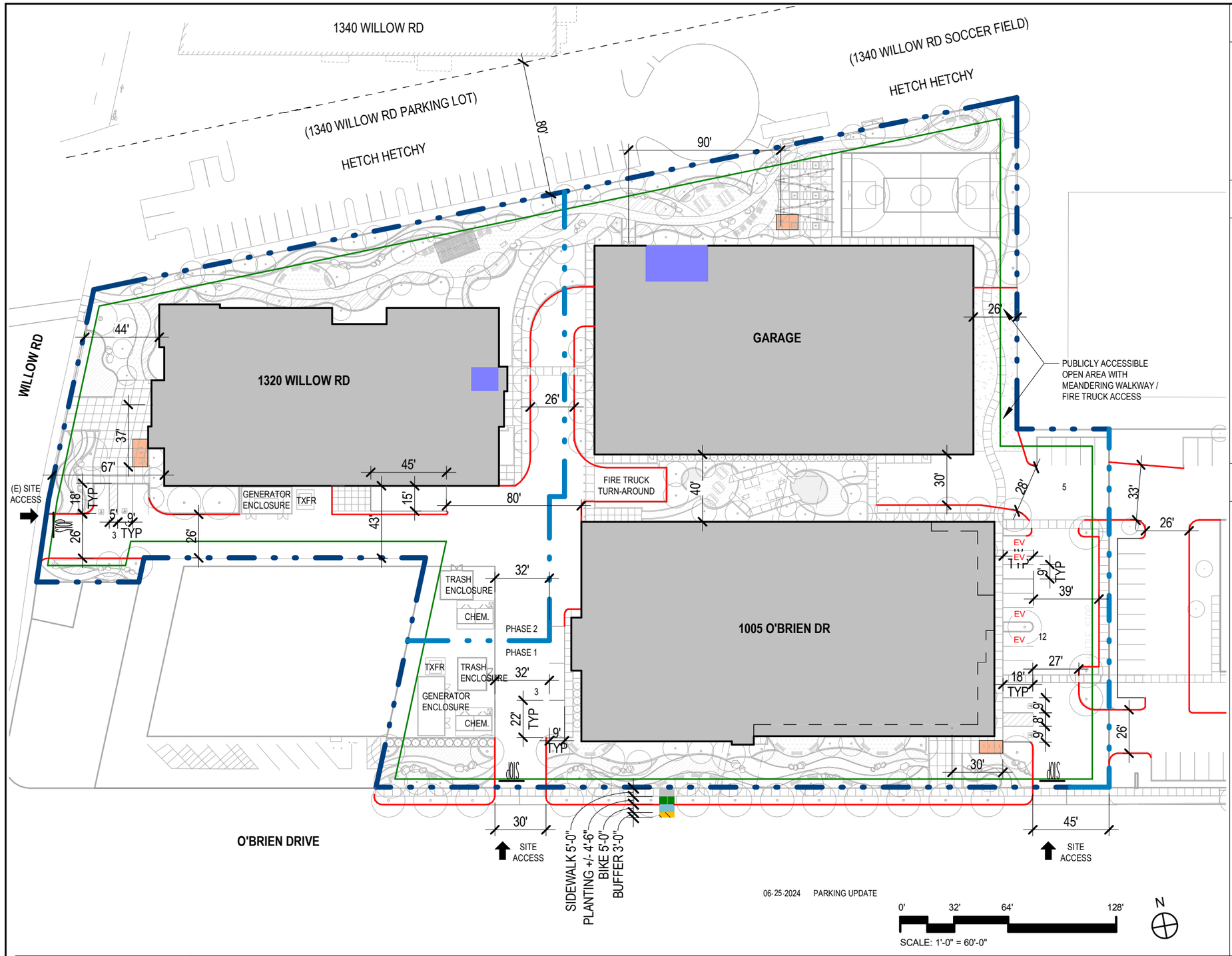
PHASE 1 PROPOSED SITE PLAN

A6.1

DES ARCHITECTS ENGINEERS

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SHEET NOTES

KEYNOTES

LEGEND

- EXISTING PROPERTY LINE
- PROPOSED LOT LINE ADJUSTMENT
- LS-ZONING SETBACKS
- FIRE LANE - NO PARKING
- SITE COVERAGE
- ENCLOSED LONG-TERM BICYCLE SEE SHEET A11.2 & A13.4
- EXTERIOR LOOPS SHORT-TERM SEE SHEET A13.4 FOR BIKE PARKING COUNT
- TXFR TRANSFORMER

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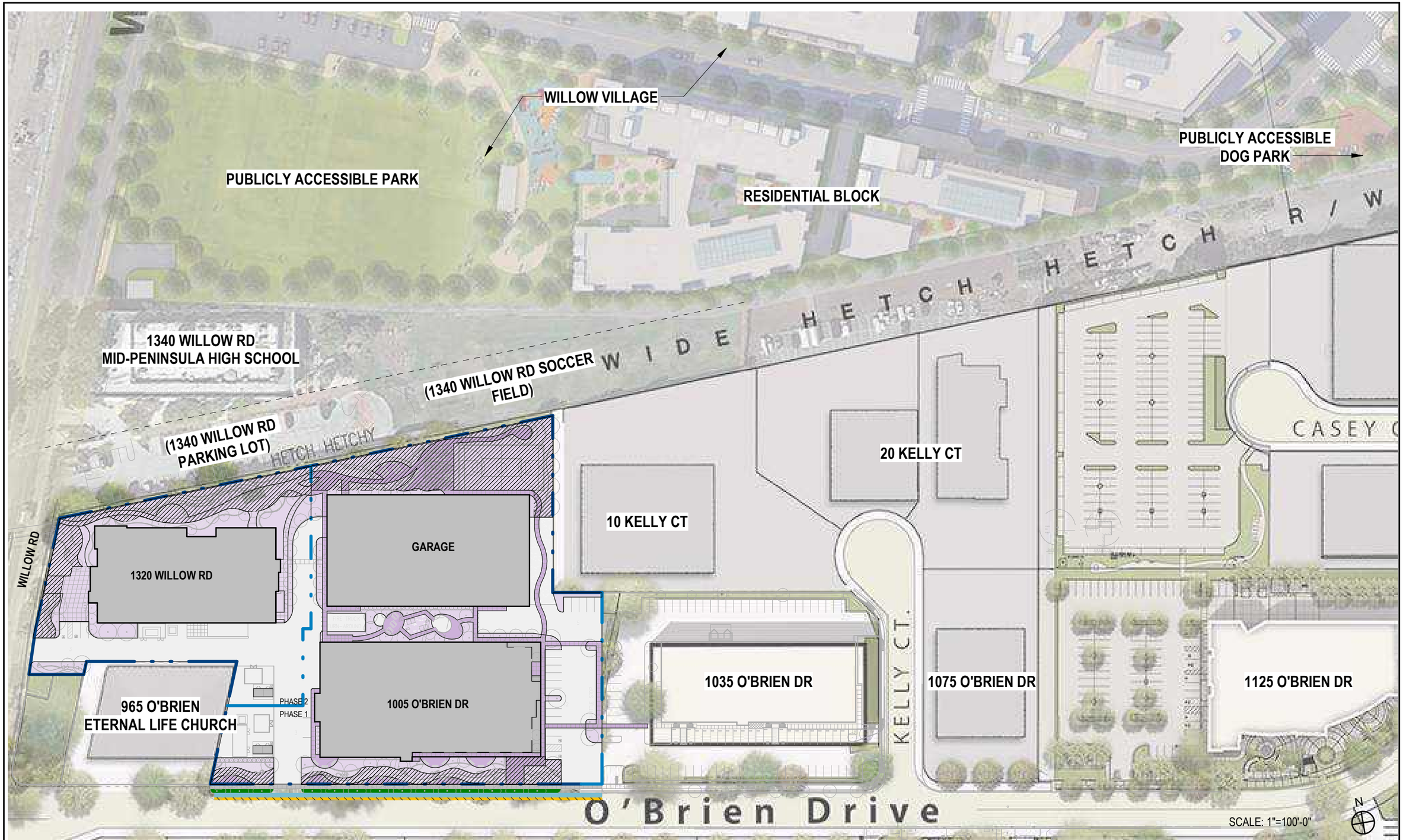
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06-25-2024	PARKING UPDATE

PHASE 2 PROPOSED SITE PLAN

A6.2

DES ARCHITECTS ENGINEERS

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TARLTON

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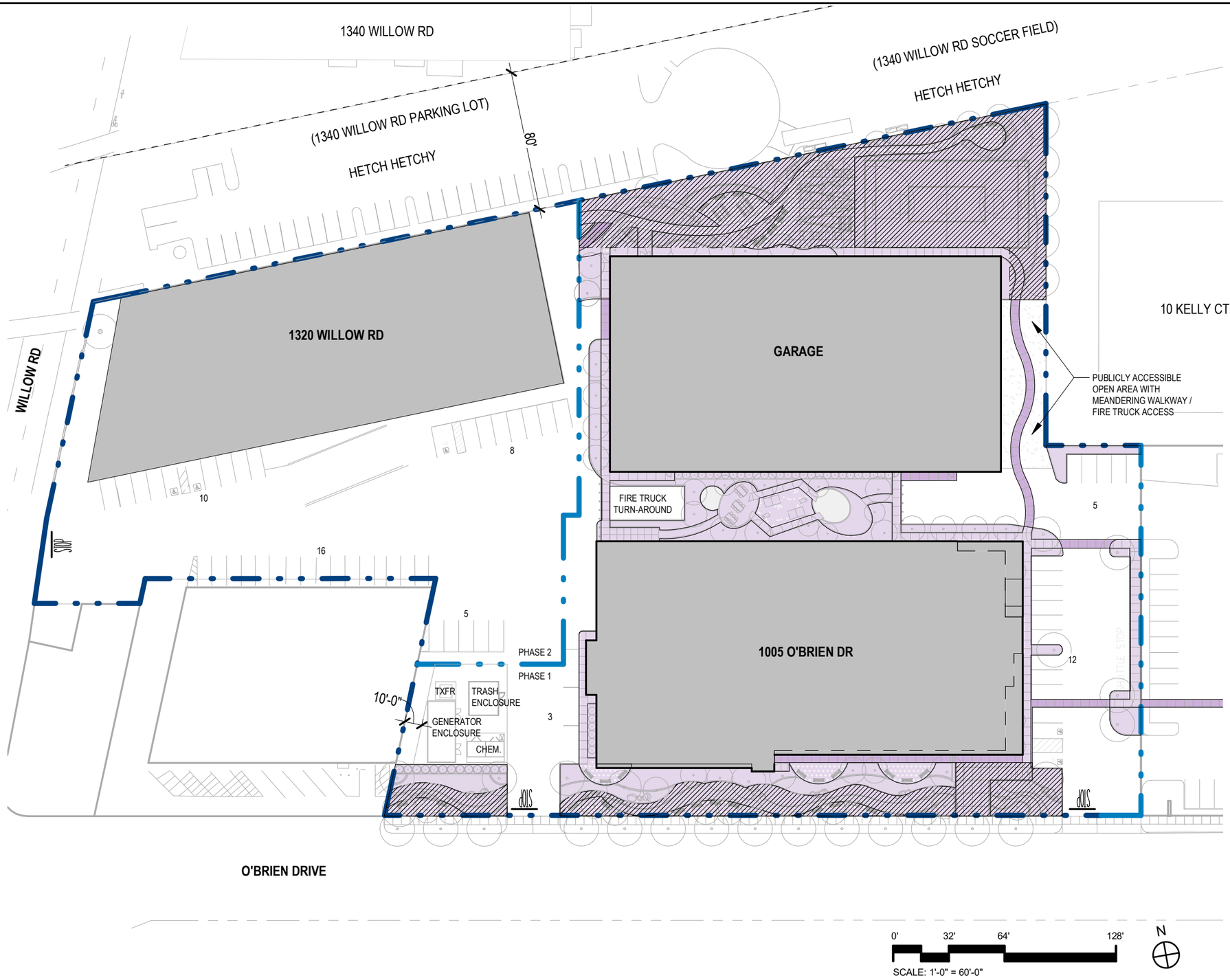
06-22-2022	C.U.P. RESPONSE 2
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07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

NEIGHBORHOOD OPEN SPACE

A7

DES ARCHITECTS ENGINEERS

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SHEET NOTES

KEYNOTES

PHASE 1
AREA: 123,738 SF

SITE COVERAGE: 59,860 SF (48%)

OPEN SPACE:
REQUIRED = 24,748 SF (20% OF SITE)
PROVIDED = 38,559 SF (31% OF SITE)

PUBLIC OPEN SPACE:
REQUIRED = 12,374 SF (50% OF REQ'D OPEN SPACE)
PROVIDED = 21,633 SF (87% OF REQ'D OPEN SPACE)

LEGEND

- EXISTING PROPERTY LINE
- PROPOSED LOT LINE ADJUSTMENT
- SITE COVERAGE
- OPEN SPACE
- PUBLIC OPEN SPACE
- PEDESTRIAN PATHS (PAVER, CONCRETE, DG)

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

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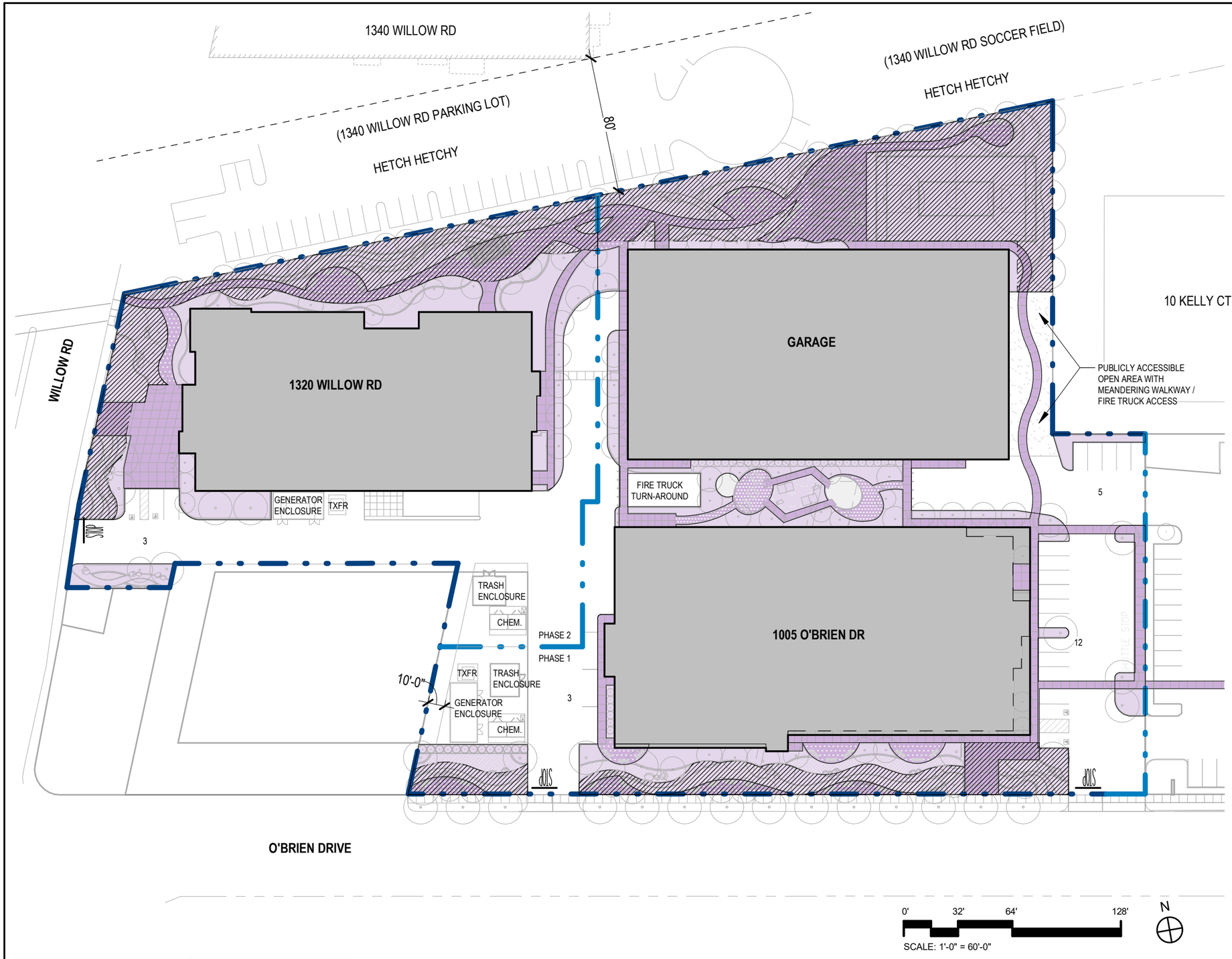
PHASE 1 OPEN SPACE DIAGRAM

A7.1

DES ARCHITECTS ENGINEERS

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SHEET NOTES

PHASE 2
AREA: 59,878 SF

SITE COVERAGE: 21,494 SF

OPEN SPACE:
REQUIRED = 11,976 SF (20% OF SITE)
PROVIDED = 20,785 SF (35% OF SITE)

PUBLIC OPEN SPACE:
REQUIRED = 5,988 SF (50% OF REQ'D OPEN SPACE)
PROVIDED = 9,902 SF (83% OF REQ'D OPEN SPACE)

PHASE 1 + 2
PROJECT SITE AREA: 182,616 SF

SITE COVERAGE: 80,354 SF (ALL STRUCTURES)

OPEN SPACE:
REQUIRED = 36,724 SF (20% OF SITE)
PROVIDED = 59,344 SF (32% OF SITE)

PUBLIC OPEN SPACE:
REQUIRED = 18,362 SF (50% OF REQ'D OPEN SPACE)
PROVIDED = 31,535 SF (86% OF REQ'D OPEN SPACE)

LEGEND

- EXISTING PROPERTY LINE
- PROPOSED LOT LINE ADJUSTMENT
- SITE COVERAGE
- OPEN SPACE
- PUBLIC OPEN SPACE
- PEDESTRIAN PATHS (PAVER, CONCRETE, DG)

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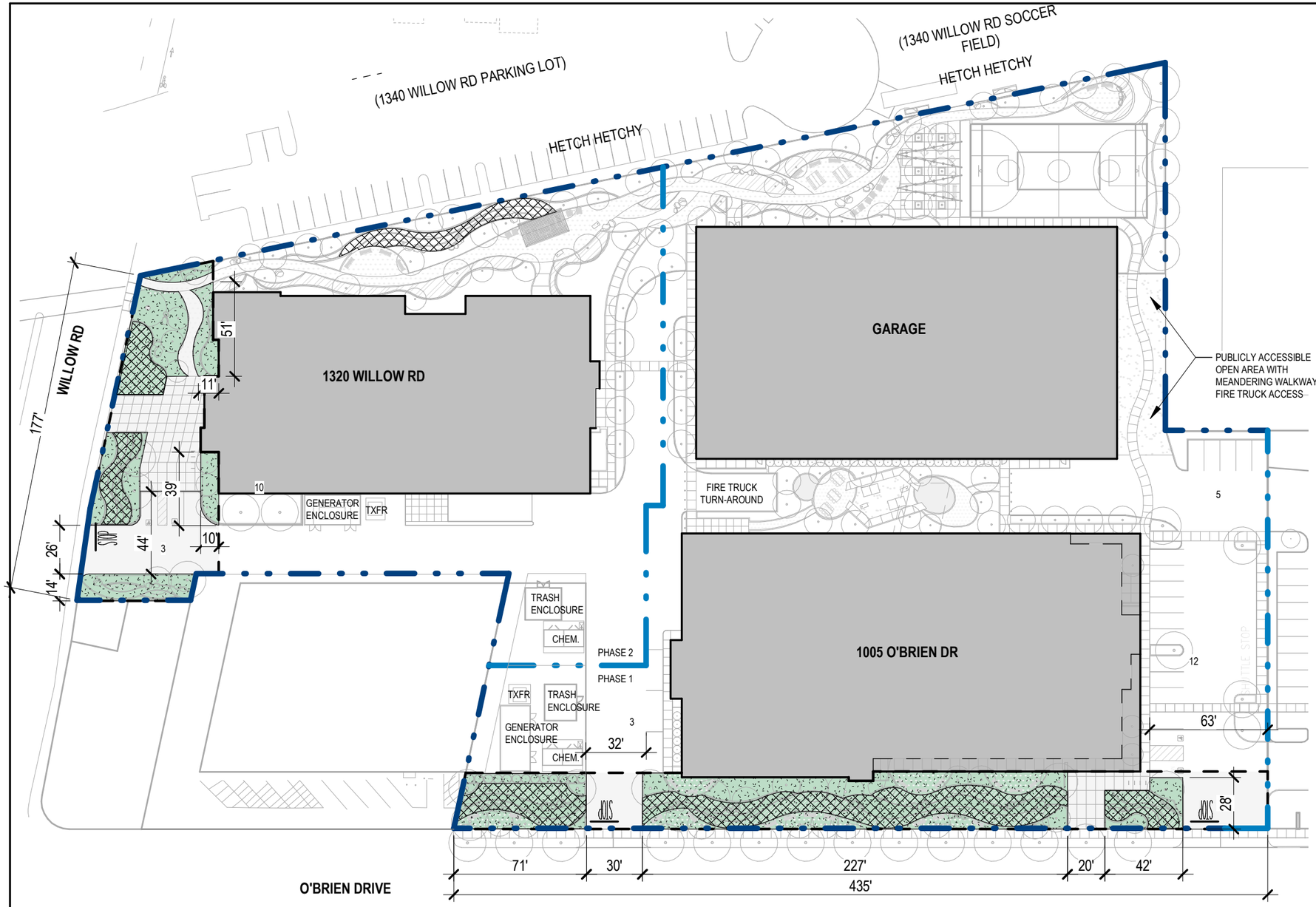
PHASE 2 OPEN SPACE DIAGRAM

A7.2

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PHASE 1	
FRONTAGE: 435'	
PKG ALONG FRONTAGE	
MAX	PROPOSED
108.75' (25%)	95' (22%)

PHASE 2	
FRONTAGE: 177'	
PKG ALONG FRONTAGE	
MAX	PROPOSED
44.25' (25%)	44' (25%)

0' 32' 64' 128'

SCALE: 1'-0" = 60'-0"

N

SHEET NOTES

PHASE 1
FRONTAGE: 13,070 SF

FRONTAGE LANDSCAPE:
REQUIRED = 3,268 SF (25% OF FRONTAGE)
PROVIDED = 9,620 SF (75% OF FRONTAGE)

FRONTAGE STORMWATER TREATMENT:
REQUIRED = 1,634 SF (50% OF FRONTAGE LANDSCAPE)
PROVIDED = 4,900 SF (300% OF REQUIRED AREA)

PHASE 2
FRONTAGE: 9,964 SF

FRONTAGE LANDSCAPE:
REQUIRED = 2,491 SF (25% OF FRONTAGE)
PROVIDED = 4,674 SF (47% OF FRONTAGE)

FRONTAGE STORMWATER TREATMENT:
REQUIRED = 1,246 SF (50% OF FRONTAGE LANDSCAPE)
PROVIDED = 1,160 SF (93% OF REQUIRED AREA)

PHASE 1 + 2
FRONTAGE: 23,034 SF

FRONTAGE LANDSCAPE:
REQUIRED = 5,759 SF (25% OF FRONTAGE)
PROVIDED = 14,494 SF (63% OF FRONTAGE)

FRONTAGE STORMWATER TREATMENT:
REQUIRED = 2,880 SF (50% OF FRONTAGE LANDSCAPE)
PROVIDED = 6,060 SF (210% OF FRONTAGE LANDSCAPE)

LEGEND

- EXISTING PROPERTY LINE
- PROPOSED LOT LINE ADJUSTMENT
- SITE COVERAGE
- FRONTAGE
- FRONTAGE LANDSCAPE
- STORMWATER TREATMENT

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

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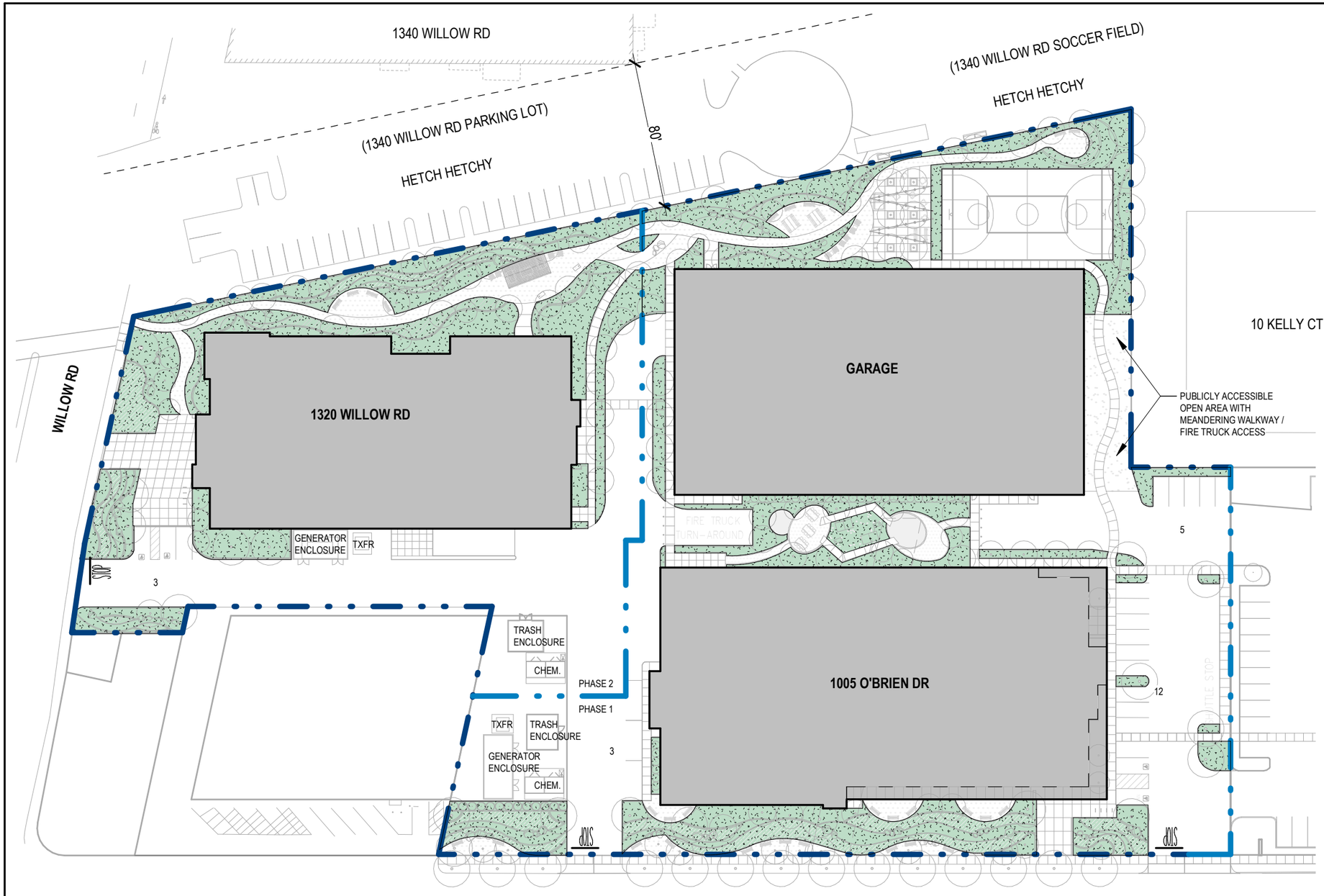
PHASE 1 & 2 FRONTAGE DIAGRAM

A7.3

DES ARCHITECTS ENGINEERS

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SHEET NOTES

PHASE 1
AREA: 123,738 SF

LANDSCAPE AREA: 19,889 SF (16%)

PHASE 2
AREA: 59,878 SF

LANDSCAPE AREA: 14,026 SF (23%)

PHASE 1 + 2
PROJECT SITE AREA: 182,616 SF

PROJECT SITE LANDSCAPE AREA: 33,915 SF (19%)

LEGEND

- EXISTING PROPERTY LINE
- PROPOSED LOT LINE ADJUSTMENT
- SITE COVERAGE
- LANDSCAPE

TARLTON

985 & 1001 O'BRIEN DR
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MENLO PARK, CA 94025

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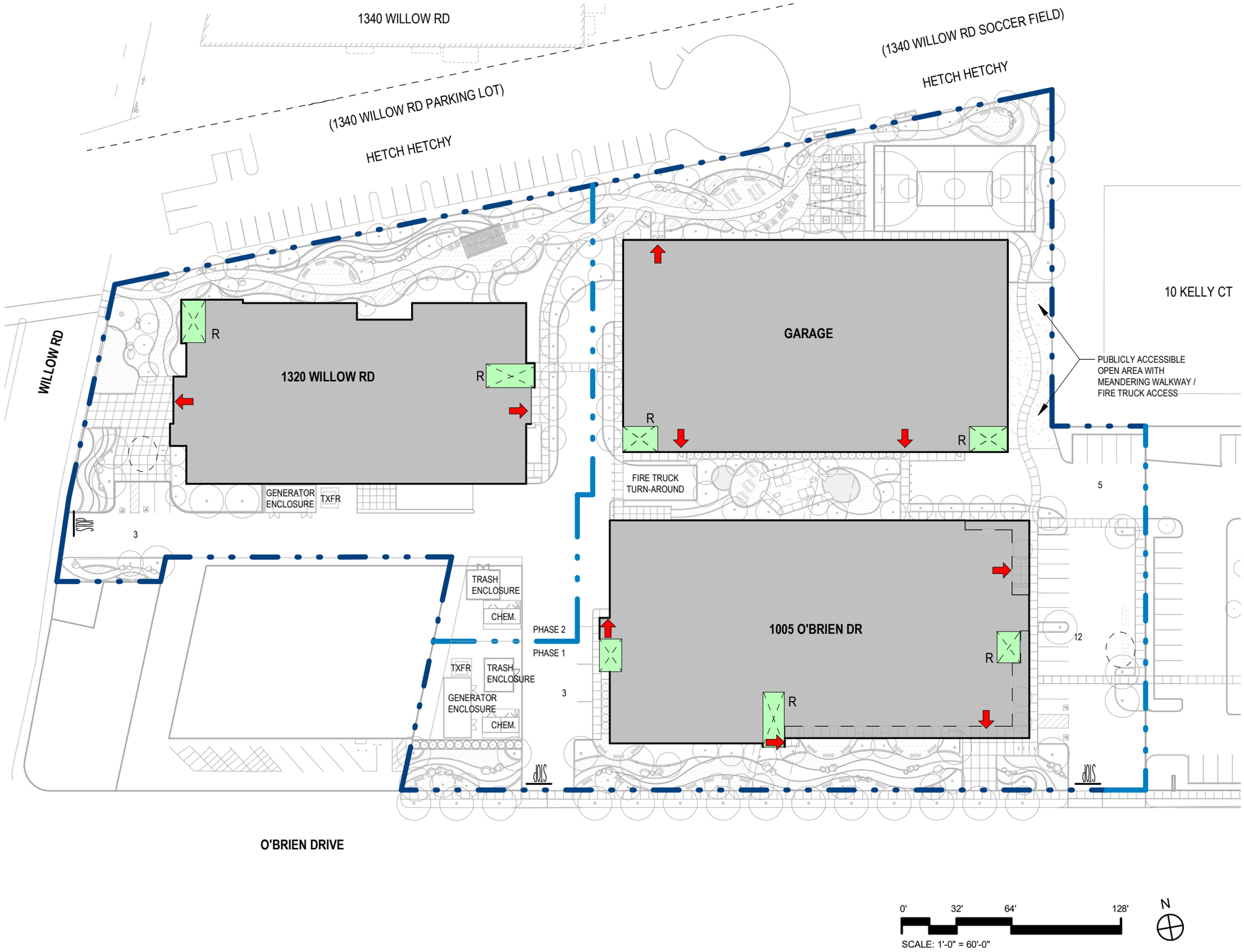
OVERALL SITE LANDSCAPE AREA CALCS

A7.4

DES ARCHITECTS ENGINEERS

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SHEET NOTES

LEGEND

- EXISTING PROPERTY LINE
- PROPOSED LOT LINE ADJUSTMENT
- EXIT — EGRESS / EXIT
- STAIR TOWER
- R — STAIR TOWER WITH ROOF ACCESS
- SAFETY GATHERING AREA

TARLTON

985 & 1001 O'BRIEN DR
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MENLO PARK, CA 94025

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09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

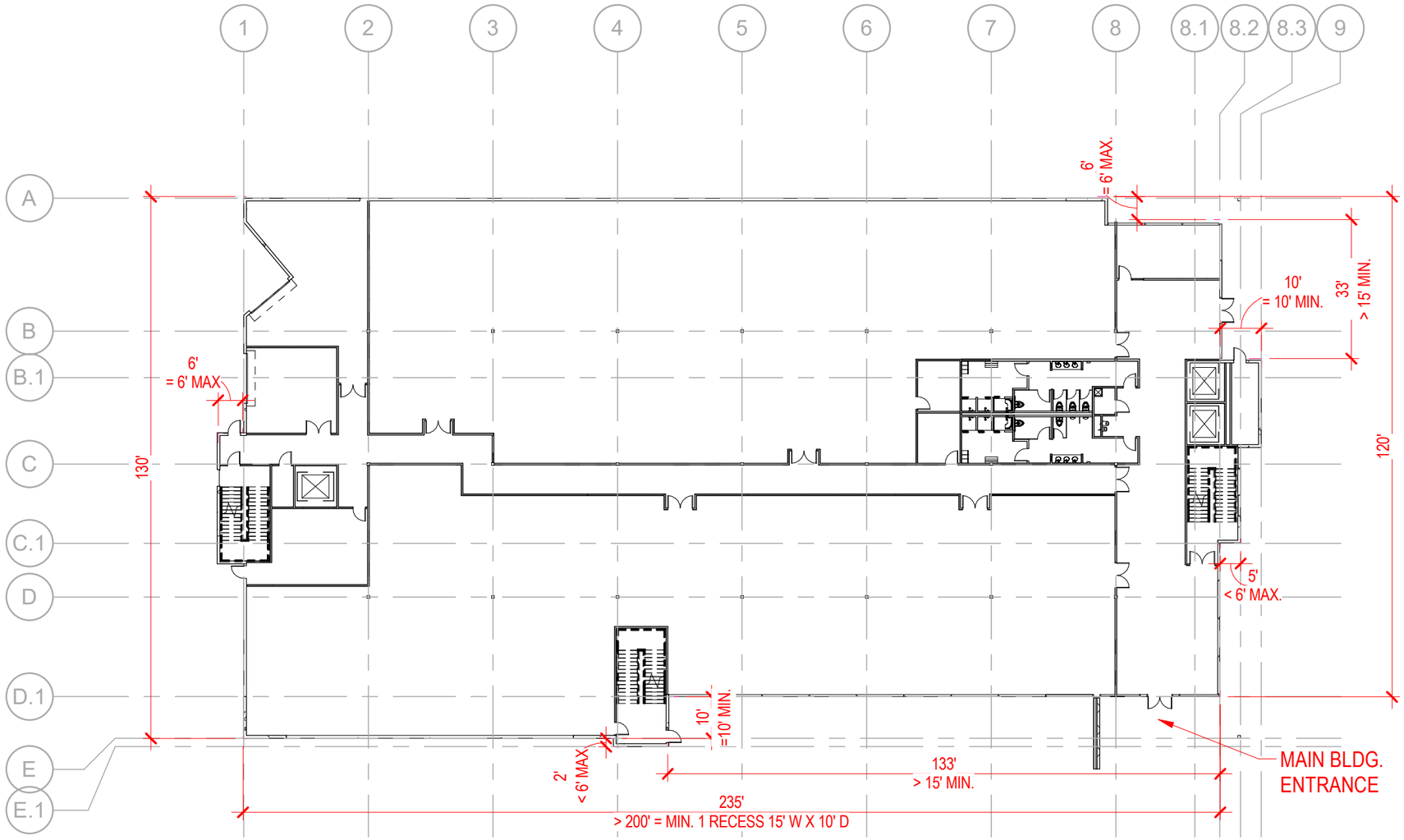
SITE SERVICE / EMERGENCY PLAN

A8

DES ARCHITECTS ENGINEERS

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0' 10' 25' 75'

SCALE: 1'-0" = 30'-0"

N

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

10-28-2021	C.U.P. RESPONSE 1
06-22-2022	C.U.P. RESPONSE 2
02-17-2023	C.U.P. RESPONSE 4
07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

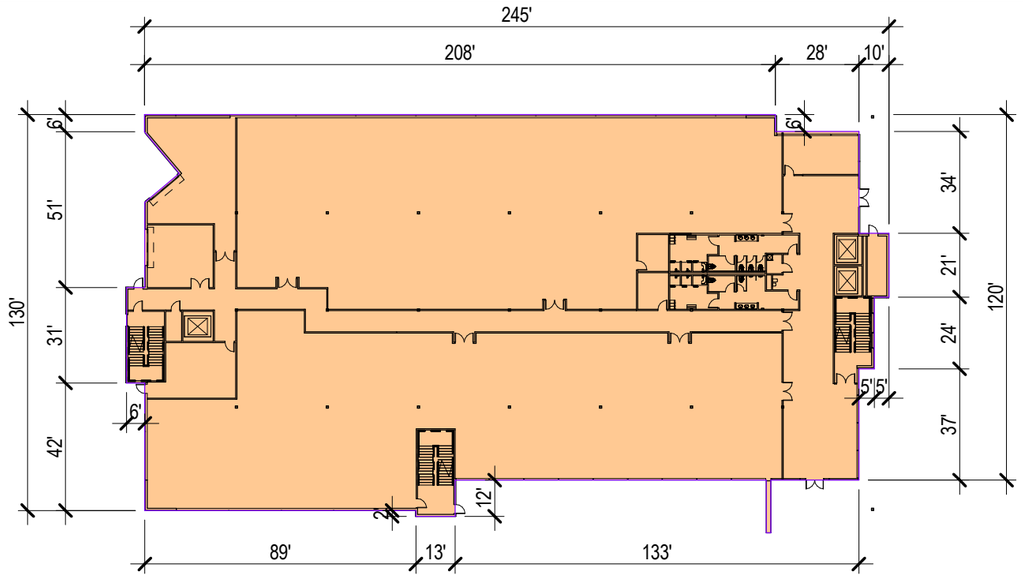
1005 O'BRIEN BLDG. MODULATION

A9

DES ARCHITECTS ENGINEERS

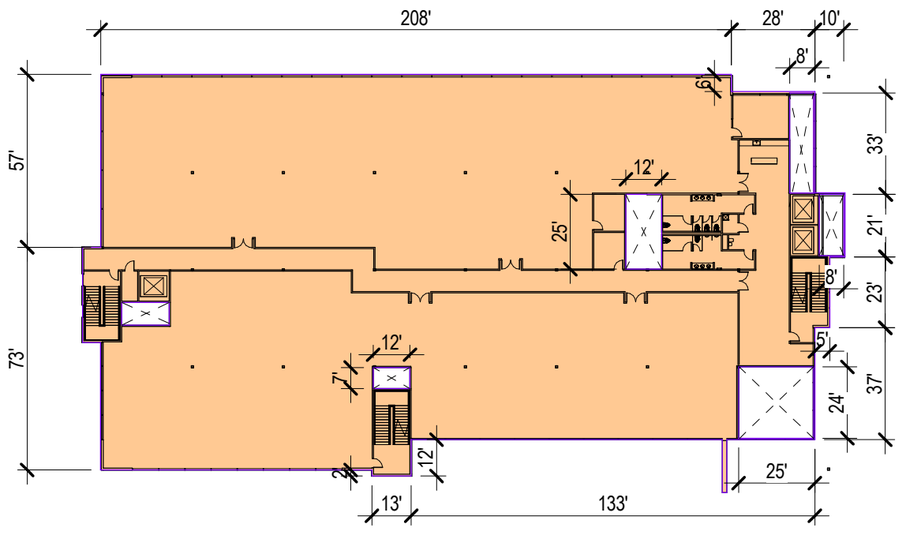
© 2020

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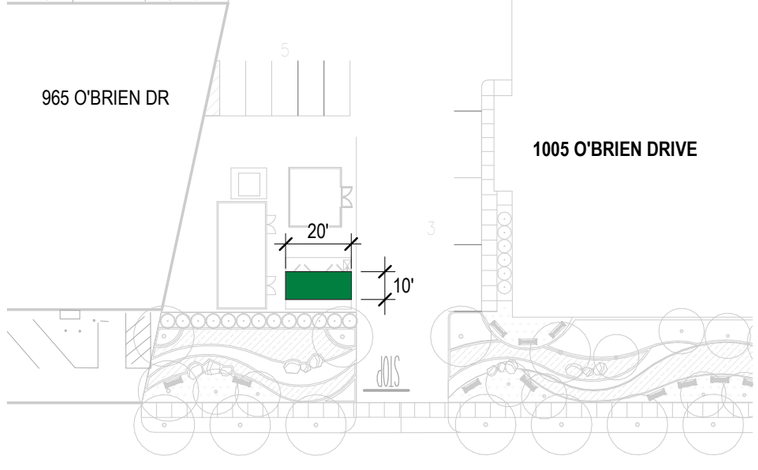
1 1005 LEVEL 1

1" = 50'-0"



2 1005 LEVEL 2

1" = 50'-0"



3 CHEMICAL STORAGE

1" = 50'-0"

0' 50' 75' 125'

N

SCALE: 1'-0" = 50'-0"

SHEET NOTES

GROSS FLOOR AREA:

LEVEL 1 R&D AREA	29,643 SF
LEVEL 2 R&D AREA	28,265 SF
LEVEL 3 R&D AREA	30,962 SF
LEVEL 4 R&D AREA	30,962 SF
LEVEL 5 R&D AREA	30,962 SF
ROOF STAIRS & ELEV.	1,407 SF
ROOF CONFERENCE	1,670 SF
ROOF STORAGE	510 SF
CHEMICAL STORAGE	200 SF
TOTAL:	**154,581 SF**

OUTDOOR ROOF DECK:

CIRCULATION:	1,517 SF
LANDSCAPE:	1,403 SF
SEATING/OPEN AREA:	953 SF
TOTAL:	3,873 SF

LEGEND

BUILDING (FAR)

- R&D AREA
- ROOF STAIRS & ELEVATOR
- CONFERENCE ROOM
- ROOF STORAGE
- CHEMICAL STORAGE

BUILDING (NOT INCLUDED IN FAR)

- ROOF DECK SEATING
- ROOF DECK CIRCULATION
- ROOF DECK LANDSCAPE
- ROOF (UNOCCUPIED)
- MECHANICAL
- SHAFTS/OPENINGS

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

04-15-2021	D.R.T. REVIEW	06-25-2024	PARKING UPDATE
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07-12-2023	C.U.P. RESPONSE 5		
09-29-2023	C.U.P. RESPONSE 6		

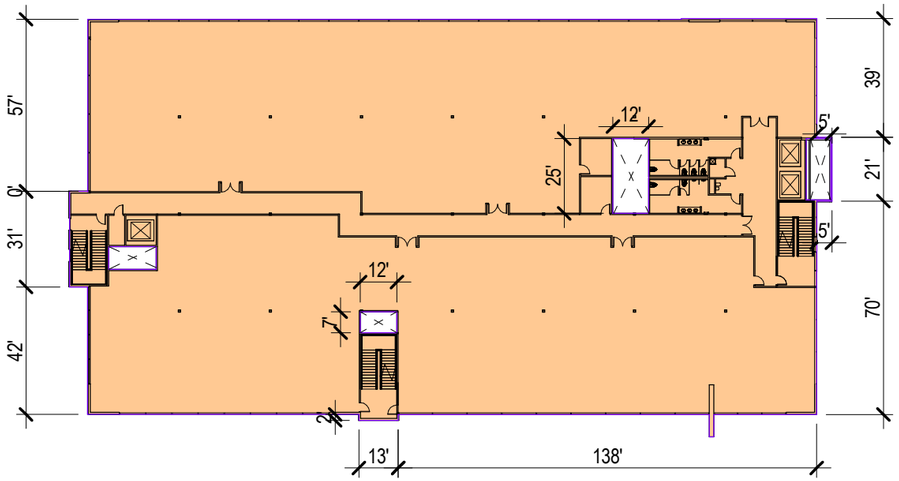
1005 O'BRIEN GROSS FLOOR AREA DIAGRAMS

A9.1A

DES ARCHITECTS ENGINEERS

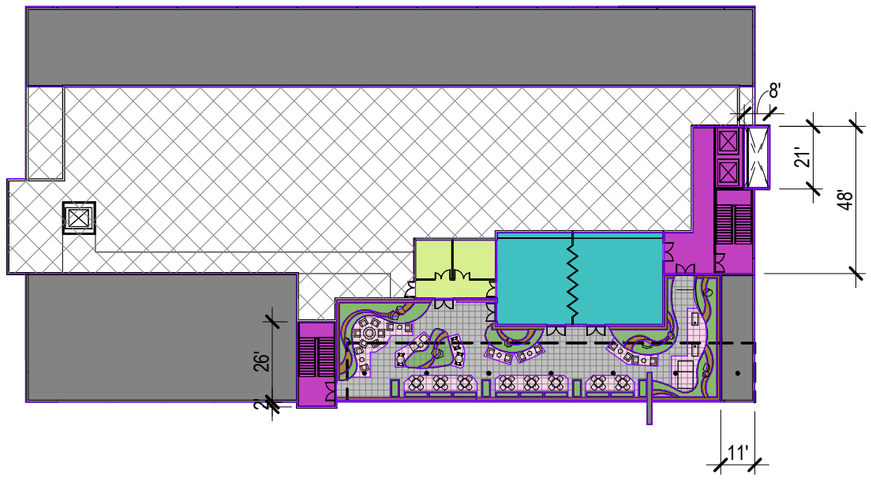
© 2020

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1 1005 LEVEL 3-5

1" = 50'-0"



2 1005 ROOF

1" = 50'-0"

0' 50' 75' 125'

SCALE: 1'-0" = 50'-0"

N

SHEET NOTES

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LEVEL 4 R&D AREA	30,962 SF
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LANDSCAPE:	1,403 SF
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LEGEND

BUILDING (FAR)

- R&D AREA
- ROOF STAIRS & ELEVATOR
- CONFERENCE ROOM
- ROOF STORAGE
- CHEMICAL STORAGE

BUILDING (NOT INCLUDED IN FAR)

- ROOF DECK SEATING
- ROOF DECK CIRCULATION
- ROOF DECK LANDSCAPE
- ROOF (UNOCCUPIED)
- MECHANICAL
- SHAFTS/OPENINGS

TARLTON

985 & 1001 O'BRIEN DR
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MENLO PARK, CA 94025

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10-28-2021	C.U.P. RESPONSE 1		
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02-17-2023	C.U.P. RESPONSE 4		
07-12-2023	C.U.P. RESPONSE 5		
09-29-2023	C.U.P. RESPONSE 6		

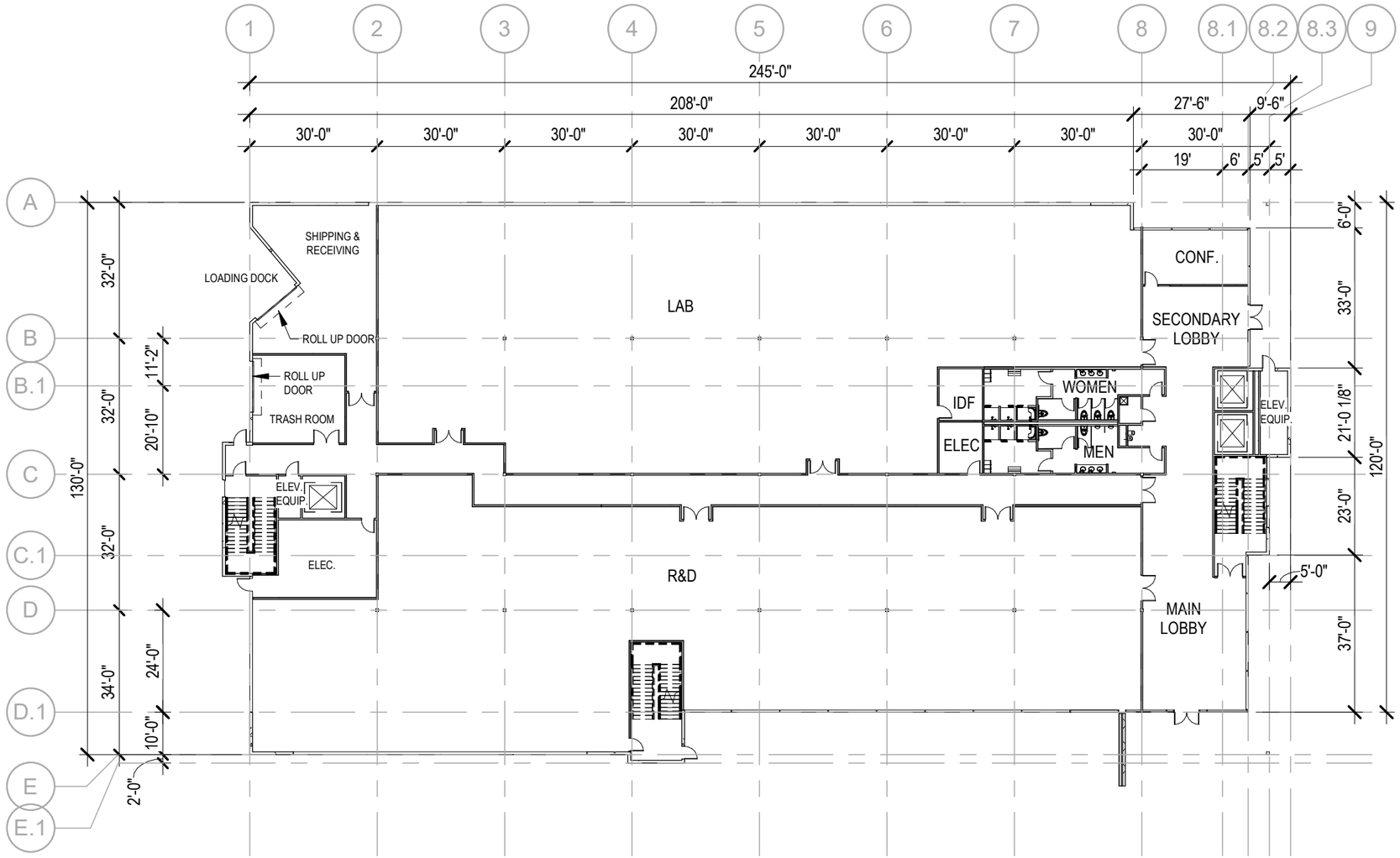
1005 O'BRIEN GROSS FLOOR AREA DIAGRAMS

A9.1B

DES ARCHITECTS ENGINEERS

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0' 10' 25' 75'

SCALE: 1'-0" = 30'-0"

N

TARLTON

985 & 1001 O'BRIEN DR
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MENLO PARK, CA 94025

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07-12-2023	C.U.P. RESPONSE 5		
09-29-2023	C.U.P. RESPONSE 6		

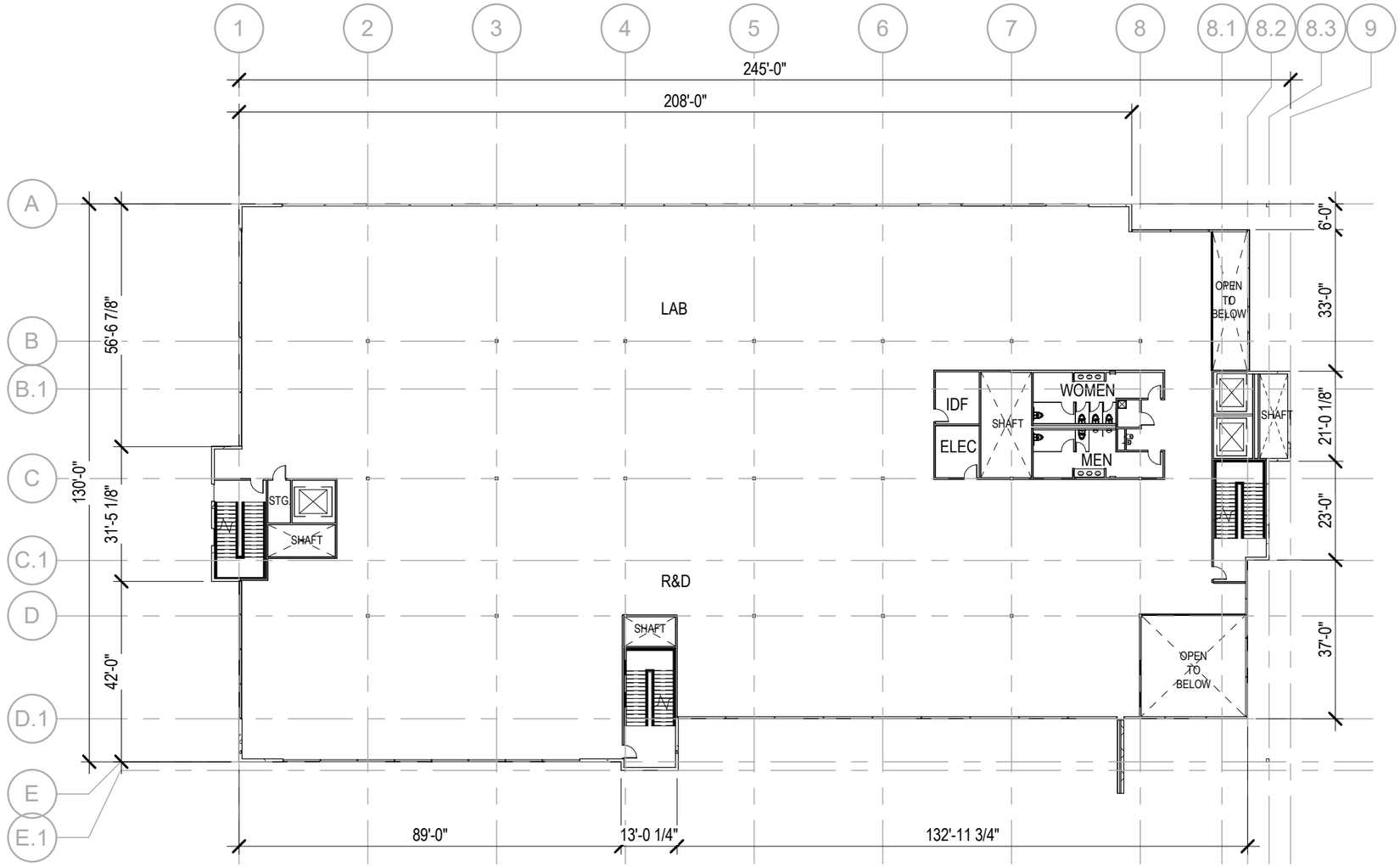
1005 O'BRIEN LEVEL 1

A9.2

DES ARCHITECTS ENGINEERS

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0' 10' 25' 75' N

SCALE: 1'-0" = 30'-0"

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

04-15-2021	D.R.T. REVIEW	06-25-2024	PARKING UPDATE
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07-12-2023	C.U.P. RESPONSE 5		
09-29-2023	C.U.P. RESPONSE 6		

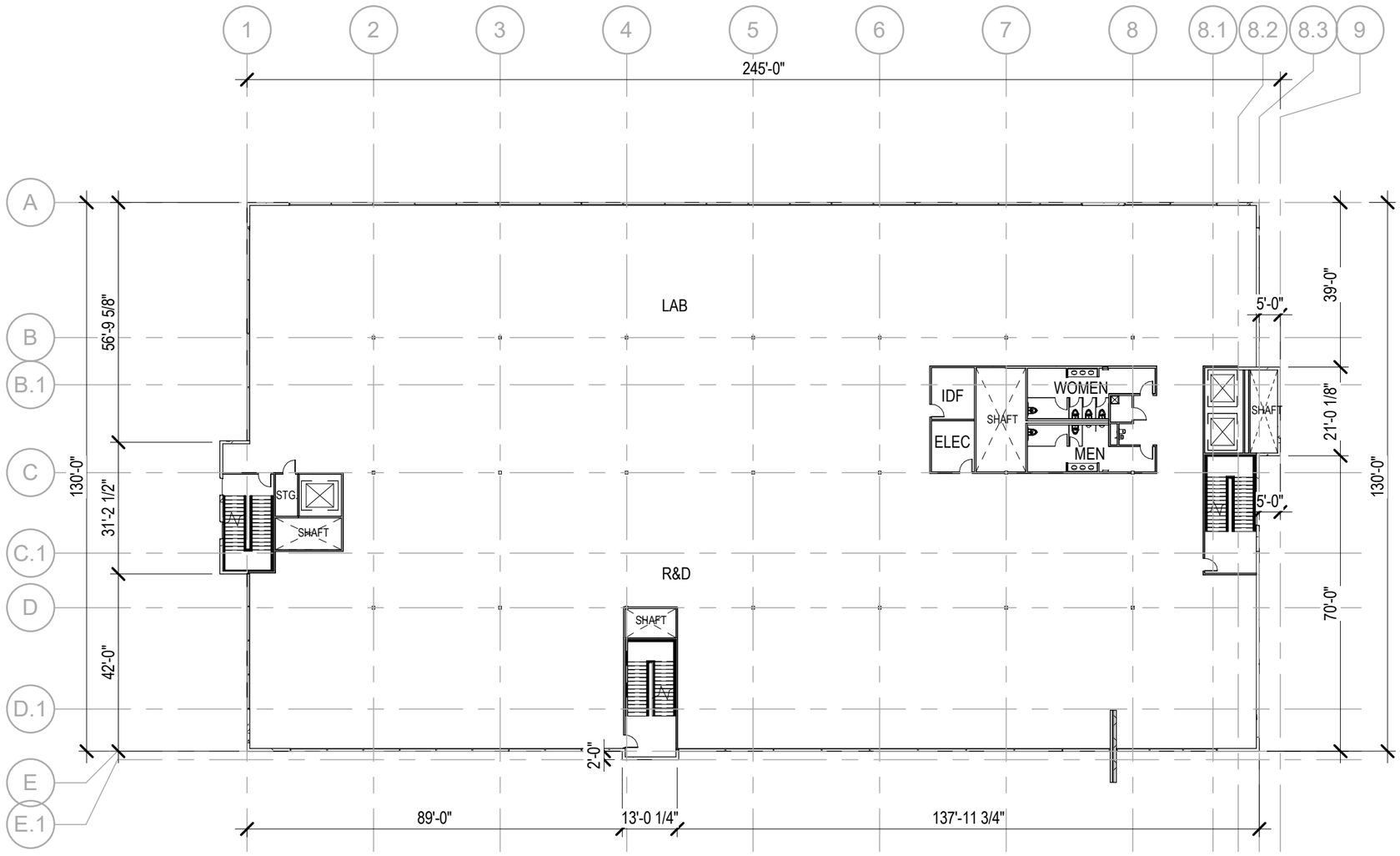
1005 O'BRIEN LEVEL 2

A9.3

DES ARCHITECTS ENGINEERS

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0' 10' 25' 75' N

SCALE: 1'-0" = 30'-0"

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

04-15-2021	D.R.T. REVIEW	06-25-2024	PARKING UPDATE
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06-22-2022	C.U.P. RESPONSE 2		
10-28-2022	C.U.P RESPONSE 3		
02-17-2023	C.U.P. RESPONSE 4		
07-12-2023	C.U.P. RESPONSE 5		
09-29-2023	C.U.P. RESPONSE 6		

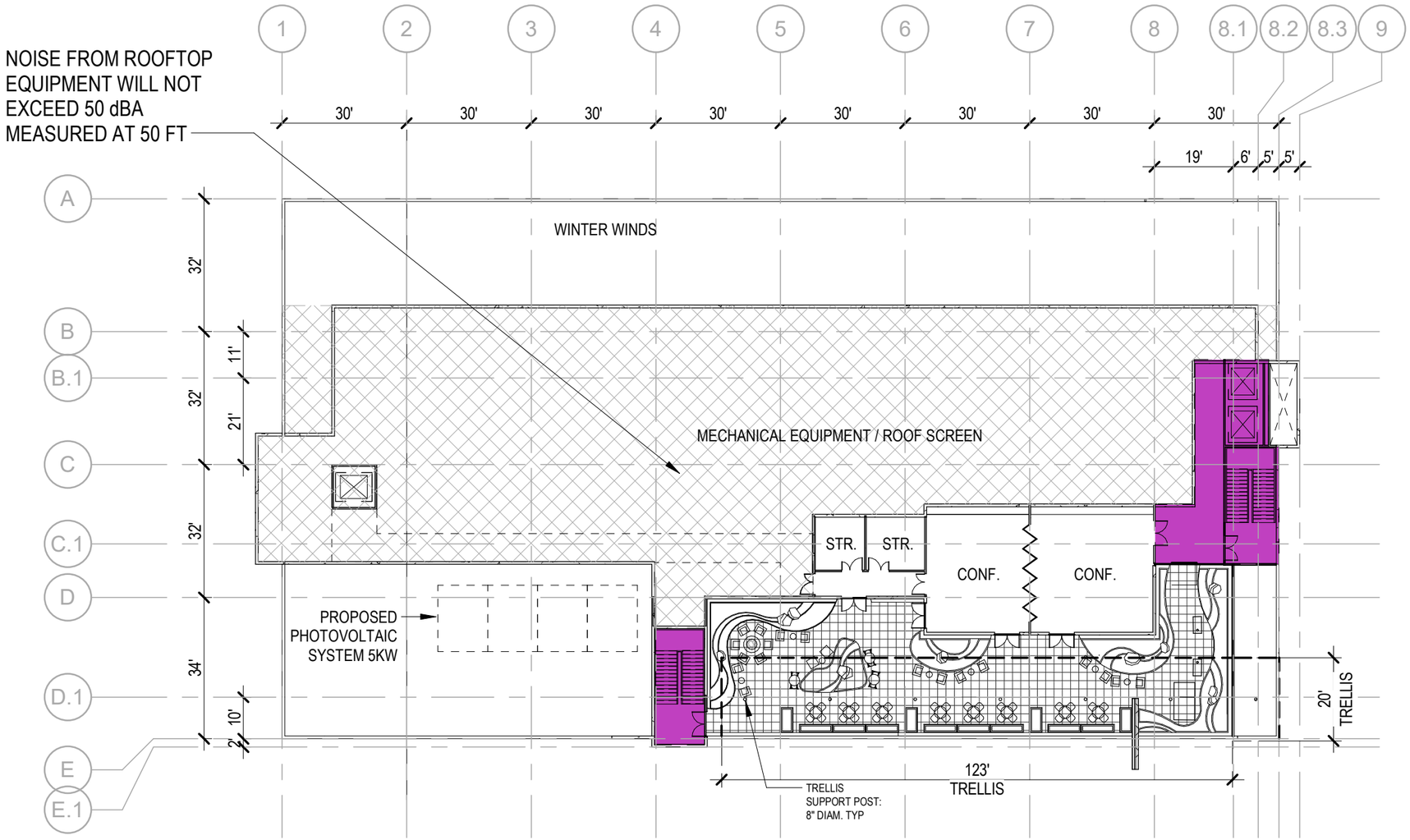
1005 O'BRIEN LEVEL 3-5

A9.4

DES ARCHITECTS ENGINEERS

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EMPLOYEE USE ONLY

0' 10' 25' 75' N

SCALE: 1'-0" = 30'-0"

LEGEND

- MECHANICAL EQUIPMENT / ROOF SCREEN AREA
- ROOF ACCESS & CIRCULATION
- ROOF TOP TRELLIS

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

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07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

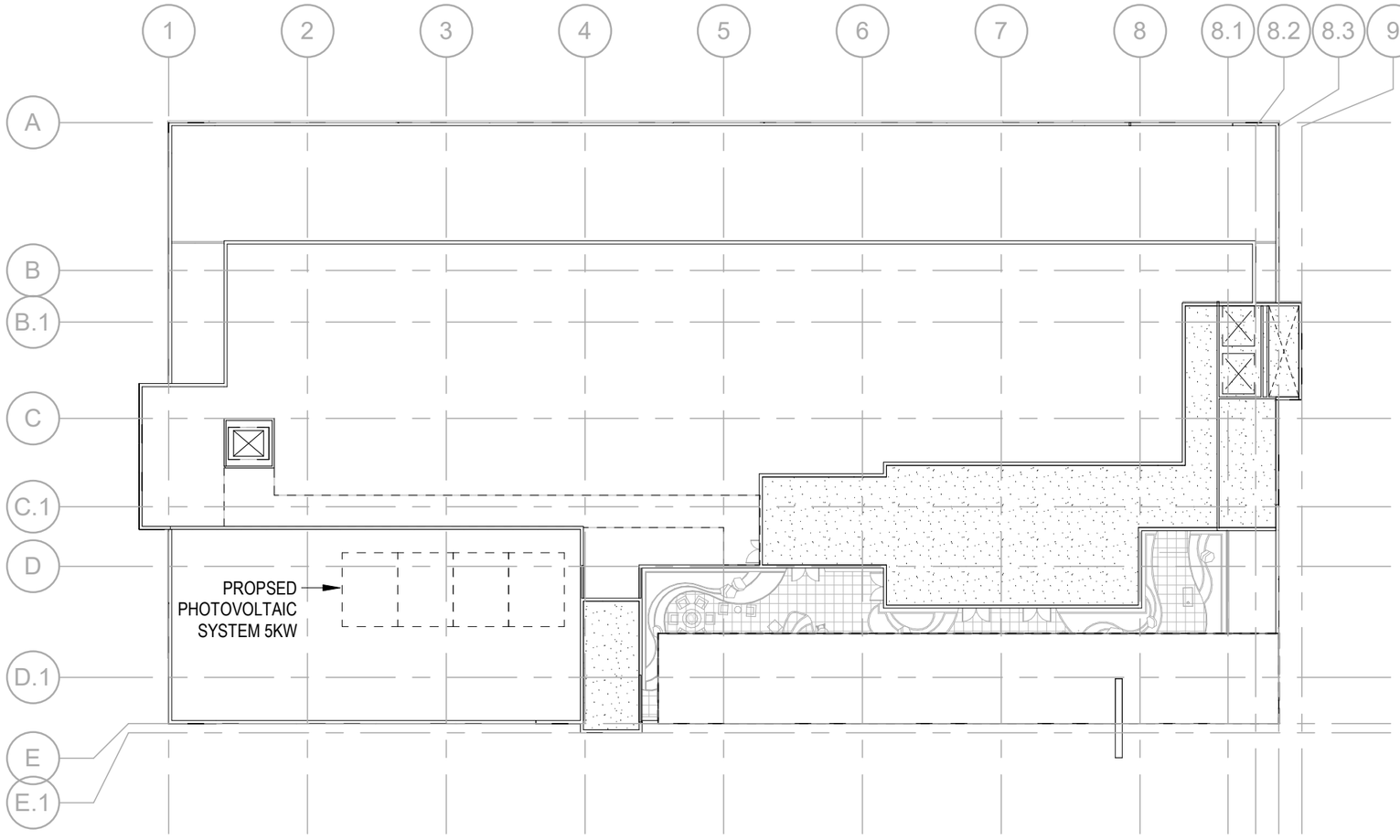
1005 O'BRIEN ROOF DECK

A9.5

DES ARCHITECTS ENGINEERS

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TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

06-22-2022	C.U.P. RESPONSE 2
10-28-2022	C.U.P RESPONSE 3
02-17-2023	C.U.P. RESPONSE 4
07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

1005 O'BRIEN ROOF PLAN

A9.6

DES ARCHITECTS ENGINEERS

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(1) GLASS (TYP), LOW-E, TINTED BLUE
(BIRD SAFE GLASS)



(2) GLASS (LOBBY), LOW-E, CLEAR
DOUBLE GLASS
(BIRD SAFE GLASS)





(3) WINDOW MULLIONS: JLR MZG GRAY
MICA II



(4) METAL PANEL SYSTEM AT LOWER CANOPY



(5) CORRUGATED METAL PANEL:
ROOF SCREEN, WALL CLADDING
COLOR TO MATCH DUNN
CHARCOAL SKETCH

(9) PERPORATED METAL AWNINGS
POWDER COATED GREY



(6) GFRC, SANDBLASTED, SMOOTH:
COLOR TO MATCH DUNN EDWARDS
RECLAIMED WOOD



(7) GFRC, SANDBLASTED, SMOOTH:
COLOR TO MATCH DUNN EDWARDS
CHARCOAL SKETCH



(8) HIGH DENSITY COMPOSITE
EXTERIOR CLADDING: WOOD LOOK

BIM 360://Tarlton - MenloParkLabs/10025002_A_1005OBD_SHELL_2020_Central.rvt

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

10-28-2021	C.U.P. RESPONSE 1
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07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25 2024	PARKING UPDATE

1005 BUILDING MATERIAL BOARD

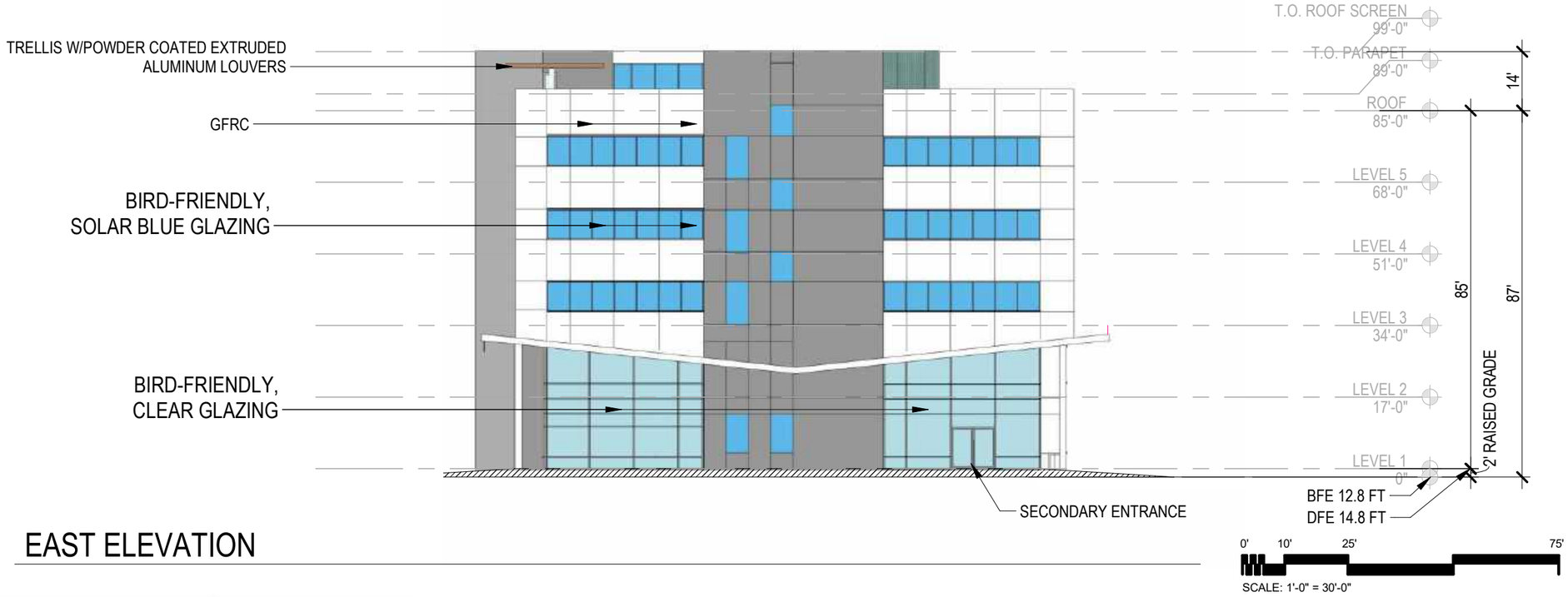
A10

DES ARCHITECTS ENGINEERS

© 2020



NORTH ELEVATION



EAST ELEVATION

LEGEND

- SOLAR BAN 70, SOLAR BLUE LOW-E GLAZING, WITH A BIRD-FRIENDLY 2" x 4" CERAMIC DOT FRIT PATTERN
- VITRO SOLARBAN 70XL, CLEAR LOW-E GLAZING, WITH A BIRD-FRIENDLY 2" x 4" CERAMIC DOT FRIT PATTERN
- GLASS FIBER REINFORCED CONCRETE PANELS SAND BLASTED FINISH TBD
- GLASS FIBER REINFORCED CONCRETE PANELS SAND BLASTED FINISH TBD
- CORRUGATED ALUMINUM PANELLING COLOR TBD
- GROUND FLOOR FRONTAGE 4,375 SF
- GROUND FLOOR TRANSPARENCY AT FRONTAGE
  REQUIRED: 1,750 SF (40%)
  PROVIDED: 2,063 SF (47%)

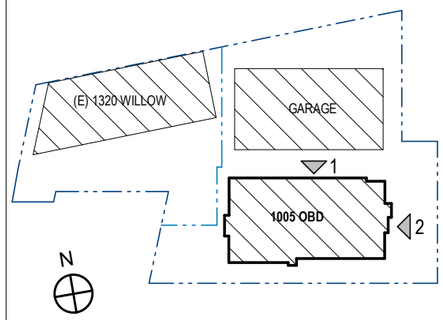
PROPOSED GLAZING RATIO

NORTH ELEVATION: 22,400 SF
SOLAR BLUE GLAZING: 15,000 SF (67%)
CLEAR GLAZING: 810 SF (4%)

EAST ELEVATION: 11,150 SF
SOLAR BLUE GLAZING: 2,000 SF (18%)
CLEAR GLAZING: 2,000 SF (18%)

NOTE:
ALUMINUM FRAMES AT WINDOWS AND DOORS

KEY PLAN



TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

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09-29-2023	C.U.P. RESPONSE 6		

1005 O'BRIEN BUILDING
ELEVATIONS

A10.1

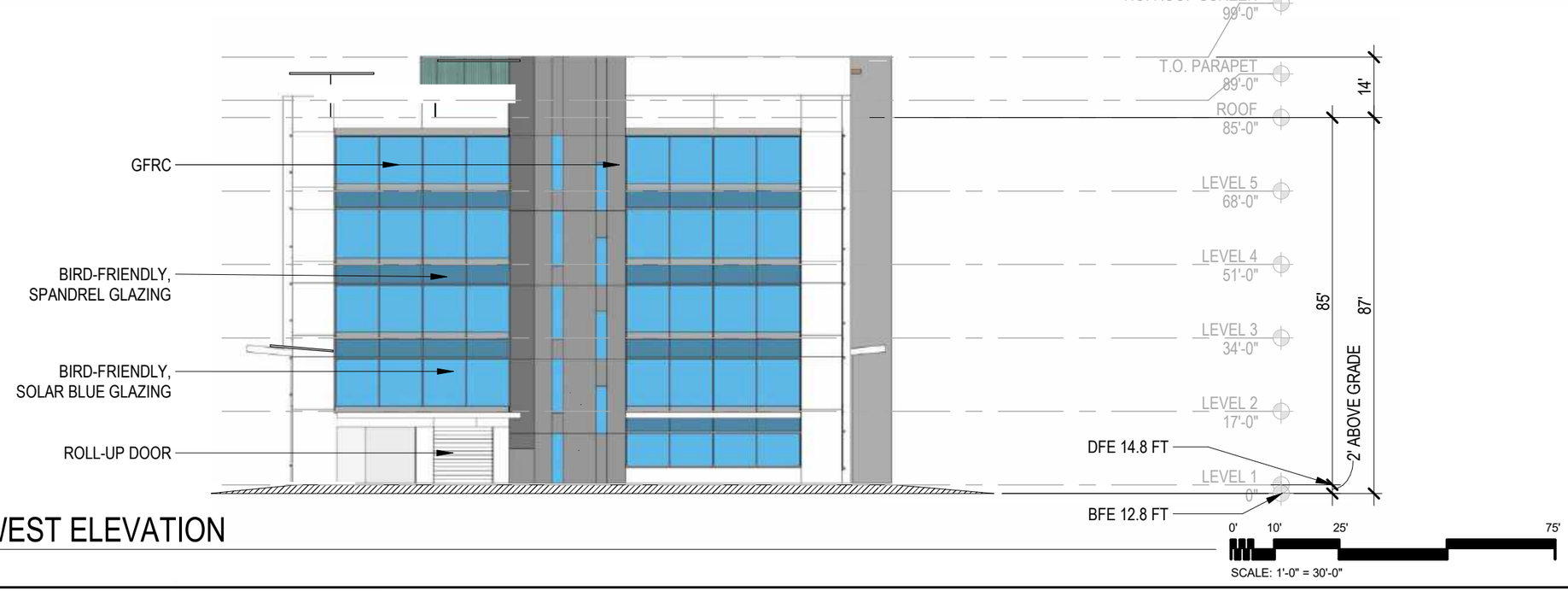
DES ARCHITECTS ENGINEERS

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SOUTH ELEVATION



WEST ELEVATION

LEGEND

- SOLAR BAN 70, SOLAR BLUE LOW-E GLAZING, WITH A BIRD-FRIENDLY 2" x 4" CERAMIC DOT FRIT PATTERN
- VITRO SOLARBAN 70XL, CLEAR LOW-E GLAZING, WITH A BIRD-FRIENDLY 2" x 4" CERAMIC DOT FRIT PATTERN
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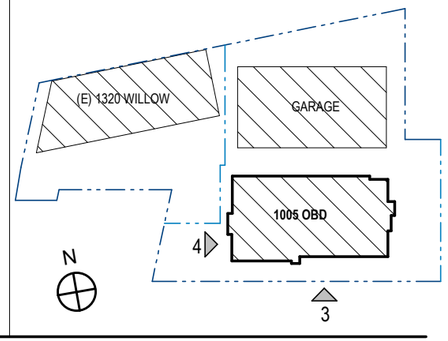
PROPOSED GLAZING RATIO

SOUTH ELEVATION: 22,000 SF
SOLAR BLUE GLAZING: 13,510 SF (61%)
CLEAR GLAZING: 2,063 SF (9%)

WEST ELEVATION: 10,800 SF
SOLAR BLUE GLAZING: 3,700 SF (34%)

NOTE:
ALUMINUM FRAMES AT WINDOWS AND DOORS

KEY PLAN



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TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

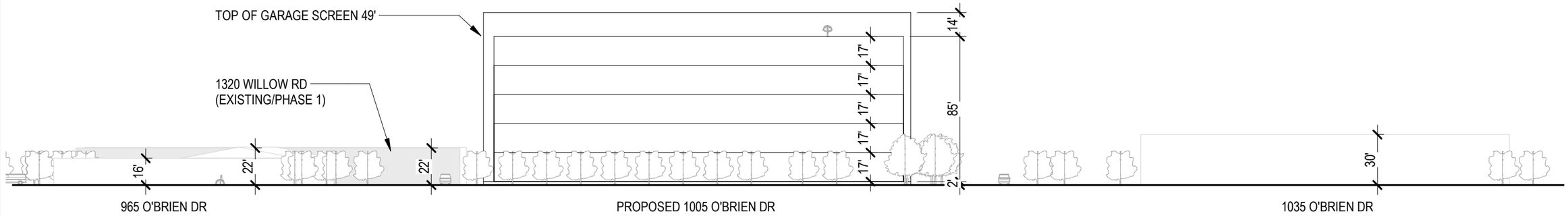
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07-12-2023	C.U.P. RESPONSE 5		
09-29-2023	C.U.P. RESPONSE 6		

1005 O'BRIEN BUILDING
ELEVATIONS

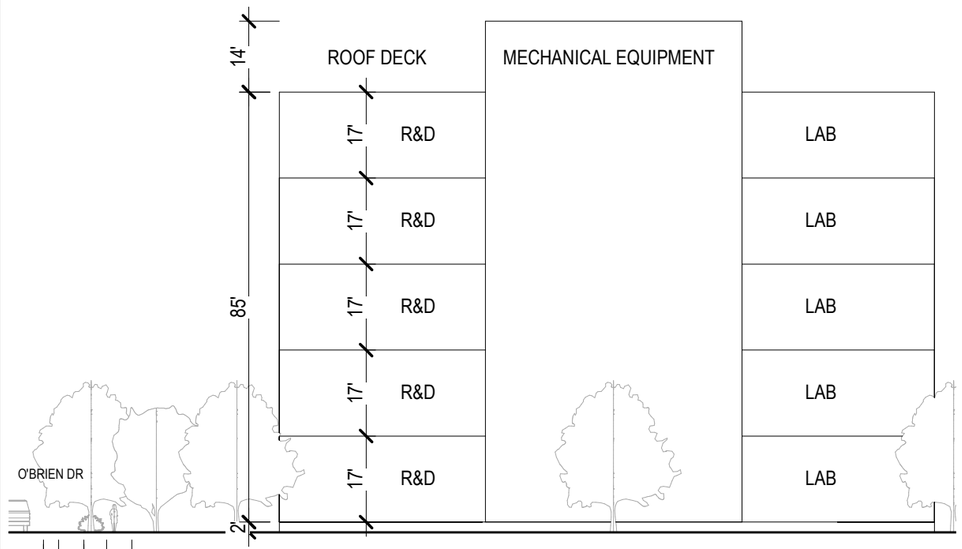
A10.2

DES ARCHITECTS ENGINEERS

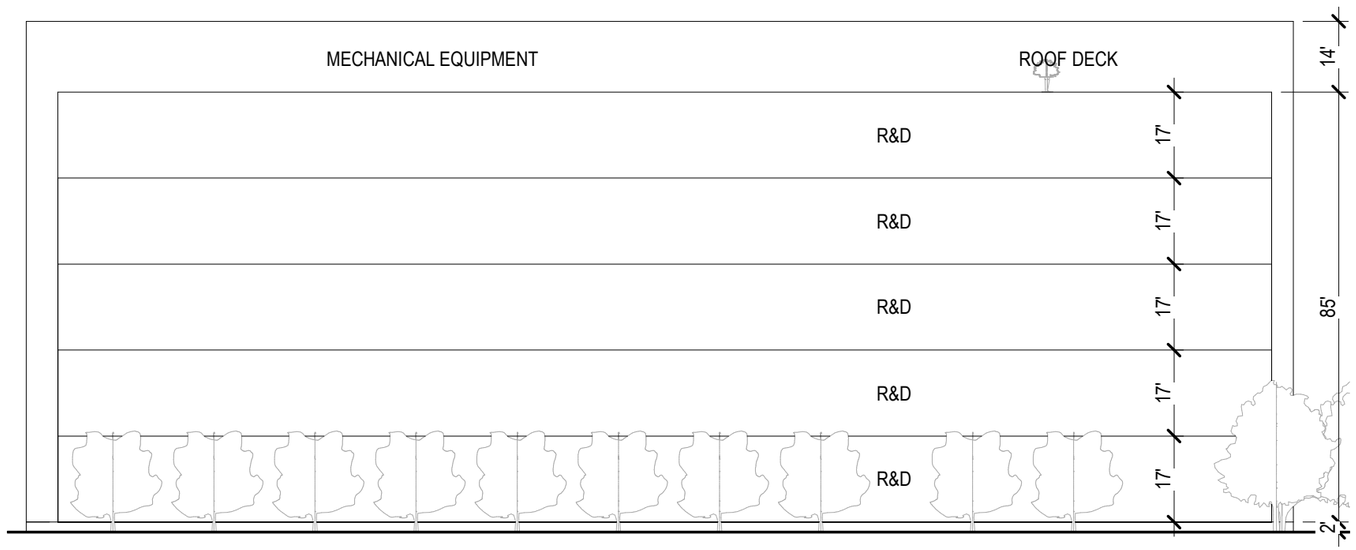
© 2020



1005 O'BRIEN DR STREETSCAPE - SOUTH



1005 O'BRIEN DR SECTION - EAST



1005 O'BRIEN DR SECTION - SOUTH

0' 10' 25' 75'
SCALE: 1'-0" = 30'-0"

TARLTON

985 & 1001 O'BRIEN DR
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MENLO PARK, CA 94025

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06-25-2024	PARKING UPDATE

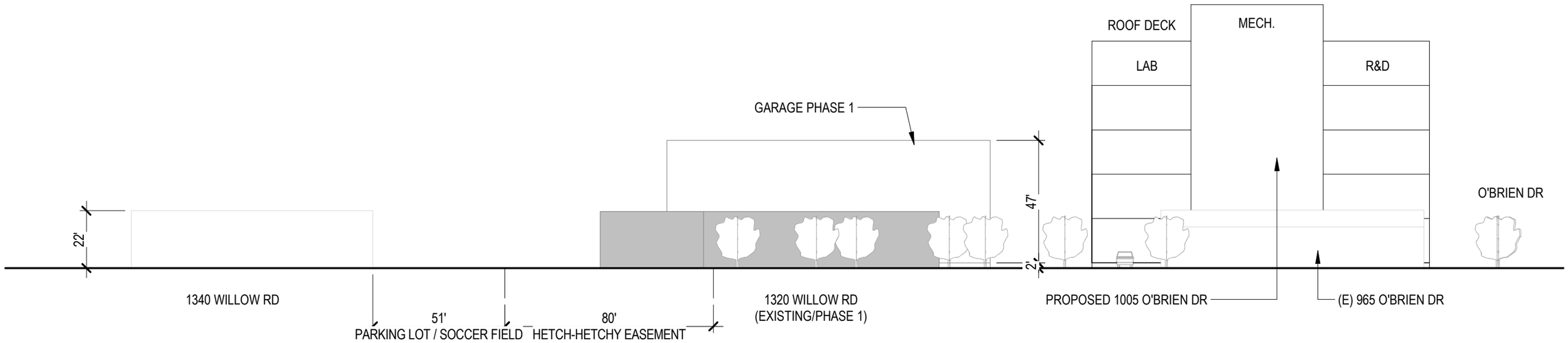
1005 O'BRIEN CROSS SECTION & STREETSCAPE - PHASE 1

A10.3A

DES ARCHITECTS ENGINEERS

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1 WILLOW ROAD - WEST

1" = 40'-0"

0' 40' 80' 125'

SCALE: 1'-0" = 40'-0"

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

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06-22-2022	C.U.P. RESPONSE 2
10-28-2022	C.U.P RESPONSE 3
02-17-2023	C.U.P. RESPONSE 4
07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

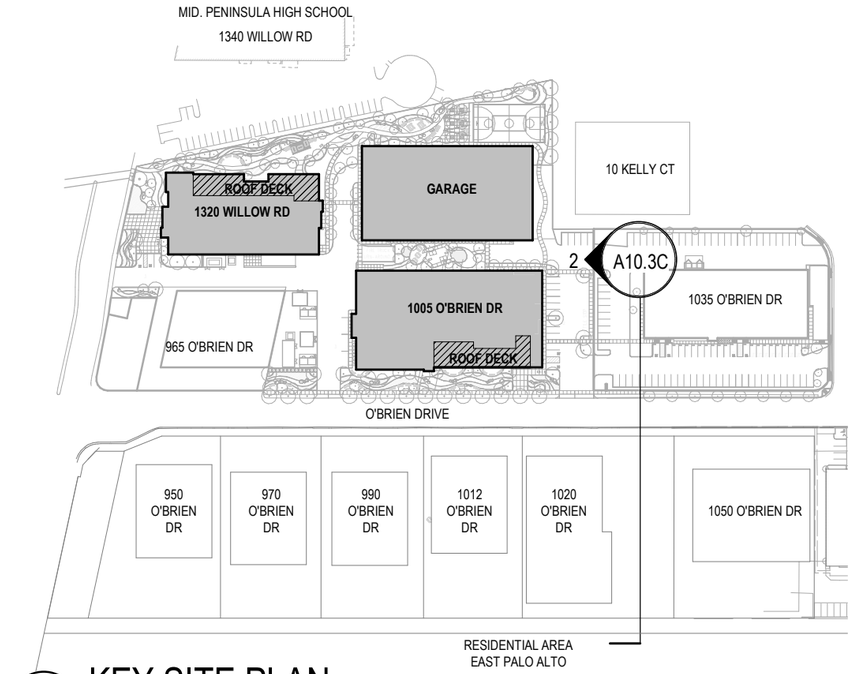
1320 WILLOW CROSS SECTION & STREETSCAPE - PHASE 1

A10.3B

DES ARCHITECTS ENGINEERS

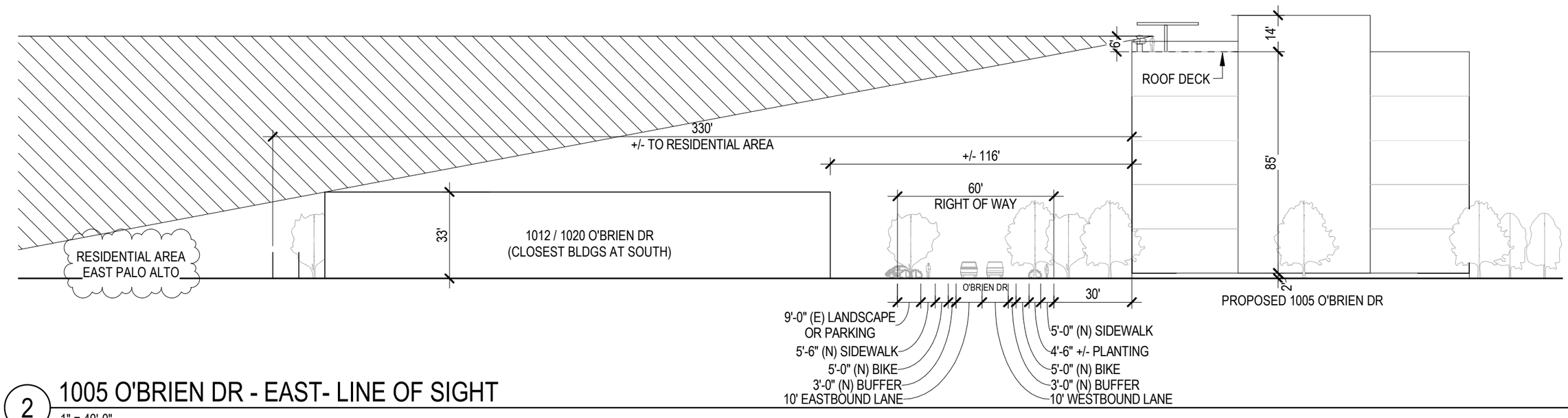
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1 KEY SITE PLAN

1" = 200'-0"



2 1005 O'BRIEN DR - EAST- LINE OF SIGHT

1" = 40'-0"

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

07-12-2023 C.U.P. RESPONSE 5
09-29-2023 C.U.P. RESPONSE 6
06-25-2024 PARKING UPDATE

LINE OF SIGHT STUDY

A10.3C

DES ARCHITECTS ENGINEERS

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FRONT VIEW

TARLTON

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1320 WILLOW RD
MENLO PARK, CA 94025

04-15-2021	D.R.T. REVIEW	06-25-2024	PARKING UPDATE
06-23-2021	C.U.P. SUBMITTAL		
10-28-2021	C.U.P. RESPONSE 1		
06-22-2022	C.U.P. RESPONSE 2		
10-28-2022	C.U.P RESPONSE 3		
02-17-2023	C.U.P. RESPONSE 4		
07-12-2023	C.U.P. RESPONSE 5		
09-29-2023	C.U.P. RESPONSE 6		

1005 O'BRIEN 3D MASSING

A10.4

DES ARCHITECTS ENGINEERS

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NORTH-EAST VIEW

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

04-15-2021	D.R.T. REVIEW	06-25-2024	PARKING UPDATE
06-23-2021	C.U.P. SUBMITTAL		
10-28-2021	C.U.P. RESPONSE 1		
06-22-2022	C.U.P. RESPONSE 2		
10-28-2022	C.U.P RESPONSE 3		
02-17-2023	C.U.P. RESPONSE 4		
07-12-2023	C.U.P. RESPONSE 5		
09-29-2023	C.U.P. RESPONSE 6		

1005 O'BRIEN 3D MASSING

A10.5

DES ARCHITECTS ENGINEERS

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SOUTH-EAST AERIAL VIEW

TARLTON

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1320 WILLOW RD
MENLO PARK, CA 94025

04-15-2021	D.R.T. REVIEW	06-25-2024	PARKING UPDATE
06-23-2021	C.U.P. SUBMITTAL		
10-28-2021	C.U.P. RESPONSE 1		
06-22-2022	C.U.P. RESPONSE 2		
10-28-2022	C.U.P RESPONSE 3		
02-17-2023	C.U.P. RESPONSE 4		
07-12-2023	C.U.P. RESPONSE 5		
09-29-2023	C.U.P. RESPONSE 6		

1005 O'BRIEN 3D MASSING

A10.6

DES ARCHITECTS ENGINEERS

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NORTH-WEST VIEW

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

04-15-2021	D.R.T. REVIEW	06-25-2024	PARKING UPDATE
06-23-2021	C.U.P. SUBMITTAL		
10-28-2021	C.U.P. RESPONSE 1		
06-22-2022	C.U.P. RESPONSE 2		
10-28-2022	C.U.P RESPONSE 3		
02-17-2023	C.U.P. RESPONSE 4		
07-12-2023	C.U.P. RESPONSE 5		
09-29-2023	C.U.P. RESPONSE 6		

1005 O'BRIEN 3D MASSING

A10.7

DES ARCHITECTS ENGINEERS

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TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

10-28-2021	C.U.P. RESPONSE 1
06-22-2022	C.U.P. RESPONSE 2
10-28-2022	C.U.P RESPONSE 3
02-17-2023	C.U.P. RESPONSE 4
07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

1005 O'BRIEN 3D MASSING

A10.8

DES ARCHITECTS ENGINEERS

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NORTH-EAST VIEW

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

10-28-2021	C.U.P. RESPONSE 1
06-22-2022	C.U.P. RESPONSE 2
10-28-2022	C.U.P RESPONSE 3
02-17-2023	C.U.P. RESPONSE 4
07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

SPORTS COURT 3D MASSING

A10.20

DES ARCHITECTS ENGINEERS

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NORTH VIEW

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

10-28-2021	C.U.P. RESPONSE 1
06-22-2022	C.U.P. RESPONSE 2
10-28-2022	C.U.P RESPONSE 3
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09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

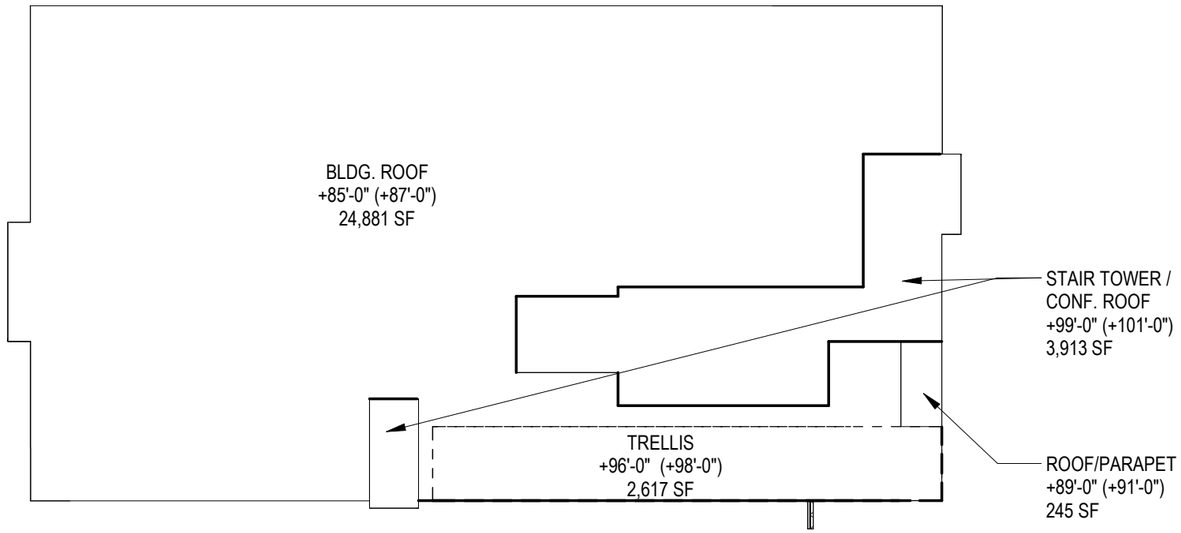
SPORTS COURT 3D MASSING

A10.21

DES ARCHITECTS ENGINEERS

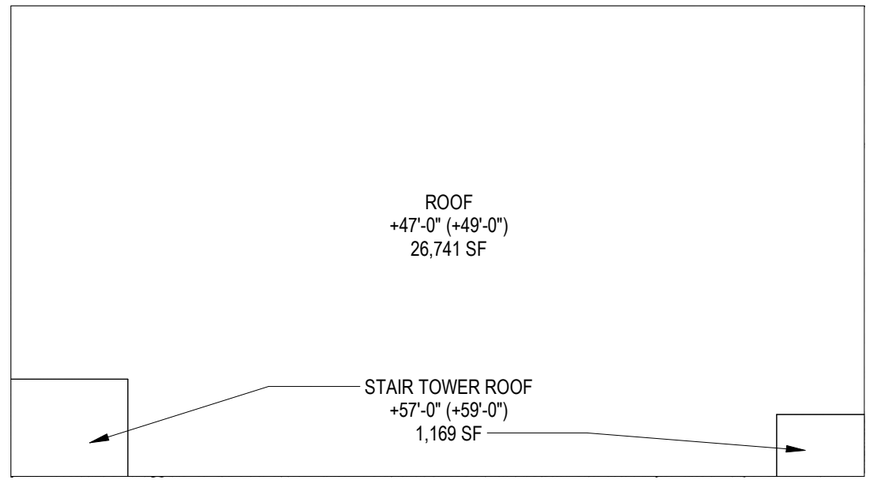
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1 1005 O'BRIEN - PHASE 1

1" = 40'-0"



2 GARAGE PHASE 1

1" = 40'-0"

AVERAGE HEIGHT CALCULATION - PHASE 1				
BUILDING		**FLOORPLATE (SF)**	**BLDG. HEIGHT (FT)***	**FLOORPLATE x BLDG. HEIGHT**
1005 R&D (85')	BLDG. ROOF	24,881	87	2,164,647
	ROOF/PARAPET	245	91	22,295
	TRELLIS	2,617	98	256,466
	STAIRS / CONF....	3,913	101	395,213
GARAGE - PH1 (47')	GARAGE ROOF	26,741	49	1,310,309
	STAIRS TOWERS	1,169	59	68,971
TOTAL		59,566		4,217,901

AVERAGE HEIGHT (TOTAL FLOORPLATE x BLDG. HEIGHT/TOTAL FLOORPLATE)	70.81

AVERAGE HEIGHT MAX. = 77.5 FT (INC. 10FT INCREASE PER IN FLOOD ZONE LOCATION)

* INCLUDES 2FT RAISED GRADE ABOVE EXISTING GRADE TO ACCOMMODATE FLOOD PLAIN REQUIREMENTS.

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

06-22-2022 C.U.P. RESPONSE 2
10-28-2022 C.U.P RESPONSE 3
02-17-2023 C.U.P. RESPONSE 4
07-12-2023 C.U.P. RESPONSE 5
09-29-2023 C.U.P. RESPONSE 6
06-25-2024 PARKING UPDATE

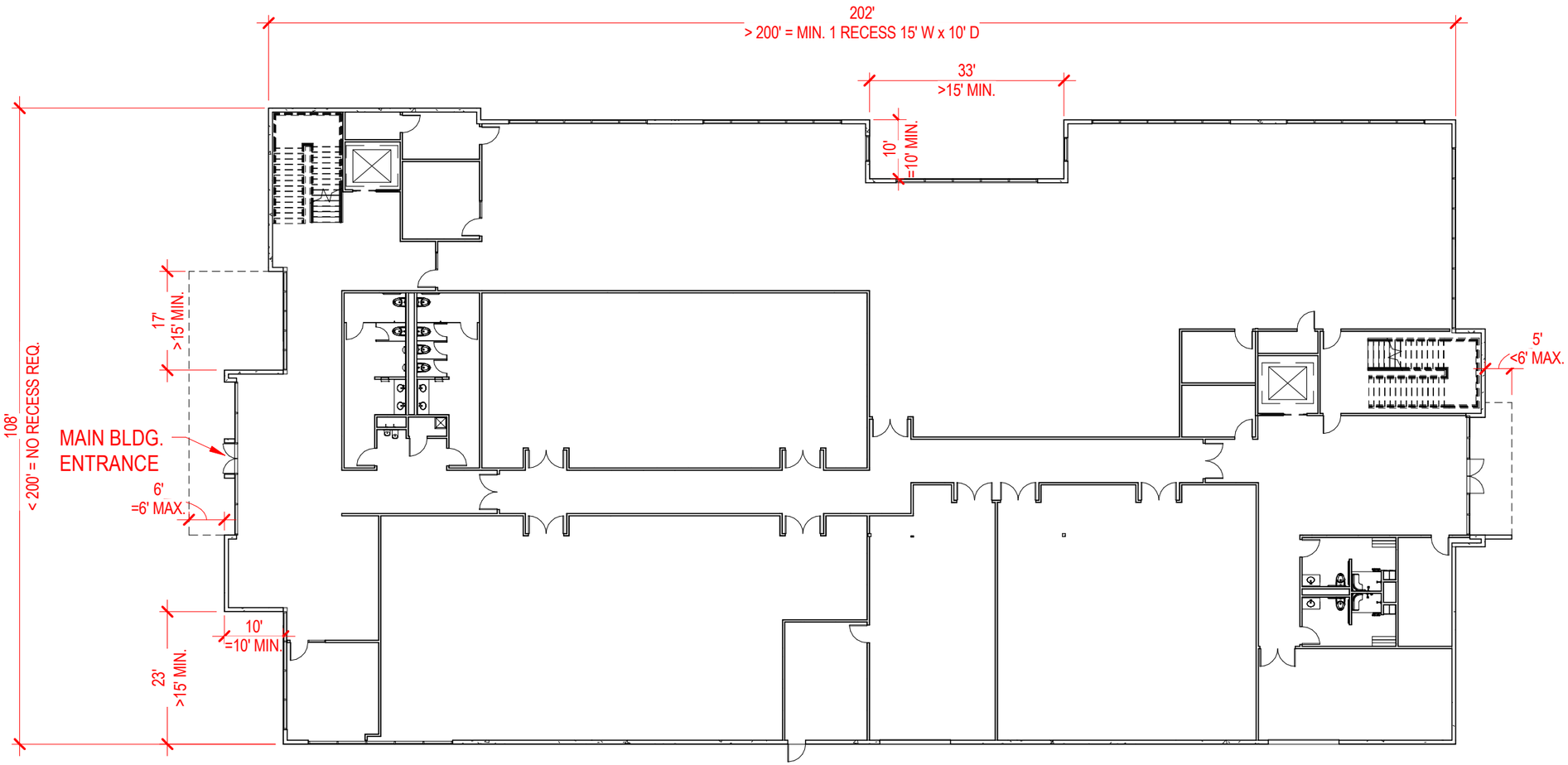
PHASE 1 HEIGHT CALCULATION

A11

DES ARCHITECTS ENGINEERS

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0' 5' 10' 25' 50'

SCALE: 3/64" = 1'-0"

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

10-28-2021	C.U.P. RESPONSE 1
06-22-2022	C.U.P. RESPONSE 2
10-28-2022	C.U.P RESPONSE 3
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07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

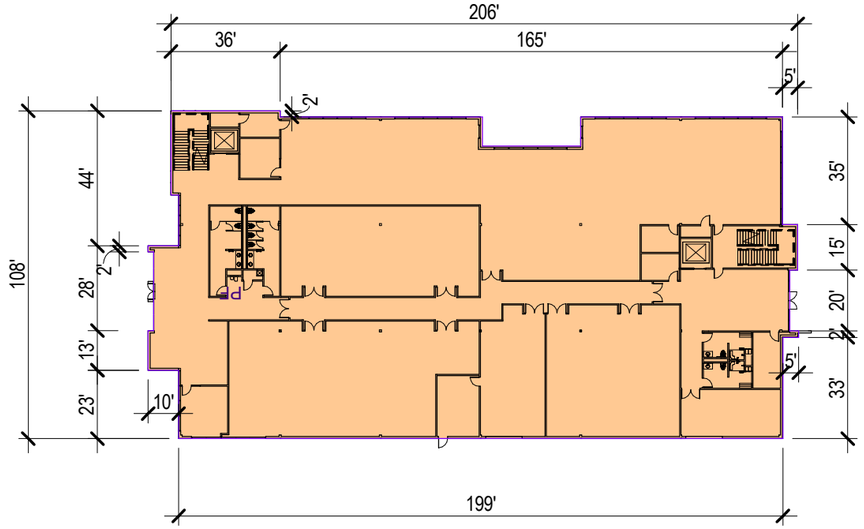
1320 WILLOW BLDG. MODULATION

A11.1

DES ARCHITECTS ENGINEERS

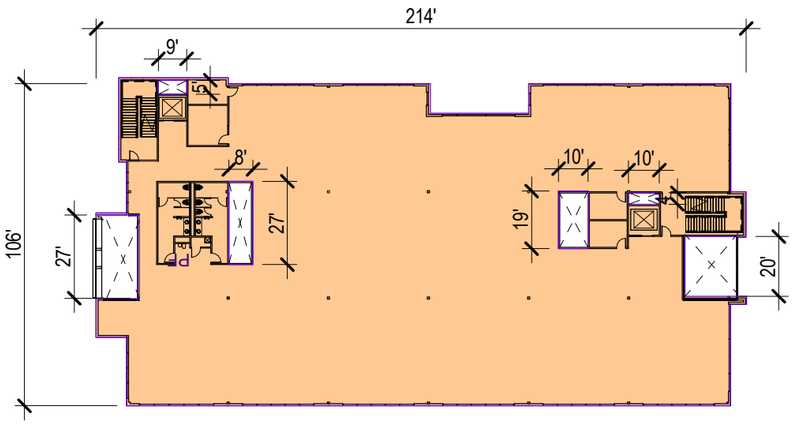
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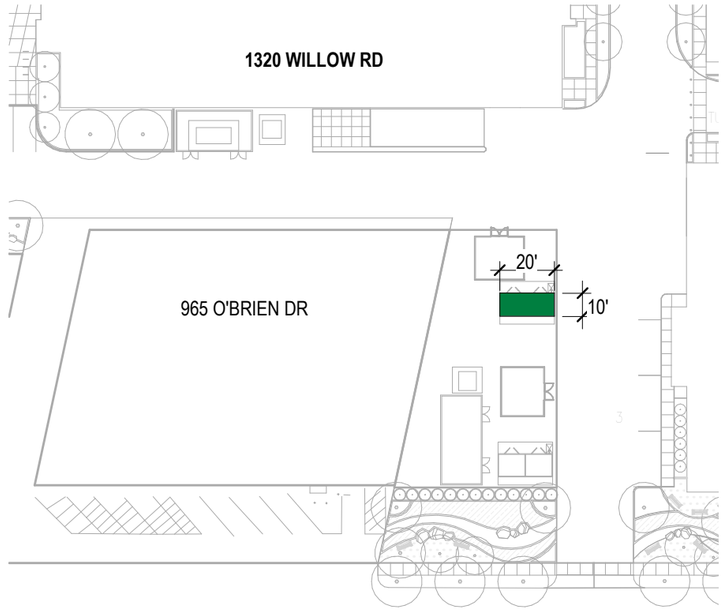
1 1320 LEVEL 1

1" = 50'-0"



2 1320 LEVEL 2

1" = 50'-0"



3 CHEMICAL STORAGE

1" = 60'-0"

0' 50' 75' 125'

SCALE: 1'-0" = 50'-0"

N

SHEET NOTES

GROSS FLOOR AREA:

LEVEL 1 R&D AREA	21,312 SF
LEVEL 2 R&D AREA	20,270 SF
LEVEL 3 R&D AREA	20,923 SF
LEVEL 4 R&D AREA	8,912 SF
ROOF STAIRS & ELEV.	2,200 SF
CHEMICAL STORAGE	200 SF
TOTAL:	**73,817 SF**

OUTDOOR ROOF DECK:

CIRCULATION:	1,643 SF
LANDSCAPE:	1,538 SF
SEATING/OPEN AREA:	1,168 SF
TOTAL:	4,349 SF

LEGEND

BUILDING (FAR)

- R&D AREA
- ROOF STAIRS & ELEVATOR
- CONFERENCE ROOM
- ROOF STORAGE
- CHEMICAL STORAGE

BUILDING (NOT INCLUDED IN FAR)

- ROOF DECK SEATING
- ROOF DECK CIRCULATION
- ROOF DECK LANDSCAPE
- ROOF (UNOCCUPIED)
- MECHANICAL
- SHAFTS/OPENINGS

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

04-15-2021	D.R.T. REVIEW	06-25-2024	PARKING UPDATE
06-23-2021	C.U.P. SUBMITTAL		
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07-12-2023	C.U.P. RESPONSE 5		
09-29-2023	C.U.P. RESPONSE 6		

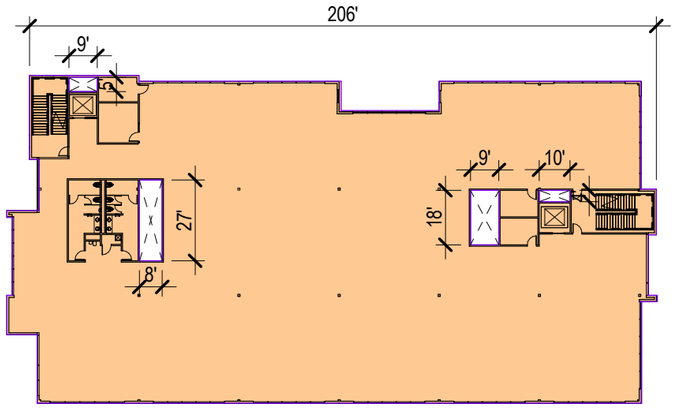
1320 WILLOW GROSS FLOOR AREA DIAGRAMS

A11.1A

DES ARCHITECTS ENGINEERS

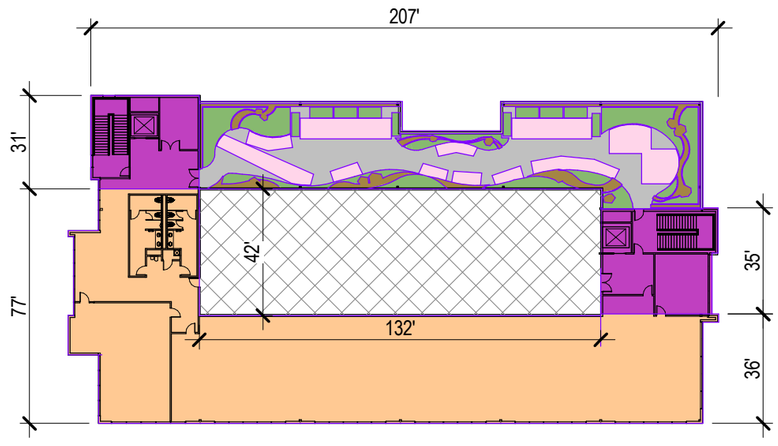
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1 1320 LEVEL 3

1" = 50'-0"



2 1320 LEVEL 4/ROOF

1" = 50'-0"

SHEET NOTES

GROSS FLOOR AREA:

LEVEL 1 R&D AREA	21,312 SF
LEVEL 2 R&D AREA	20,270 SF
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LEVEL 4 R&D AREA	8,912 SF
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LEGEND

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- R&D AREA
- ROOF STAIRS & ELEVATOR
- CONFERENCE ROOM
- ROOF STORAGE
- CHEMICAL STORAGE

BUILDING (NOT INCLUDED IN FAR)

- ROOF DECK SEATING
- ROOF DECK CIRCULATION
- ROOF DECK LANDSCAPE
- ROOF (UNOCCUPIED)
- MECHANICAL
- SHAFTS/OPENINGS

0' 50' 75' 125'

N

SCALE: 1'-0" = 50'-0"

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TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

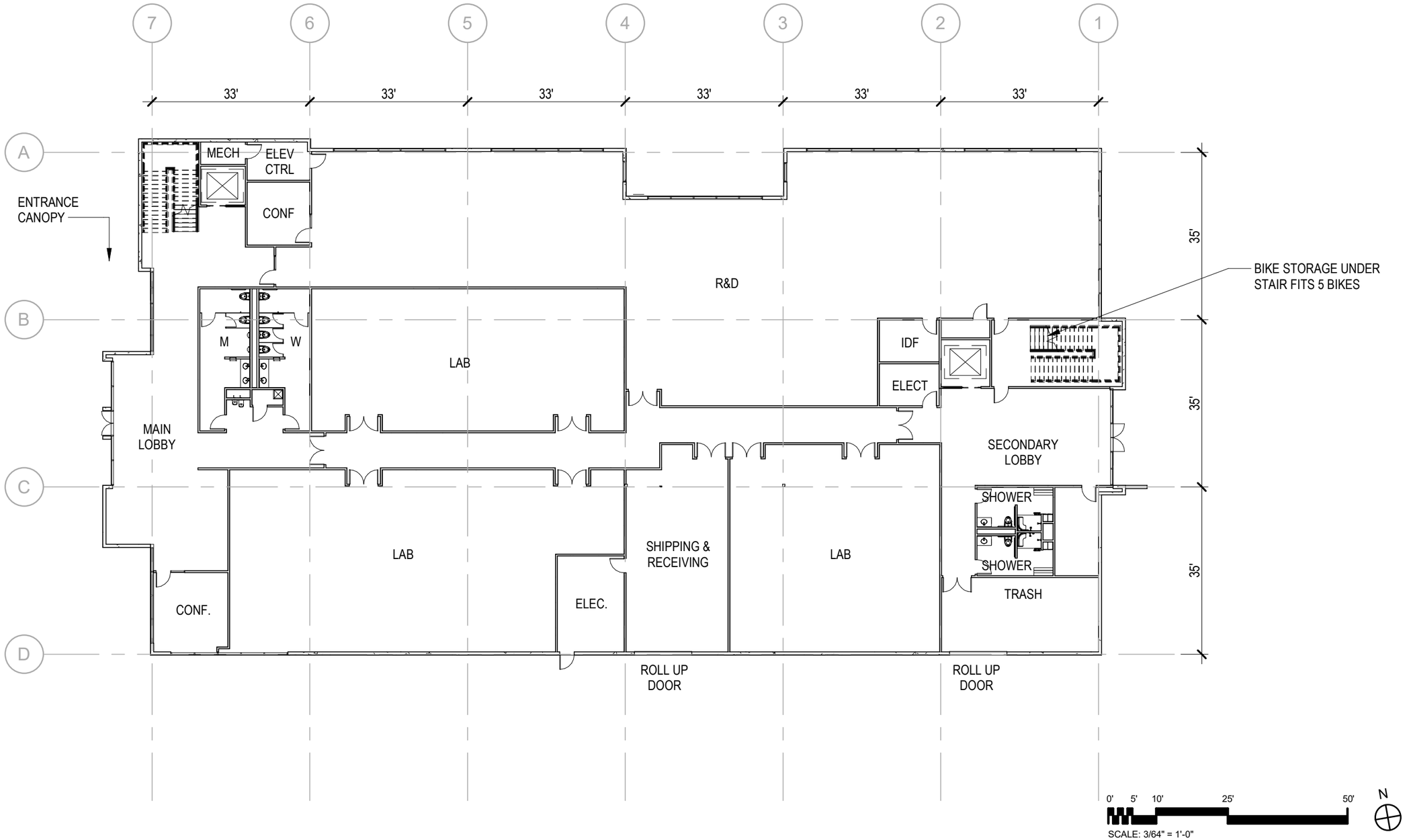
04-15-2021	D.R.T. REVIEW	
06-23-2021	C.U.P. SUBMITTAL	
10-28-2021	C.U.P. RESPONSE 1	
06-22-2022	C.U.P. RESPONSE 2	
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07-12-2023	C.U.P. RESPONSE 5	
09-29-2023	C.U.P. RESPONSE 6	
06-25-2024	PARKING UPDATE	

1320 WILLOW GROSS FLOOR AREA DIAGRAMS

A11.1B

DES ARCHITECTS ENGINEERS

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985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

04-15-2021	D.R.T. REVIEW	06-25-2024	PARKING UPDATE
06-23-2021	C.U.P. SUBMITTAL		
10-28-2021	C.U.P. RESPONSE 1		
06-22-2022	C.U.P. RESPONSE 2		
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02-17-2023	C.U.P. RESPONSE 4		
07-12-2023	C.U.P. RESPONSE 5		
09-29-2023	C.U.P. RESPONSE 6		

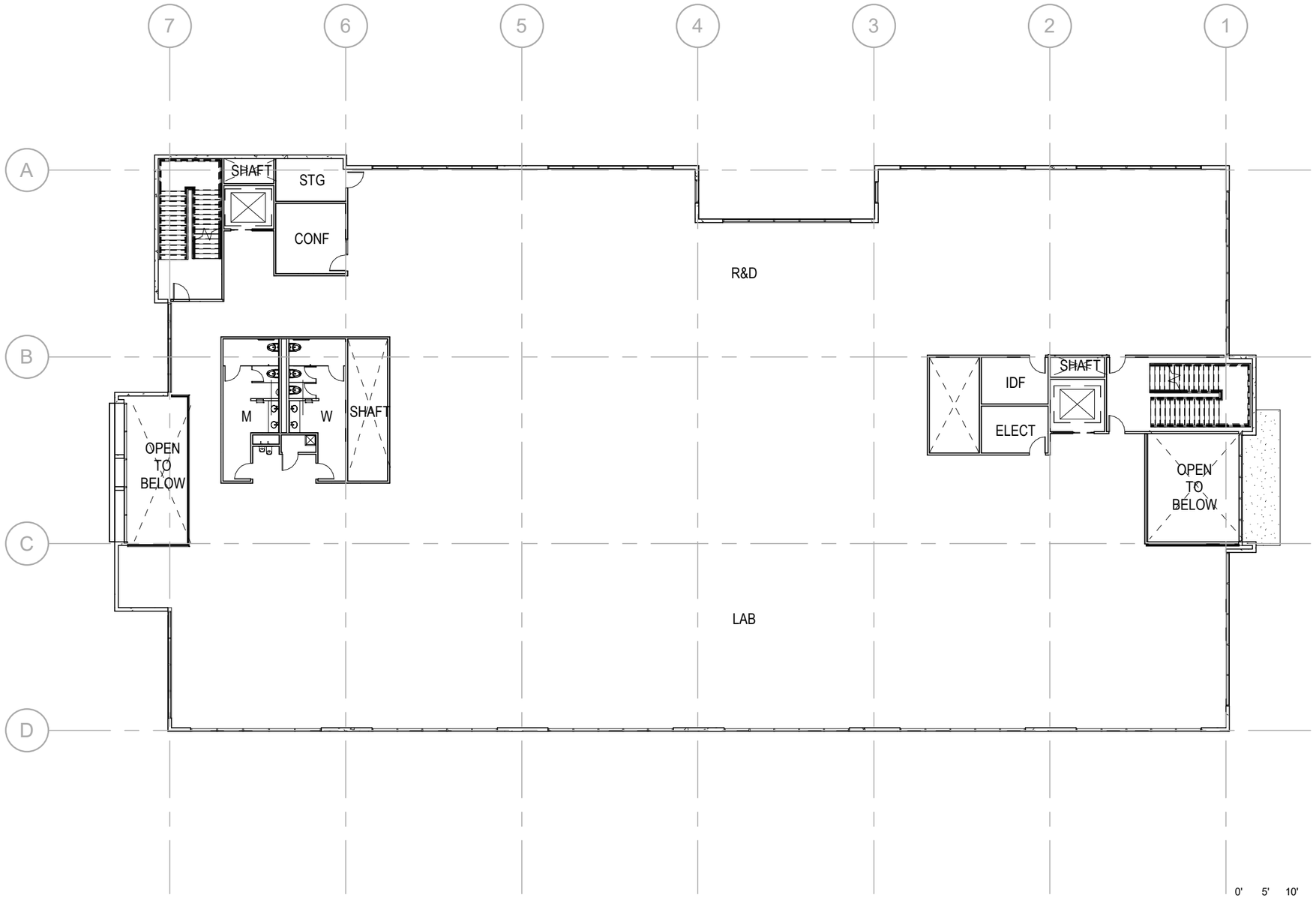
1320 WILLOW LEVEL 1

A11.2

DES ARCHITECTS ENGINEERS

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TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

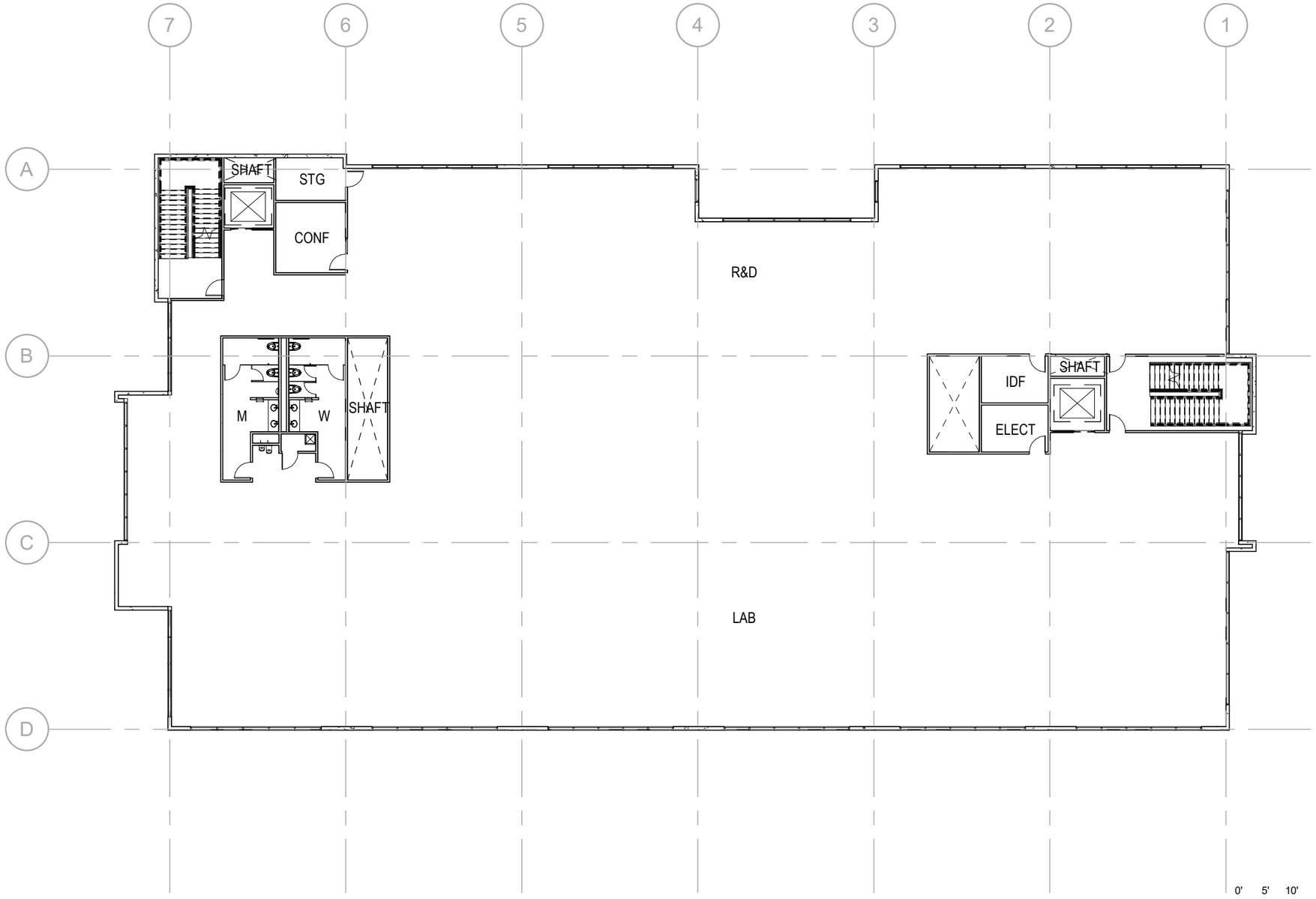
04-15-2021	D.R.T. REVIEW
06-23-2021	C.U.P. SUBMITTAL
10-28-2021	C.U.P. RESPONSE 1
06-22-2022	C.U.P. RESPONSE 2
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02-17-2023	C.U.P. RESPONSE 4
07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

1320 WILLOW LEVEL 2

A11.3

DES ARCHITECTS ENGINEERS

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1320 WILLOW RD
MENLO PARK, CA 94025

04-15-2021	D.R.T. REVIEW	06-25-2024	PARKING UPDATE
06-23-2021	C.U.P. SUBMITTAL		
10-28-2021	C.U.P. RESPONSE 1		
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07-12-2023	C.U.P. RESPONSE 5		
09-29-2023	C.U.P. RESPONSE 6		

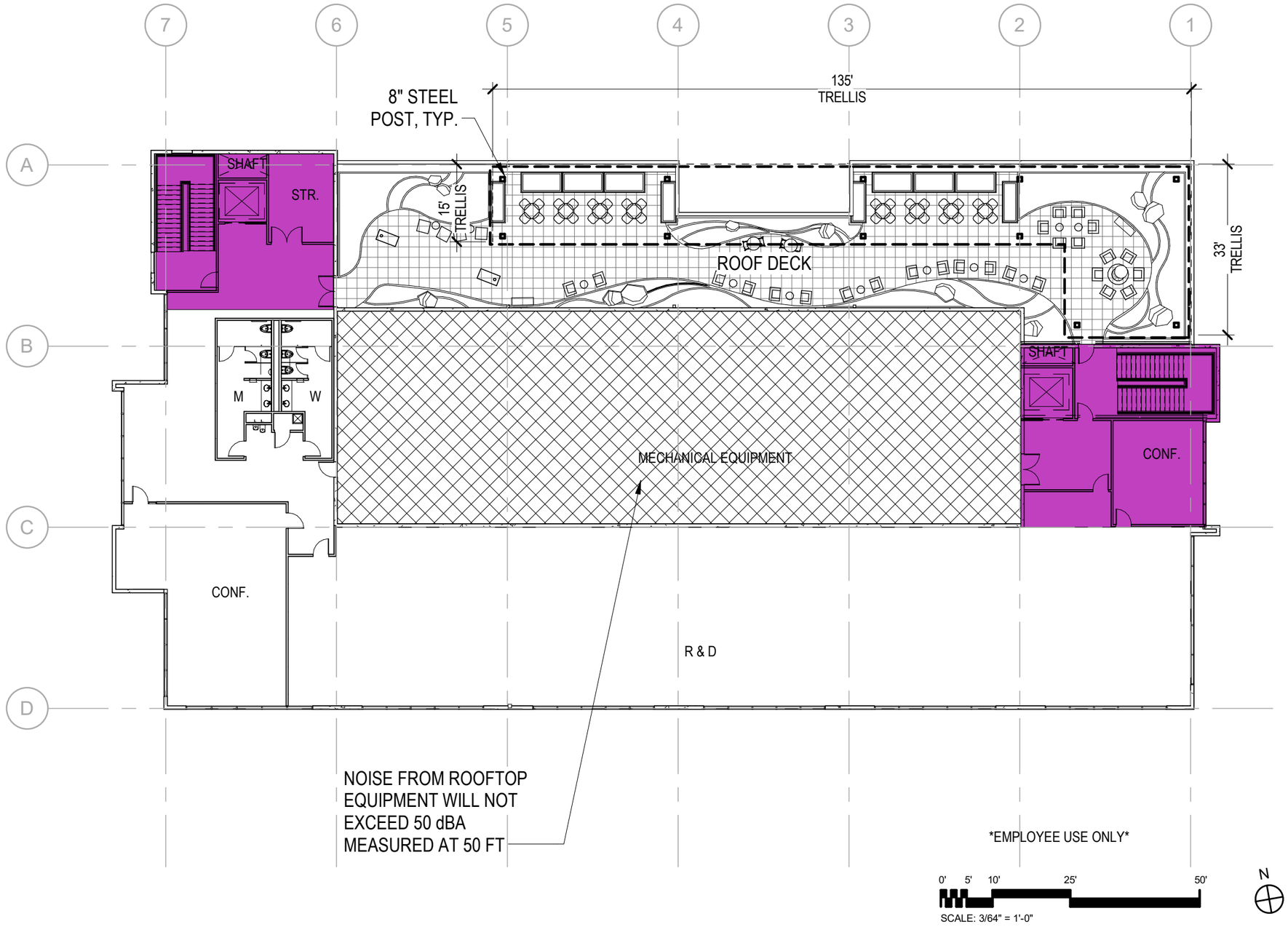
1320 WILLOW LEVEL 3

A11.4

DES ARCHITECTS ENGINEERS

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LEGEND

- MECHANICAL EQUIPMENT / ROOF SCREEN AREA
- ROOF ACCESS & CIRCULATION
- ROOF TOP TRELLIS

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TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

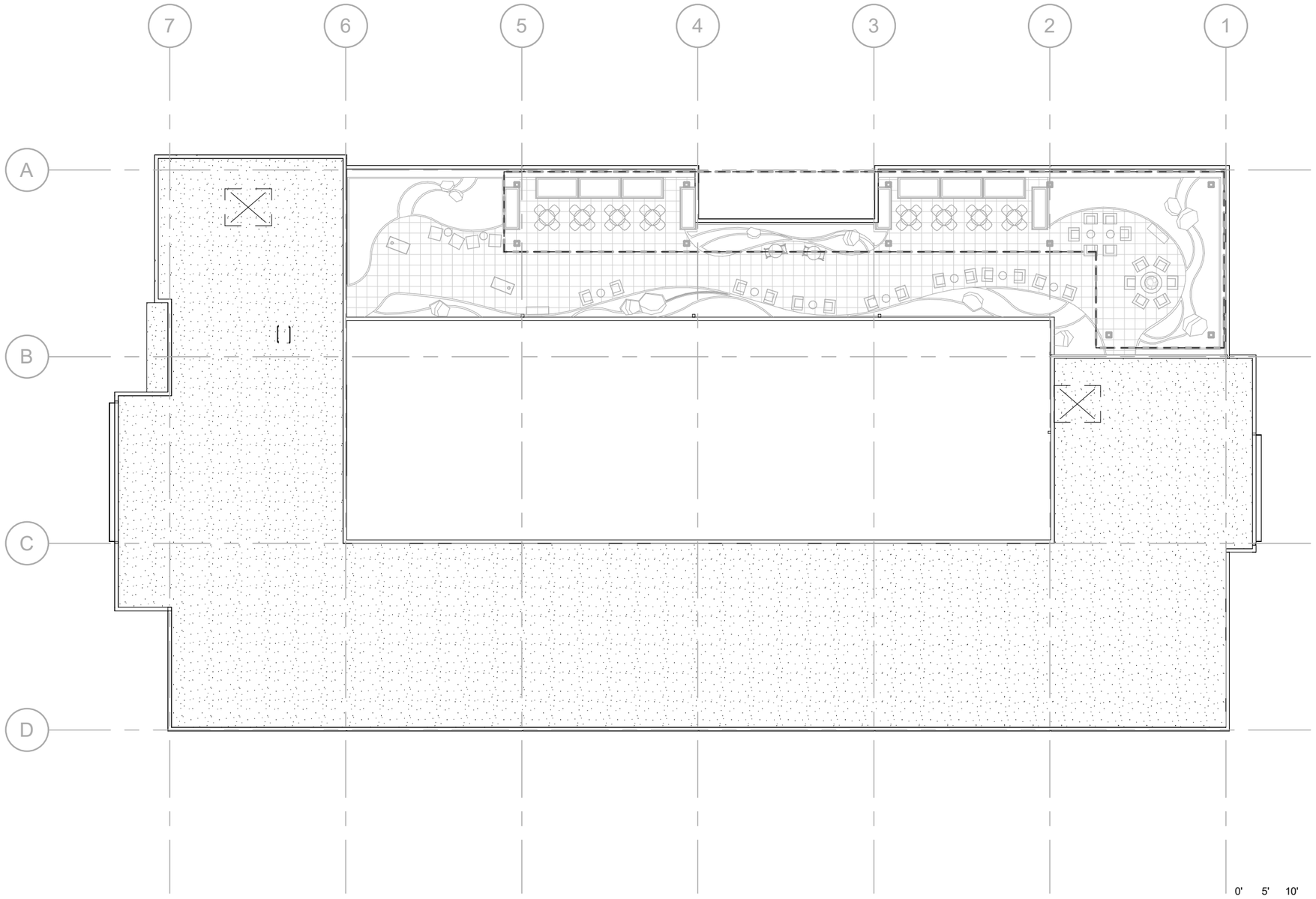
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06-23-2021	C.U.P. SUBMITTAL
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07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

1320 WILLOW LEVEL 4 /ROOF DECK

A11.5

DES ARCHITECTS ENGINEERS

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SCALE: 3/64" = 1'-0"

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

10-28-2021	C.U.P. RESPONSE 1
06-22-2022	C.U.P. RESPONSE 2
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06-25-2024	PARKING UPDATE

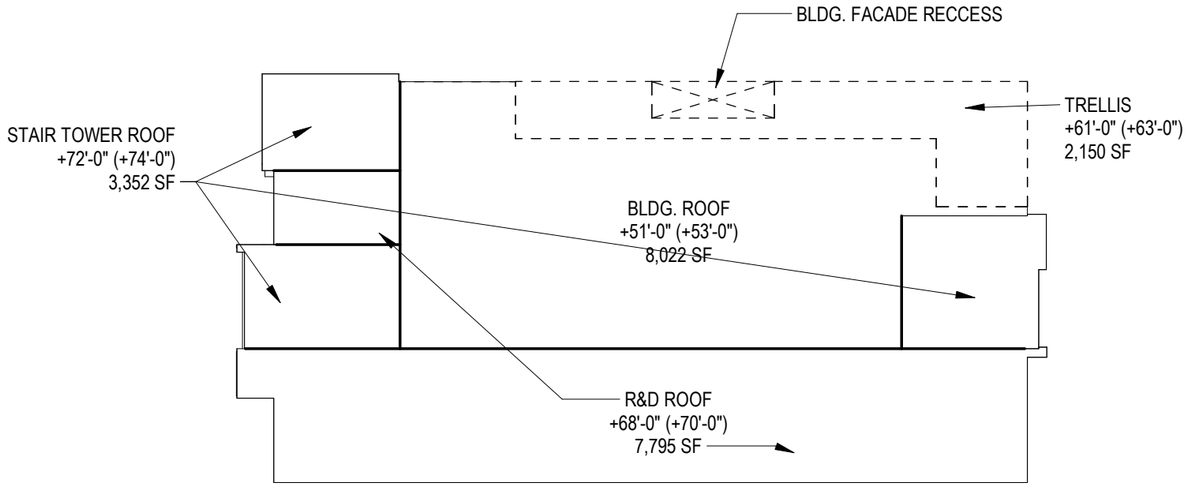
1320 WILLOW ROOF

A11.6

DES ARCHITECTS ENGINEERS

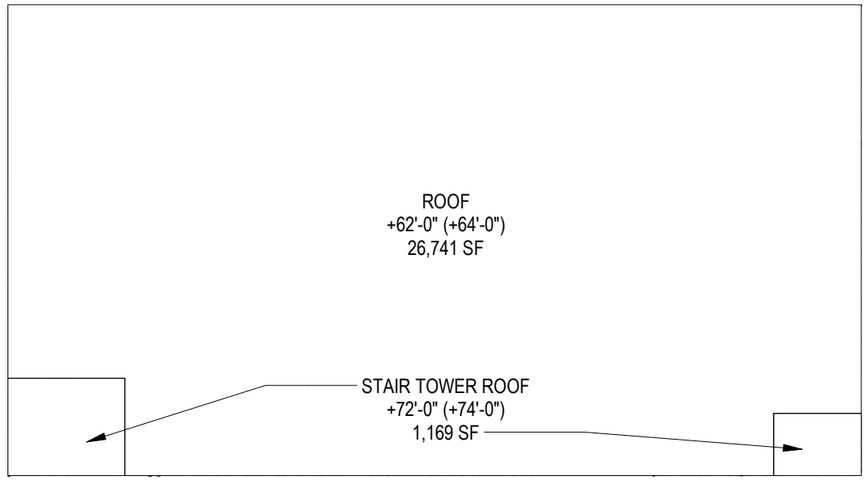
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1 1320 WILLOW - PHASE 2

1" = 40'-0"



2 GARAGE PHASE 2

1" = 40'-0"

AVERAGE HEIGHT CALCULATION - PHASE 2

BUILDING		FLOORPLATE (SF)	BLDG. HEIGHT (FT)*	FLOORPLATE x BLDG. HEIGHT
1005 R&D (85')	BLDG. ROOF	24,881	87	2,164,647
	ROOF/PARAPET	245	91	22,295
	TRELLIS	2,617	98	256,466
	STAIRS / CONF....	3,913	101	395,213
GARAGE - PH2 (62')	GARAGE ROOF	26,741	64	1,711,424
	STAIRS TOWERS	1,169	74	86,506
1320 WILLOW - PH2 (68')	BLDG. ROOF	8,022	53	425,166
	TRELLIS	2,150	63	135,450
	BLDG. ROOF	7,795	70	545,650
	STAIRS TOWERS	3,352	74	248,048
TOTAL		80,885		5,990,865

AVERAGE HEIGHT (TOTAL FLOORPLATE x BLDG. HEIGHT/TOTAL FLOORPLATE)	74.07

AVERAGE HEIGHT MAX. = 77.5 FT (INC. 10FT INCREASE PER IN FLOOD ZONE LOCATION)

* INCLUDES 2FT RAISED GRADE ABOVE EXISTING GRADE TO ACCOMMODATE FLOOD PLAIN REQUIREMENTS.

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TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

06-22-2022	C.U.P. RESPONSE 2
10-28-2022	C.U.P RESPONSE 3
02-17-2023	C.U.P. RESPONSE 4
07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

PHASE 2 HEIGHT CALCULATION

A11.7

DES ARCHITECTS ENGINEERS

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1 GLASS (TYP), LOW-E, TINTED BLUE (BIRD SAFE GLASS)



2 GLASS (LOBBY), LOW-E, CLEAR DOUBLE GLASS (BIRD SAFE GLASS)





3 WINDOW MULLIONS: JLR MZG GRAY MICA II



4 METAL PANEL SYSTEM AT ENTRY CANOPY



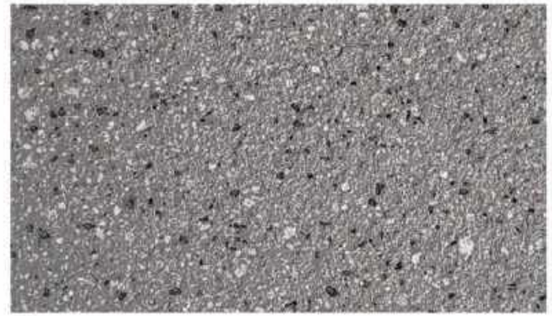
5 CORRUGATED METAL PANEL: ROOF SCREEN, WALL CLADDING COLOR TO MATCH DUNN CHARCOAL SKETCH

9 PERFORMATIVE METAL AWNINGS: POWDER COATED GREY

10 PAINTED METAL TUBE LOUVERS COLOR TO MATCH DUNN EDWARDS AUTUMN BARK



6 GFRC, SANDBLASTED, SMOOTH: COLOR TO MATCH DUNN EDWARDS RECLAIMED WOOD



7 GFRC, SANDBLASTED, SMOOTH: COLOR TO MATCH DUNN EDWARDS CHARCOAL SKETCH



8 TRELLIS: HIGH DENSITY COMPOSITE EXTERIOR CLADDING: WOOD LOOK

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TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

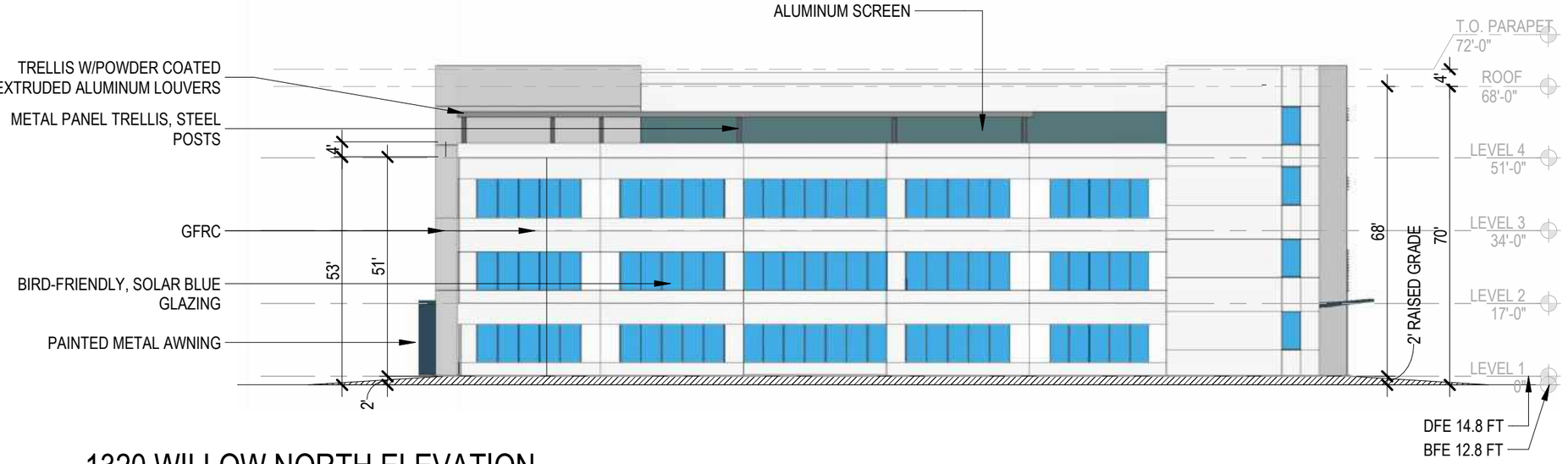
10-28-2021	C.U.P. RESPONSE 1
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09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

1320 BUILDING MATERIAL BOARD

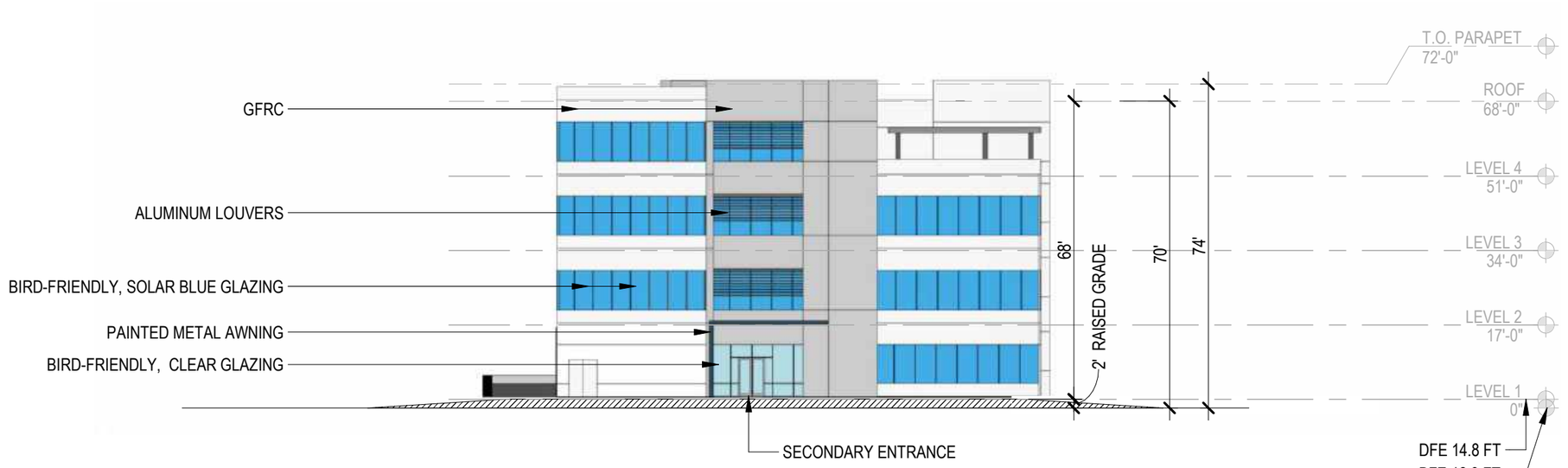
A12

DES ARCHITECTS ENGINEERS

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1320 WILLOW NORTH ELEVATION



1320 WILLOW EAST ELEVATION

0' 10' 25' 75'

SCALE: 1'-0" = 30'-0"

LEGEND

- SOLAR BAN 70, SOLAR BLUE LOW-E GLAZING, WITH A BIRD-FRIENDLY 2" x 4" CERAMIC DOT FRIT PATTERN
- VITRO SOLARBAN 70XL, CLEAR LOW-E GLAZING, WITH A BIRD-FRIENDLY 2" x 4" CERAMIC DOT FRIT PATTERN
- GLASS FIBER REINFORCED CONCRETE PANELS SAND BLASTED FINISH TBD
- GLASS FIBER REINFORCED CONCRETE PANELS SAND BLASTED FINISH TBD
- CORRUGATED ALUMINUM PANELLING COLOR TBD
- GROUND FLOOR FRONTAGE 1,914 SF
- GROUND FLOOR TRANSPARENCY AT FRONTAGE
  REQUIRED: 766 SF (40%)
  PROVIDED: 939 SF (49%)

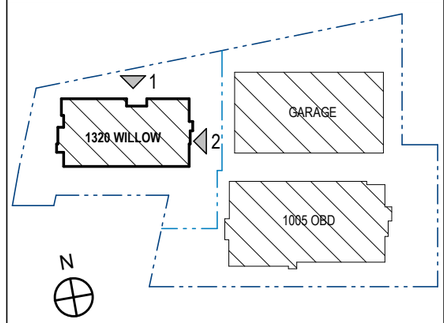
PROPOSED GLAZING RATIO

NORTH ELEVATION: 11,000 SF
SOLAR BLUE GLAZING: 3,250 SF (30%)

EAST ELEVATION: 7,200 SF
SOLAR BLUE GLAZING: 2,500 SF (35%)
CLEAR GLAZING: 250 SF (4%)

NOTE:
ALUMINUM FRAMES AT WINDOWS AND DOORS

KEY PLAN



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TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

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07-12-2023	C.U.P. RESPONSE 5		
09-29-2023	C.U.P. RESPONSE 6		

1320 WILLOW BUILDING ELEVATIONS

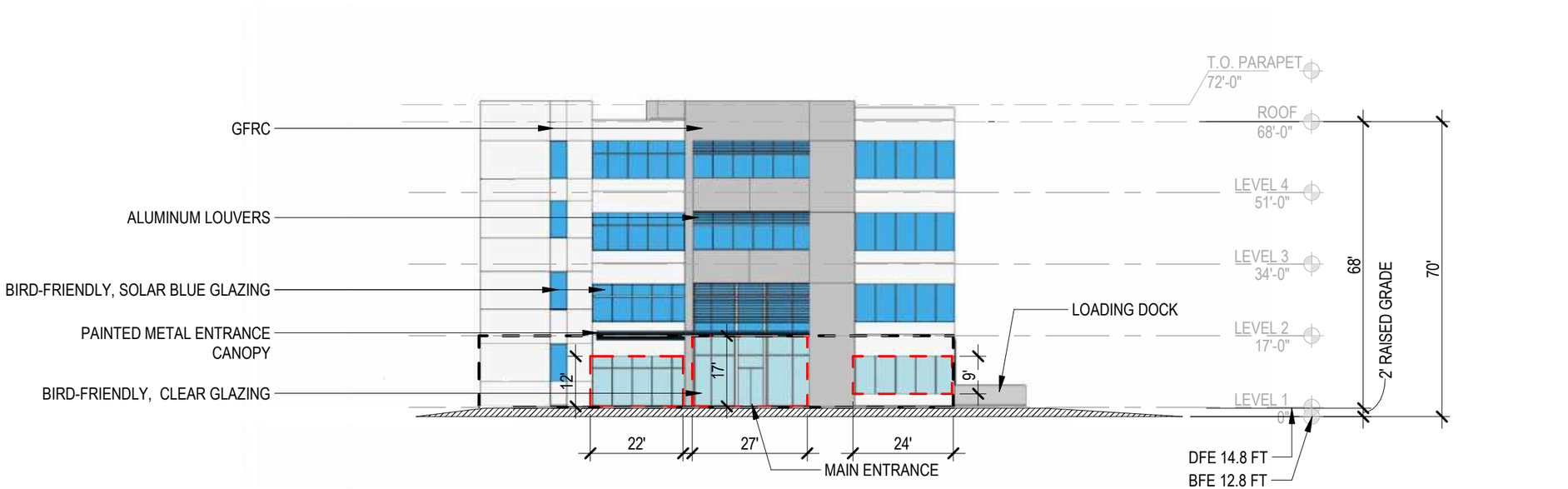
A12.1

DES ARCHITECTS ENGINEERS

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1320 WILLOW SOUTH ELEVATION



1320 WILLOW WEST ELEVATION

LEGEND

- SOLAR BAN 70, SOLAR BLUE LOW-E GLAZING, WITH A BIRD-FRIENDLY 2" x 4" CERAMIC DOT FRIT PATTERN
- VITRO SOLARBAN 70XL, CLEAR LOW-E GLAZING, WITH A BIRD-FRIENDLY 2" x 4" CERAMIC DOT FRIT PATTERN
- GLASS FIBER REINFORCED CONCRETE PANELS SAND BLASTED FINISH TBD
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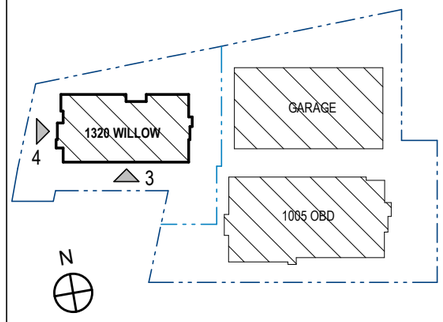
PROPOSED GLAZING RATIO

SOUTH ELEVATION: 14,400 SF
SOLAR BLUE GLAZING: 4,265 SF (30%)

WEST ELEVATION: 8,115 SF
SOLAR BLUE GLAZING: 2,151 SF (27%)
CLEAR GLAZING: 939 SF (12%)

NOTE:
ALUMINUM FRAMES AT WINDOWS AND DOORS

KEY PLAN



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TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
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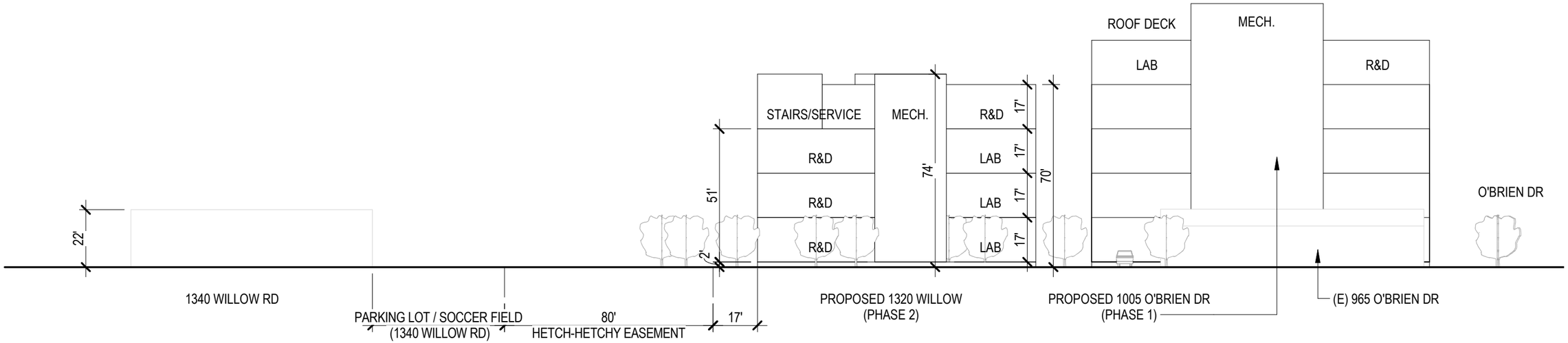
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07-12-2023	C.U.P. RESPONSE 5		
09-29-2023	C.U.P. RESPONSE 6		

1320 WILLOW BUILDING ELEVATIONS

A12.2

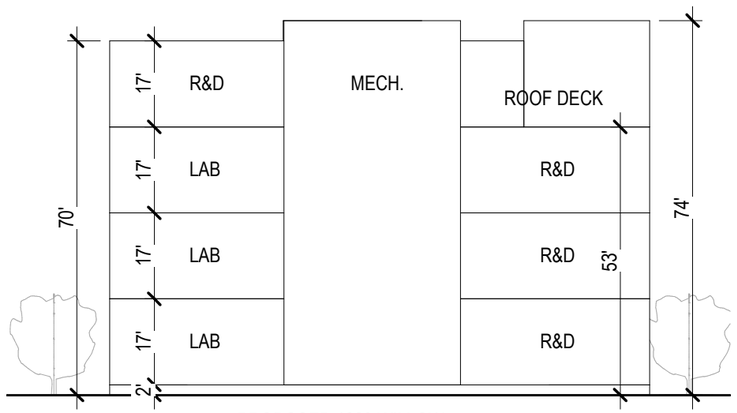
DES ARCHITECTS ENGINEERS

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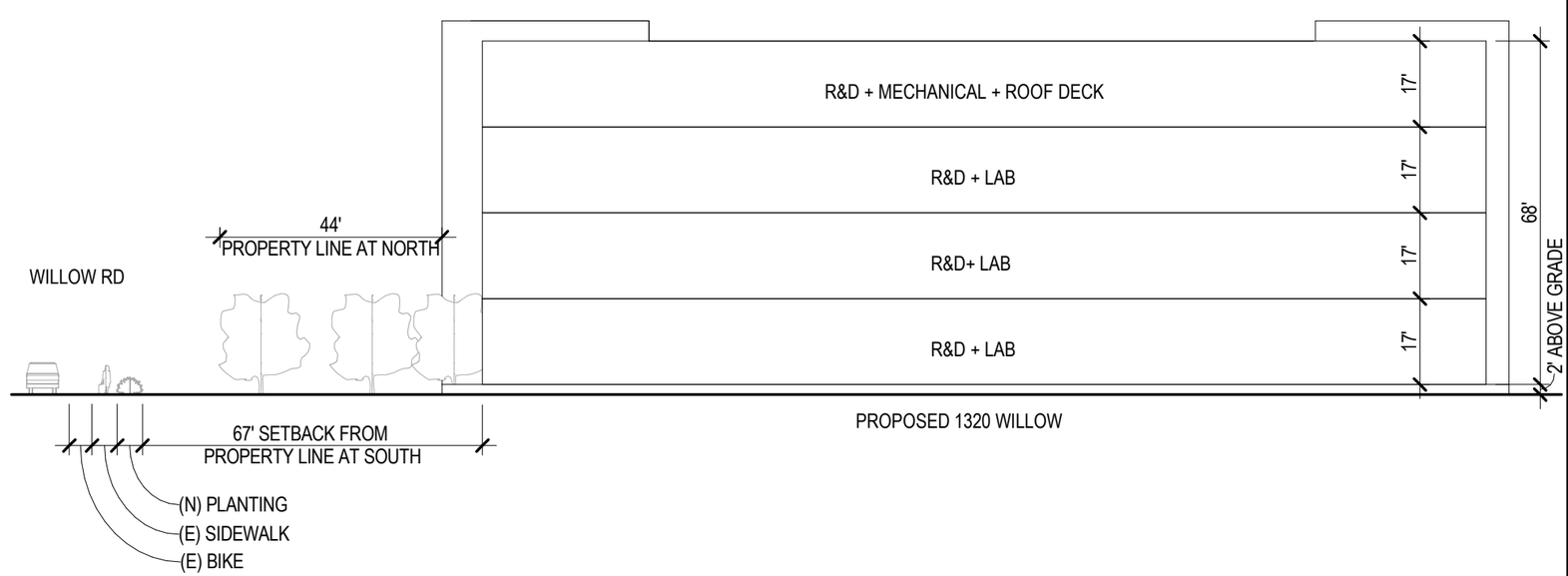
1 1320 WILLOW STREETSCAPE - WEST

1" = 40'-0"



2 1320 WILLOW SECTION - FACING EAST

1" = 30'-0"



3 1320 WILLOW SECTION - SOUTH

1" = 30'-0"

0' 10' 25' 75'

SCALE: 1'-0" = 30'-0"

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

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07-12-2023	C.U.P. RESPONSE 5	
09-29-2023	C.U.P. RESPONSE 6	
06-25-2024	PARKING UPDATE	

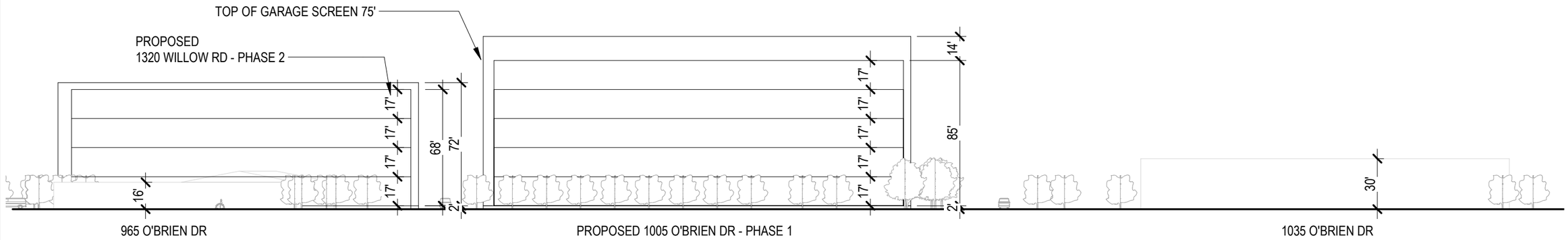
1320 WILLOW CROSS SECTION & STREETSCAPE - PHASE 2

A12.3A

DES ARCHITECTS ENGINEERS

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1 1005 O'BRIEN DR STREETSCAPE - SOUTH - PHASE 2

1" = 60'-0"

0' 10' 25' 75'

SCALE: 1'-0" = 30'-0"

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

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07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

1005 O'BRIEN CROSS SECTION & STREETSCAPE - PHASE 2

A12.3B

DES ARCHITECTS ENGINEERS

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FRONT VIEW

TARLTON

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MENLO PARK, CA 94025

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07-12-2023	C.U.P. RESPONSE 5		
09-29-2023	C.U.P. RESPONSE 6		

1320 WILLOW 3D MASSING

A12.4

DES ARCHITECTS ENGINEERS

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NORTH-WEST VIEW

TARLTON

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1320 WILLOW RD
MENLO PARK, CA 94025

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06-22-2022	C.U.P. RESPONSE 2		
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02-17-2023	C.U.P. RESPONSE 4		
07-12-2023	C.U.P. RESPONSE 5		
09-29-2023	C.U.P. RESPONSE 6		

1320 WILLOW 3D MASSING

A12.5

DES ARCHITECTS ENGINEERS

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SOUTH-EAST VIEW

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

04-15-2021	D.R.T. REVIEW	06-25 2024	PARKING UPDATE
06-23-2021	C.U.P. SUBMITTAL		
10-28-2021	C.U.P. RESPONSE 1		
06-22-2022	C.U.P. RESPONSE 2		
10-28-2022	C.U.P RESPONSE 3		
02-17-2023	C.U.P. RESPONSE 4		
07-12-2023	C.U.P. RESPONSE 5		
09-29-2023	C.U.P. RESPONSE 6		

1320 WILLOW 3D MASSING

A12.6

DES ARCHITECTS ENGINEERS

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TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

06-23-2021	C.U.P. SUBMITTAL
10-28-2021	C.U.P. RESPONSE 1
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07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25 2024	PARKING UPDATE

1320 WILLOW 3D VIEW OPEN SPACE

A12.7

DES ARCHITECTS ENGINEERS

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AERIAL VIEW

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

10-28-2021	C.U.P. RESPONSE 1
06-22-2022	C.U.P. RESPONSE 2
10-28-2022	C.U.P RESPONSE 3
02-17-2023	C.U.P. RESPONSE 4
07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

1320 WILLOW 3D MASSING

A12.8

DES ARCHITECTS ENGINEERS

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PHASE 1



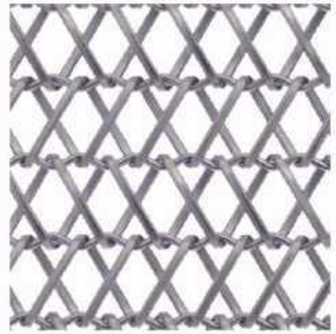
PHASE 2



① CONCRETE STRUCTURE:COLOR TO MATCH DUNN EDWARDS FOSSIL



② FLEXIBLE METAL MESH: COLOR TO MATCH DUNN EDWARDS FOSSIL



③ FLEXIBLE METAL MESH: COLOR TO MATCH DUNN EDWARDS CHARCOAL SKETCH

④ METAL STRUCTURE: COLOR TO MATCH DUNN EDWARDS CHARCOAL SKETCH

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

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06-25 2024	PARKING UPDATE

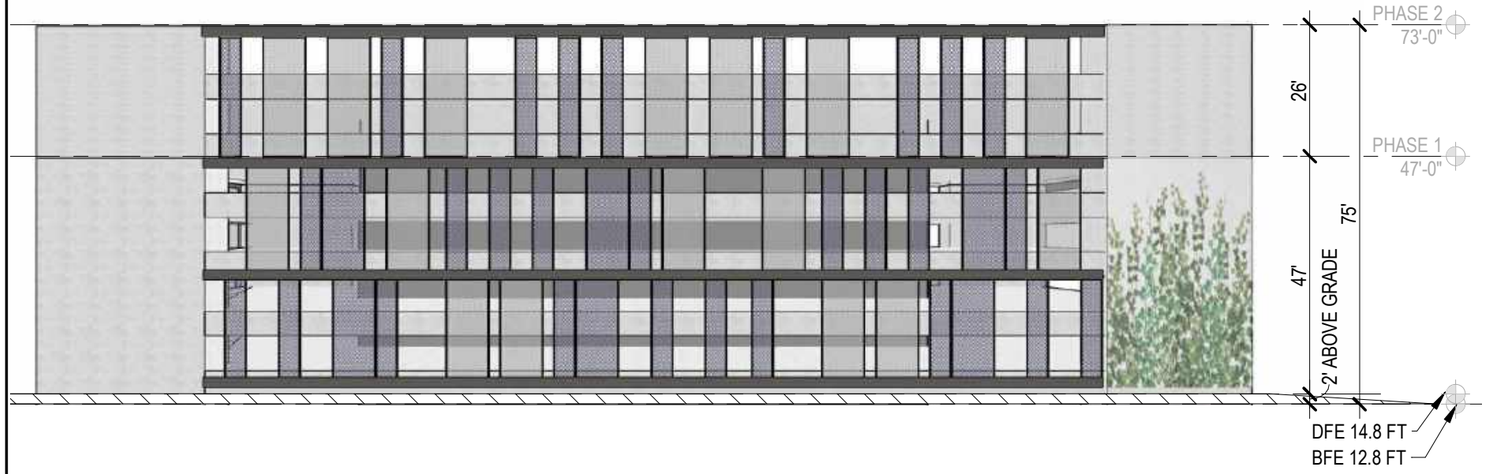
GARAGE MATERIAL BOARD

A12.9

DES ARCHITECTS ENGINEERS

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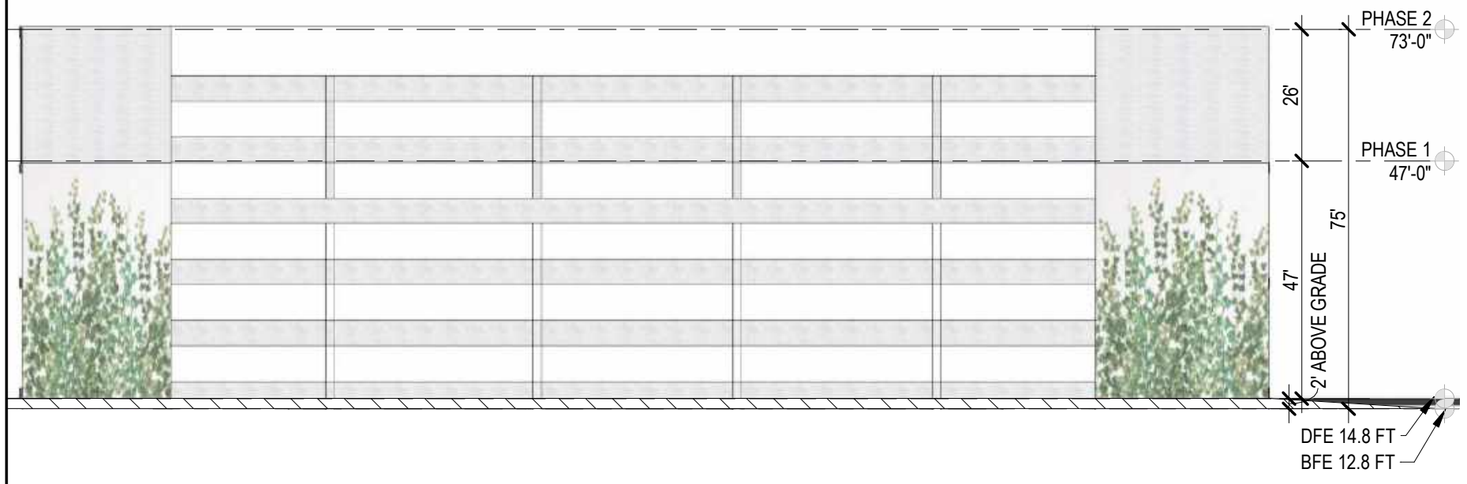
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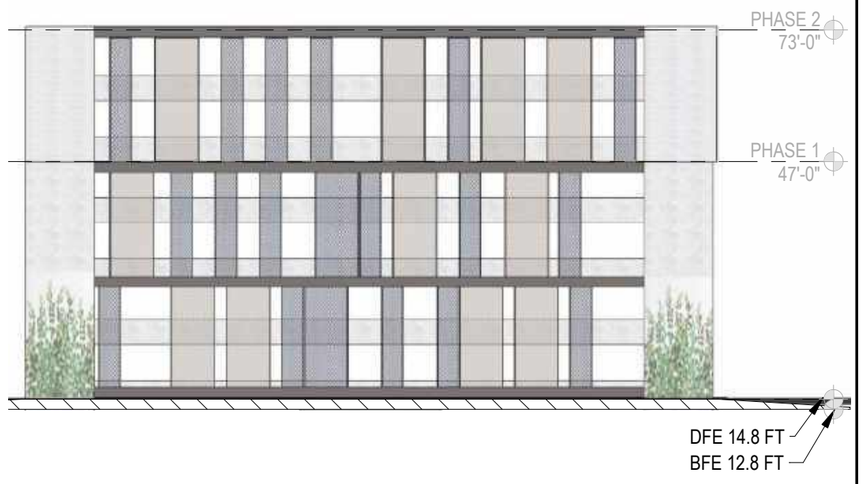
GARAGE NORTH ELEVATION



GARAGE WEST ELEVATION



GARAGE SOUTH ELEVATION



GARAGE EAST ELEVATION

0' 10' 25' 75'

SCALE: 1'-0" = 30'-0"

TARLTON

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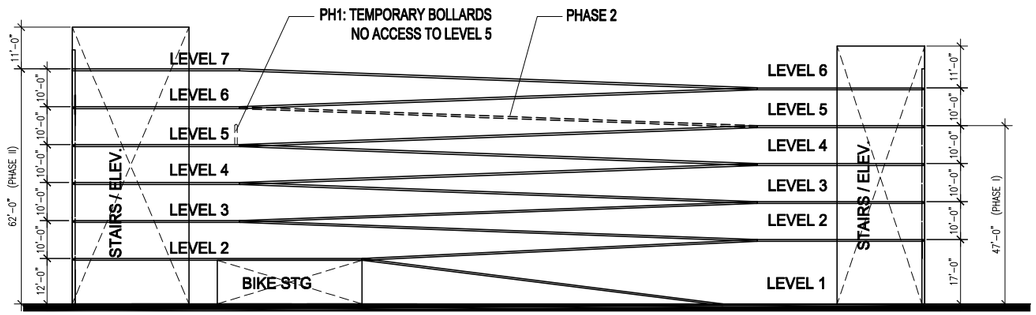
GARAGE ELEVATIONS

A13.0

DES ARCHITECTS ENGINEERS

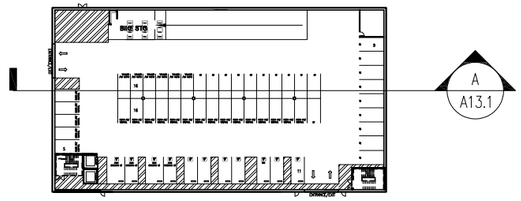
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A GARAGE SECTION
1'–0"=40'–0"

KEY PLAN



GARAGE

PHASE 1:

LEVEL 1	27,900 SF	
LEVEL 2	27,900 SF	
LEVEL 3	27,900 SF	
LEVEL 4	27,900 SF	
LEVEL 5	27,900 SF	(NOT ACCESSIBLE BY CARS)
	139,500 SF	

PHASE 2:

LEVEL 6	27,900 SF	
TOTAL:	5,400 SF	
	33,300 SF	

LEVEL 7 **172,800 SF**

TOTAL REQUIRED		PHASE 1	PHASE 2	TOTAL
LS ZONING:				
RESEARCH & DEVELOPMENT:	(1.5 - 2.5 / 1,000 SF)	232 - 387	111 - 186	343 - 573
LEED V4.1:				
RESEARCH & DEVELOPMENT:	(3.4 / 1,000 SF - 20%) MAX	420	200	620
EV / CLEAN AIR SPACES:				
LS ZONING:	10% EVSE 5% EVCS			
CALGREEN(TIER 2): APPENDIX A-5	EVCS 45% OF TOTAL SPACES; EVSE 33% OF EVCS; 8% CLEAN AIR/VANPOOL/CARPOOL			
LEED V4.1:	10% EVSE			
CBC 2019:	ACCESSIBLE EVCS PER TABLE 11B-228.3.2.1	14 (PH. 1 + PH. 2)		
TOTAL PROVIDED				
LS ZONING: RESEARCH & DEVELOPMENT:		325	195	520 (2.3/1000 SF)
LEED V4.1: RESEARCH & DEVELOPMENT:	< 620			
EV / CLEAN AIR SPACES:				
	EVCS (45%):	147	88	235
	(INCLUDING 33% EVSE)-	(49)	(29)	(78)
	CLEAN AIR/VANPOOL/CARPOOL(8%):	26	16	42
CBC 2019:	ACCESSIBLE EVCS PER TABLE 11B-228.3.2.1	14		

EVCS = EV CAPABLE SPACE
EVSE = EV SUPPLY EQUIPMENT

PARKING SPACES BREAKDOWN

PROVIDED AT PHASE 1 (1005 O'BRIEN)			INTERIM AT 1320 WILLOW	PROVIDED AT PHASE 2 (1320 WILLOW)		TOTAL (PH1 + PH2)
SITE:				**SITE:**		
STANDARD:	14		39	STANDARD:	1	15
ACCESSIBLE:	2		3 (1 VAN, 2 STDRD)	ACCESSIBLE:	2	4
EVCS(1%):	4					4
GARAGE (4 LEVELS):				**GARAGE (3 LEVELS - ABV. EXISTING):**		
STANDARD:	129			STANDARD:	88	217
ACCESSIBLE:	7	(INC. REQ. FOR PHASE 2)		ACCESSIBLE:	(PROVIDED AT PHASE 1)	7
EVCS(44%):	143	(14 EV ACCESSIBLE) (2 VAN, 6 STDRD, 6 AMBULATORY)		EVCS(45%)	88	231
CLEAN AIR/VANPOOL(6%):	20			CLEAN AIR/VANPOOL(6%)	12	32
CLEAN AIR/CARPOOL (2%):	6			CLEAN AIR/CARPOOL (2%)	4	10
TOTAL: 1005 O'BRIEN DR:	**325 SPACES**			**TOTAL: 1320 WILLOW RD:**	**195 SPACES**	**520 SPACES**

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

04-15-2021	D.R.T. REVIEW	
06-23-2021	C.U.P. SUBMITTAL	
10-28-2021	C.U.P. RESPONSE 1	
06-22-2022	C.U.P. RESPONSE 2	
10-28-2022	C.U.P RESPONSE 3	
02-17-2023	C.U.P. RESPONSE 4	
07-12-2023	C.U.P. RESPONSE 5	
09-29-2023	C.U.P. RESPONSE 6	
06-25-2024	PARKING UPDATE	

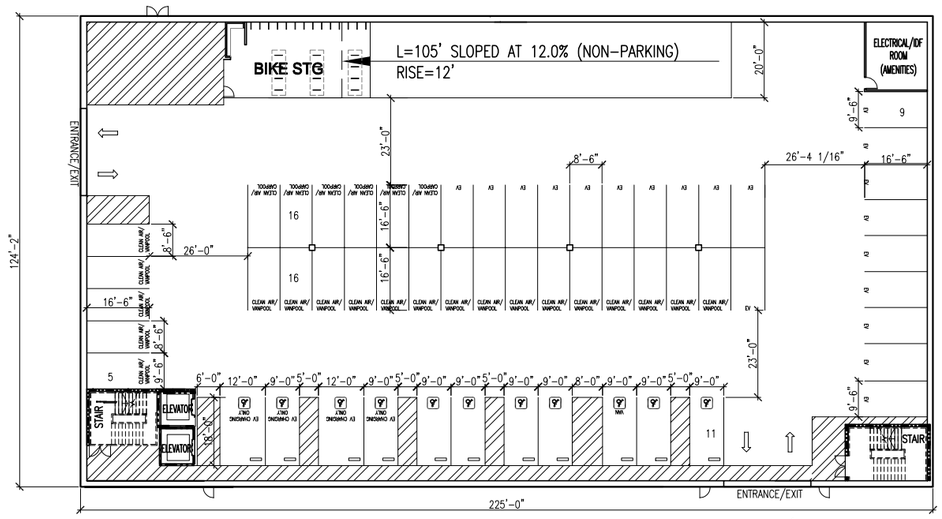
PARKING COUNT & GARAGE SECTION

A13.1

DES ARCHITECTS ENGINEERS

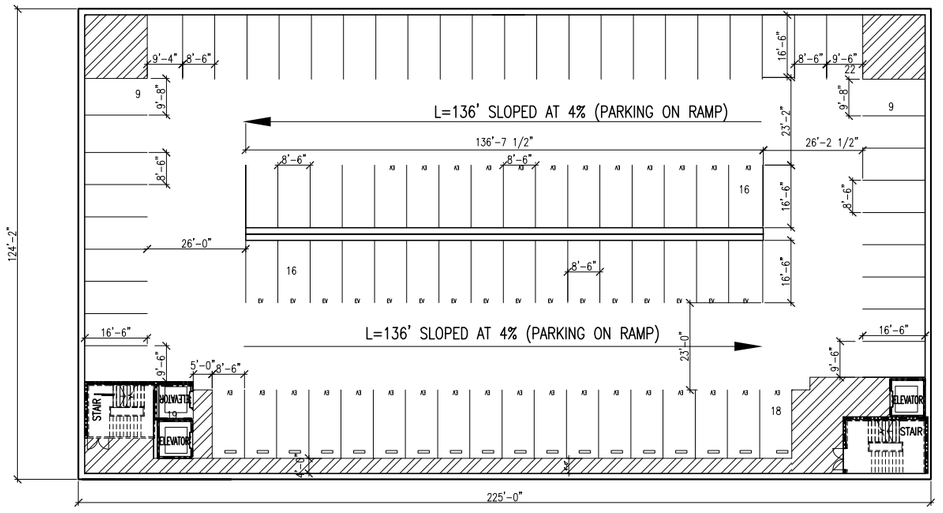
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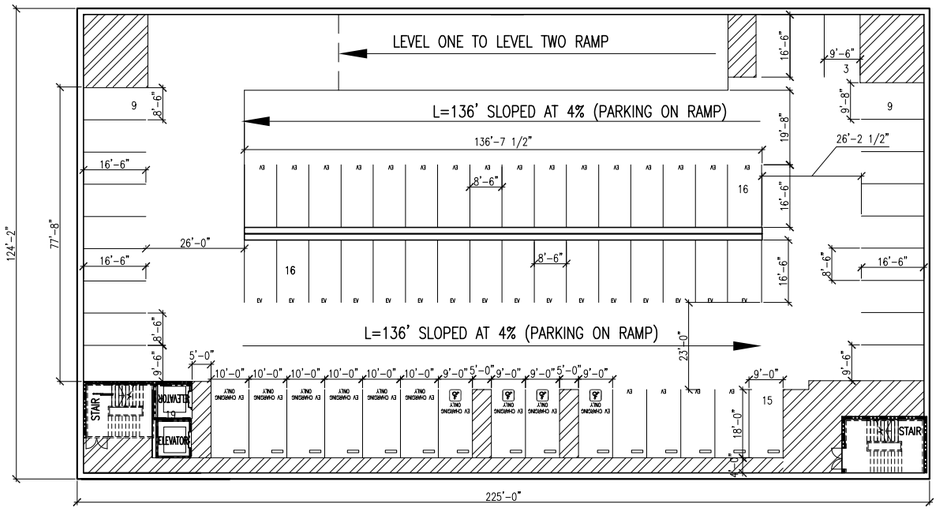
1 LEVEL 1 – NO PARKING ON RAMP (9.5% SLOPE)
1'-0"=40'-0"

P1: 7 ADA (6 STANDARD + 1 VAN)
4 ACCESSIBLE EVCS (2 VAN + 2 STD)
20 CLEAN AIR/VANPOOL
6 CLEAN AIR/CARPOOL
20 EVCS
TOTAL 57 SPACES



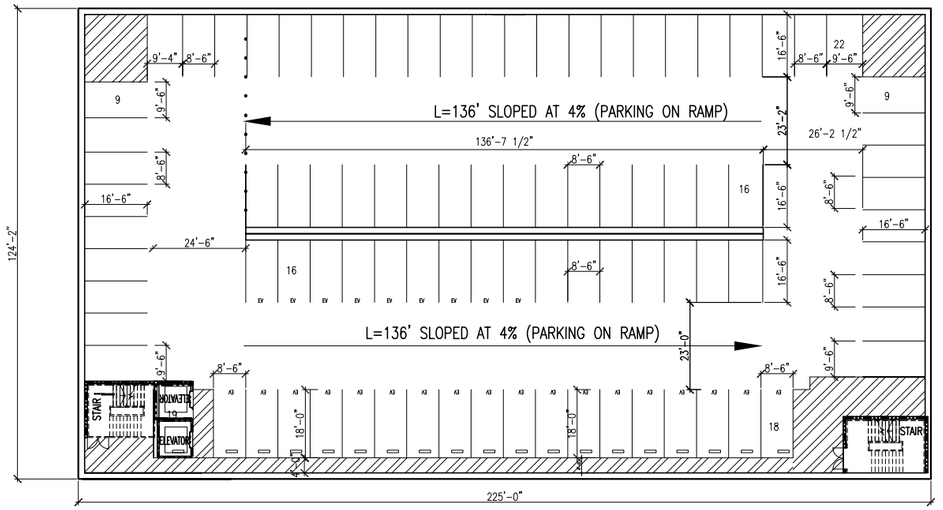
3 LEVEL 3 – PARKING ON RAMP (4% CONTINUOUS)
1'-0"=40'-0"

P3: 46 EVCS
44 STANDARD
TOTAL 90 SPACES



2 LEVEL 2 – PARKING ON RAMP (4% CONTINUOUS)
1'-0"=40'-0"

P2: 10 ACCESSIBLE EVCS (4 STD + 6 AMB)
36 EVCS
22 STANDARD
TOTAL 68 SPACES



4 LEVEL 4 – PARKING ON RAMP (4% CONTINUOUS)
1'-0"=40'-0"

PH1 P4:
27 EVCS
63 STANDARD
TOTAL 90 SPACES

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

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10-28-2022	C.U.P. RESPONSE 3
02-03-2023	C.U.P. RESPONSE 4
07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

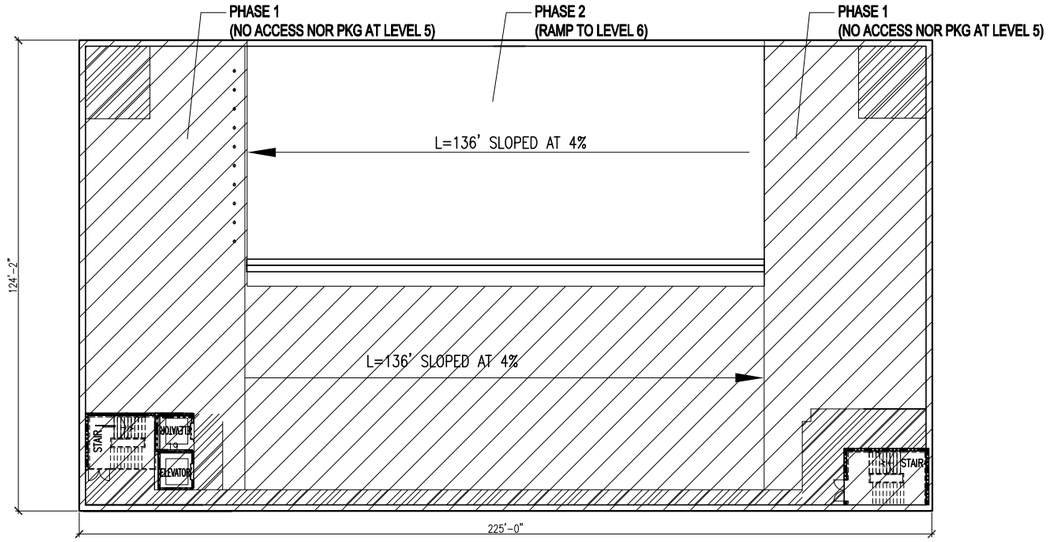
GARAGE PLANS PHASE 1

A13.2

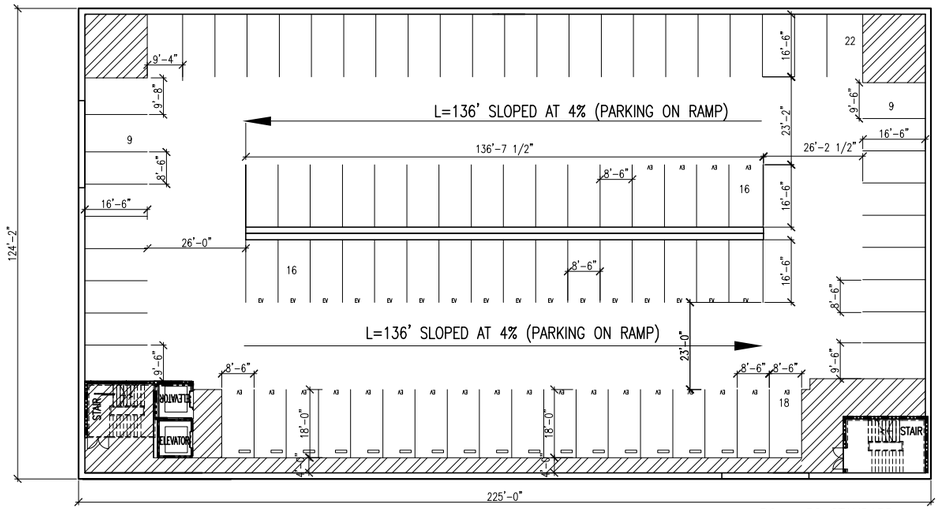
DES ARCHITECTS ENGINEERS

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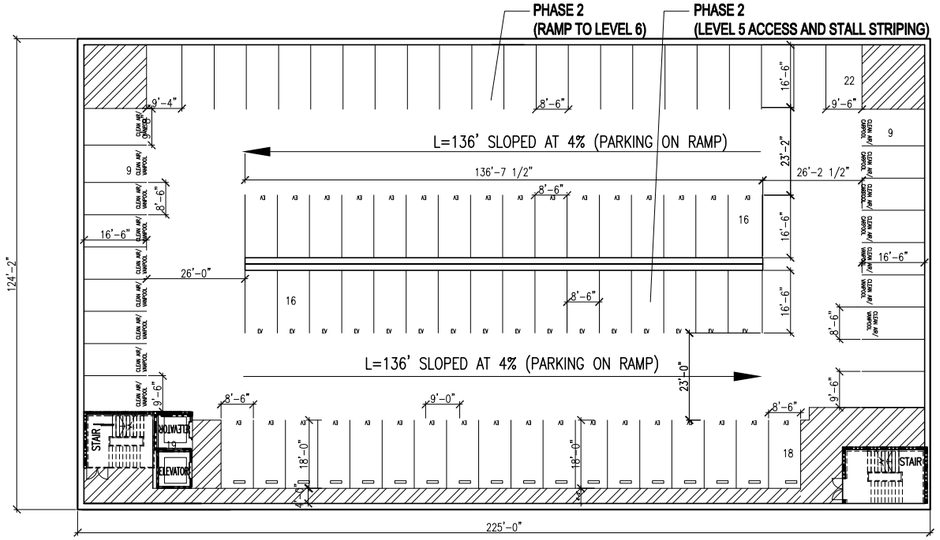


5 LEVEL 5 – RAMP (4% CONTINUOUS) – PHASE 1
1'–0"=40'–0"



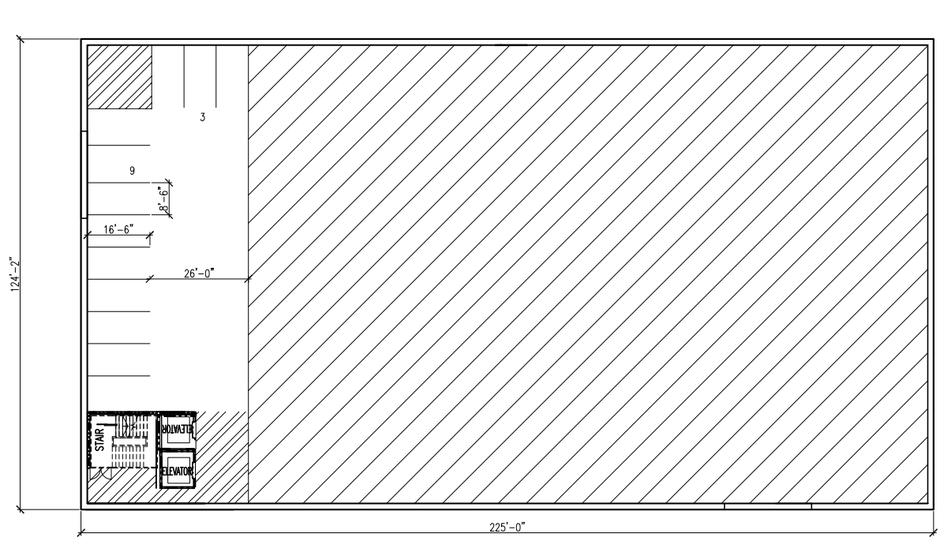
6 LEVEL 6 – PARKING ON RAMP (4% CONTINUOUS)
1'–0"=40'–0"

P6: 52 STANDARD
38 EVCS
TOTAL 90 SPACES



5 LEVEL 5 – PARKING ON RAMP (4% CONTINUOUS) – PHASE 2
1'–0"=40'–0"

PH2 P5:
24 STANDARD
50 EVCS
12 CLEAN AIR/VANPOOL
4 CLEAN AIR/CARPOOL
TOTAL 90 SPACES



7 LEVEL 7
1'–0"=40'–0"

P7 12 STANDARD
TOTAL 12 SPACES

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TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

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07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

GARAGE PLANS PHASE 2

A13.3

DES ARCHITECTS ENGINEERS

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SHORT-TERM BICYCLE STORAGE

REQUIRED:

LS (R&D):	9	(20% OF TOTAL BIKE PARKING)
CALGREEN:	4	(5% OF VISITOR PARKING, 2 MIN. PER BLDG.)
LEED V4.1:	8	(4 MIN. PER BUILDING)

PHASE 1:

1005 O'BRIEN DR:	6

PHASE 2:

1320 WILLOW RD:	3

TOTAL REQUIRED: 9

PROVIDED:

PHASE 1:

1005 O'BRIEN DR:	8 (EXTERIOR BUILDING)
1005 O'BRIEN DR:	4 (SPORTS COURT)

TOTAL PHASE 1: 12

PHASE 2:

1320 WILLOW RD:	8 (EXTERIOR BUILDING)

TOTAL PROVIDED: 20

LONG-TERM BICYCLE STORAGE

REQUIRED:

LS (R&D):	37	(80% OF TOTAL BIKE PARKING)
CALGREEN:	27	(5% OF PARKING)
LEED V4.1:	46	(5% OF BLDG. OCC.)

PHASE 1:

1005 O'BRIEN DR:	32

PHASE 2:

1320 WILLOW RD:	14

TOTAL REQUIRED: 46

PROVIDED:

PHASE 1:

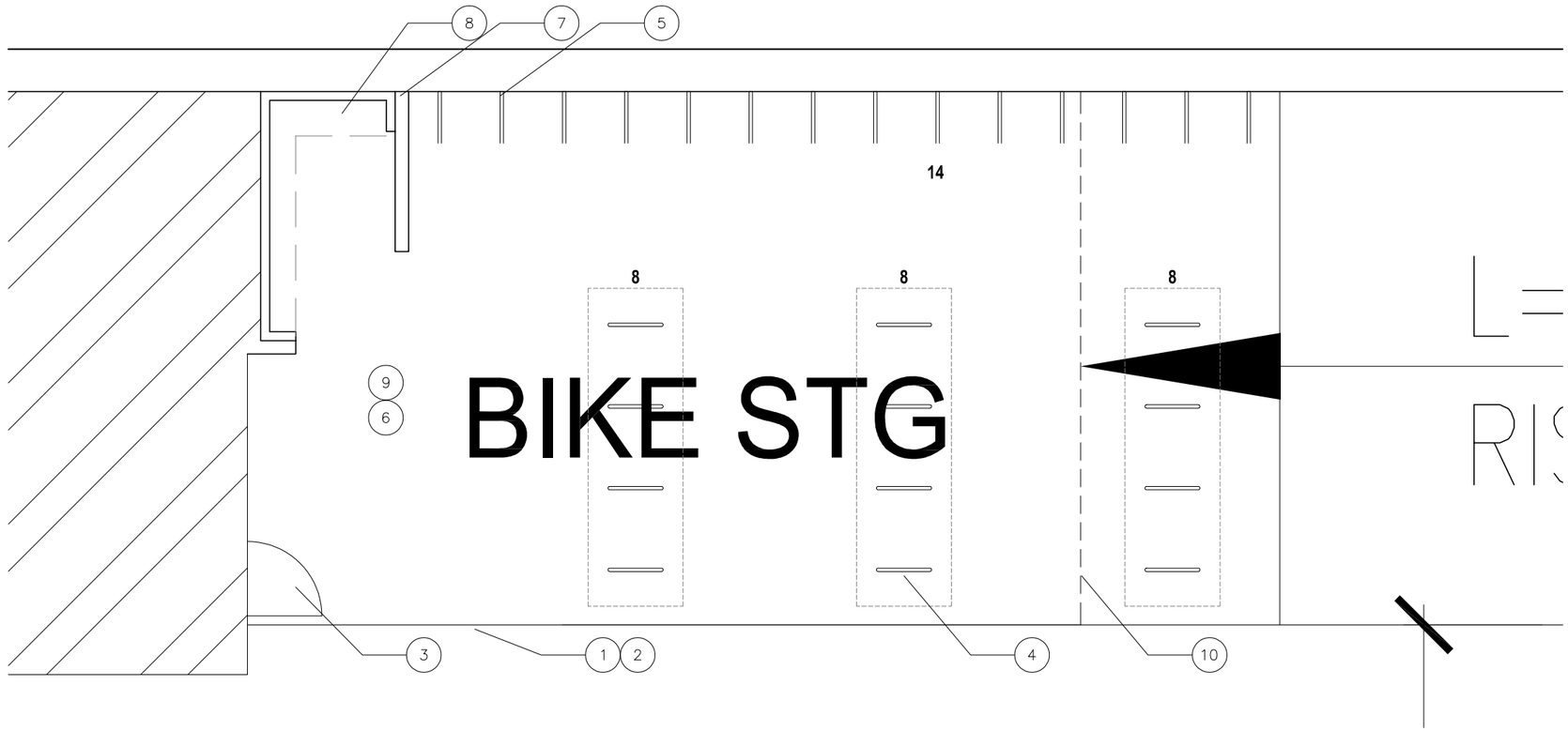
1005 O'BRIEN DR:	28 (GARAGE)
1005 O'BRIEN DR:	5 (BUILDING LOBBY)
FUTURE 1320 WILLOW RD:	10 (GARAGE)

TOTAL PHASE 1: 43

PHASE 2:

1320 WILLOW RD:	5 (BUILDING LOBBY)

TOTAL PROVIDED: 48



KEY NOTES

1. BIKE RACK CAGE - 2"X2" SQUARE TUBING
2. METAL MESH PANEL
3. 3'X8' HINGE DOOR WITH ELECTRICAL HINGE
4. DERO FLOOR MOUNTED POST AND RING RACK
5. STEADYRACK CLASSIC RACK TYP.
6. EPOXY FLOOR
7. FULL HEIGHT 4" STUD FURRED WALLS TO SLAB ABOVE
8. HOLLMAN PHENOLIC LOCKERS (PHANTOM CHARCOAL)
9. ARMSTRONG PRELUDE XL GRID SYSTEM
10. TOP OF RAMP SLOPE ABOVE

TARLTON

985 & 1001 O'BRIEN DR
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06-25-2024	PARKING UPDATE

LONG TERM BIKE STORAGE

A13.4

DES ARCHITECTS ENGINEERS

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NORTH-WEST VIEW

TARLTON

985 & 1001 O'BRIEN DR
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MENLO PARK, CA 94025

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07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

GARAGE 3D MASSING - PHASE 1

A13.5

DES ARCHITECTS ENGINEERS

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NORTH-WEST VIEW

TARLTON

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07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

GARAGE 3D MASSING - PHASE 2

A13.6

DES ARCHITECTS ENGINEERS

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SOUTH-EAST VIEW

TARLTON

985 & 1001 O'BRIEN DR
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10-28-2022	C.U.P RESPONSE 3
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07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

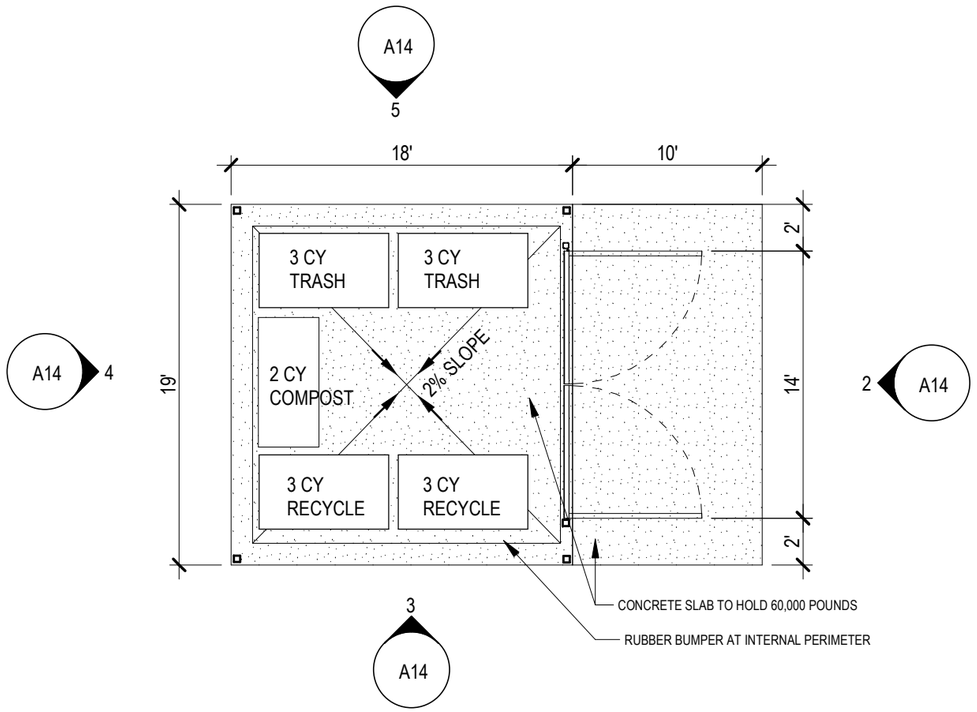
GARAGE 3D MASSING - PHASE 2

A13.7

DES ARCHITECTS ENGINEERS

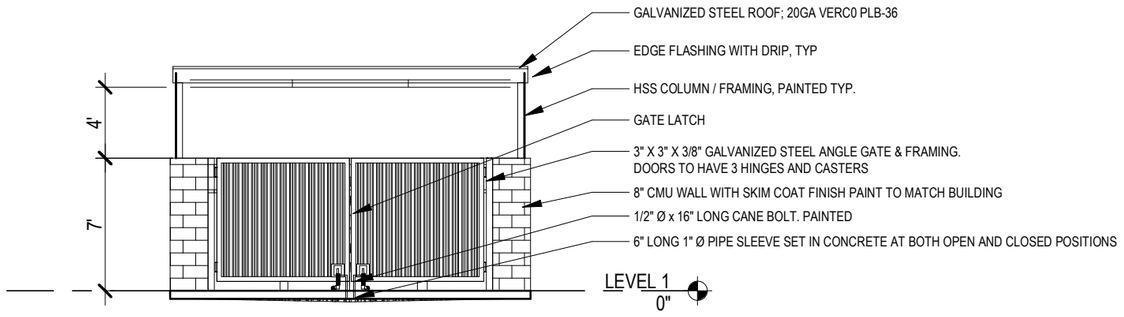
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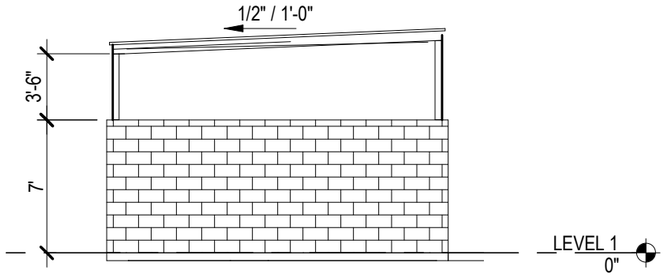
1 PLAN VIEW

1/8" = 1'-0"



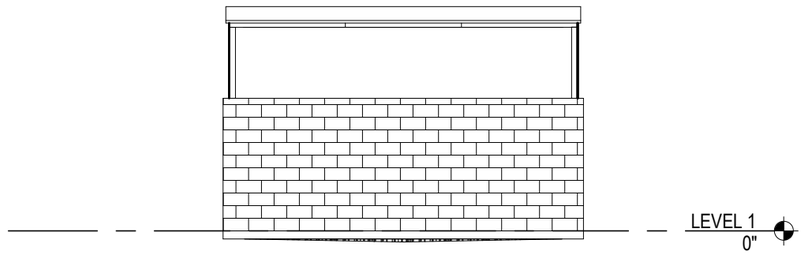
2 EAST ELEVATION

1/8" = 1'-0"



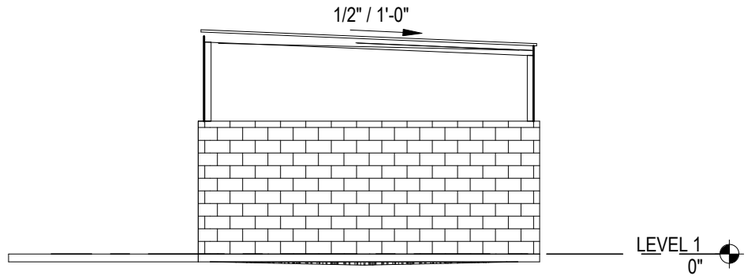
3 SOUTH ELEVATION

1/8" = 1'-0"



4 WEST ELEVATION

1/8" = 1'-0"



5 NORTH ELEVATION

1/8" = 1'-0"

0 4 8 16'

SCALE: 1/8" = 1'-0"

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

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09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

TRASH ENCLOSURE - 1005 O'BRIEN & 1320 WILLOW

A14

DES ARCHITECTS ENGINEERS

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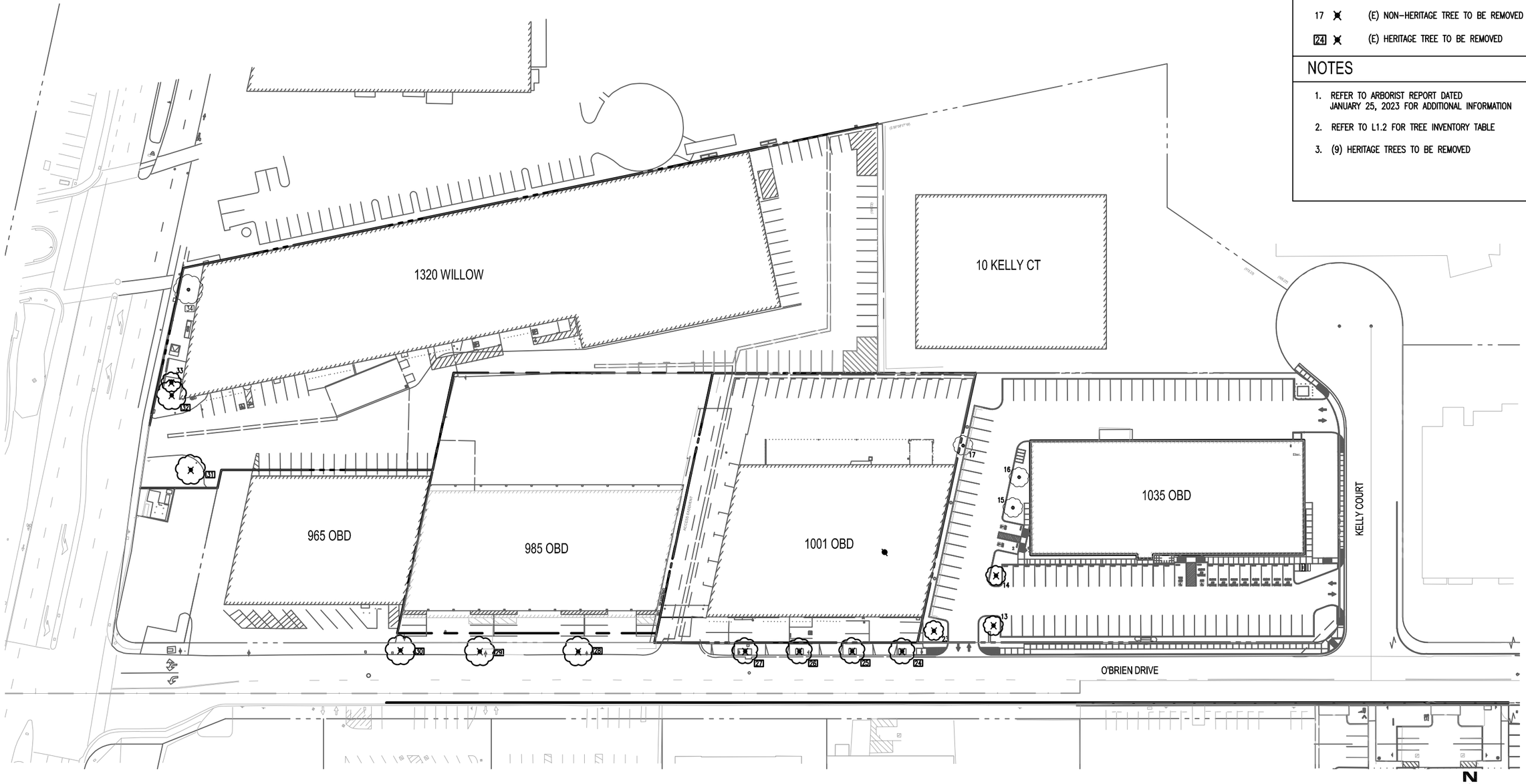
BIM 360://Tarlton - MenloParkLabs/10025002_A_1005OBD_SHELL_2020_Central.rvt

LEGEND

——·——	PROPERTY LINE
17	(E) NON-HERITAGE TREE TO BE REMOVED
24	(E) HERITAGE TREE TO BE REMOVED

NOTES

1. REFER TO ARBORIST REPORT DATED JANUARY 25, 2023 FOR ADDITIONAL INFORMATION
2. REFER TO L1.2 FOR TREE INVENTORY TABLE
3. (9) HERITAGE TREES TO BE REMOVED



0 40’ 80’ 160’

N

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

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07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

EXISTING TREE PLAN

L1.1

DES ARCHITECTS ENGINEERS

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ARBOR RESOURCES
professional consulting arborists and tree care

Prepared by:

David L. Babby
Registered Consulting Arborist® #399
Board-Certified Master Arborist® #WE-4001B
Menlo Park Business License #73953

TREE INVENTORY TABLE

TREE INVENTORY TABLE

TREE/ TAG NO.	TREE NAME	SIZE: Trunk Diameter (in.)	SIZE: Height (ft.)	SIZE: Canopy Spread (ft.)	CONDITION: Health Condition (100%=Best, 0%=Worst)	CONDITION: Structural Integrity (100%=Best, 0%=Worst)	CONDITION: Form (100%=Best, 0%=Worst)	CONDITION: Overall Condition (Good/Fair/Poor/Dead)	Suitability for Preservation (High/Moderate/Low)	REGULATED: Heritage Tree	REGULATED: Street Tree	Removal	Appraised Value (Heritage Tree)
13	Chinese pistache (*Pistacia chinensis*)	3.7	13	12	70%	60%	80%	Good	High	-	-	X	-
Comments: Dormant. Single-staked (and staked should be removed, including the one without the tie).													
14	Columbia London plane (*Platanus × h.* 'Columbia')	6.4	35	25	70%	80%	80%	Good	High	-	-	X	-
Comments: Limb emerges at 4' high.													
15	Chinese pistache (*Pistacia chinensis*)	3.5	15	10	70%	60%	40%	Fair	Moderate	-	-	-	-
Comments: Dormant. Double-staked (and both should be removed). Asymmetrical canopy. Has a slight SW lean.													
16	Chinese pistache (*Pistacia chinensis*)	3.1	15	10	70%	60%	50%	Fair	Moderate	-	-	-	-
Comments: Dormant. Double-staked (and both should be removed). Low branch encroaches into drive aisle.													
17	Columbia London plane (*Platanus × h.* 'Columbia')	7.1	35	20	70%	80%	80%	Good	High	-	-	-	-
Comments: Limbs emerge at 7' high.													
23	Forest Pansy redbud (*Cercis c.* 'Forest Pansy')	1	8	10	70%	40%	80%	Fair	Moderate	-	-	X	-
Comments: Recently installed and double-staked. Nursery stake also remains unfavorably attached (and should be removed). Low branching structure. Excessive moisture at base and over rootball.													
24	Modesto ash (*Fraxinus v.* 'Modesto')	15.8	20	20	40%	30%	50%	Poor	Low	X	X	X	$600
Comments: Beneath high-voltage wires and reduced in height. Within a square planter covered by landscape fabric and river rock. Adjacent concrete driveway apron, curb and gutter are cracked and/or buckled. Multiple leaders emerge at 15' high.													
25	Modesto ash (*Fraxinus v.* 'Modesto')	15.3	20	25	40%	30%	30%	Poor	Low	X	X	X	$600
Comments: Beneath high-voltage wires and has been reduced in height. Within square planter covered by landscape fabric and river rock. Has a large, old decaying cut where trunk bifurcates at 6' high.													
26	Modesto ash (*Fraxinus v.* 'Modesto')	20.7	35	40	40%	20%	50%	Poor	Low	X	X	X	$700
Comments: Remove asap. Has a massive, hollowed decay column along its entire trunk (street side), and begins at 2.5' high (and decay possibly to base), ascends by 4', is 8" wide and 6" plus deep - at its the top is a fruiting body, which informs of extensive internal decay. Decay highly likely exceeds these hollow dimensions, perhaps quite significantly, and I estimate at least 40-50% of the stem's cross section is decayed. Woundwood formation along the margins appears relatively sound. There is also a decaying basal wound along the trunk's W side. Trunk bifurcates into codominants at 9' high, at which point forms a weak attachment (including a rib formed nearly 17" below the attachment). Beneath high-voltage wires and has been reduced in height. Within a square planter covered by landscape fabric and river rock. Adjacent concrete curb and gutter are buckled, and sidewalk is cracked and slightly raised. At 2' high, the trunk leans slightly (8°) SE from vertical.													
27	Modesto ash (*Fraxinus v.* 'Modesto')	24.0	30	35	70%	30%	50%	Poor	Low	X	X	X	$1,500
Comments: Beneath high-voltage wires and has been reduced in height. Within a rectangular-shaped planter covered by landscape fabric and river rock. Near fire hydrant. Adjacent sidewalk is cracked and raised. Multiple leaders emerge at 7' high. At utility pole, and a pronounced buttress root surfaces towards pole. Has a large decayed section along street side limb.													
28	Modesto ash (*Fraxinus v.* 'Modesto')	28.3	40	45	60%	40%	50%	Poor	Low	X	X	X	$2,700
Comments: Beneath high-voltage wires and has been reduced in height. Within a rectangular-shaped planter covered by landscape fabric and river rock (and surrounded by asphalt parking lot along three sides). Canopy is slightly asymmetrical. At utility pole. Adjacent asphalt is raised by roots.													
29	Modesto ash (*Fraxinus v.* 'Modesto')	15.8	35	30	40%	10%	30%	Poor	Low	X	X	X	$200
Comments: Remove asap. It has an 8' tall, 9"+ deep decay column along trunk, comprised of one large hollow and several smaller ones above and below; ~75% of the stem's cross section is degraded. Woundwood along the margins appears relatively sound. Beneath high-voltage wires, but not yet reduced in height. Within a square planter covered by landscape fabric and river rock (and surrounded by asphalt parking lot along three sides). Asphalt is raised by roots, and adjacent curb is buckled. Has several old basal wounds. Narrow, highly-elevated and asymmetrical canopy.													
30	Modesto ash (*Fraxinus v.* 'Modesto')	21.4	35	40	40%	10%	30%	Poor	Low	X	X	X	$400
Comments: Remove asap. At 5' high along the trunk's W side is an 0.8' tall, 0.2' wide, and 5" deep wound with extensive internal decay, as evidenced by a large, deteriorating fruiting body emerging from the hollow. Decay highly likely extends beyond these dimensions. Directly above, there is also an old, 8" diameter diameter wound (along the street side) with decay extending above and below. In total, I estimate least 30-40% of the stem's cross section is decayed. Woundwood along the margins appears relatively sound. Beneath high-voltage wires and has been reduced in height. W/in a square planter covered by landscape fabric and river rock (and surrounded by asphalt along three sides). Roots have cracked and raised the surrounding asphalt and adjacent curb/gutter. Canopy is asymmetrical. Trunk grows at an ~11° E lean.													
31	Italian stone pine (*Pinus pinea*)	24.4	35	35	80%	50%	60%	Fair	Moderate	X	-	X	$5,100
Comments: Irregular trunk formation, sweeping SW around 7' high. Adjacent to pole with security camera. Has many recent cuts along the lower crown's south section.													
32	Silver dollar gum (*Eucalyptus polyanthemos*)	31.8, 19.8	50	35	60%	30%	40%	Poor	Low	X	-	X	$7,500
Comments: Possibly a street tree (tbd with survey). Adjacent to building, within a raised planter aligning sidewalk, and adjacent to an FDC hydrant and fire sprinkler vault. Formed by two trunks. The smaller southern one has a large basal wound with extensive decay, and an 11" diameter decaying wound 18" above. The larger, northern trunk bifurcates into codominant leaders 3' above grade. Excessively thin canopy with interior watersprouts.													
33	Marina madrone (*Arbutus* 'Marina')	2.9	12	10	80%	40%	40%	Fair	Moderate	-	-	X	-
Comments: Possibly a street tree (tbd with survey). Suppressed, crowded-growing conditions within several feet from #32's nearest trunk. Asymmetrical canopy and buried root collar. Adjacent to building.													
34	Silver dollar gum (*Eucalyptus polyanthemos*)	27.2	50	30	40%	60%	40%	Poor	Moderate	X	-	-	$7,200
Comments: Possibly a street tree (tbd with survey). Adjacent to building, and within a raised and narrow planter aligning sidewalk. Extremely thin and sparse canopy with interior watersprouts.													

NOTES

1. EXCERPTS TAKEN FROM ARBORIST REPORT DATED JANUARY 25, 2023
2. ALL TREES, EXCEPT #15–17 AND 34, IN CURRENT SCOPE TO BE REMOVED.
3. TREE #1–12, 18–22 IN FUTURE SCOPE

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TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

04-15-2021	D.R.T. REVIEW	06-25 2024	PARKING UPDATE
06-23-2021	C.U.P. SUBMITTAL		
10-28-2021	C.U.P. RESPONSE 1		
06-22-2022	C.U.P. RESPONSE 2		
10-28-2022	C.U.P RESPONSE 3		
02-17-2023	C.U.P. RESPONSE 4		
07-12-2023	C.U.P. RESPONSE 5		
09-29-2023	C.U.P. RESPONSE 6		

EXISTING TREE INVENTORY TABLE

L1.2

DES ARCHITECTS ENGINEERS

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KEY NOTES:

1. CANOPY TREE
2. ACCENT TREE
3. STREET TREE
4. SCREEN HEDGES
5. BIORETENTION AREA
6. COBBLE CREEK WITH BOULDERS
7. THEMED PLANTING STRIPS
8. PUBLIC GATHERING SPACE
9. PUBLIC EVENT PLAZA
10. STROLLING PATH
11. PUBLIC RESPITE SPACE WITH BENCHES
12. SMALL GROUP GATHERING SPACE
13. MAIN ENTRY PLAZA
14. BIKE RACKS
15. OUTDOOR DINING TERRACE
16. OUTDOOR ACTIVITY SPACE
17. FLEX TURF SPACE AND DRIVABLE SURFACE FOR FIRE TRUCK ACCESS
18. CATENARY LIGHT
19. DRINKING FOUNTAIN
20. TRASH RECEPTACLES (SOLID WASTE/RECYCLING/COMPOST)

0 30' 60' 120'

N

MATERIAL KEY:

CONCRETE PAVING

DECOMPOSED GRANITE PATHS/PAVING, TYP.

FLAGSTONE PAVING, TYP.

TARLTON

985 & 1001 O'BRIEN DR
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06-22-2022	C.U.P. RESPONSE 2
10-28-2022	C.U.P RESPONSE 3
02-17-2023	C.U.P. RESPONSE 4
07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25 2024	PARKING UPDATE

PROPOSED LANDSCAPE PLAN - PHASE 1

L2.1A

DES ARCHITECTS ENGINEERS

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KEY NOTES:

1. CANOPY TREE
2. ACCENT TREE
3. STREET TREE
4. SCREEN HEDGES
5. BIORETENTION AREA
6. COBBLE CREEK WITH BOULDERS
7. THEMED PLANTING STRIPS
8. PUBLIC GATHERING SPACE
9. PUBLIC EVENT PLAZA
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14. BIKE RACKS
15. OUTDOOR DINING TERRACE
16. OUTDOOR ACTIVITY SPACE
17. FLEX TURF SPACE AND DRIVABLE SURFACE FOR FIRE TRUCK ACCESS
18. CATENARY LIGHT
19. DRINKING FOUNTAIN
21. TRELLIS
20. TRASH RECEPTACLES (SOLID WASTE/RECYCLING/COMPOST)

MATERIAL KEY:

CONCRETE PAVING

DECOMPOSED GRANITE PATHS/PAVING, TYP.

FLAGSTONE PAVING, TYP.

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10-28-2022	C.U.P RESPONSE 3
02-17-2023	C.U.P. RESPONSE 4
07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25 2024	PARKING UPDATE

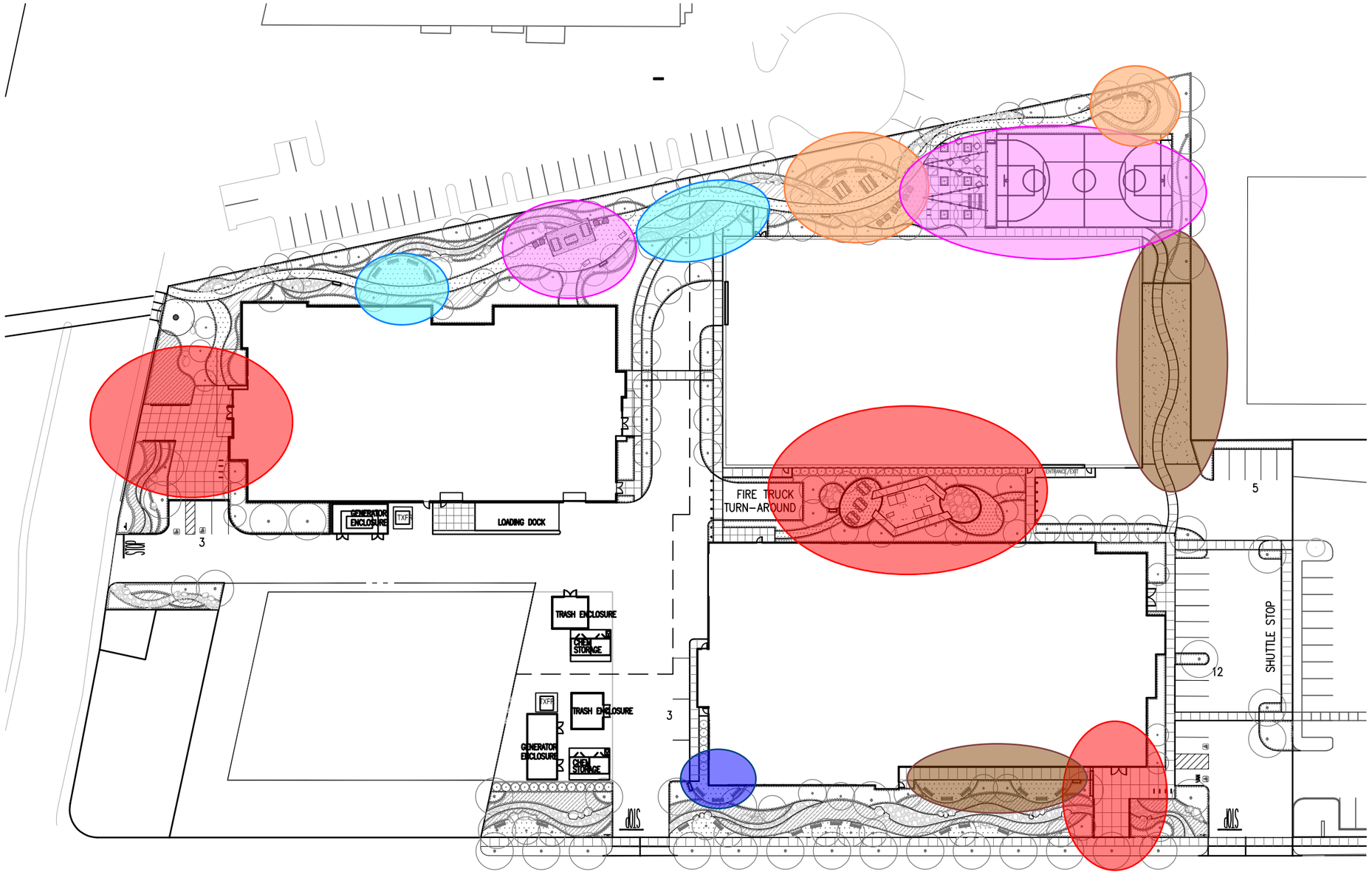
PROPOSED LANDSCAPE PLAN - PHASE 2

L2.1B

DES ARCHITECTS ENGINEERS

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PUBLIC

ACTIVE SPACE

SEMI-ACTIVE SPACE

MEDITATIVE SPACE

PRIVATE

ACTIVE SPACE

SEMI-ACTIVE SPACE

MEDITATIVE SPACE

0 30’ 60’ 120’

N

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

10-15-2021	C.U.P. RESPONSE 1
06/17/2022	C.U.P. RESPONSE 2
10/27/2022	C.U.P. RESPONSE 3
02/03/2023	C.U.P. RESPONSE 4
07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

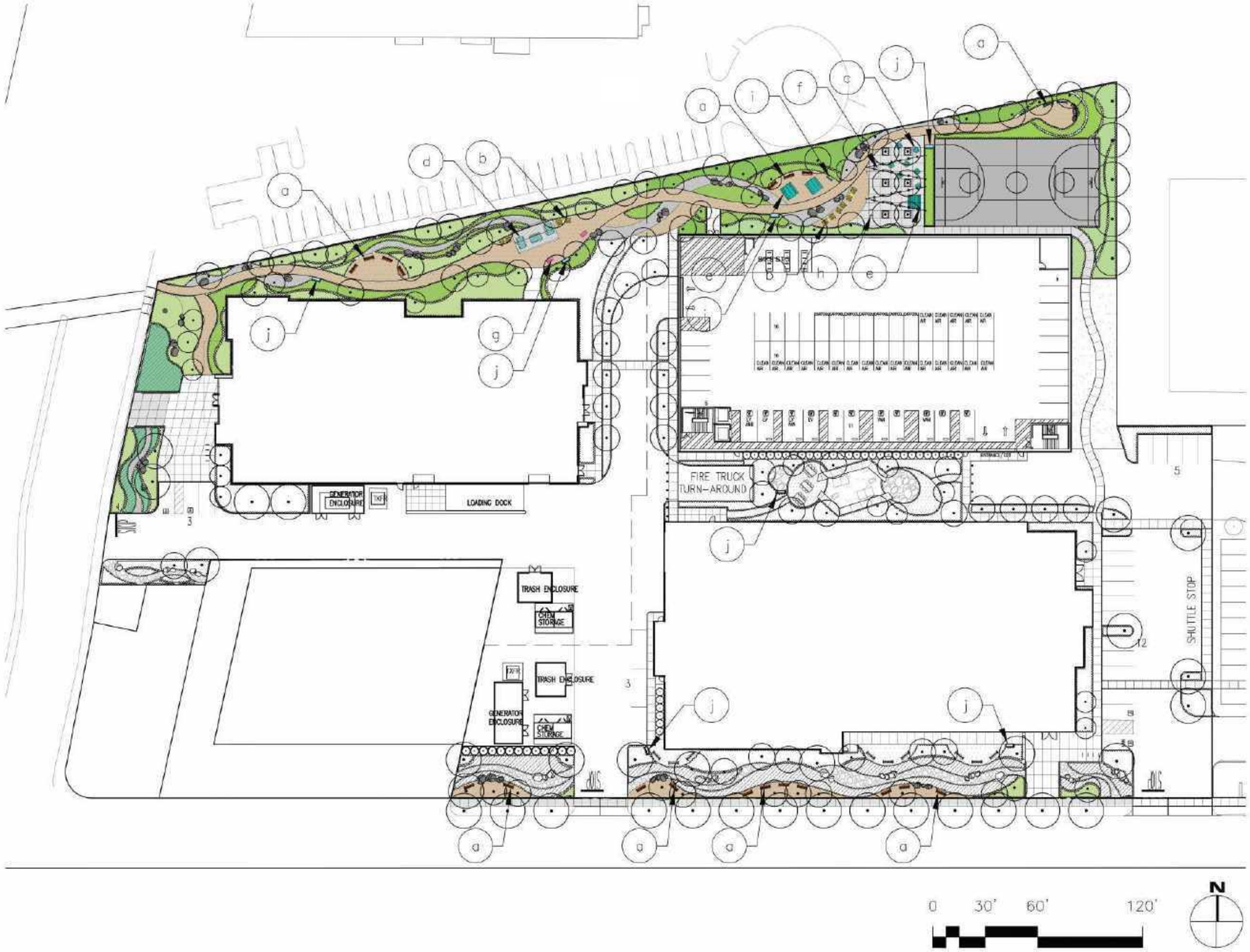
LANDSCAPE SPACE DIAGRAM

L2.1C

DES ARCHITECTS ENGINEERS

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KEY NOTES:

- a — BENCH
- b — ADIRONDACK CHAIR & SIDE TABLE
- c — BISTRO TABLE & CHAIRS
- d — DINING TABLE & CHAIRS
- e — PICNIC TABLE
- f — PING PONG TABLE
- g — CORN HOLES
- h — BIKE RACK
- i — DRINKING FOUNTAIN
- j — TRASH RECEPTACLES (SOLID WASTE/RECYCLING/COMPOST)

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

08-17-2022	C.U.P. RESPONSE 2
10-27-2022	C.U.P. RESPONSE 3
02-03-2023	C.U.P. RESPONSE 4
07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

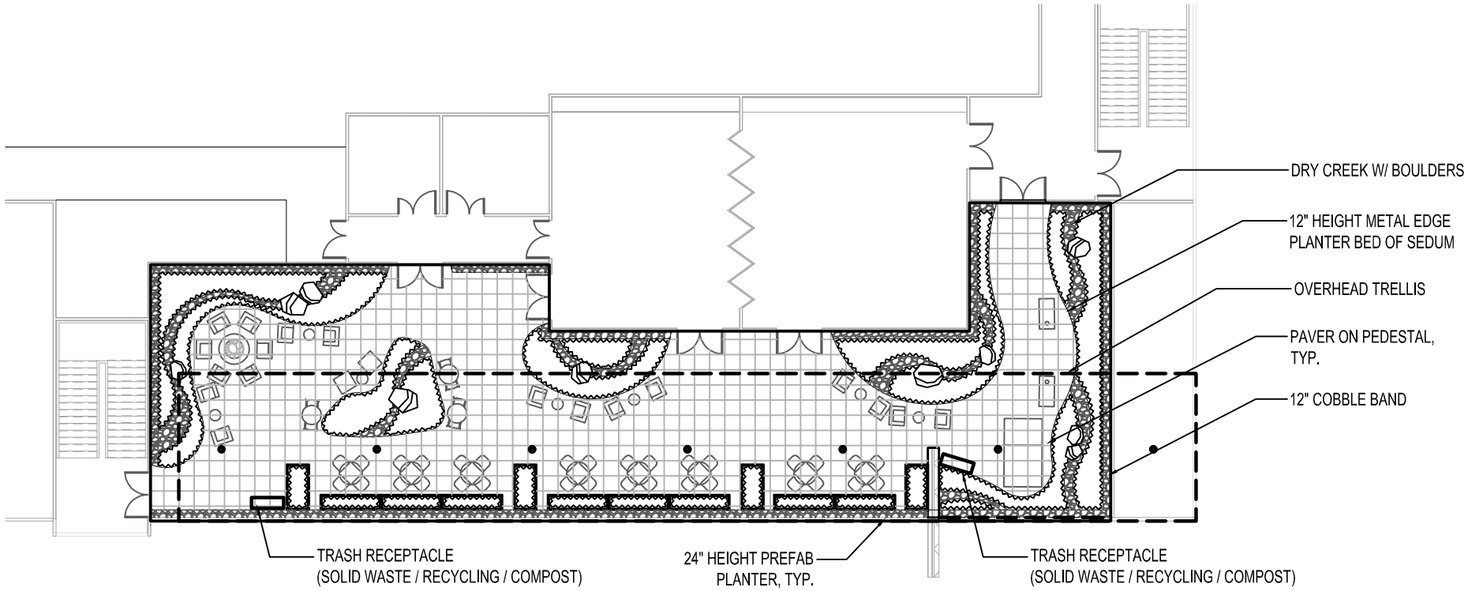
PROPOSED AMENITY PLAN AT PUBLIC SPACE

L2.1D

DES ARCHITECTS ENGINEERS

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1 1005 OBD ROOF DECK ENLARGEMENT

SCALE: 1" = 20'-0"

0 10' 20' 40'

N

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TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

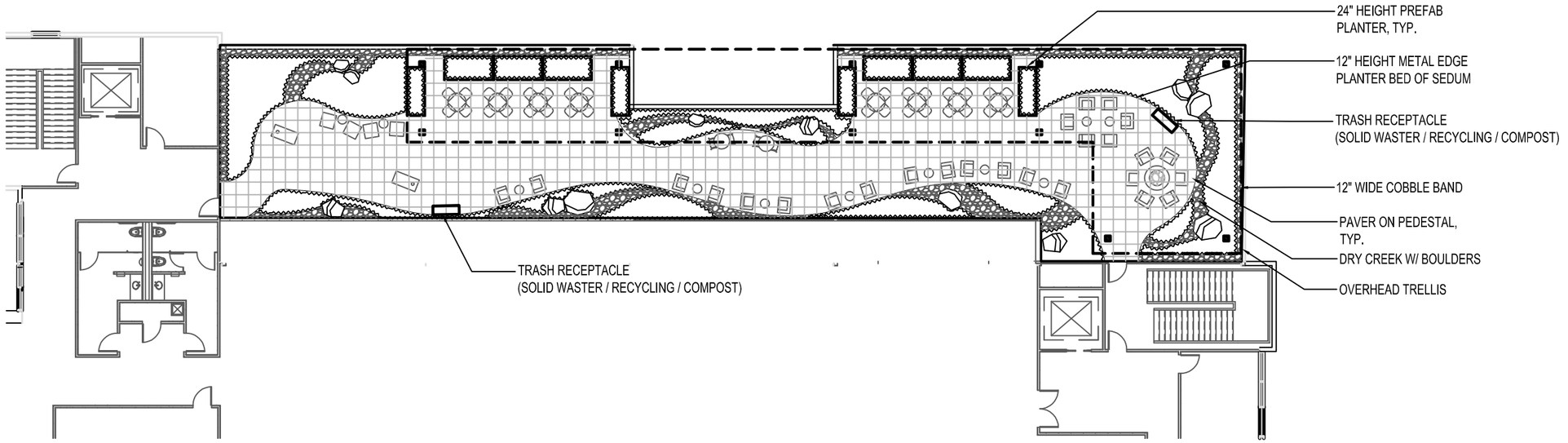
04-15-2021	D.R.T. REVIEW
06-23-2021	C.U.P. SUBMITTAL
10-28-2021	C.U.P. RESPONSE 1
06-22-2022	C.U.P. RESPONSE 2
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07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25 2024	PARKING UPDATE

ENLARGED ROOF DECK PLAN - PHASE 1

L2.2

DES ARCHITECTS ENGINEERS

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1 1320 WILLOW ROOF DECK ENLARGEMENT
SCALE: 1" = 20'–0"

0 10' 20' 40'

N

TARLTON

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05-26-2021	C.U.P. SUBMITTAL
10-15-2021	C.U.P. RESPONSE 1
06-17-2022	C.U.P. RESPONSE 2
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09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

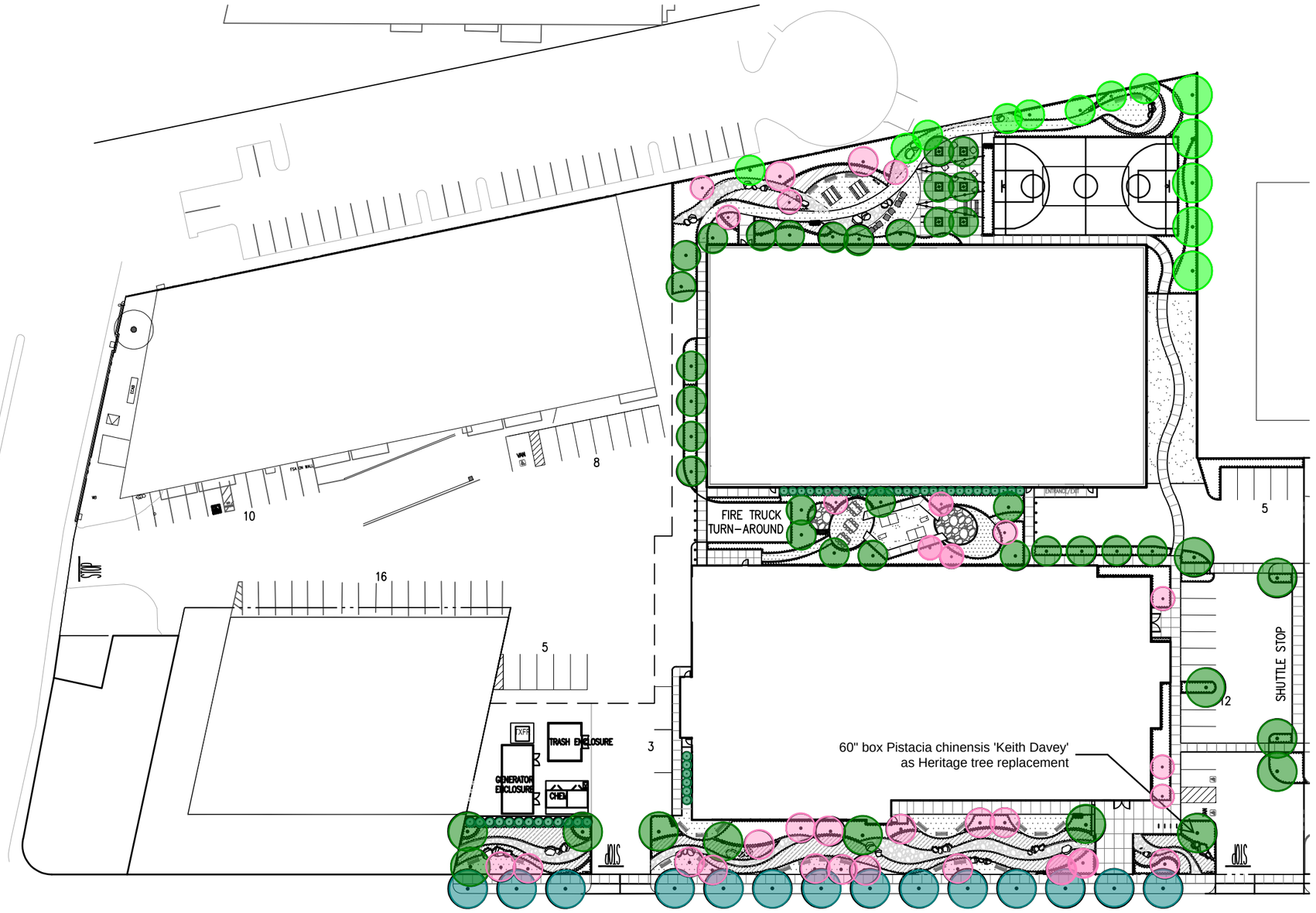
ENLARGED ROOF DECK PLAN - PHASE 2

L2.2a

DES ARCHITECTS ENGINEERS

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PLANTING PALETTE *All proposed trees to be 24" box unless noted

	BOTANICAL NAME / COMMON NAME	WUCOLS
STREET TREE total : 14	Koelreuteria bipinnata/ Chinese Flame Tree	MOD
	Quercus buckleyi/ Texas Red Oak	MOD
	Tilia tomentosa/ Silver Linden	LOW
SCREEN TREE total : 13	Pinus canariensis/ Canary Island Pine	LOW
	Quercus tomentella/ Island Oak	V.LOW
CANOPY TREE total : 42	Acer rubrum 'October Glory'/ October Glory Maple	MOD
	Ginkgo biloba 'Autumn Gold'/ Autumn Gold ginkgo	MOD
	Pistacia chinensis 'Keith Davey'/ Keith Davey Chinese Pistache	LOW
	Platanus acerifolia 'Columbia'/ London Plane Tree	MOD
	Ulmus parvifolia 'True Green'/ Chinese Elm 'True Green'	LOW
ACCENT TREE total : 31	Magnolia grandiflora 'Little Gem'/Little Gem Magnolia	MOD
	Cercis occidentalis/ Western Redbud	LOW
	Lophostemon confertus/ Brisbane Box	MOD
	Lagerstroemia indica x fauriei 'Muskogee'/ Muskogee Crape Myrtle	LOW
	Ulmus parvifolia 'True Green'/ Chinese Elm 'True Green'	LOW
SCREEN HEDGE (15 GALLON)	Pittosporum tenuifolium 'Silver Sheen' / Silver Sheen Kohuhu	MOD
	Ligustrum japonicum 'Texanum' / Waxleaf Privet	MOD

TARLTON

985 & 1001 O'BRIEN DR
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10-15-2021	C.U.P. RESPONSE 1
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10-27-2022	C.U.P. RESPONSE 3
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07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

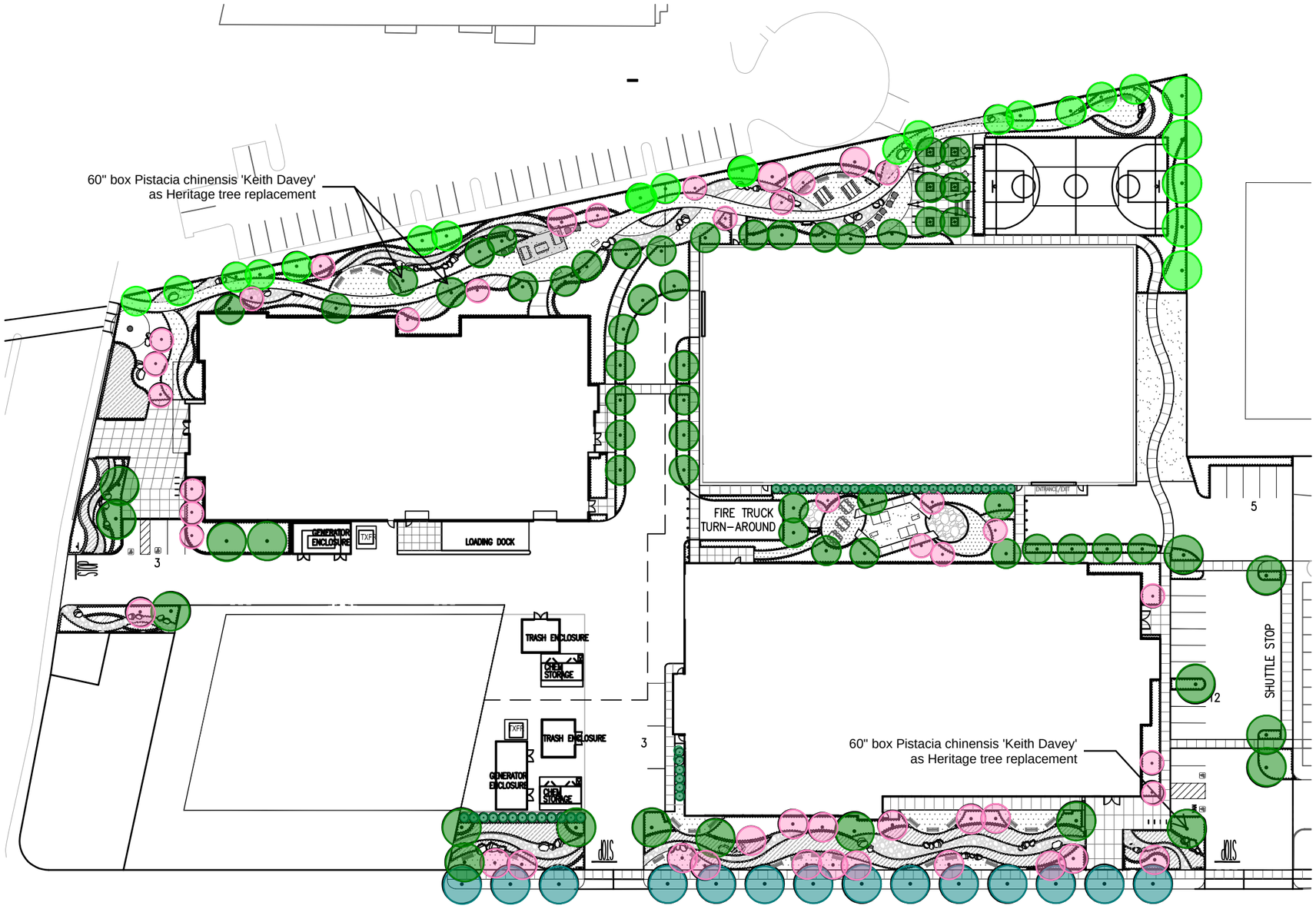
PROPOSED PLANTING PLAN - PHASE 1

L2.3A

DES ARCHITECTS ENGINEERS

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PLANTING PALETTE *All proposed trees to be 24" box unless noted

	BOTANICAL NAME / COMMON NAME	WUCOLS
STREET TREE total : 14	Koelreuteria bipinnata/ Chinese Flame Tree	MOD
	Quercus buckleyi/ Texas Red Oak	MOD
	Tilia tomentosa/ Silver Linden	LOW
SCREEN TREE total : 23	Pinus canariensis/ Canary Island Pine	LOW
	Quercus tomentella/ Island Oak	V.LOW
CANOPY TREE total : 63	Acer rubrum 'October Glory'/ October Glory Maple	MOD
	Ginkgo biloba 'Autumn Gold'/ Autumn Gold ginkgo	MOD
	Pistacia chinensis 'Keith Davey'/ Keith Davey Chinese Pistache	LOW
	Platanus acerifolia 'Columbia'/ London Plane Tree	MOD
	Ulmus parvifolia 'True Green'/ Chinese Elm 'True Green'	LOW
ACCENT TREE total : 45	Magnolia grandiflora 'Little Gem'/Little Gem Magnolia	MOD
	Cercis occidentalis/ Western Redbud	LOW
	Lophostemon confertus/ Brisbane Box	MOD
	Lagerstroemia indica x fauriei 'Muskogee'/ Muskogee Crape Myrtle	LOW
	Ulmus parvifolia 'True Green'/ Chinese Elm 'True Green'	LOW
SCREEN HEDGE (15 GALLON)	Pittosporum tenuifolium 'Silver Sheen' / Silver Sheen Kohuhu	MOD
	Ligustrum japonicum 'Texanum' / Waxleaf Privet	MOD

TARLTON

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MENLO PARK, CA 94025

10-15-2021	C.U.P. RESPONSE 1
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10-27-2022	C.U.P. RESPONSE 3
02-03-2023	C.U.P. RESPONSE 4
07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

PROPOSED PLANTING PLAN - PHASE 2

L2.3B

DES ARCHITECTS ENGINEERS

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TARLTON

1005 O'BRIEN DR
MENLO PARK, CA

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05-26-2021	C.U.P. SUBMITTAL		
10-28-2021	C.U.P. RESPONSE 1		
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10-27-2022	C.U.P. RESPONSE 3		
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07-12-2023	C.U.P. RESPONSE 5		
09-29-2023	C.U.P. RESPONSE 6		

PROPOSED LANDSCAPE IMAGERY

L3

DES ARCHITECTS ENGINEERS

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a: Bench



b: Lounge chairs & Side Table



c: Bistro Table



d: Dining Table



e: Picnic Table



f: Drinking Fountain



g: Ping Pong Table



h: Corn Holes



i: Bike Rack



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TARLTON

985 & 1001 O'BRIEN DR
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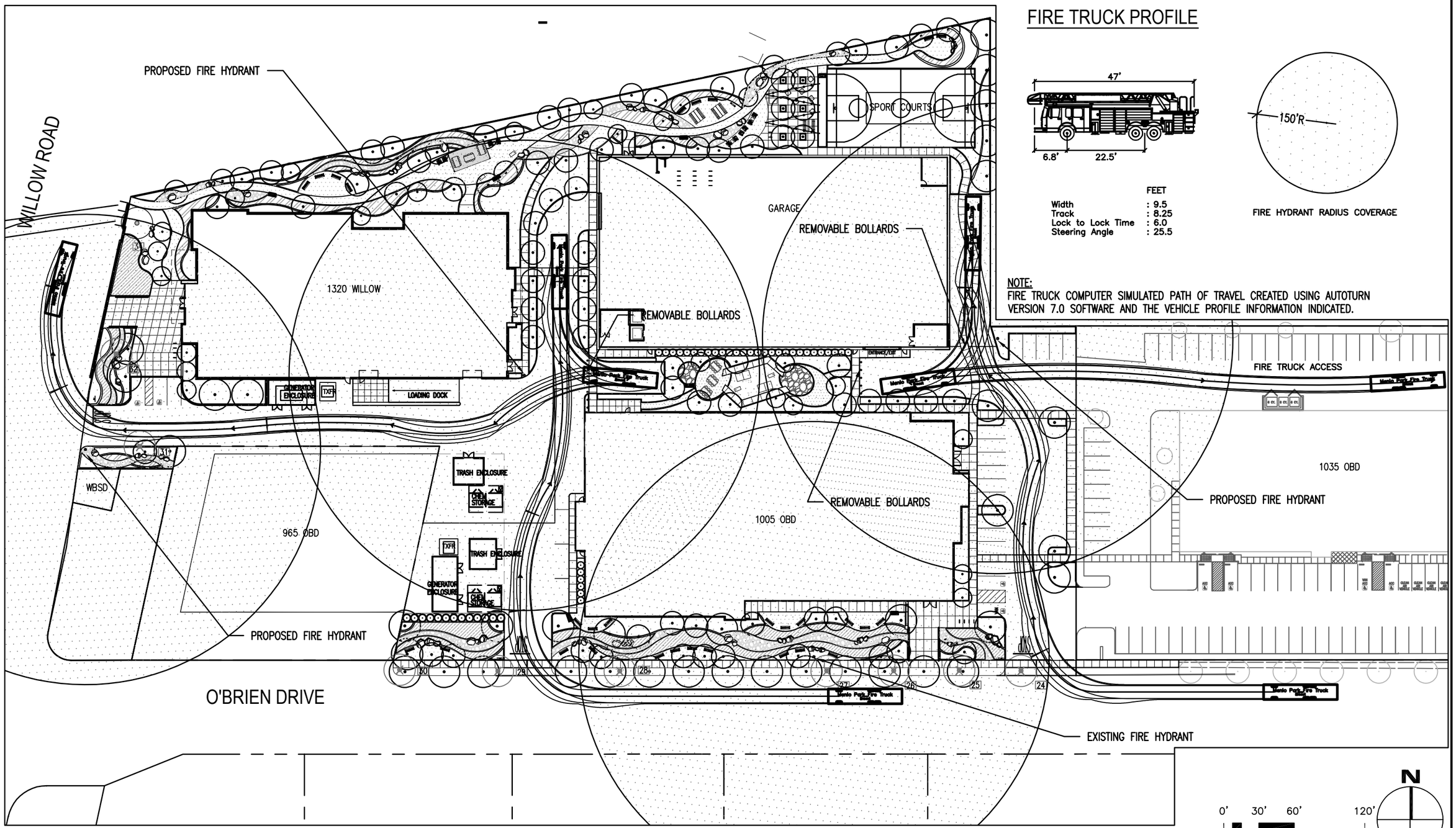
06-22-2022	C.U.P. RESPONSE 2
10-28-2022	C.U.P RESPONSE 3
02-17-2023	C.U.P. RESPONSE 4
07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25 2024	PARKING UPDATE

PROPOSED PUBLIC AMENITY IMAGERY

L4

DES ARCHITECTS ENGINEERS

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FIRE TRUCK PROFILE

	FEET
Width	: 9.5
Track	: 8.25
Lock to Lock Time	: 6.0
Steering Angle	: 25.5

FIRE HYDRANT RADIUS COVERAGE

NOTE:
FIRE TRUCK COMPUTER SIMULATED PATH OF TRAVEL CREATED USING AUTOTURN VERSION 7.0 SOFTWARE AND THE VEHICLE PROFILE INFORMATION INDICATED.

TARLTON

985 & 1001 O'BRIEN DR
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09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

FIRE TRUCK TURNING AND HYDRANT EXHIBIT

C1.1

DES ARCHITECTS ENGINEERS

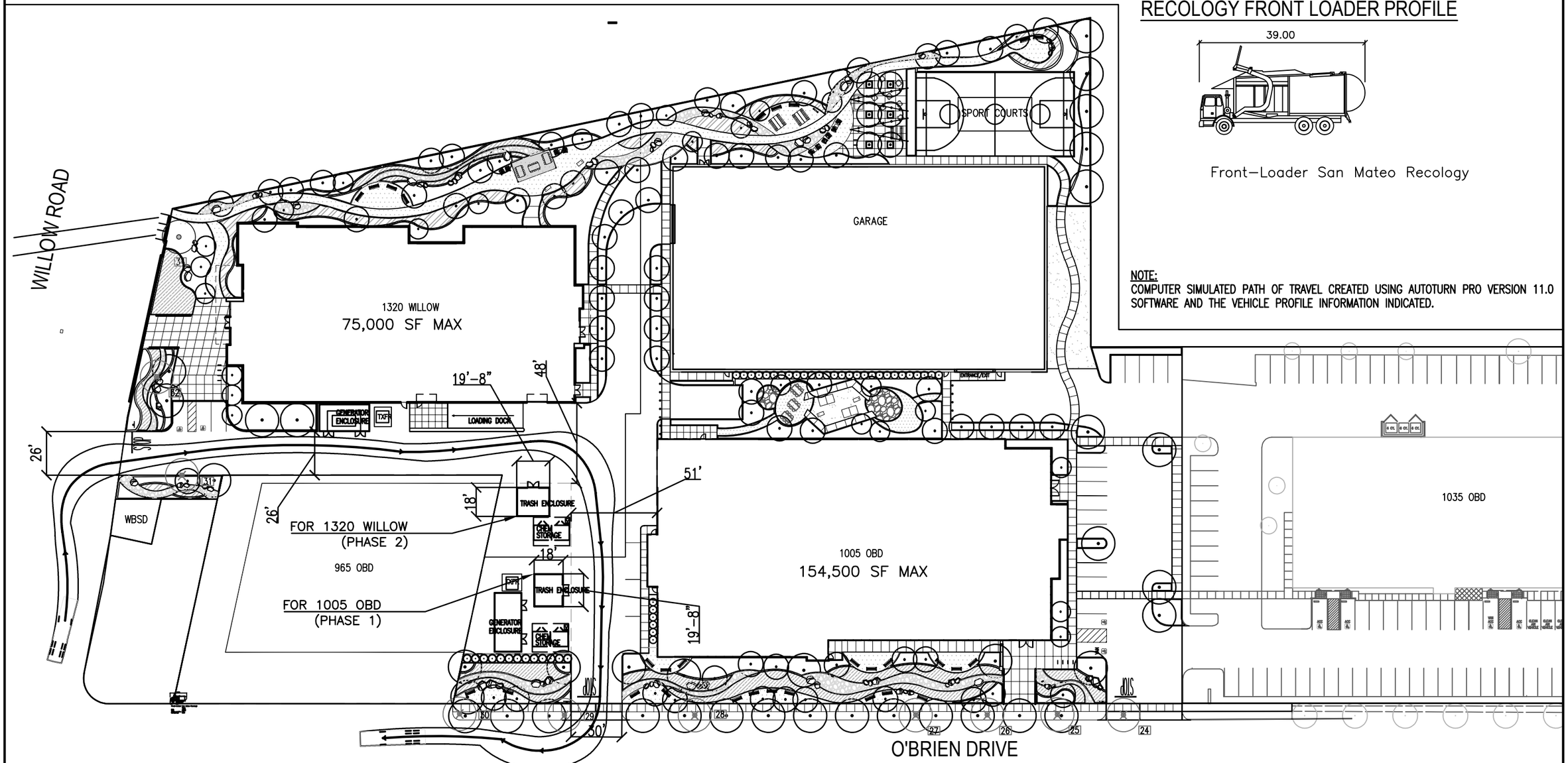
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RECOLOGY FRONT LOADER PROFILE

Front–Loader San Mateo Recology

NOTE:
COMPUTER SIMULATED PATH OF TRAVEL CREATED USING AUTOTURN PRO VERSION 11.0 SOFTWARE AND THE VEHICLE PROFILE INFORMATION INDICATED.



0' 30' 60' 120'

SCALE: 1" = 60'–0"

N

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TARLTON

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07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

RECOLOGY TRUCK TURNING EXHIBIT

C1.2

DES ARCHITECTS ENGINEERS

© 2020

WILLOW ROAD

1320 WILLOW

GENERATOR ENCLOSURE

TXFR

3

WBSD

965 OBD

TRASH ENCLOSURE

CHEM STORAGE

TXFR

GENERATOR ENCLOSURE

CHEM STORAGE

3

GARAGE

SPORT COURTS

FIRE TRUCK TURN-AROUND

1005 OBD

5

12

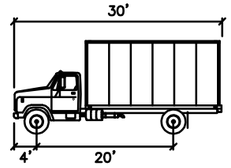
SHUTTLE STOP

1035 OBD

30 29 28 27 26 25 24

O'BRIEN DRIVE

DELIVERY SEMI-AXEL TRUCK PROFILE



FEET

Width	: 8
Track	: 8
Lock to Lock Time	: 6.0
Steering Angle	: 31.8

LEGEND:

10' 10' VISION TRIANGLE AT DRIVEWAY APROACHS

VEHICLE

NOTE:
DELIVERY SEMI-AXEL TRUCK COMPUTER SIMULATED PATH OF TRAVEL CREATED USING AUTOTURN VERSION 7.0 SOFTWARE AND THE VEHICLE PROFILE INFORMATION INDICATED.

N

0' 30' 60' 120'

SCALE: 1" = 60'-0"

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

04-15-2021	D.R.T. REVIEW	02-17-2023	C.U.P. RESPONSE 4
05-26-2021	C.U.P. SUBMITTAL	07-12-2023	C.U.P. RESPONSE 5
10-28-2021	C.U.P. RESPONSE 1	09-29-2023	C.U.P. RESPONSE 6
06-22-2022	C.U.P. RESPONSE 2	06-25 2024	PARKING UPDATE
10-28-2022	C.U.P. RESPONSE 3		

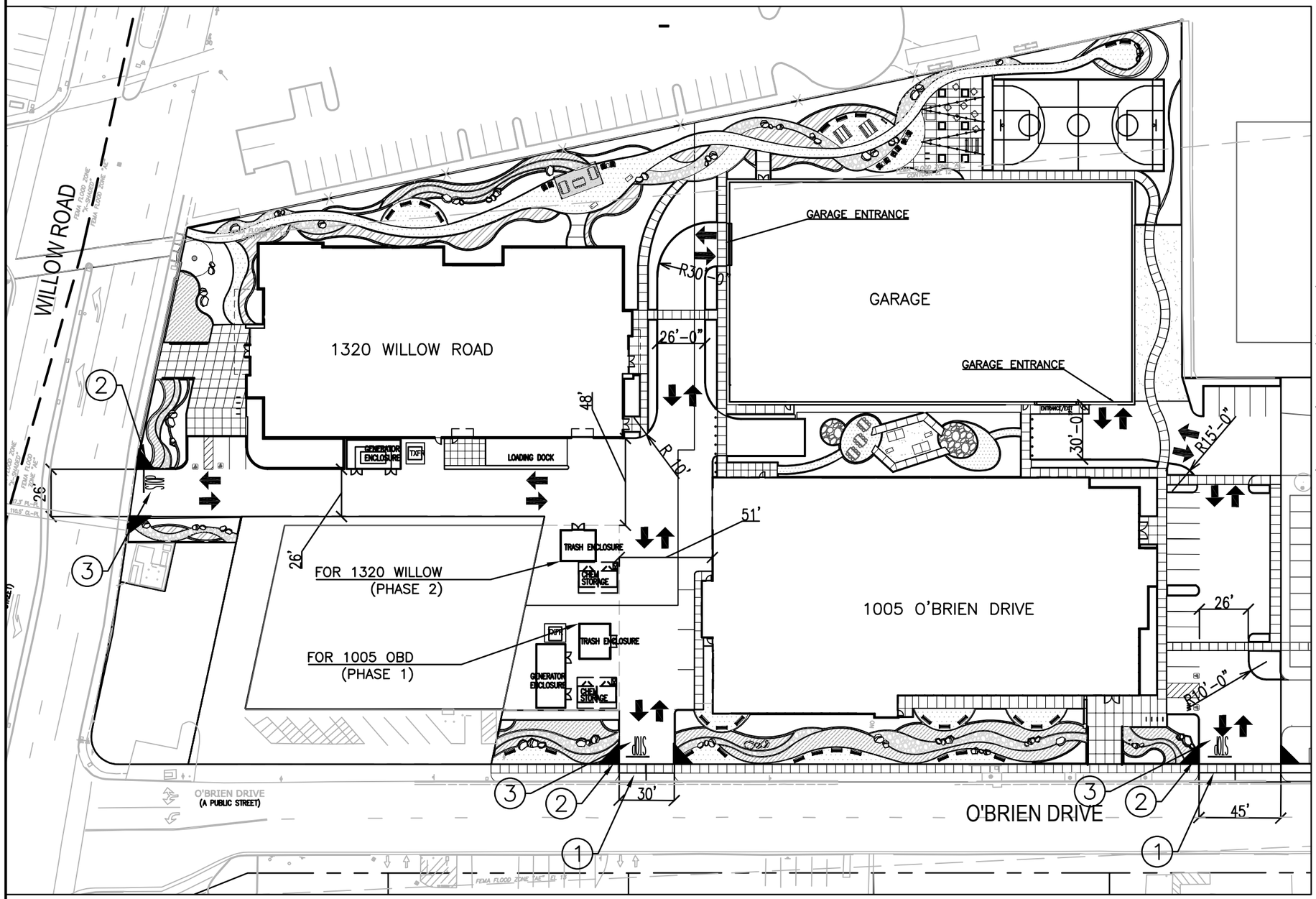
DELIVERY TRUCK EXHIBIT

C1.3

DES ARCHITECTS ENGINEERS

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LEGEND:

DIRECTION OF PARKING CIRCULATION

VISION TRIANGLE AT DRIVEWAY APROACHS

R RADIUS

NOTES:

1. ALL DIMENSIONS TO FACE OF CURB U.N.O. (ALL FTP DIMENSIONS ARE SHOWN TO OUTSIDE WALL EDGES.
2. ALL SIGNS AND ASSOCIATED STRIPING AND PAVEMENT MARKINGS SHOULD BE INSTALLED AT THESE DRIVEWAYS IN ACCORDANCE WITH THE CALIFORNIA–MUTCD.
3. ALL CURB RADIUS, DRIVEWAY WIDTHS, AND SPACING BETWEEN DRIVEWAYS SHALL MEET THE CITY OF MENLO PARK STALL AND DRIVEWAY GUIDELINE DETAILS.
4. LANDSCAPING PROPOSED ON EACH SIDE OF THE PROPOSED DRIVEWAYS SHOULD NOT OBSTRUCT VIEW OF DRIVERS WHILE EXITING.

KEYNOTES:

1. PROPOSED DRIVEWAY TO BE INSTALLED PER CITY OF MENLO PARK STANDARD DETAILS
2. INSTALL STOP SIGN PER CA–MUTCD STANDARD DETAILS.
3. INSTALL "STOP" PAVEMENT MARKING PER CA–MUTCD STANDARD DETAILS.

N

0' 30' 60' 120'

SCALE: 1" = 60'–0"

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

04-15-2021	D.R.T. REVIEW				
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10-28-2022	C.U.P. RESPONSE 3	09-29-2023	C.U.P. RESPONSE 6	06-25-2024	PARKING UPDATE

PARKING CIRCULATION AND STRIPING EXHIBIT

C1.4

DES ARCHITECTS ENGINEERS

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LEGEND:

▬ ▬	BOUNDARY OF WORK LIMIT FOR PHASE 1
TP	TOP OF PAVEMENT
TC	TOP OF CURB
FF	FINISH FLOOR ELEVATION
FH	FIRE HYDRANT
FL	FLOWLINE
FG	FINISH GRADE
RIM	RIM OF SD CATCH BASIN
SDCB	STORM DRAIN CATCH BASIN
AD	AREA DRAIN
HP	HIGH POINT
(E)	EXISTING
(P)	PROPOSED
→	DIRECTION OF SURFACE DRAINAGE
□	CATCH BASIN
	BIORETENTION BASIN
	DG PAVEMENT
	COBBLE BAND
	LANDSCAPE AREA

NOTE:

1. SEE SHEET C6.1 FOR SECTIONS OF EXISTING AND PROPOSED CONDITIONS ALONG O'BRIEN DRIVE AND BOUNDARY.
2. SLOPES WITHIN THE FIRST 10' MUST SLOPE AWAY FORM THE BUILDING AT 5% MIN. FOR PERVIOUS SURFACES AND 2% MIN. FOR IMPERVIOUS AREAS.
3. ALL OFFSITE IMPROVEMENTS SHALL BE PER CITY OF MENLO PARK STANDARD DETAILS.
4. PER MUNICIPAL CODE CHAPTER 16, ELECTRICAL UNDERGROUNDING (LESS THAN 60KV AND COMMUNICATION LINES).

BENCHMARK:

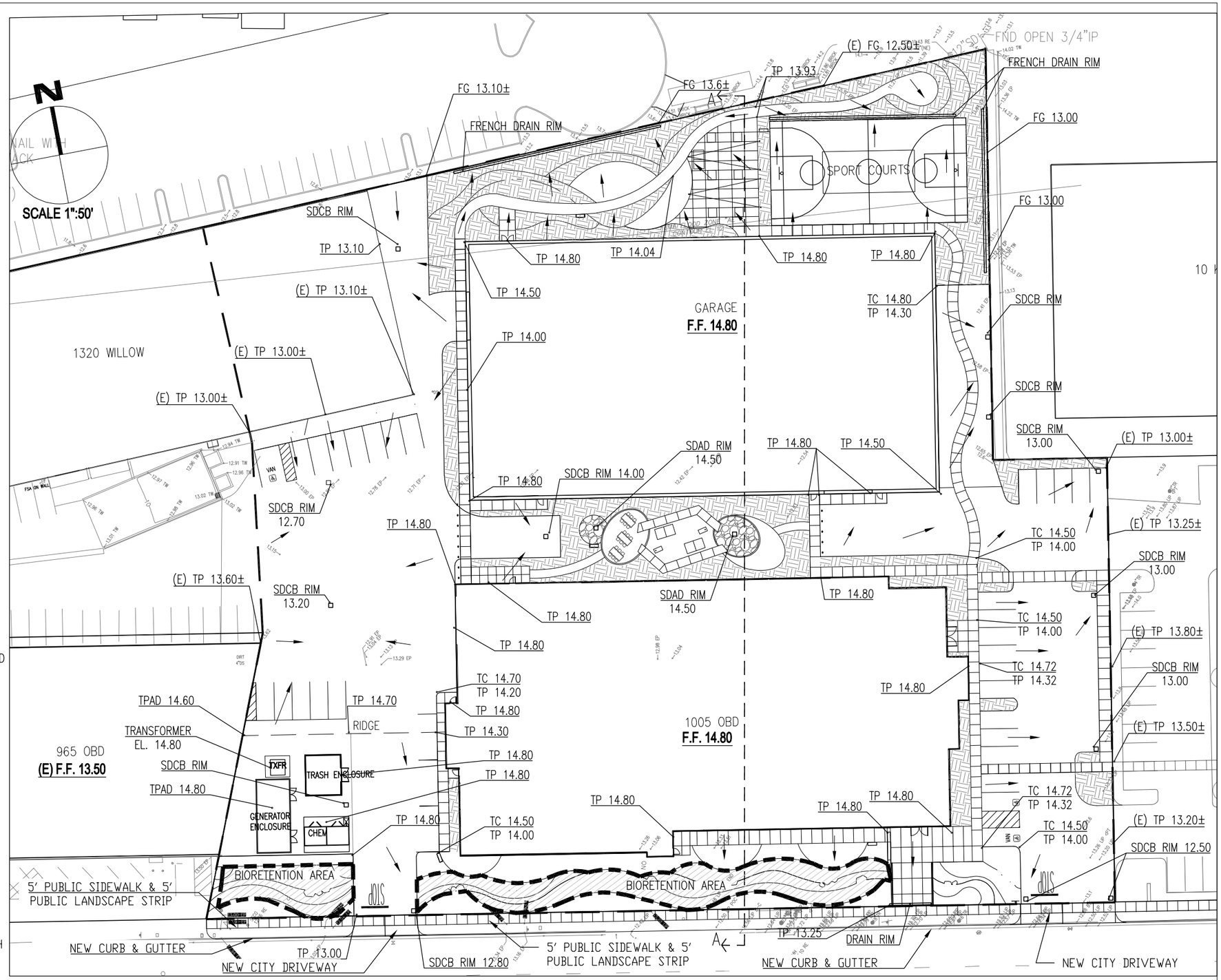
(FROM TOPOGRAPHIC SURVEY PREPARED BY KIER & WRIGHT SURVEYORS: JOB A15124-5 DATED FEB. 2021)

FLOOD ZONE NOTE:

THE SUBJECT PROPERTY IS SHOWN ON THE FEDERAL EMERGENCY MANAGEMENT AGENCY FLOOD INSURANCE RATE MAP, MAP NUMBER 06081C0307E FOR COMMUNITY PANEL NUMBER 060321 0307 E, DATED OCTOBER 16, 2012, WITH THE SITE BEING LOCATED IN FLOOD ZONE "AE";

BASE FLOOD ELEVATION DETERMINED AS 12.8 FEET.

NOTE: THE PROJECT WILL BE DESIGNED AND CONSTRUCTED IN COMPLIANCE WITH CURRENT FEMA REGULATIONS AND CITY'S FLOOD DAMAGE PREVENTION ORDINANCE.



TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

04-15-2021	D.R.T. REVIEW
05-26-2021	C.U.P. SUBMITTAL
10-28-2021	C.U.P. RESPONSE 1
06-22-2022	C.U.P. RESPONSE 2
10-28-2022	C.U.P. RESPONSE 3
02-17-2023	C.U.P. RESPONSE 4
07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

PHASE 1 PRELIMINARY GRADING PLAN

C2.1

DES ARCHITECTS ENGINEERS

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LEGEND:

▬▬ ▬▬	BOUNDARY OF WORK LIMIT FOR PHASE 2
TP	TOP OF PAVEMENT
TC	TOP OF CURB
FF	FINISH FLOOR ELEVATION
FH	FIRE HYDRANT
FL	FLOWLINE
FG	FINISH GRADE
RIM	RIM OF SD CATCH BASIN
SDCB	STORM DRAIN CATCH BASIN
AD	AREA DRAIN
HP	HIGH POINT
(E)	EXISTING
(P)	PROPOSED
→	DIRECTION OF SURFACE DRAINAGE
□	CATCH BASIN
	BIORETENTION BASIN
	DG PAVEMENT
	COBBLE BAND
	LANDSCAPE AREA

NOTE:

1. SEE SHEET C6.1 FOR SECTIONS OF EXISTING AND PROPOSED CONDITIONS ALONG O'BRIEN DRIVE AND BOUNDARY.
2. SLOPES WITHIN THE FIRST 10' MUST SLOPE AWAY FORM THE BUILDING AT 5% MIN. FOR PERVIOUS SURFACES AND 2% MIN. FOR IMPERVIOUS AREAS.

BENCHMARK:

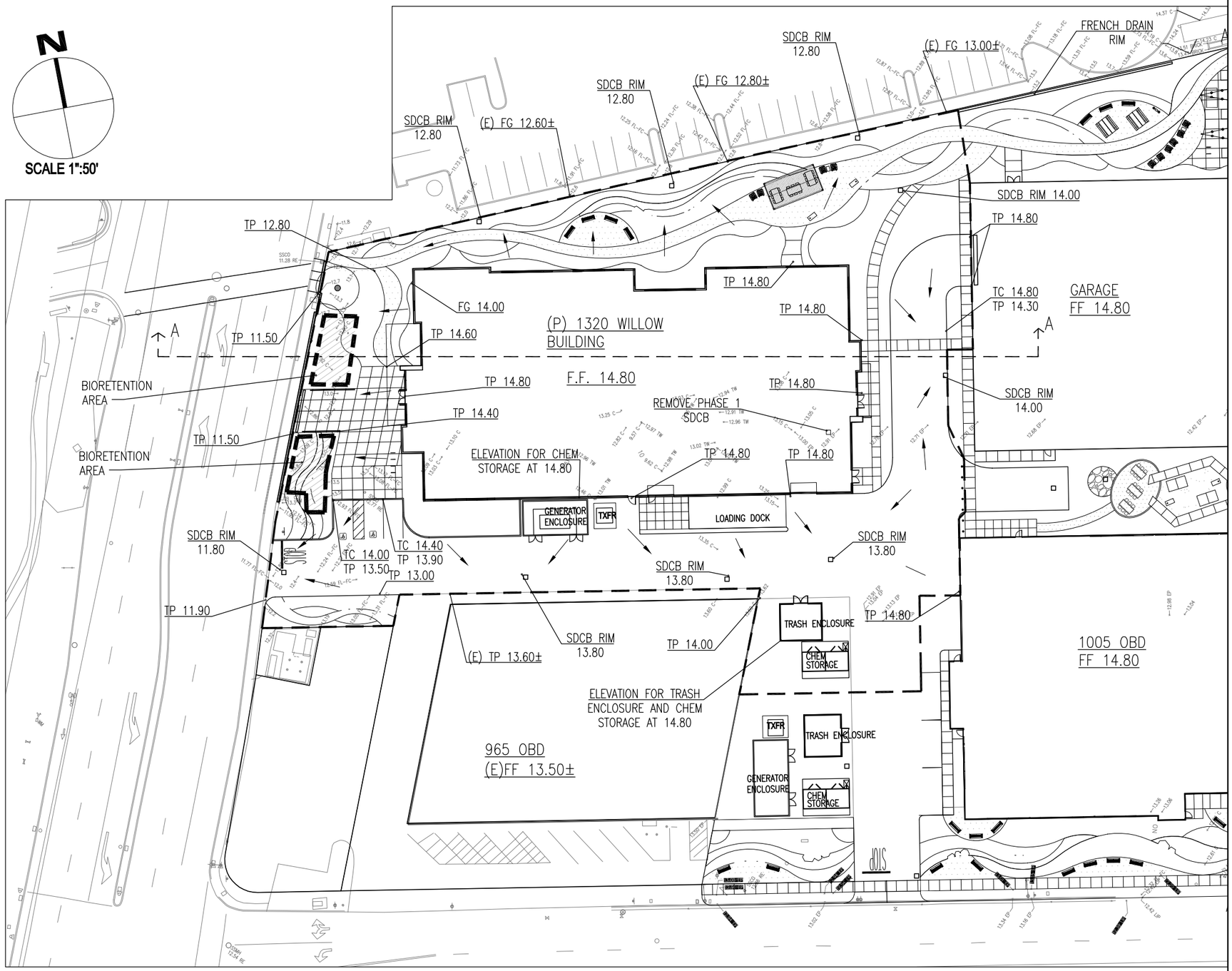
(FROM TOPOGRAPHIC SURVEY PREPARED BY KIER & WRIGHT SURVEYORS: JOB A15124-5 DATED FEB. 2021)

FLOOD ZONE NOTE:

THE SUBJECT PROPERTY IS SHOWN ON THE FEDERAL EMERGENCY MANAGEMENT AGENCY FLOOD INSURANCE RATE MAP, MAP NUMBER 06081C0307E FOR COMMUNITY PANEL NUMBER 060321 0307 E, DATED OCTOBER 16, 2012, WITH THE SITE BEING LOCATED IN FLOOD ZONE "AE";

BASE FLOOD ELEVATION DETERMINED AS 12.8 FEET.

NOTE: THE PROJECT WILL BE DESIGNED AND CONSTRUCTED IN COMPLIANCE WITH CURRENT FEMA REGULATIONS AND CITY'S FLOOD DAMAGE PREVENTION ORDINANCE.



TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

04-15-2021	D.R.T. REVIEW	02-17-2023	C.U.P. RESPONSE 4
05-26-2021	C.U.P. SUBMITTAL	07-12-2023	C.U.P. RESPONSE 5
10-28-2021	C.U.P. RESPONSE 1	09-29-2023	C.U.P. RESPONSE 6
06-22-2022	C.U.P. RESPONSE 2	06-25-2024	PARKING UPDATE
10-28-2022	C.U.P. RESPONSE 3		

PHASE 2 PRELIMINARY GRADING PLAN

C2.2

DES ARCHITECTS ENGINEERS

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SHEET NOTES:

1. DIRECT RUNOFF FROM UNCOVERED PARKING AREAS AND/OR DRIVEWAYS ONTO VEGETATED AREAS.
2. MINIMIZE IMPERVIOUS SURFACES.
3. PRELIMINARY SIZING IS BASED ON THE COUNTY OF SAN MATEO WORKSHEET FOR CALCULATING THE COMBINATION FLOW AND VOLUME METHOD PER SECTION 5.1.3 OF C.3. REGULATED PROJECTS GUIDE.
4. SEE SHEET C3.2A FOR PHASE 2 STORMWATER MANAGEMENT SUMMARY. SEE SHEET C3.3 FOR FINAL CONDITION STORMWATER MANAGEMENT PLAN SUMMARY.

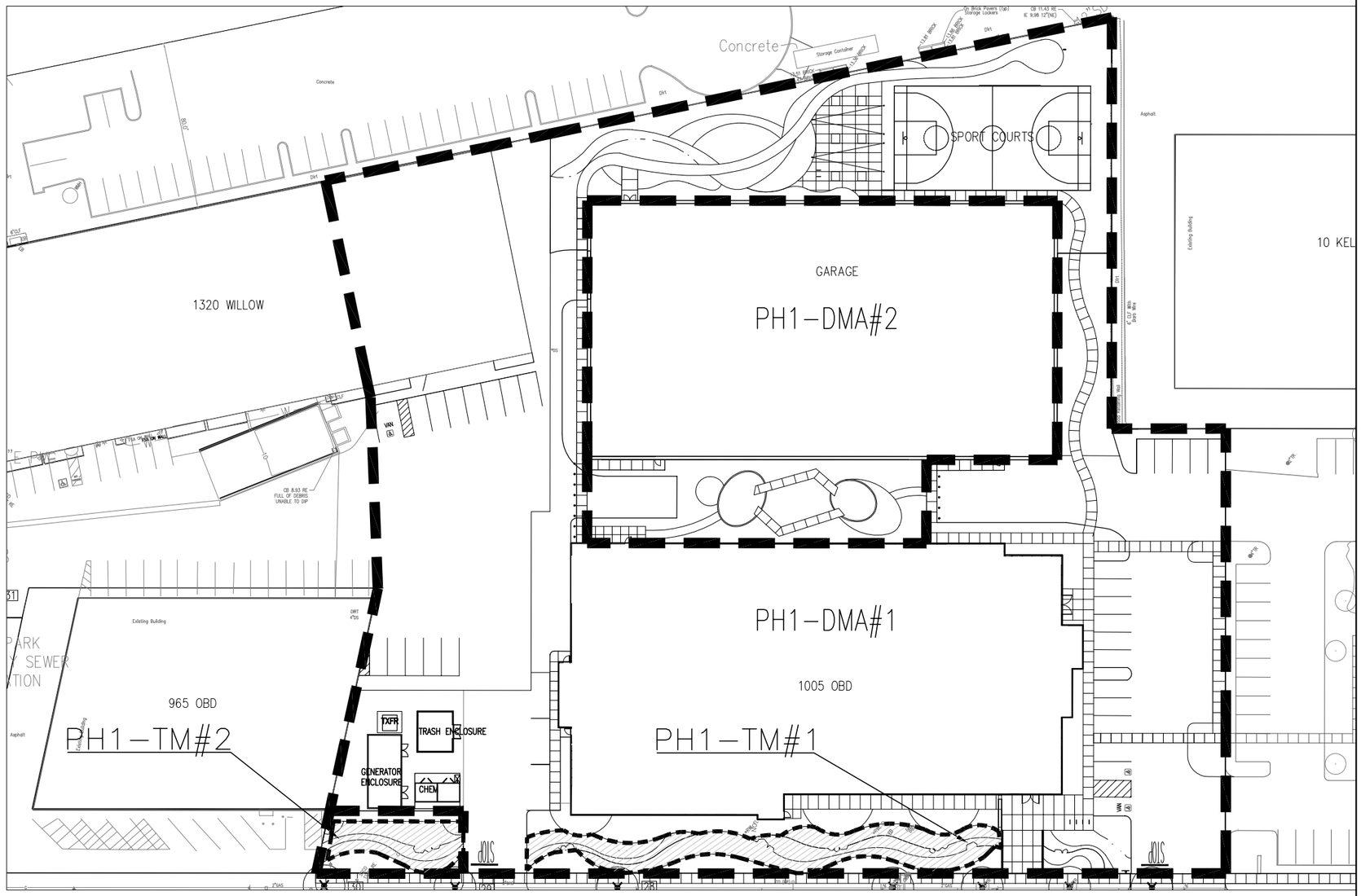
LEGEND:

PROPOSED STORMWATER DRAINAGE AREA BOUNDARY

BIORETENTION BASIN

ABBREVIATIONS:

PH1–DMA#	PHASE 1 DRAINAGE MANAGEMENT AREA #
PH1–TM#	PHASE 1 TREATMENT MEASURE #



STORMWATER MANAGEMENT TREATMENT MEASURE SUMMARY:

DRAINAGE AREA #	STORMWATER TREATMENT MEASURE	TREATMENT MEASURE DESIGNATION #	TOTAL AREA (SQ. FT.)	IMPERVIOUS AREA (SQ. FT.)	PERVIOUS AREA (SQ. FT)	EFFECTIVE IMPERVIOUS AREA (SQ. FT)	TREATMENT AREA REQUIRED (SQ.FT.)	TREATMENT AREA PROVIDED (SQ. FT.)
PH1–DMA#1	BIORETENTION AREA	PH1–TM#1	112165	90384	21781	92560	2800	3290
PH1–DMA#2	BIORETENTION BASIN	PH1–TM#2	34390	31507	2883	31795	960	1200

N

SCALE 1": 60'

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

PHASE 1 PRELIMINARY STORMWATER MANAGEMENT PLAN

04-15-2021	D.R.T. REVIEW	02-17-2023	C.U.P. RESPONSE 4
05-26-2021	C.U.P. SUBMITTAL	07-12-2023	C.U.P. RESPONSE 5
10-28-2021	C.U.P. RESPONSE 1	09-29-2023	C.U.P. RESPONSE 6
06-22-2022	C.U.P. RESPONSE 2	06-25 2024	PARKING UPDATE
10-28-2022	C.U.P. RESPONSE 3		

C3.1A

DES ARCHITECTS ENGINEERS

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LEGEND

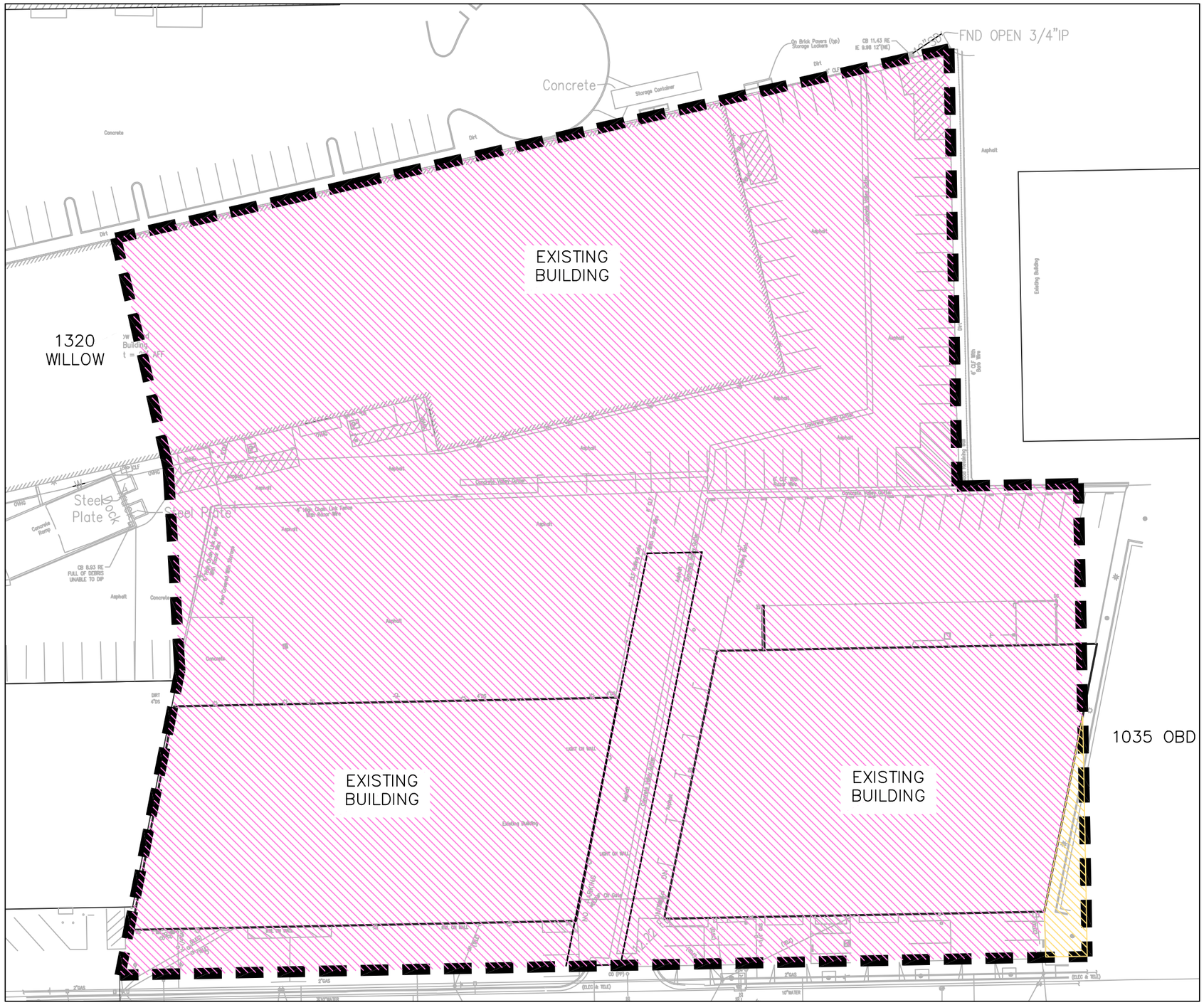
PROPERTY BOUNDARY

EXISTING IMPERVIOUS AREA

EXISTING PERVIOUS AREA

IMPERVIOUS/PERVIOUS AREA SUMMARY:

	EXISTING
PERVIOUS AREA (SQ. FT.)	1318
IMPERVIOUS AREA (SQ. FT.)	145237
TOTAL AREA (SQ. FT.)	146555



N

0’ 25’ 50’ 100’

SCALE: 1” = 50’–0”

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

PHASE 1 OVERALL EXISTING PERVIOUS/IMPERVIOUS AREA

04-15-2021	D.R.T. REVIEW
05-26-2021	C.U.P. SUBMITTAL
10-28-2021	C.U.P. RESPONSE 1
06-22-2022	C.U.P. RESPONSE 2
10-28-2022	C.U.P. RESPONSE 3
02-17-2023	C.U.P. RESPONSE 4
07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

C3.1B

DES ARCHITECTS ENGINEERS

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LEGEND

PROPERTY BOUNDARY

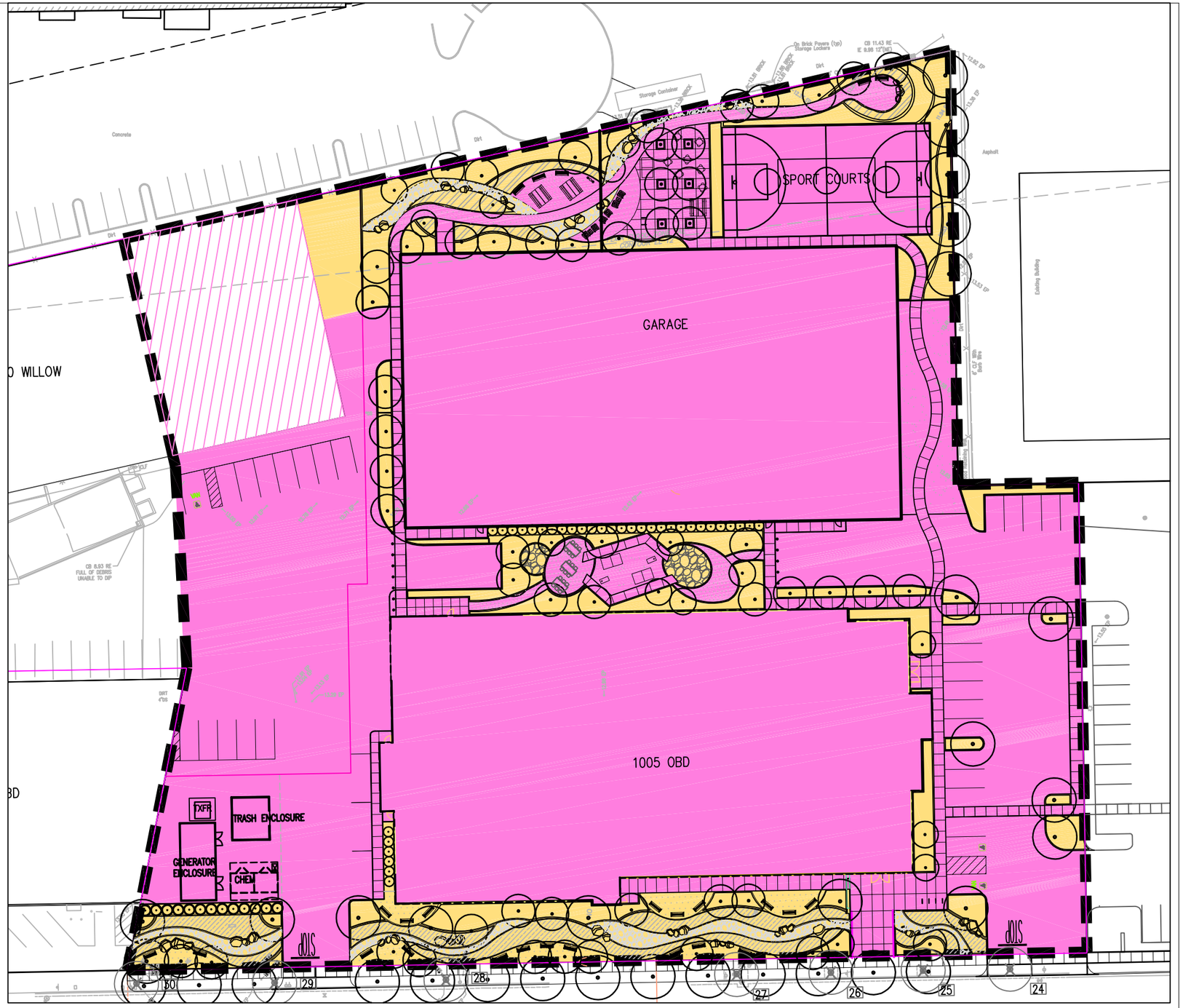
EXISTING IMPERVIOUS AREA

PROPOSED IMPERVIOUS AREA

PROPOSED PERVIOUS AREA

IMPERVIOUS/PERVIOUS AREA SUMMARY:

	PROPOSED
PERVIOUS AREA (SQ. FT.)	24664
IMPERVIOUS AREA (SQ. FT.)	121891
TOTAL AREA (SQ. FT.)	146555



N

0’ 25’ 50’ 100’

SCALE: 1” = 50’–0”

BIM 360://Tarlton - 1005 OBD/10025002_A_1005OBD_SHELL_2020_Central.rvt

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

PHASE 1 OVERALL PROPOSED PERVIOUS/IMPERVIOUS AREA

04-15-2021	D.R.T. REVIEW
05-26-2021	C.U.P. SUBMITTAL
10-28-2021	C.U.P. RESPONSE 1
06-22-2022	C.U.P. RESPONSE 2
10-28-2022	C.U.P. RESPONSE 3
02-17-2023	C.U.P. RESPONSE 4
07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

C3.1C

DES ARCHITECTS ENGINEERS

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SHEET NOTES:

1. DIRECT RUNOFF FROM UNCOVERED PARKING AREAS AND/OR DRIVEWAYS ONTO VEGETATED AREAS.
2. MINIMIZE IMPERVIOUS SURFACES.
3. PRELIMINARY SIZING IS BASED ON THE COUNTY OF SAN MATEO WORKSHEET FOR CALCULATING THE COMBINATION FLOW AND VOLUME METHOD PER SECTION 5.1.3 OF C.3. REGULATED PROJECTS GUIDE.
4. SEE SHEET C3.1A FOR PHASE 1 STORMWATER MANAGEMENT SUMMARY. SEE SHEET C3.3 FOR FINAL CONDITION STORMWATER MANAGEMENT PLAN SUMMARY.

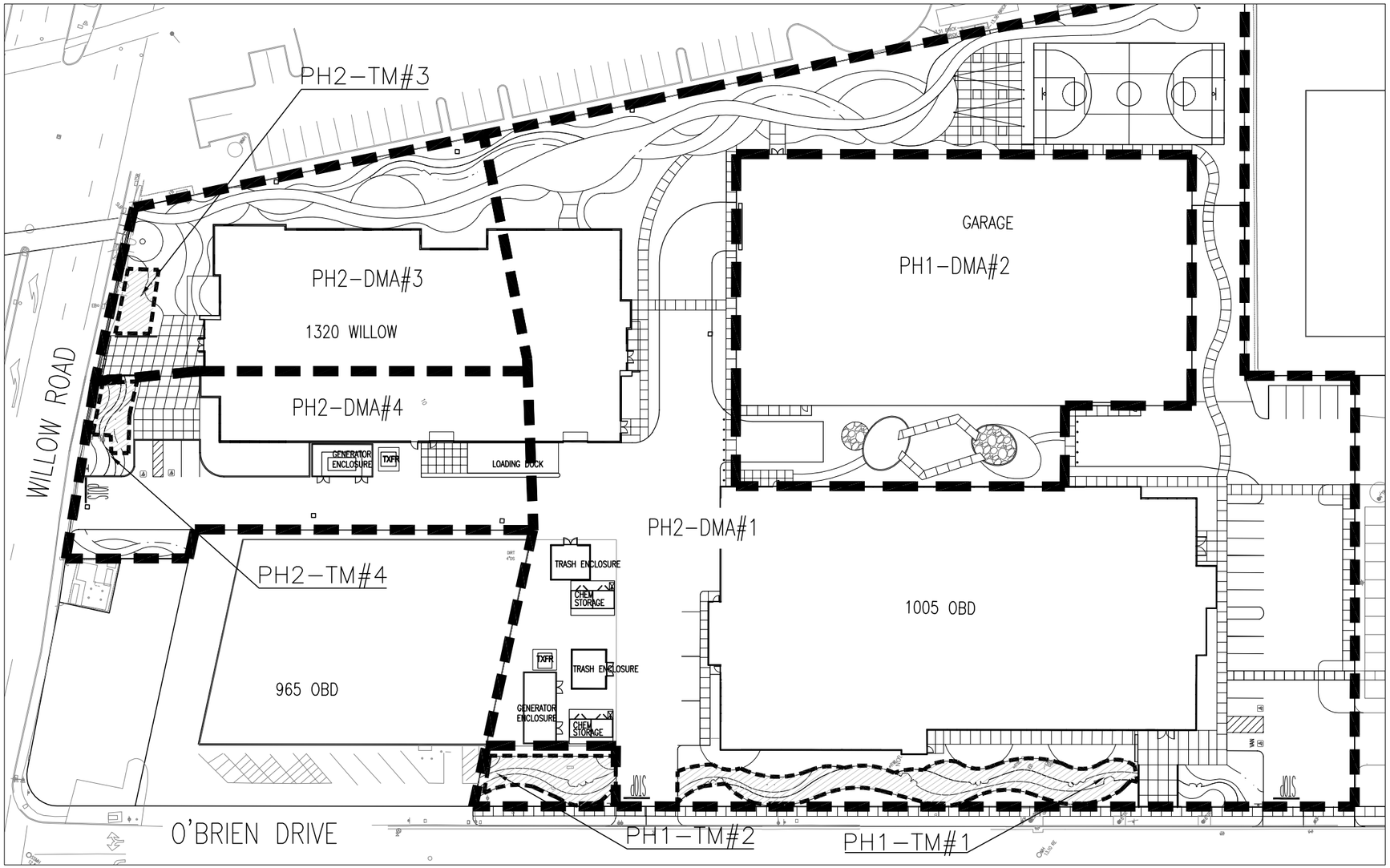
LEGEND:

PROPOSED STORMWATER DRAINAGE AREA BOUNDARY

BIORETENTION BASIN

ABBREVIATIONS:

PH#–DMA#	PHASE # DRAINAGE MANAGEMENT AREA #
PH#–TM#	PHASE # TREATMENT MEASURE #



STORMWATER MANAGEMENT TREATMENT MEASURE SUMMARY:

DRAINAGE AREA #	STORMWATER TREATMENT MEASURE	TREATMENT MEASURE DESIGNATION #	TOTAL AREA (SQ. FT.)	IMPERVIOUS AREA (SQ. FT.)	PERVIOUS AREA (SQ. FT)	EFFECTIVE IMPERVIOUS AREA (SQ. FT)	TREATMENT AREA REQUIRED (SQ.FT.)	TREATMENT AREA PROVIDED (SQ. FT.)
PH2–DMA#3	BIORETENTION AREA	PH2–TM#3	19170	13394	5776	13972	423	500
PH2–DMA#4	BIORETENTION AREA	PH2–TM#4	18030	14930	3100	15240	462	520

N

SCALE 1": 60'

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

PHASE 2 PRELIMINARY STORMWATER MANAGEMENT PLAN

04-15-2021	D.R.T. REVIEW	02-17-2023	C.U.P. RESPONSE 4
05-26-2021	C.U.P. SUBMITTAL	07-12-2023	C.U.P. RESPONSE 5
10-28-2021	C.U.P. RESPONSE 1	09-29-2023	C.U.P. RESPONSE 6
06-22-2022	C.U.P. RESPONSE 2	06-25 2024	PARKING UPDATE
10-28-2022	C.U.P. RESPONSE 3		

C3.2A

DES ARCHITECTS ENGINEERS

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LEGEND

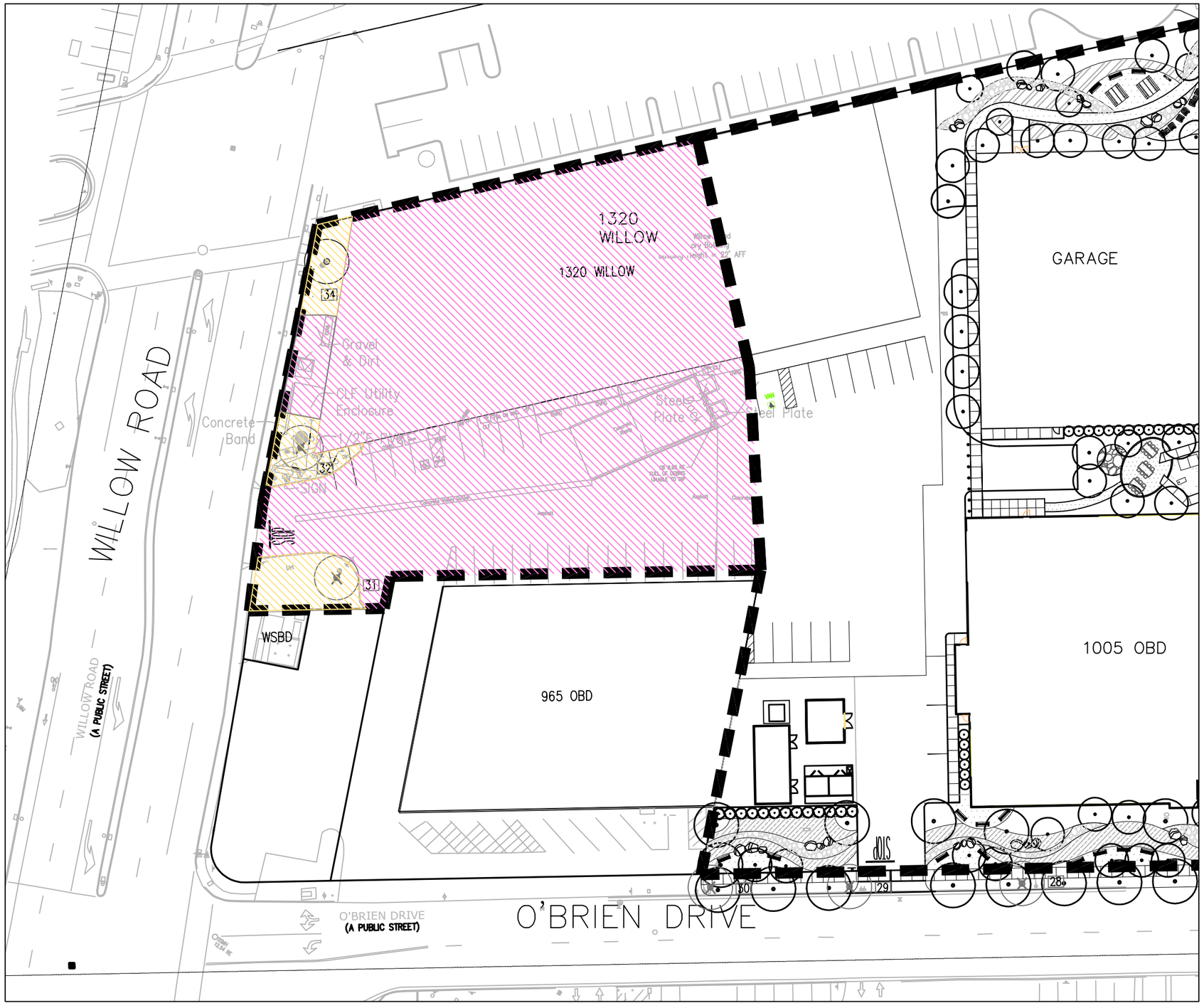
LIMIT OF DRAINAGE SHED AREA

EXISTING IMPERVIOUS AREA

EXISTING PERVIOUS AREA

IMPERVIOUS/PERVIOUS AREA SUMMARY:

	EXISTING
PERVIOUS AREA (SQ. FT.)	2612
IMPERVIOUS AREA (SQ. FT.)	34588
TOTAL AREA (SQ. FT.)	37200



N

0' 25' 50' 100'

SCALE: 1" = 50'-0"

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

04-15-2021	D.R.T. REVIEW
05-26-2021	C.U.P. SUBMITTAL
10-28-2021	C.U.P. RESPONSE 1
06-22-2022	C.U.P. RESPONSE 2
10-28-2022	C.U.P. RESPONSE 3
02-17-2023	C.U.P. RESPONSE 4
07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25 2024	PARKING UPDATE

PHASE 2 OVERALL EXISTING PERVIOUS/IMPERVIOUS AREA

C3.2B

DES ARCHITECTS ENGINEERS

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LEGEND

LIMIT OF DRAINAGE SHED AREA

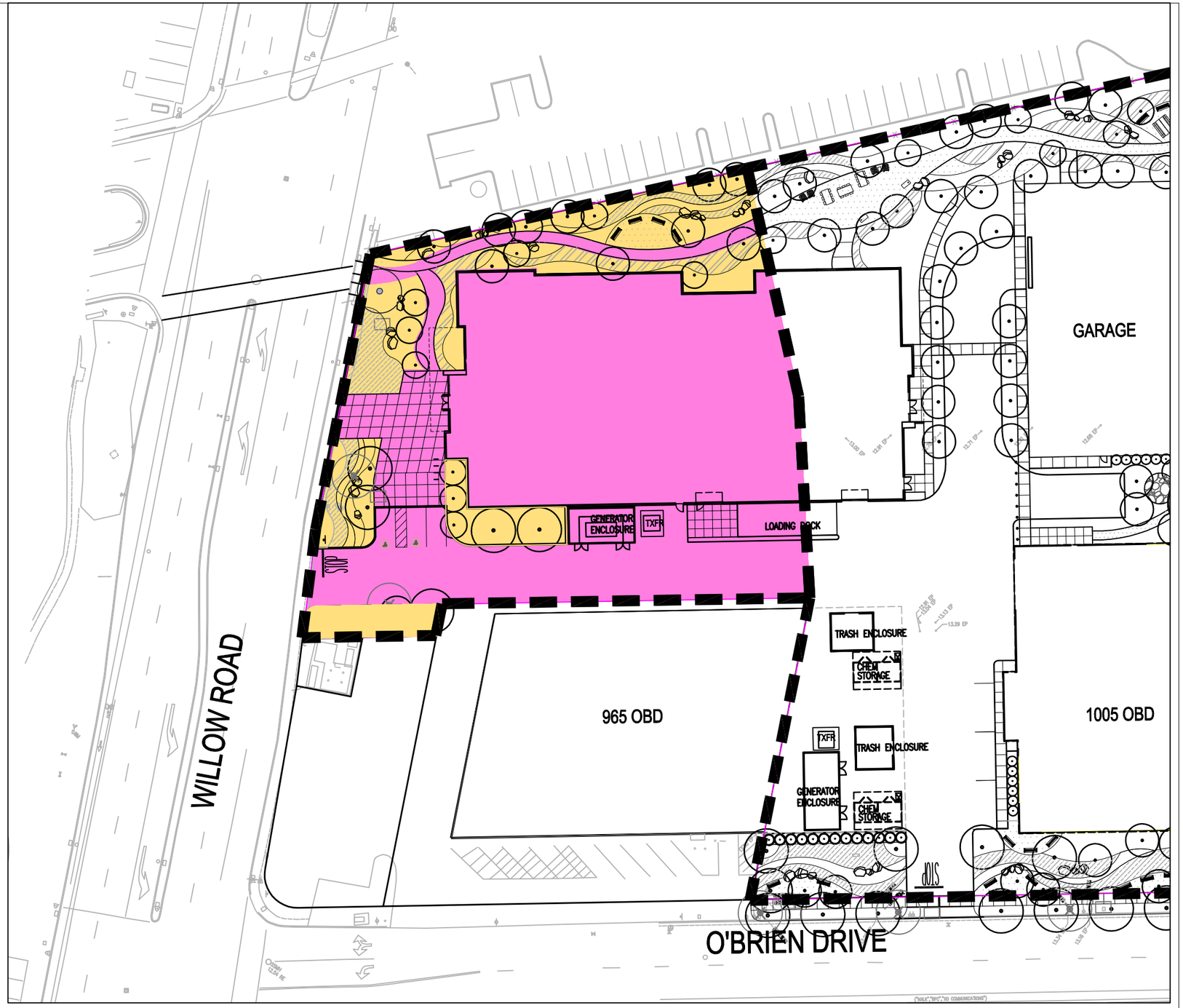
EXISTING IMPERVIOUS AREA

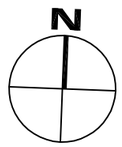
PROPOSED IMPERVIOUS AREA

PROPOSED PERVIOUS AREA

IMPERVIOUS/PERVIOUS AREA SUMMARY:

	PROPOSED
PERVIOUS AREA (SQ. FT.)	8876
IMPERVIOUS AREA (SQ. FT.)	28324
TOTAL AREA (SQ. FT.)	37200





0’ 25’ 50’ 100’

SCALE: 1” = 50’–0”

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

PHASE 2 OVERALL PROPOSED PERVIOUS/IMPERVIOUS AREA

04-15-2021	D.R.T. REVIEW
05-26-2021	C.U.P. SUBMITTAL
10-28-2021	C.U.P. RESPONSE 1
06-22-2022	C.U.P. RESPONSE 2
10-28-2022	C.U.P. RESPONSE 3
02-17-2023	C.U.P. RESPONSE 4
07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

C3.2C

DES ARCHITECTS ENGINEERS

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SHEET NOTES:

1. SEE SHEET C3.1A FOR PHASE 1 STORMWATER MANAGEMENT SUMMARY. SEE SHEET C3.2A FOR PHASE 2 STORMWATER TREATMENT SUMMARY.

LEGEND:

PROPOSED STORMWATER DRAINAGE AREA BOUNDARY

BIORETENTION BASIN

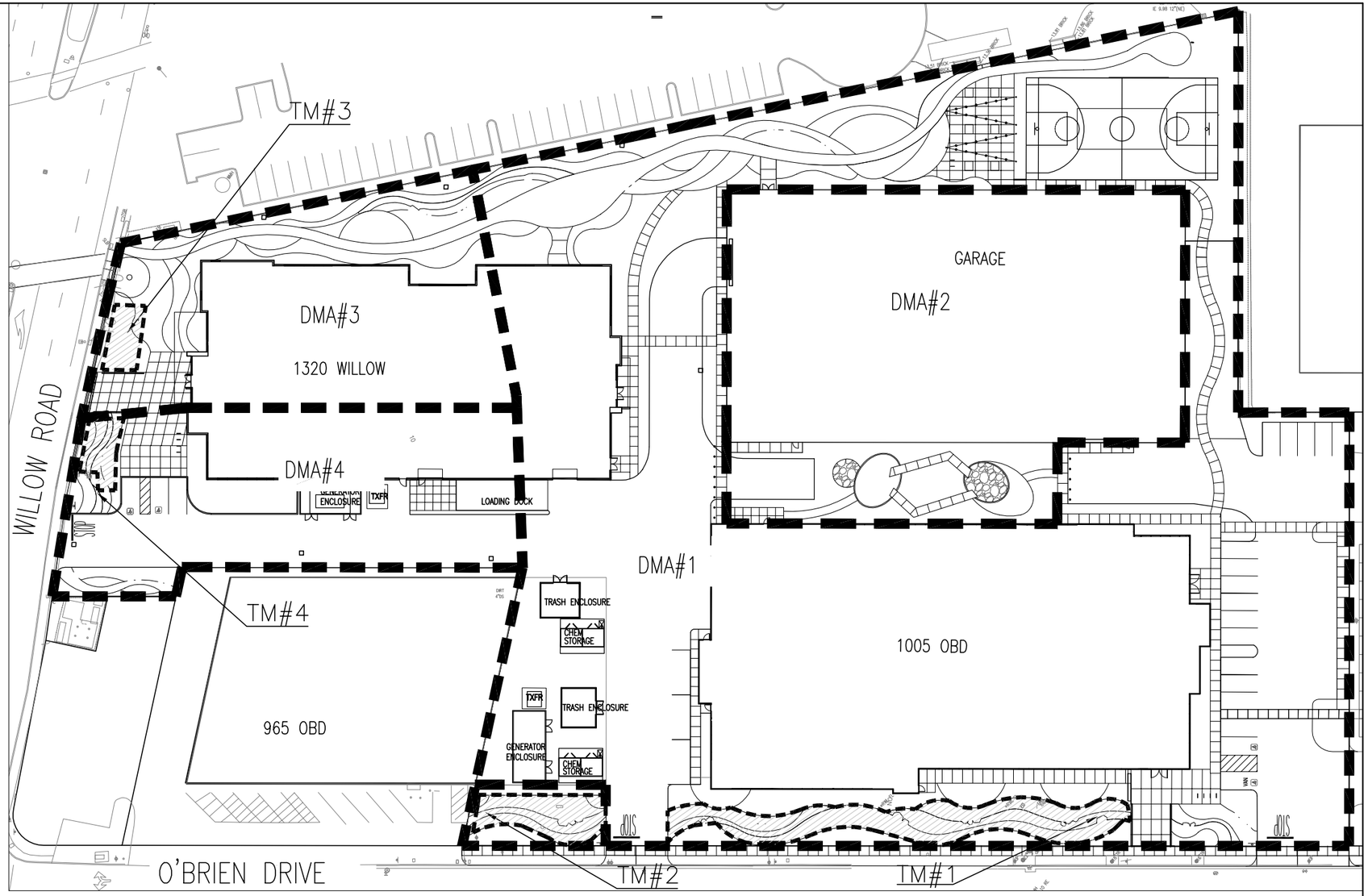
ABBREVIATIONS:

DMA# PHASE # DRAINAGE MANAGEMENT AREA #

TM# PHASE # TREATMENT MEASURE #

IMPERVIOUS/PERVIOUS AREA SUMMARY FOR FULL PROJECT

	FULL PROJECT EXISTING CONDITION	FULL PROJECT PROPOSED CONDITION
PERVIOUS AREA (SQ. FT.)	3930	36896
IMPERVIOUS AREA (SQ. FT.)	179825	146859
TOTAL AREA (SQ. FT.)	183755	183755



IMPERVIOUS/PERVIOUS AREA SUMMARY PER DRAINAGE MANAGEMENT AREAS:

	PHASE 0: DMA#1 AND DMA#2 SD OUTLET INTO O'BRIEN DR.	PHASE 1: DMA#1 AND DMA#2 SD OUTLET INTO O'BRIEN DR.	PHASE 2: DMA#1 AND DMA#2 SD OUTLET INTO O'BRIEN DR.
PERVIOUS AREA (SQ. FT.)	1318	24664	28020
IMPERVIOUS AREA (SQ. FT.)	145237	121891	118535
TOTAL AREA (SQ. FT.)	146555	146555	146555

	PHASE 1: DMA#3 AND DMA#4 SD OUTLET INTO WILLOW RD.	PHASE 2: DMA#1 AND DMA#2 SD OUTLET INTO WILLOW RD.
PERVIOUS AREA (SQ. FT.)	2612	8876
IMPERVIOUS AREA (SQ. FT.)	34588	28324
TOTAL AREA (SQ. FT.)	37200	37200

N

SCALE 1": 60'

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

FINAL CONDITION PRELIMINARY STORMWATER MANAGEMENT PLAN

04-15-2021	D.R.T. REVIEW	02-17-2023	C.U.P. RESPONSE 4
05-26-2021	C.U.P. SUBMITTAL	07-12-2023	C.U.P. RESPONSE 5
10-28-2021	C.U.P. RESPONSE 1	09-29-2023	C.U.P. RESPONSE 6
06-22-2022	C.U.P. RESPONSE 2	06-25-2024	PARKING UPDATE
10-28-2022	C.U.P. RESPONSE 3		

C3.3

DES ARCHITECTS ENGINEERS

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ABBREVIATIONS & LEGEND:

BFP	BACKFLOW PREVENTOR
SS	SANITARY SEWER
SD	STORM DRAIN
TP	TOP OF PAVEMENT
TC	TOP OF CURB
E	ELECTRICAL LINE
FF	FINISH FLOOR ELEVATION
FS	FIRE SERVICE
DW	DOMESTIC WATER
(P)	PROPOSED
SDCB	STORM DRAIN CATCH BASIN
AD	AREA DRAIN
JUT	JOINT UTILITY TRENCH
HP	HIGH POINT
(E)	EXISTING
FH	FIRE HYDRANT
RIM	GRATE OF CATCH BASIN, MANHOLE OR AREA DRAIN RIM ELEVATION
RWL	RAIN WATER LEADER
P.O.C.	POINT OF CONNECTION
P.I.V.	POST INDICATOR VALVE
F.D.C.	FIRE DEPT. CONNECTION

BIORETENTION BASIN

CATCH BASIN

STORM DRAIN MANHOLE

(P) SD — STORM DRAIN LINE

(P) FS LINE

(P) DW LINE

(P) SS LINE

PROPOSED BACKFLOW PREVENTOR DOUBLE DETECTOR CHECK ASSEMBLY

SANITARY SEWER MANHOLE

FDC

PIV

FIRE HYDRANT

BUBBLE-UP STRUCTURE

OVERFLOW STRUCTURE

FUTURE GAS REGULATOR

BOUNDARY OF WORK LIMIT FOR PHASE 1

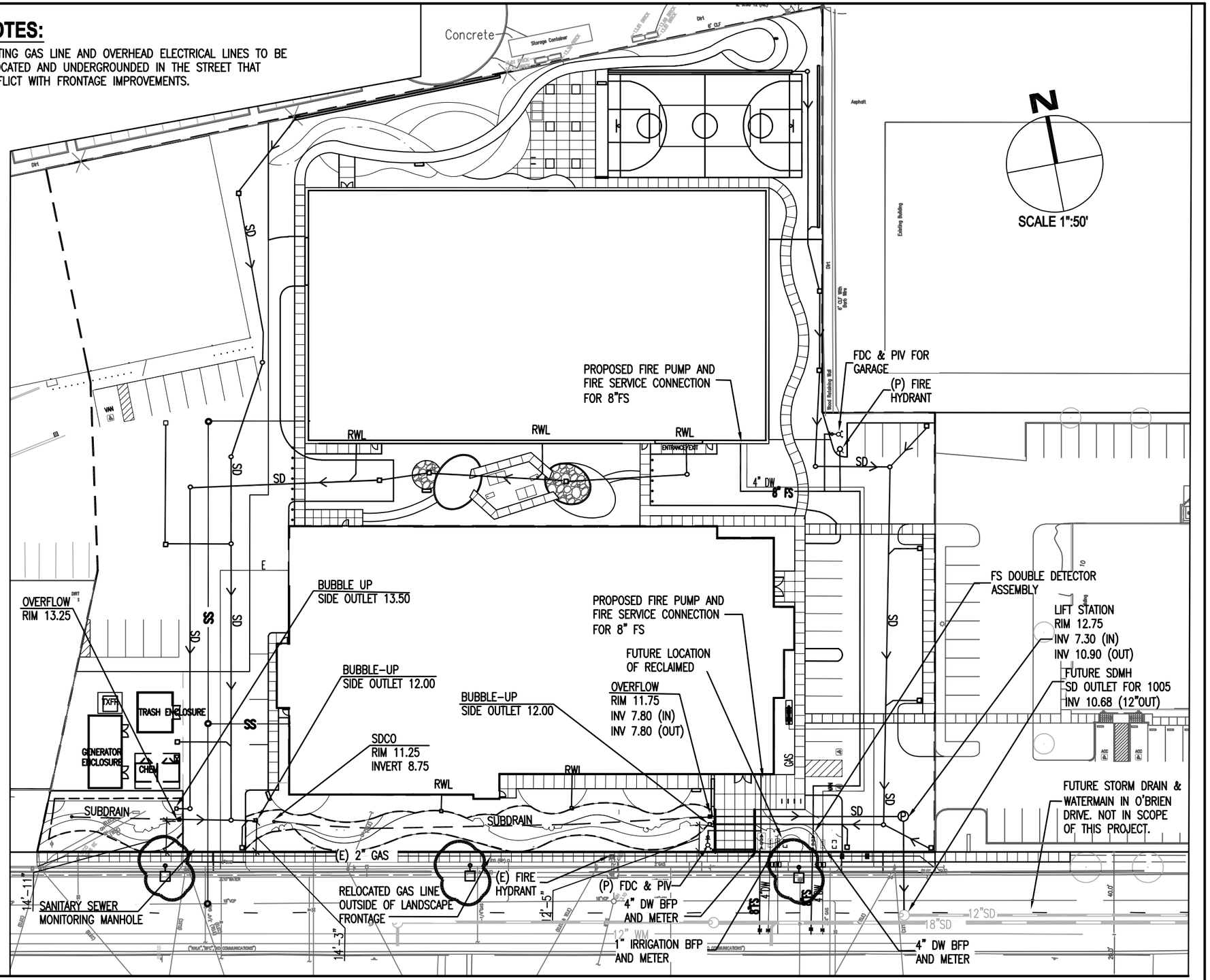
WATER METER PROVIDED IN PUBLIC ROW

WATER VALVES

STREET LIGHTS PER CITY STANDARD DETAILS

NOTES:

EXISTING GAS LINE AND OVERHEAD ELECTRICAL LINES TO BE RELOCATED AND UNDERGROUNDED IN THE STREET THAT CONFLICT WITH FRONTAGE IMPROVEMENTS.



TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

04-15-2021	D.R.T. REVIEW	02-17-2023	C.U.P. RESPONSE 4
05-26-2021	C.U.P. SUBMITTAL	07-12-2023	C.U.P. RESPONSE 5
10-28-2021	C.U.P. RESPONSE 1	09-29-2023	C.U.P. RESPONSE 6
06-22-2022	C.U.P. RESPONSE 2	06-25-2024	PARKING UPDATE
10-28-2022	C.U.P. RESPONSE 3		

PHASE 1 PRELIMINARY UTILITY PLAN

C4.1

DES ARCHITECTS ENGINEERS

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ABBREVIATIONS & LEGEND:

BFP	BACKFLOW PREVENTOR
SS	SANITARY SEWER
SD	STORM DRAIN
TP	TOP OF PAVEMENT
TC	TOP OF CURB
E	ELECTRICAL LINE
FF	FINISH FLOOR ELEVATION
FS	FIRE SERVICE
DW	DOMESTIC WATER
(P)	PROPOSED
SDCB	STORM DRAIN CATCH BASIN
AD	AREA DRAIN
JUT	JOINT UTILITY TRENCH
HP	HIGH POINT
(E)	EXISTING
FH	FIRE HYDRANT
RIM	GRATE OF CATCH BASIN, MANHOLE OR AREA DRAIN RIM ELEVATION
RWL	RAIN WATER LEADER
P.O.C.	POINT OF CONNECTION
P.I.V.	POST INDICATOR VALVE
F.D.C.	FIRE DEPT. CONNECTION

BIORETENTION BASIN

CATCH BASIN

STORM DRAIN MANHOLE

(P) SD — STORM DRAIN LINE

(P) FS LINE

(P) DW LINE

(P) SS LINE

PROPOSED BACKFLOW PREVENTOR DOUBLE DETECTOR CHECK ASSEMBLY

SANITARY SEWER MANHOLE

FDC

PIV

FIRE HYDRANT

BUBBLE–UP STRUCTURE

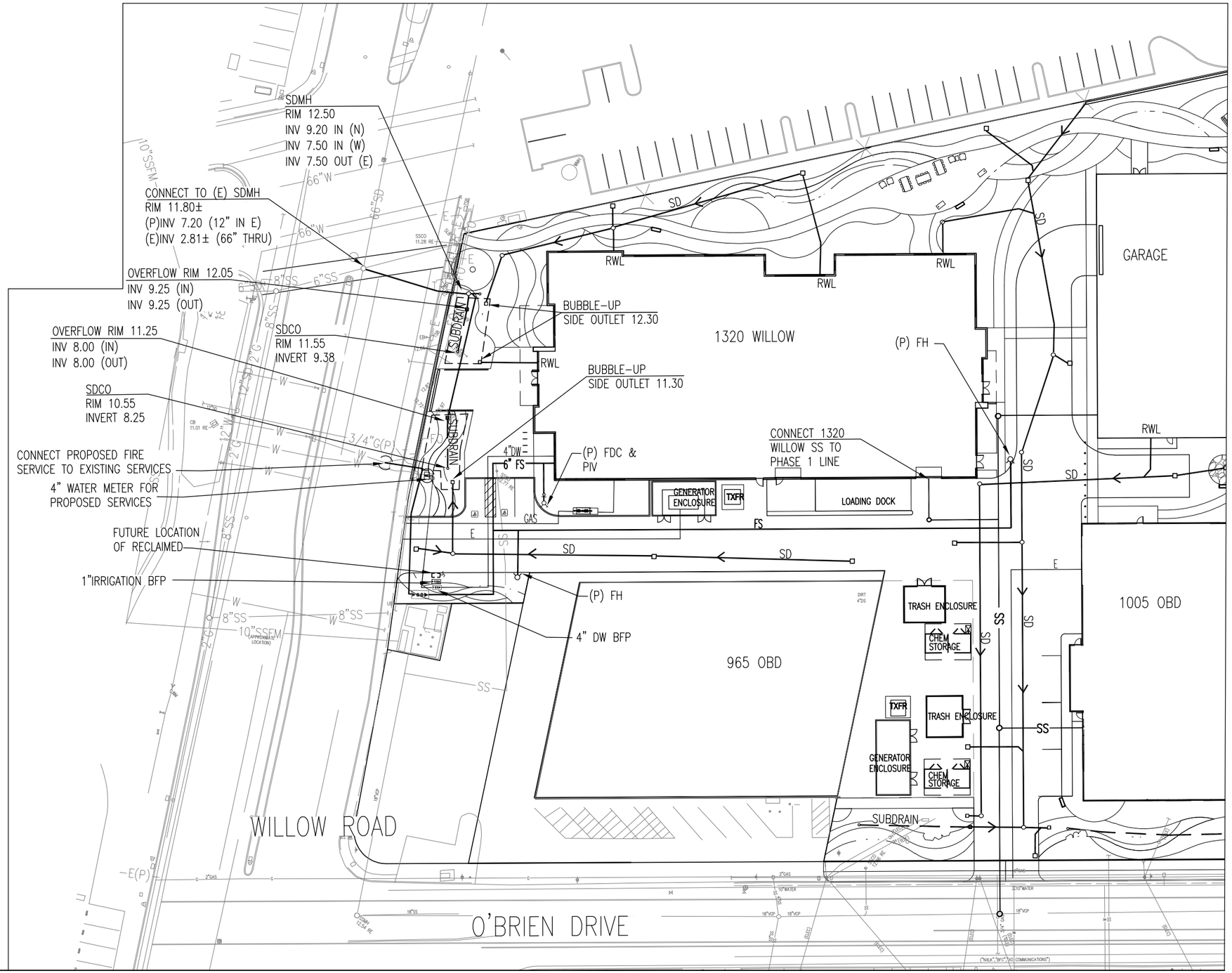
OVERFLOW STRUCTURE

FUTURE GAS REGULATOR

BOUNDARY OF WORK LIMIT

N

SCALE 1":50'



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TARLTON

985 & 1001 O'BRIEN DR
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04-15-2021	D.R.T. REVIEW
05-26-2021	C.U.P. SUBMITTAL
10-28-2021	C.U.P. RESPONSE 1
06-22-2022	C.U.P. RESPONSE 2
10-28-2022	C.U.P. RESPONSE 3
02-17-2023	C.U.P. RESPONSE 4
07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

PHASE 2 PRELIMINARY UTILITY PLAN

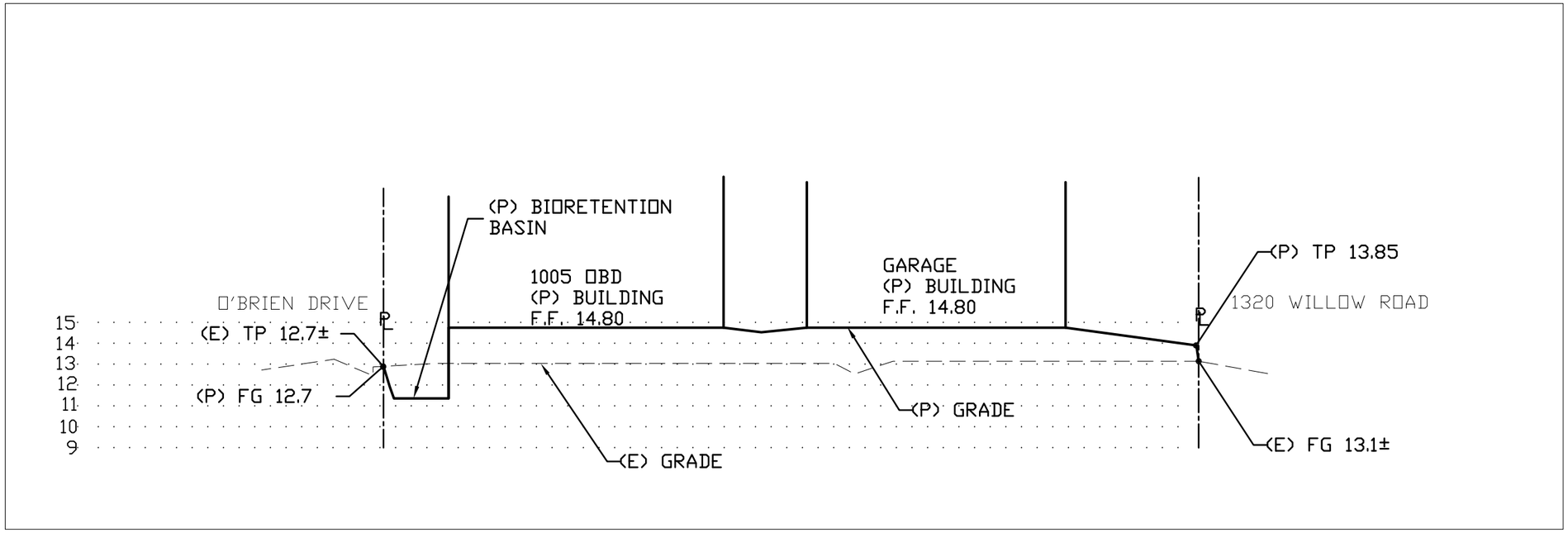
C4.2

DES ARCHITECTS ENGINEERS

© 2020

NOTE:

SEE SHEET C2.1 FOR PROPOSED GRADING AND DRAINAGE PLAN.



SECTION A TO A: NORTH TO SOUTH
HORIZ. SCALE: 1"=60', VERT. SCALE: 1"=1'

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

04-15-2021	D.R.T. REVIEW	02-17-2023	C.U.P. RESPONSE 4
05-26-2021	C.U.P. SUBMITTAL	07-12-2023	C.U.P. RESPONSE 5
10-28-2021	C.U.P. RESPONSE 1	09-29-2023	C.U.P. RESPONSE 6
06-22-2022	C.U.P. RESPONSE 2	06-25-2024	PARKING UPDATE
10-28-2022	C.U.P. RESPONSE 3		

PHASE 1 GRADING SECTIONS

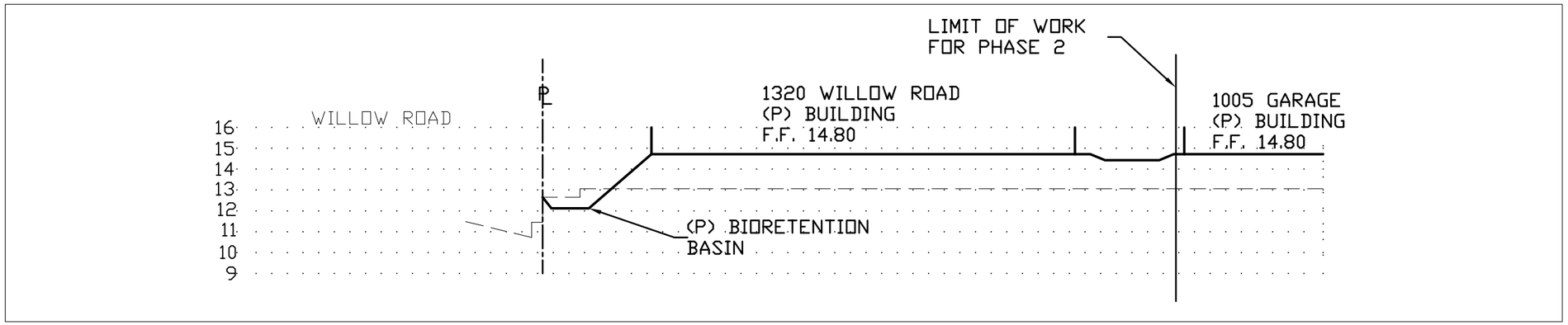
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DES ARCHITECTS ENGINEERS

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NOTE:

SEE SHEET C2.2 FOR PROPOSED GRADING AND DRAINAGE PLAN.



SECTION A TO A: WEST TO EAST
HORIZ. SCALE: 1"=60', VERT. SCALE: 1"=1'

BIM 360://Tarlton - 1005 OBD/10025002_A_1005OBD_SHELL_2020_Central.rvt

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

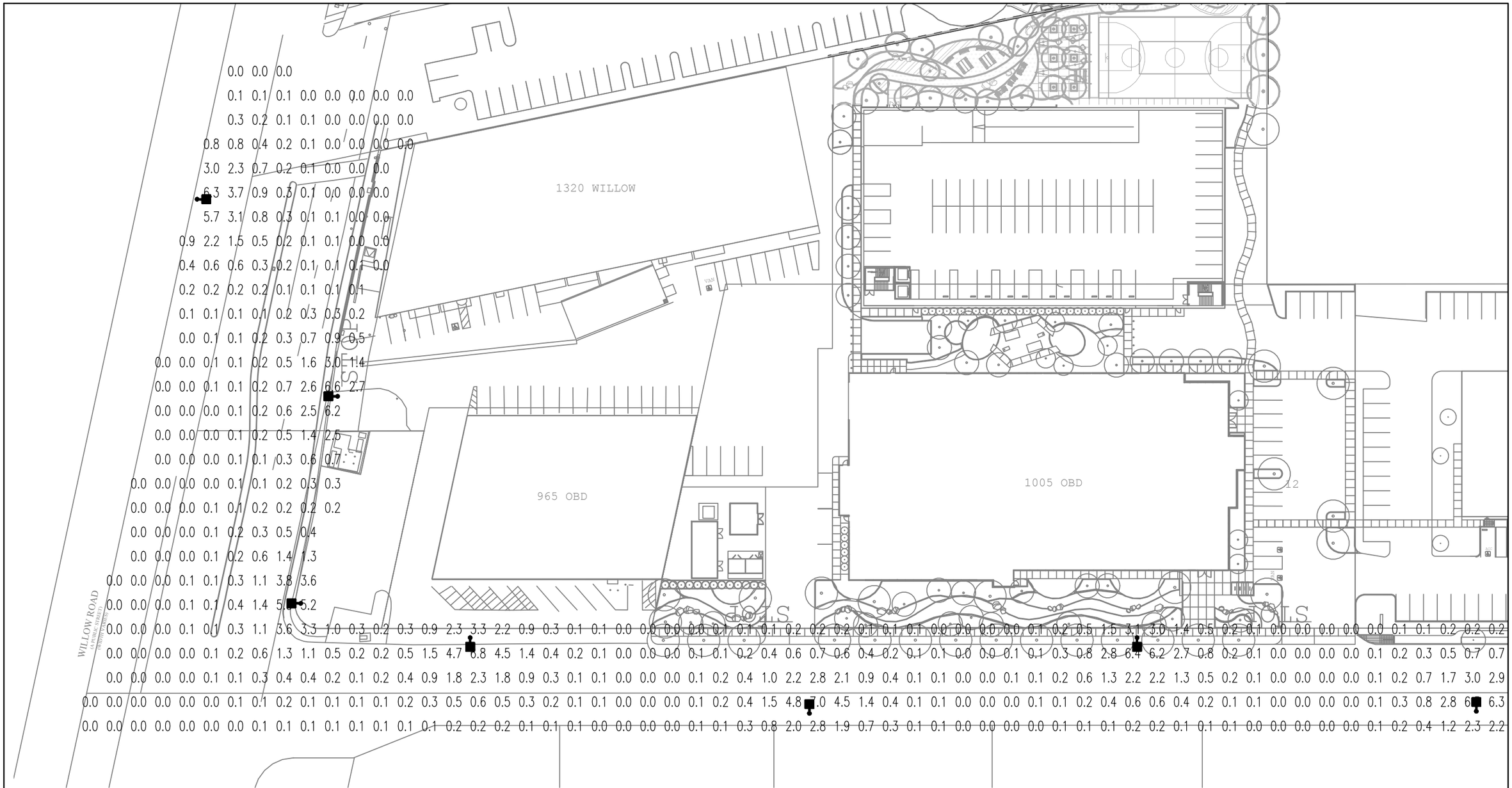
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05-26-2021	C.U.P. SUBMITTAL	07-12-2023	C.U.P. RESPONSE 5
10-28-2021	C.U.P. RESPONSE 1	09-29-2023	C.U.P. RESPONSE 6
06-22-2022	C.U.P. RESPONSE 2	06-25 2024	PARKING UPDATE
10-28-2022	C.U.P. RESPONSE 3		

PHASE 2 GRADING SECTIONS

C6.2

DES ARCHITECTS ENGINEERS

© 2020



Calculation Summary					
Label	CalcType	Units	Avg	Max	Min
Street	Illuminance	Fc	0.60	7.0	0.0

10-28-2021	C.U.P. RESPONSE 1
06-22-2022	C.U.P. RESPONSE 2
10-28-2022	C.U.P RESPONSE 3
02-17-2023	C.U.P. RESPONSE 4
07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

SCALE (FT.):

0 . 60 . 120

G:\Tri Bay Electric\O'Brien Drive\Lighting\O'BRIEN DRIVE LP-1.dwg Oct 25, 2021 - 4:35pm

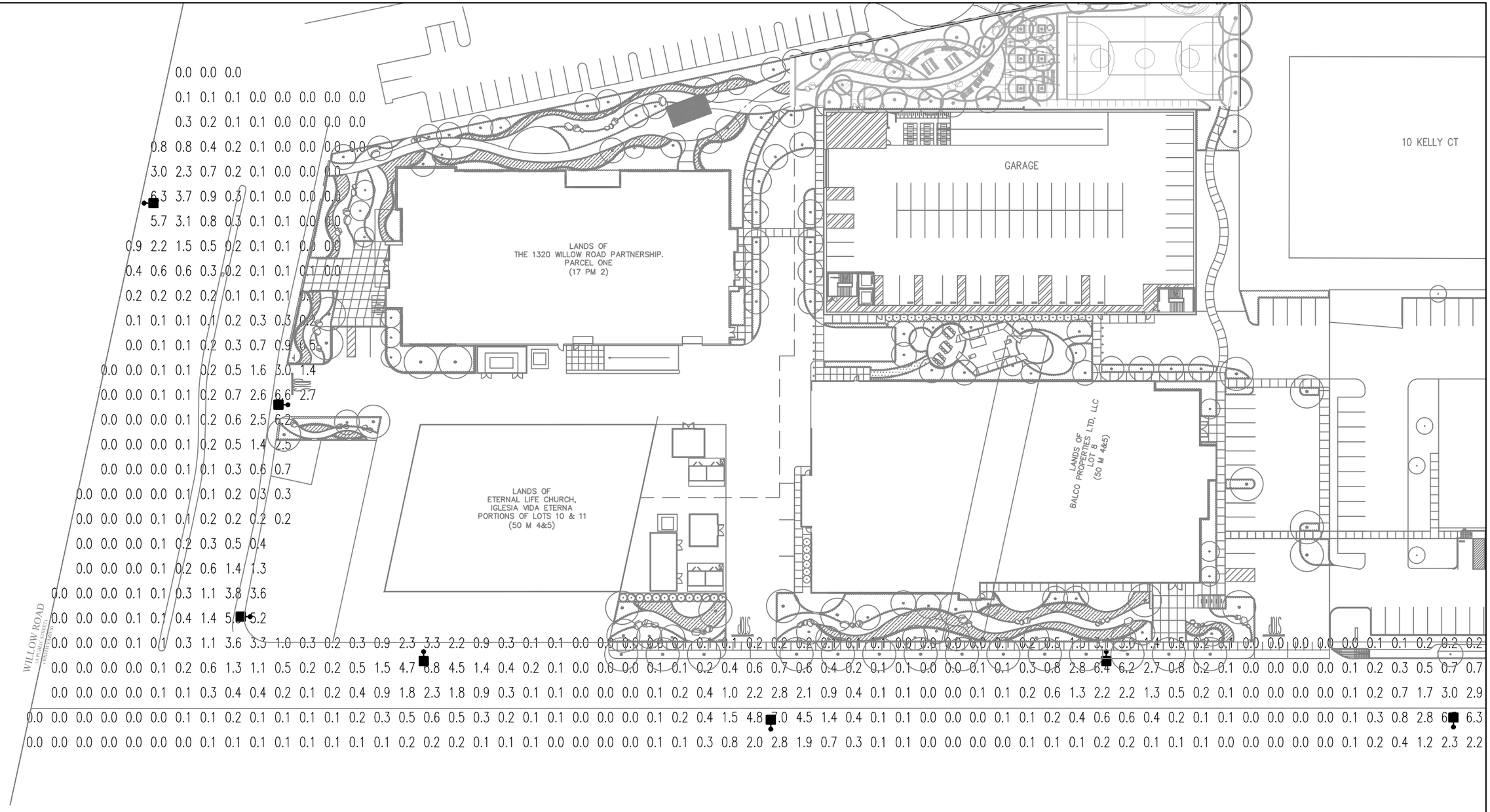
TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

POINT X POINT
PHOTOMETRY PLAN

LP-1

TRI-BAY
ELECTRIC INC.
761 E. BROKAW ROAD, SAN JOSE, CA 95112
PHONE: (408) 392-0014 FAX: (408) 392-0084



Calculation Summary					
Label	CalcType	Units	Avg	Max	Min
Street	Illuminance	Fc	0.60	7.0	0.0

10-28-2021	C.U.P. RESPONSE 1
06-22-2022	C.U.P. RESPONSE 2
10-28-2022	C.U.P RESPONSE 3
02-17-2023	C.U.P. RESPONSE 4
07-12-2023	C.U.P. RESPONSE 5
09-29-2023	C.U.P. RESPONSE 6
06-25-2024	PARKING UPDATE

SCALE (FT.):

0 . 60 . 120

G:\Tri Bay Electric\O'Brien Drive\Lighting\O'BRIEN DRIVE LP-2.dwg Oct 25, 2021 - 5:01pm

TARLTON

985 & 1001 O'BRIEN DR
1320 WILLOW RD
MENLO PARK, CA 94025

POINT X POINT
PHOTOMETRY PLAN

LP-2

TRI-BAY
ELECTRIC INC.
761 E. BROKAW ROAD, SAN JOSE, CA 95112
PHONE: (408) 392-0014 FAX: (408) 392-0084

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1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	1005 O’Brien Drive and 1320 Willow Road (Project)
Construction Start Date	7/1/2024
Operational Year	2028
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	4.20
Precipitation (days)	18.8
Location	37.47566209097283, -122.15210426306923
County	San Mateo
City	Menlo Park
Air District	Bay Area AQMD
Air Basin	San Francisco Bay Area
TAZ	1279
EDFZ	1
Electric Utility	Pacific Gas & Electric Company
Gas Utility	Pacific Gas & Electric
App Version	2022.1.1.22

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description

Research & Development	228	1000sqft	5.24	228,400	40,946	0.00	—	—
Unenclosed Parking with Elevator	140	1000sqft	3.20	139,500	0.00	0.00	—	—
Other Non-Asphalt Surfaces	76.8	1000sqft	1.76	0.00	0.00	0.00	—	—

1.3. User-Selected Emission Reduction Measures by Emissions Sector

Sector	#	Measure Title
Energy	E-10-A	Establish Onsite Renewable Energy Systems: Generic

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	3.25	12.4	26.1	23.4	0.05	1.09	4.26	5.35	1.00	1.65	2.65	—	5,271	5,271	0.29	0.18	2.43	5,327
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	3.24	2.64	26.1	23.3	0.05	1.09	4.26	5.35	1.00	1.65	2.65	—	5,264	5,264	0.29	0.16	0.05	5,318
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.82	1.29	6.00	7.28	0.01	0.23	0.85	1.06	0.21	0.26	0.45	—	1,612	1,612	0.07	0.04	0.37	1,626
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Unmit.	0.15	0.24	1.09	1.33	< 0.005	0.04	0.16	0.19	0.04	0.05	0.08	—	267	267	0.01	0.01	0.06	269

2.2. Construction Emissions by Year, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	3.25	2.64	26.1	23.4	0.05	1.09	4.26	5.35	1.00	1.65	2.65	—	5,271	5,271	0.29	0.18	2.43	5,327
2025	1.15	0.94	8.38	10.3	0.02	0.32	1.04	1.36	0.29	0.26	0.55	—	2,267	2,267	0.10	0.05	1.20	2,286
2026	1.82	12.4	13.5	14.5	0.02	0.58	3.60	4.18	0.54	1.55	2.08	—	2,892	2,892	0.15	0.09	1.18	2,921
2027	0.96	12.1	6.74	8.40	0.02	0.23	1.04	1.28	0.21	0.26	0.47	—	1,995	1,995	0.09	0.06	0.97	2,012
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	3.24	2.64	26.1	23.3	0.05	1.09	4.26	5.35	1.00	1.65	2.65	—	5,264	5,264	0.29	0.16	0.05	5,318
2025	1.15	0.94	8.41	10.2	0.02	0.32	1.04	1.36	0.29	0.26	0.55	—	2,256	2,256	0.11	0.06	0.03	2,275
2026	1.10	0.90	7.97	10.1	0.02	0.29	1.04	1.33	0.26	0.26	0.52	—	2,247	2,247	0.10	0.06	0.03	2,266
2027	0.96	0.79	6.77	8.36	0.02	0.23	1.04	1.28	0.21	0.26	0.47	—	1,984	1,984	0.09	0.05	0.03	2,000
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	0.67	0.54	5.20	5.06	0.01	0.21	0.70	0.91	0.19	0.24	0.43	—	1,112	1,112	0.06	0.04	0.26	1,125
2025	0.82	0.67	6.00	7.28	0.01	0.23	0.74	0.96	0.21	0.18	0.39	—	1,612	1,612	0.07	0.04	0.37	1,626
2026	0.77	1.29	5.55	6.46	0.01	0.21	0.85	1.06	0.19	0.26	0.45	—	1,455	1,455	0.07	0.04	0.33	1,470
2027	0.30	0.72	2.13	2.66	0.01	0.07	0.32	0.39	0.07	0.08	0.15	—	620	620	0.03	0.02	0.13	625
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	0.12	0.10	0.95	0.92	< 0.005	0.04	0.13	0.17	0.04	0.04	0.08	—	184	184	0.01	0.01	0.04	186
2025	0.15	0.12	1.09	1.33	< 0.005	0.04	0.13	0.18	0.04	0.03	0.07	—	267	267	0.01	0.01	0.06	269
2026	0.14	0.24	1.01	1.18	< 0.005	0.04	0.16	0.19	0.03	0.05	0.08	—	241	241	0.01	0.01	0.05	243

2027	0.05	0.13	0.39	0.49	< 0.005	0.01	0.06	0.07	0.01	0.01	0.03	—	103	103	< 0.005	< 0.005	0.02	103

2.3. Construction Emissions by Year, Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	3.25	2.64	26.1	23.4	0.05	1.09	4.26	5.35	1.00	1.65	2.65	—	5,271	5,271	0.29	0.18	2.43	5,327
2025	1.15	0.94	8.38	10.3	0.02	0.32	1.04	1.36	0.29	0.26	0.55	—	2,267	2,267	0.10	0.05	1.20	2,286
2026	1.82	12.4	13.5	14.5	0.02	0.58	3.60	4.18	0.54	1.55	2.08	—	2,892	2,892	0.15	0.09	1.18	2,921
2027	0.96	12.1	6.74	8.40	0.02	0.23	1.04	1.28	0.21	0.26	0.47	—	1,995	1,995	0.09	0.06	0.97	2,012
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	3.24	2.64	26.1	23.3	0.05	1.09	4.26	5.35	1.00	1.65	2.65	—	5,264	5,264	0.29	0.16	0.05	5,318
2025	1.15	0.94	8.41	10.2	0.02	0.32	1.04	1.36	0.29	0.26	0.55	—	2,256	2,256	0.11	0.06	0.03	2,275
2026	1.10	0.90	7.97	10.1	0.02	0.29	1.04	1.33	0.26	0.26	0.52	—	2,247	2,247	0.10	0.06	0.03	2,266
2027	0.96	0.79	6.77	8.36	0.02	0.23	1.04	1.28	0.21	0.26	0.47	—	1,984	1,984	0.09	0.05	0.03	2,000
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	0.67	0.54	5.20	5.06	0.01	0.21	0.70	0.91	0.19	0.24	0.43	—	1,112	1,112	0.06	0.04	0.26	1,125
2025	0.82	0.67	6.00	7.28	0.01	0.23	0.74	0.96	0.21	0.18	0.39	—	1,612	1,612	0.07	0.04	0.37	1,626
2026	0.77	1.29	5.55	6.46	0.01	0.21	0.85	1.06	0.19	0.26	0.45	—	1,455	1,455	0.07	0.04	0.33	1,470
2027	0.30	0.72	2.13	2.66	0.01	0.07	0.32	0.39	0.07	0.08	0.15	—	620	620	0.03	0.02	0.13	625
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	0.12	0.10	0.95	0.92	< 0.005	0.04	0.13	0.17	0.04	0.04	0.08	—	184	184	0.01	0.01	0.04	186
2025	0.15	0.12	1.09	1.33	< 0.005	0.04	0.13	0.18	0.04	0.03	0.07	—	267	267	0.01	0.01	0.06	269
2026	0.14	0.24	1.01	1.18	< 0.005	0.04	0.16	0.19	0.03	0.05	0.08	—	241	241	0.01	0.01	0.05	243

2027	0.05	0.13	0.39	0.49	< 0.005	0.01	0.06	0.07	0.01	0.01	0.03	—	103	103	< 0.005	< 0.005	0.02	103

2.4. Operations Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	9.27	13.4	10.8	65.2	0.15	0.40	13.5	13.9	0.39	3.42	3.81	19.4	16,580	16,600	2.89	0.49	39.1	16,858
Mit.	9.27	13.4	10.8	65.2	0.15	0.40	13.5	13.9	0.39	3.42	3.81	19.4	16,580	16,600	2.89	0.49	39.1	16,858
% Reduced	—	—	—	—	—	—	—	—	—	—	—	—	< 0.5%	< 0.5%	—	—	—	< 0.5%
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	6.37	10.7	11.3	47.1	0.15	0.38	13.5	13.9	0.37	3.42	3.79	19.4	15,901	15,920	2.93	0.53	6.70	16,159
Mit.	6.37	10.7	11.3	47.1	0.15	0.38	13.5	13.9	0.37	3.42	3.79	19.4	15,901	15,920	2.93	0.53	6.70	16,159
% Reduced	—	—	—	—	—	—	—	—	—	—	—	—	< 0.5%	< 0.5%	—	—	—	< 0.5%
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	5.53	9.98	5.98	41.5	0.11	0.23	10.2	10.4	0.23	2.57	2.80	19.4	12,289	12,309	2.78	0.41	16.8	12,517
Mit.	5.53	9.98	5.98	41.5	0.11	0.23	10.2	10.4	0.23	2.57	2.80	19.4	12,289	12,309	2.78	0.41	16.8	12,517
% Reduced	—	—	—	—	—	—	—	—	—	—	—	—	< 0.5%	< 0.5%	—	—	—	< 0.5%
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	1.01	1.82	1.09	7.57	0.02	0.04	1.85	1.90	0.04	0.47	0.51	3.22	2,035	2,038	0.46	0.07	2.78	2,072
Mit.	1.01	1.82	1.09	7.57	0.02	0.04	1.85	1.90	0.04	0.47	0.51	3.22	2,035	2,038	0.46	0.07	2.78	2,072

% Reduced	—	—	—	—	—	—	—	—	—	—	—	—	< 0.5%	< 0.5%	< 0.5%	< 0.5%	—	< 0.5%

2.5. Operations Emissions by Sector, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Sector	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	4.81	4.37	3.29	44.5	0.14	0.07	13.5	13.6	0.06	3.42	3.48	—	13,928	13,928	0.42	0.42	33.3	14,098
Area	2.85	7.64	0.13	16.0	< 0.005	0.03	—	0.03	0.02	—	0.02	—	65.8	65.8	< 0.005	< 0.005	—	66.0
Energy	0.17	0.08	1.51	1.27	0.01	0.11	—	0.11	0.11	—	0.11	—	1,910	1,910	0.46	0.04	—	1,933
Water	—	—	—	—	—	—	—	—	—	—	—	10.1	1.12	11.2	1.04	0.02	—	44.6
Waste	—	—	—	—	—	—	—	—	—	—	—	9.35	0.00	9.35	0.93	0.00	—	32.7
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.84	5.84
Stationary	1.45	1.32	5.90	3.37	0.01	0.19	0.00	0.19	0.19	0.00	0.19	0.00	675	675	0.03	0.01	0.00	678
Total	9.27	13.4	10.8	65.2	0.15	0.40	13.5	13.9	0.39	3.42	3.81	19.4	16,580	16,600	2.89	0.49	39.1	16,858
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	4.75	4.30	3.89	42.5	0.13	0.07	13.5	13.6	0.06	3.42	3.48	—	13,315	13,315	0.46	0.46	0.86	13,465
Area	—	5.02	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Energy	0.17	0.08	1.51	1.27	0.01	0.11	—	0.11	0.11	—	0.11	—	1,910	1,910	0.46	0.04	—	1,933
Water	—	—	—	—	—	—	—	—	—	—	—	10.1	1.12	11.2	1.04	0.02	—	44.6
Waste	—	—	—	—	—	—	—	—	—	—	—	9.35	0.00	9.35	0.93	0.00	—	32.7
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.84	5.84
Stationary	1.45	1.32	5.90	3.37	0.01	0.19	0.00	0.19	0.19	0.00	0.19	0.00	675	675	0.03	0.01	0.00	678
Total	6.37	10.7	11.3	47.1	0.15	0.38	13.5	13.9	0.37	3.42	3.79	19.4	15,901	15,920	2.93	0.53	6.70	16,159

Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	3.57	3.22	2.79	31.4	0.10	0.05	10.2	10.2	0.05	2.57	2.62	—	10,161	10,161	0.34	0.34	10.9	10,282
Area	1.40	6.31	0.07	7.89	< 0.005	0.01	—	0.01	0.01	—	0.01	—	32.4	32.4	< 0.005	< 0.005	—	32.6
Energy	0.17	0.08	1.51	1.27	0.01	0.11	—	0.11	0.11	—	0.11	—	1,910	1,910	0.46	0.04	—	1,933
Water	—	—	—	—	—	—	—	—	—	—	—	10.1	1.12	11.2	1.04	0.02	—	44.6
Waste	—	—	—	—	—	—	—	—	—	—	—	9.35	0.00	9.35	0.93	0.00	—	32.7
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.84	5.84
Stationary	0.40	0.36	1.62	0.92	< 0.005	0.05	0.00	0.05	0.05	0.00	0.05	0.00	185	185	0.01	< 0.005	0.00	186
Total	5.53	9.98	5.98	41.5	0.11	0.23	10.2	10.4	0.23	2.57	2.80	19.4	12,289	12,309	2.78	0.41	16.8	12,517
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.65	0.59	0.51	5.73	0.02	0.01	1.85	1.86	0.01	0.47	0.48	—	1,682	1,682	0.06	0.06	1.81	1,702
Area	0.26	1.15	0.01	1.44	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	5.37	5.37	< 0.005	< 0.005	—	5.39
Energy	0.03	0.02	0.28	0.23	< 0.005	0.02	—	0.02	0.02	—	0.02	—	316	316	0.08	0.01	—	320
Water	—	—	—	—	—	—	—	—	—	—	—	1.67	0.19	1.86	0.17	< 0.005	—	7.38
Waste	—	—	—	—	—	—	—	—	—	—	—	1.55	0.00	1.55	0.15	0.00	—	5.42
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.97	0.97
Stationary	0.07	0.07	0.30	0.17	< 0.005	0.01	0.00	0.01	0.01	0.00	0.01	0.00	30.6	30.6	< 0.005	< 0.005	0.00	30.7
Total	1.01	1.82	1.09	7.57	0.02	0.04	1.85	1.90	0.04	0.47	0.51	3.22	2,035	2,038	0.46	0.07	2.78	2,072

2.6. Operations Emissions by Sector, Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Sector	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	4.81	4.37	3.29	44.5	0.14	0.07	13.5	13.6	0.06	3.42	3.48	—	13,928	13,928	0.42	0.42	33.3	14,098

Area	2.85	7.64	0.13	16.0	< 0.005	0.03	—	0.03	0.02	—	0.02	—	65.8	65.8	< 0.005	< 0.005	—	66.0
Energy	0.17	0.08	1.51	1.27	0.01	0.11	—	0.11	0.11	—	0.11	—	1,909	1,909	0.46	0.04	—	1,933
Water	—	—	—	—	—	—	—	—	—	—	—	10.1	1.12	11.2	1.04	0.02	—	44.6
Waste	—	—	—	—	—	—	—	—	—	—	—	9.35	0.00	9.35	0.93	0.00	—	32.7
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.84	5.84
Stationary	1.45	1.32	5.90	3.37	0.01	0.19	0.00	0.19	0.19	0.00	0.19	0.00	675	675	0.03	0.01	0.00	678
Total	9.27	13.4	10.8	65.2	0.15	0.40	13.5	13.9	0.39	3.42	3.81	19.4	16,580	16,600	2.89	0.49	39.1	16,858
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	4.75	4.30	3.89	42.5	0.13	0.07	13.5	13.6	0.06	3.42	3.48	—	13,315	13,315	0.46	0.46	0.86	13,465
Area	—	5.02	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Energy	0.17	0.08	1.51	1.27	0.01	0.11	—	0.11	0.11	—	0.11	—	1,909	1,909	0.46	0.04	—	1,933
Water	—	—	—	—	—	—	—	—	—	—	—	10.1	1.12	11.2	1.04	0.02	—	44.6
Waste	—	—	—	—	—	—	—	—	—	—	—	9.35	0.00	9.35	0.93	0.00	—	32.7
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.84	5.84
Stationary	1.45	1.32	5.90	3.37	0.01	0.19	0.00	0.19	0.19	0.00	0.19	0.00	675	675	0.03	0.01	0.00	678
Total	6.37	10.7	11.3	47.1	0.15	0.38	13.5	13.9	0.37	3.42	3.79	19.4	15,901	15,920	2.93	0.53	6.70	16,159
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	3.57	3.22	2.79	31.4	0.10	0.05	10.2	10.2	0.05	2.57	2.62	—	10,161	10,161	0.34	0.34	10.9	10,282
Area	1.40	6.31	0.07	7.89	< 0.005	0.01	—	0.01	0.01	—	0.01	—	32.4	32.4	< 0.005	< 0.005	—	32.6
Energy	0.17	0.08	1.51	1.27	0.01	0.11	—	0.11	0.11	—	0.11	—	1,909	1,909	0.46	0.04	—	1,933
Water	—	—	—	—	—	—	—	—	—	—	—	10.1	1.12	11.2	1.04	0.02	—	44.6
Waste	—	—	—	—	—	—	—	—	—	—	—	9.35	0.00	9.35	0.93	0.00	—	32.7
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.84	5.84
Stationary	0.40	0.36	1.62	0.92	< 0.005	0.05	0.00	0.05	0.05	0.00	0.05	0.00	185	185	0.01	< 0.005	0.00	186

Total	5.53	9.98	5.98	41.5	0.11	0.23	10.2	10.4	0.23	2.57	2.80	19.4	12,289	12,309	2.78	0.41	16.8	12,517
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.65	0.59	0.51	5.73	0.02	0.01	1.85	1.86	0.01	0.47	0.48	—	1,682	1,682	0.06	0.06	1.81	1,702
Area	0.26	1.15	0.01	1.44	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	5.37	5.37	< 0.005	< 0.005	—	5.39
Energy	0.03	0.02	0.28	0.23	< 0.005	0.02	—	0.02	0.02	—	0.02	—	316	316	0.08	0.01	—	320
Water	—	—	—	—	—	—	—	—	—	—	—	1.67	0.19	1.86	0.17	< 0.005	—	7.38
Waste	—	—	—	—	—	—	—	—	—	—	—	1.55	0.00	1.55	0.15	0.00	—	5.42
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.97	0.97
Stationary	0.07	0.07	0.30	0.17	< 0.005	0.01	0.00	0.01	0.01	0.00	0.01	0.00	30.6	30.6	< 0.005	< 0.005	0.00	30.7
Total	1.01	1.82	1.09	7.57	0.02	0.04	1.85	1.90	0.04	0.47	0.51	3.22	2,035	2,038	0.46	0.07	2.78	2,072

3. Construction Emissions Details

3.1. Phase 1 - Demolition (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.74	1.46	13.7	12.3	0.02	0.57	—	0.57	0.52	—	0.52	—	1,906	1,906	0.08	0.02	—	1,912
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.14	0.12	1.12	1.01	< 0.005	0.05	—	0.05	0.04	—	0.04	—	157	157	0.01	< 0.005	—	157
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.02	0.20	0.18	< 0.005	0.01	—	0.01	0.01	—	0.01	—	25.9	25.9	< 0.005	< 0.005	—	26.0
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.04	0.04	0.03	0.51	0.00	0.00	0.51	0.51	0.00	0.13	0.13	—	126	126	< 0.005	< 0.005	0.46	128
Vendor	< 0.005	< 0.005	0.04	0.03	< 0.005	< 0.005	0.03	0.03	< 0.005	0.01	0.01	—	29.3	29.3	< 0.005	< 0.005	0.07	30.7
Hauling	0.18	0.02	1.53	1.00	0.01	0.01	0.75	0.76	0.01	0.19	0.20	—	965	965	0.15	0.16	1.89	1,017
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.04	0.00	0.00	0.04	0.04	0.00	0.01	0.01	—	9.84	9.84	< 0.005	< 0.005	0.02	9.98
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.41	2.41	< 0.005	< 0.005	< 0.005	2.52
Hauling	0.01	< 0.005	0.13	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	79.3	79.3	0.01	0.01	0.07	83.5
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	1.63	1.63	< 0.005	< 0.005	< 0.005	1.65

Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.40	0.40	< 0.005	< 0.005	< 0.005	0.42
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	13.1	13.1	< 0.005	< 0.005	0.01	13.8

3.2. Phase 1 - Demolition (2024) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.74	1.46	13.7	12.3	0.02	0.57	—	0.57	0.52	—	0.52	—	1,906	1,906	0.08	0.02	—	1,912
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.14	0.12	1.12	1.01	< 0.005	0.05	—	0.05	0.04	—	0.04	—	157	157	0.01	< 0.005	—	157
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.02	0.20	0.18	< 0.005	0.01	—	0.01	0.01	—	0.01	—	25.9	25.9	< 0.005	< 0.005	—	26.0
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.04	0.04	0.03	0.51	0.00	0.00	0.51	0.51	0.00	0.13	0.13	—	126	126	< 0.005	< 0.005	0.46	128
Vendor	< 0.005	< 0.005	0.04	0.03	< 0.005	< 0.005	0.03	0.03	< 0.005	0.01	0.01	—	29.3	29.3	< 0.005	< 0.005	0.07	30.7
Hauling	0.18	0.02	1.53	1.00	0.01	0.01	0.75	0.76	0.01	0.19	0.20	—	965	965	0.15	0.16	1.89	1,017
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.04	0.00	0.00	0.04	0.04	0.00	0.01	0.01	—	9.84	9.84	< 0.005	< 0.005	0.02	9.98
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.41	2.41	< 0.005	< 0.005	< 0.005	2.52
Hauling	0.01	< 0.005	0.13	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	79.3	79.3	0.01	0.01	0.07	83.5
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	1.63	1.63	< 0.005	< 0.005	< 0.005	1.65
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.40	0.40	< 0.005	< 0.005	< 0.005	0.42
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	13.1	13.1	< 0.005	< 0.005	0.01	13.8

3.3. Phase 2 - Demolition (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	1.41	1.18	10.7	9.91	0.02	0.43	—	0.43	0.39	—	0.39	—	1,764	1,764	0.07	0.01	—	1,771
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.08	0.06	0.58	0.54	< 0.005	0.02	—	0.02	0.02	—	0.02	—	96.7	96.7	< 0.005	< 0.005	—	97.0
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.11	0.10	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	16.0	16.0	< 0.005	< 0.005	—	16.1
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.02	0.35	0.00	0.00	0.41	0.41	0.00	0.10	0.10	—	96.8	96.8	< 0.005	< 0.005	0.29	97.4
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.08	0.01	0.69	0.49	< 0.005	0.01	0.38	0.38	0.01	0.10	0.10	—	461	461	0.07	0.07	0.89	486

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.02	0.00	0.00	0.02	0.02	0.00	0.01	0.01	—	5.03	5.03	< 0.005	< 0.005	0.01	5.10
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.04	0.03	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	—	25.3	25.3	< 0.005	< 0.005	0.02	26.6
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.83	0.83	< 0.005	< 0.005	< 0.005	0.84
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	4.18	4.18	< 0.005	< 0.005	< 0.005	4.40

3.4. Phase 2 - Demolition (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.41	1.18	10.7	9.91	0.02	0.43	—	0.43	0.39	—	0.39	—	1,764	1,764	0.07	0.01	—	1,771
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.08	0.06	0.58	0.54	< 0.005	0.02	—	0.02	0.02	—	0.02	—	96.7	96.7	< 0.005	< 0.005	—	97.0
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.11	0.10	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	16.0	16.0	< 0.005	< 0.005	—	16.1
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.02	0.35	0.00	0.00	0.41	0.41	0.00	0.10	0.10	—	96.8	96.8	< 0.005	< 0.005	0.29	97.4
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.08	0.01	0.69	0.49	< 0.005	0.01	0.38	0.38	0.01	0.10	0.10	—	461	461	0.07	0.07	0.89	486
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.02	0.00	0.00	0.02	0.02	0.00	0.01	0.01	—	5.03	5.03	< 0.005	< 0.005	0.01	5.10
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.04	0.03	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	—	25.3	25.3	< 0.005	< 0.005	0.02	26.6
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.83	0.83	< 0.005	< 0.005	< 0.005	0.84
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	4.18	4.18	< 0.005	< 0.005	< 0.005	4.40

3.5. Phase 1 - Site Preparation (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.54	1.29	12.8	12.3	0.02	0.57	—	0.57	0.52	—	0.52	—	1,959	1,959	0.08	0.02	—	1,966
Dust From Material Movement	—	—	—	—	—	—	2.56	2.56	—	1.31	1.31	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.04	0.35	0.34	< 0.005	0.02	—	0.02	0.01	—	0.01	—	53.7	53.7	< 0.005	< 0.005	—	53.9
Dust From Material Movement	—	—	—	—	—	—	0.07	0.07	—	0.04	0.04	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.06	0.06	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	8.89	8.89	< 0.005	< 0.005	—	8.92

Dust From Material Movement	—	—	—	—	—	—	0.01	0.01	—	0.01	0.01	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.02	0.34	0.00	0.00	0.34	0.34	0.00	0.08	0.08	—	84.2	84.2	< 0.005	< 0.005	0.31	85.5
Vendor	0.01	< 0.005	0.09	0.05	< 0.005	< 0.005	0.05	0.05	< 0.005	0.01	0.01	—	58.6	58.6	0.01	0.01	0.14	61.5
Hauling	0.07	0.01	0.64	0.42	< 0.005	< 0.005	0.31	0.32	< 0.005	0.08	0.08	—	402	402	0.06	0.07	0.79	424
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	2.19	2.19	< 0.005	< 0.005	< 0.005	2.22
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.61	1.61	< 0.005	< 0.005	< 0.005	1.68
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	11.0	11.0	< 0.005	< 0.005	0.01	11.6
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.36	0.36	< 0.005	< 0.005	< 0.005	0.37
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.27	0.27	< 0.005	< 0.005	< 0.005	0.28
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.82	1.82	< 0.005	< 0.005	< 0.005	1.92

3.6. Phase 1 - Site Preparation (2024) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.54	1.29	12.8	12.3	0.02	0.57	—	0.57	0.52	—	0.52	—	1,959	1,959	0.08	0.02	—	1,966
Dust From Material Movement	—	—	—	—	—	—	2.56	2.56	—	1.31	1.31	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.04	0.35	0.34	< 0.005	0.02	—	0.02	0.01	—	0.01	—	53.7	53.7	< 0.005	< 0.005	—	53.9
Dust From Material Movement	—	—	—	—	—	—	0.07	0.07	—	0.04	0.04	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.06	0.06	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	8.89	8.89	< 0.005	< 0.005	—	8.92
Dust From Material Movement	—	—	—	—	—	—	0.01	0.01	—	0.01	0.01	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.02	0.34	0.00	0.00	0.34	0.34	0.00	0.08	0.08	—	84.2	84.2	< 0.005	< 0.005	0.31	85.5
Vendor	0.01	< 0.005	0.09	0.05	< 0.005	< 0.005	0.05	0.05	< 0.005	0.01	0.01	—	58.6	58.6	0.01	0.01	0.14	61.5
Hauling	0.07	0.01	0.64	0.42	< 0.005	< 0.005	0.31	0.32	< 0.005	0.08	0.08	—	402	402	0.06	0.07	0.79	424
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	2.19	2.19	< 0.005	< 0.005	< 0.005	2.22
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.61	1.61	< 0.005	< 0.005	< 0.005	1.68
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	11.0	11.0	< 0.005	< 0.005	0.01	11.6
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.36	0.36	< 0.005	< 0.005	< 0.005	0.37
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.27	0.27	< 0.005	< 0.005	< 0.005	0.28
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.82	1.82	< 0.005	< 0.005	< 0.005	1.92

3.7. Phase 2 - Site Preparation (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.21	1.01	9.38	8.97	0.02	0.40	—	0.40	0.37	—	0.37	—	1,669	1,669	0.07	0.01	—	1,675

Dust From Material Movement	—	—	—	—	—	—	2.56	2.56	—	1.31	1.31	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.01	0.13	0.12	< 0.005	0.01	—	0.01	0.01	—	0.01	—	22.9	22.9	< 0.005	< 0.005	—	22.9
Dust From Material Movement	—	—	—	—	—	—	0.04	0.04	—	0.02	0.02	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	3.79	3.79	< 0.005	< 0.005	—	3.80
Dust From Material Movement	—	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.02	0.29	0.00	0.00	0.34	0.34	0.00	0.08	0.08	—	80.7	80.7	< 0.005	< 0.005	0.24	81.2
Vendor	0.01	< 0.005	0.08	0.05	< 0.005	< 0.005	0.05	0.05	< 0.005	0.01	0.01	—	56.5	56.5	0.01	0.01	0.13	59.2
Hauling	0.07	0.01	0.57	0.41	< 0.005	< 0.005	0.31	0.32	< 0.005	0.08	0.08	—	384	384	0.06	0.06	0.74	405

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	1.05	1.05	< 0.005	< 0.005	< 0.005	1.06
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.77	0.77	< 0.005	< 0.005	< 0.005	0.81
Hauling	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	5.27	5.27	< 0.005	< 0.005	< 0.005	5.54
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.17	0.17	< 0.005	< 0.005	< 0.005	0.18
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.13	0.13	< 0.005	< 0.005	< 0.005	0.13
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.87	0.87	< 0.005	< 0.005	< 0.005	0.92

3.8. Phase 2 - Site Preparation (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.21	1.01	9.38	8.97	0.02	0.40	—	0.40	0.37	—	0.37	—	1,669	1,669	0.07	0.01	—	1,675
Dust From Material Movement	—	—	—	—	—	—	2.56	2.56	—	1.31	1.31	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.01	0.13	0.12	< 0.005	0.01	—	0.01	0.01	—	0.01	—	22.9	22.9	< 0.005	< 0.005	—	22.9
Dust From Material Movement	—	—	—	—	—	—	0.04	0.04	—	0.02	0.02	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	3.79	3.79	< 0.005	< 0.005	—	3.80
Dust From Material Movement	—	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.02	0.29	0.00	0.00	0.34	0.34	0.00	0.08	0.08	—	80.7	80.7	< 0.005	< 0.005	0.24	81.2
Vendor	0.01	< 0.005	0.08	0.05	< 0.005	< 0.005	0.05	0.05	< 0.005	0.01	0.01	—	56.5	56.5	0.01	0.01	0.13	59.2
Hauling	0.07	0.01	0.57	0.41	< 0.005	< 0.005	0.31	0.32	< 0.005	0.08	0.08	—	384	384	0.06	0.06	0.74	405
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	1.05	1.05	< 0.005	< 0.005	< 0.005	1.06
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.77	0.77	< 0.005	< 0.005	< 0.005	0.81

Hauling	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	5.27	5.27	< 0.005	< 0.005	< 0.005	5.54
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.17	0.17	< 0.005	< 0.005	< 0.005	0.18
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.13	0.13	< 0.005	< 0.005	< 0.005	0.13
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.87	0.87	< 0.005	< 0.005	< 0.005	0.92

3.9. Phase 1 - Grading (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	3.07	2.58	24.9	22.1	0.04	1.08	—	1.08	0.99	—	0.99	—	4,413	4,413	0.18	0.04	—	4,429
Dust From Material Movement	—	—	—	—	—	—	3.18	3.18	—	1.38	1.38	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	3.07	2.58	24.9	22.1	0.04	1.08	—	1.08	0.99	—	0.99	—	4,413	4,413	0.18	0.04	—	4,429
Dust From Material Movement	—	—	—	—	—	—	3.18	3.18	—	1.38	1.38	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.24	0.21	1.98	1.76	< 0.005	0.09	—	0.09	0.08	—	0.08	—	351	351	0.01	< 0.005	—	352
Dust From Material Movement	—	—	—	—	—	—	0.25	0.25	—	0.11	0.11	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.04	0.36	0.32	< 0.005	0.02	—	0.02	0.01	—	0.01	—	58.1	58.1	< 0.005	< 0.005	—	58.3
Dust From Material Movement	—	—	—	—	—	—	0.05	0.05	—	0.02	0.02	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.04	0.04	0.03	0.51	0.00	0.00	0.51	0.51	0.00	0.13	0.13	—	126	126	< 0.005	< 0.005	0.46	128
Vendor	0.01	< 0.005	0.13	0.08	< 0.005	< 0.005	0.08	0.08	< 0.005	0.02	0.02	—	88.0	88.0	0.01	0.01	0.22	92.2
Hauling	0.12	0.01	1.02	0.67	0.01	0.01	0.50	0.51	0.01	0.13	0.14	—	643	643	0.10	0.10	1.26	678
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.04	0.04	0.04	0.47	0.00	0.00	0.51	0.51	0.00	0.13	0.13	—	119	119	< 0.005	< 0.005	0.01	121
Vendor	0.01	< 0.005	0.14	0.08	< 0.005	< 0.005	0.08	0.08	< 0.005	0.02	0.02	—	87.9	87.9	0.01	0.01	0.01	92.0
Hauling	0.12	0.01	1.07	0.67	0.01	0.01	0.50	0.51	0.01	0.13	0.14	—	643	643	0.10	0.10	0.03	677

Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.04	0.00	0.00	0.04	0.04	0.00	0.01	0.01	—	9.51	9.51	< 0.005	< 0.005	0.02	9.65
Vendor	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	6.99	6.99	< 0.005	< 0.005	0.01	7.32
Hauling	0.01	< 0.005	0.08	0.05	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	—	51.1	51.1	0.01	0.01	0.04	53.8
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	1.57	1.57	< 0.005	< 0.005	< 0.005	1.60
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.16	1.16	< 0.005	< 0.005	< 0.005	1.21
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	8.46	8.46	< 0.005	< 0.005	0.01	8.91

3.10. Phase 1 - Grading (2024) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	3.07	2.58	24.9	22.1	0.04	1.08	—	1.08	0.99	—	0.99	—	4,413	4,413	0.18	0.04	—	4,429
Dust From Material Movement	—	—	—	—	—	—	3.18	3.18	—	1.38	1.38	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	3.07	2.58	24.9	22.1	0.04	1.08	—	1.08	0.99	—	0.99	—	4,413	4,413	0.18	0.04	—	4,429

Dust From Material Movement	—	—	—	—	—	—	3.18	3.18	—	1.38	1.38	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.24	0.21	1.98	1.76	< 0.005	0.09	—	0.09	0.08	—	0.08	—	351	351	0.01	< 0.005	—	352
Dust From Material Movement	—	—	—	—	—	—	0.25	0.25	—	0.11	0.11	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.04	0.36	0.32	< 0.005	0.02	—	0.02	0.01	—	0.01	—	58.1	58.1	< 0.005	< 0.005	—	58.3
Dust From Material Movement	—	—	—	—	—	—	0.05	0.05	—	0.02	0.02	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.04	0.04	0.03	0.51	0.00	0.00	0.51	0.51	0.00	0.13	0.13	—	126	126	< 0.005	< 0.005	0.46	128
Vendor	0.01	< 0.005	0.13	0.08	< 0.005	< 0.005	0.08	0.08	< 0.005	0.02	0.02	—	88.0	88.0	0.01	0.01	0.22	92.2
Hauling	0.12	0.01	1.02	0.67	0.01	0.01	0.50	0.51	0.01	0.13	0.14	—	643	643	0.10	0.10	1.26	678
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Worker	0.04	0.04	0.04	0.47	0.00	0.00	0.51	0.51	0.00	0.13	0.13	—	119	119	< 0.005	< 0.005	0.01	121
Vendor	0.01	< 0.005	0.14	0.08	< 0.005	< 0.005	0.08	0.08	< 0.005	0.02	0.02	—	87.9	87.9	0.01	0.01	0.01	92.0
Hauling	0.12	0.01	1.07	0.67	0.01	0.01	0.50	0.51	0.01	0.13	0.14	—	643	643	0.10	0.10	0.03	677
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.04	0.00	0.00	0.04	0.04	0.00	0.01	0.01	—	9.51	9.51	< 0.005	< 0.005	0.02	9.65
Vendor	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	6.99	6.99	< 0.005	< 0.005	0.01	7.32
Hauling	0.01	< 0.005	0.08	0.05	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	—	51.1	51.1	0.01	0.01	0.04	53.8
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	1.57	1.57	< 0.005	< 0.005	< 0.005	1.60
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.16	1.16	< 0.005	< 0.005	< 0.005	1.21
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	8.46	8.46	< 0.005	< 0.005	0.01	8.91

3.11. Phase 2 - Grading (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.72	1.44	12.9	13.6	0.02	0.58	—	0.58	0.53	—	0.53	—	2,379	2,379	0.10	0.02	—	2,387
Dust From Material Movement	—	—	—	—	—	—	2.76	2.76	—	1.34	1.34	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.09	0.08	0.71	0.75	< 0.005	0.03	—	0.03	0.03	—	0.03	—	130	130	0.01	< 0.005	—	131
Dust From Material Movement	—	—	—	—	—	—	0.15	0.15	—	0.07	0.07	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.01	0.13	0.14	< 0.005	0.01	—	0.01	0.01	—	0.01	—	21.6	21.6	< 0.005	< 0.005	—	21.7
Dust From Material Movement	—	—	—	—	—	—	0.03	0.03	—	0.01	0.01	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.04	0.03	0.03	0.43	0.00	0.00	0.51	0.51	0.00	0.13	0.13	—	121	121	< 0.005	< 0.005	0.36	122
Vendor	0.01	< 0.005	0.12	0.07	< 0.005	< 0.005	0.08	0.08	< 0.005	0.02	0.02	—	84.7	84.7	0.01	0.01	0.20	88.7
Hauling	0.05	0.01	0.46	0.33	< 0.005	< 0.005	0.25	0.25	< 0.005	0.06	0.07	—	307	307	0.05	0.05	0.59	324
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.02	0.00	0.00	0.03	0.03	0.00	0.01	0.01	—	6.29	6.29	< 0.005	< 0.005	0.01	6.38
Vendor	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	4.64	4.64	< 0.005	< 0.005	< 0.005	4.86

Hauling	< 0.005	< 0.005	0.03	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	16.8	16.8	< 0.005	< 0.005	0.01	17.7
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	1.04	1.04	< 0.005	< 0.005	< 0.005	1.06
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.77	0.77	< 0.005	< 0.005	< 0.005	0.80
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.79	2.79	< 0.005	< 0.005	< 0.005	2.93

3.12. Phase 2 - Grading (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.72	1.44	12.9	13.6	0.02	0.58	—	0.58	0.53	—	0.53	—	2,379	2,379	0.10	0.02	—	2,387
Dust From Material Movement	—	—	—	—	—	—	2.76	2.76	—	1.34	1.34	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.09	0.08	0.71	0.75	< 0.005	0.03	—	0.03	0.03	—	0.03	—	130	130	0.01	< 0.005	—	131
Dust From Material Movement	—	—	—	—	—	—	0.15	0.15	—	0.07	0.07	—	—	—	—	—	—	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.01	0.13	0.14	< 0.005	0.01	—	0.01	0.01	—	0.01	—	21.6	21.6	< 0.005	< 0.005	—	21.7
Dust From Material Movement	—	—	—	—	—	—	0.03	0.03	—	0.01	0.01	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.04	0.03	0.03	0.43	0.00	0.00	0.51	0.51	0.00	0.13	0.13	—	121	121	< 0.005	< 0.005	0.36	122
Vendor	0.01	< 0.005	0.12	0.07	< 0.005	< 0.005	0.08	0.08	< 0.005	0.02	0.02	—	84.7	84.7	0.01	0.01	0.20	88.7
Hauling	0.05	0.01	0.46	0.33	< 0.005	< 0.005	0.25	0.25	< 0.005	0.06	0.07	—	307	307	0.05	0.05	0.59	324
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.02	0.00	0.00	0.03	0.03	0.00	0.01	0.01	—	6.29	6.29	< 0.005	< 0.005	0.01	6.38
Vendor	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	4.64	4.64	< 0.005	< 0.005	< 0.005	4.86
Hauling	< 0.005	< 0.005	0.03	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	16.8	16.8	< 0.005	< 0.005	0.01	17.7
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	1.04	1.04	< 0.005	< 0.005	< 0.005	1.06
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.77	0.77	< 0.005	< 0.005	< 0.005	0.80
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.79	2.79	< 0.005	< 0.005	< 0.005	2.93

3.13. Phase 1 - Building Construction (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.11	0.93	8.58	9.35	0.02	0.36	—	0.36	0.33	—	0.33	—	1,839	1,839	0.07	0.01	—	1,845
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.19	0.15	1.43	1.55	< 0.005	0.06	—	0.06	0.06	—	0.06	—	306	306	0.01	< 0.005	—	307
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.03	0.26	0.28	< 0.005	0.01	—	0.01	0.01	—	0.01	—	50.6	50.6	< 0.005	< 0.005	—	50.8
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Worker	0.07	0.06	0.07	0.79	0.00	0.00	0.85	0.85	0.00	0.21	0.21	—	199	199	< 0.005	0.01	0.02	201
Vendor	0.02	0.01	0.23	0.13	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	147	147	0.02	0.02	0.01	153
Hauling	0.01	< 0.005	0.13	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	80.4	80.4	0.01	0.01	< 0.005	84.6
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.13	0.00	0.00	0.14	0.14	0.00	0.03	0.03	—	33.2	33.2	< 0.005	< 0.005	0.06	33.7
Vendor	< 0.005	< 0.005	0.04	0.02	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	—	24.4	24.4	< 0.005	< 0.005	0.03	25.5
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	13.4	13.4	< 0.005	< 0.005	0.01	14.1
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.02	0.00	0.00	0.03	0.03	0.00	0.01	0.01	—	5.49	5.49	< 0.005	< 0.005	0.01	5.57
Vendor	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	4.04	4.04	< 0.005	< 0.005	< 0.005	4.23
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.21	2.21	< 0.005	< 0.005	< 0.005	2.33

3.14. Phase 1 - Building Construction (2024) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.11	0.93	8.58	9.35	0.02	0.36	—	0.36	0.33	—	0.33	—	1,839	1,839	0.07	0.01	—	1,845
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.19	0.15	1.43	1.55	< 0.005	0.06	—	0.06	0.06	—	0.06	—	306	306	0.01	< 0.005	—	307
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.03	0.26	0.28	< 0.005	0.01	—	0.01	0.01	—	0.01	—	50.6	50.6	< 0.005	< 0.005	—	50.8
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.07	0.06	0.07	0.79	0.00	0.00	0.85	0.85	0.00	0.21	0.21	—	199	199	< 0.005	0.01	0.02	201
Vendor	0.02	0.01	0.23	0.13	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	147	147	0.02	0.02	0.01	153
Hauling	0.01	< 0.005	0.13	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	80.4	80.4	0.01	0.01	< 0.005	84.6
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.13	0.00	0.00	0.14	0.14	0.00	0.03	0.03	—	33.2	33.2	< 0.005	< 0.005	0.06	33.7
Vendor	< 0.005	< 0.005	0.04	0.02	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	—	24.4	24.4	< 0.005	< 0.005	0.03	25.5
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	13.4	13.4	< 0.005	< 0.005	0.01	14.1
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.02	0.00	0.00	0.03	0.03	0.00	0.01	0.01	—	5.49	5.49	< 0.005	< 0.005	0.01	5.57
Vendor	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	4.04	4.04	< 0.005	< 0.005	< 0.005	4.23
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.21	2.21	< 0.005	< 0.005	< 0.005	2.33

3.15. Phase 1 - Building Construction (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.05	0.88	8.00	9.29	0.02	0.32	—	0.32	0.29	—	0.29	—	1,839	1,839	0.07	0.01	—	1,845
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.05	0.88	8.00	9.29	0.02	0.32	—	0.32	0.29	—	0.29	—	1,839	1,839	0.07	0.01	—	1,845
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.75	0.63	5.72	6.63	0.01	0.23	—	0.23	0.21	—	0.21	—	1,313	1,313	0.05	0.01	—	1,318
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.14	0.11	1.04	1.21	< 0.005	0.04	—	0.04	0.04	—	0.04	—	217	217	0.01	< 0.005	—	218
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.07	0.06	0.05	0.78	0.00	0.00	0.85	0.85	0.00	0.21	0.21	—	206	206	< 0.005	< 0.005	0.68	207

Vendor	0.02	< 0.005	0.21	0.13	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	144	144	0.01	0.02	0.36	151
Hauling	0.01	< 0.005	0.12	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	78.6	78.6	0.01	0.01	0.16	82.8
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.07	0.06	0.06	0.72	0.00	0.00	0.85	0.85	0.00	0.21	0.21	—	195	195	< 0.005	0.01	0.02	197
Vendor	0.02	< 0.005	0.22	0.13	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	144	144	0.01	0.02	0.01	150
Hauling	0.01	< 0.005	0.13	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	78.6	78.6	0.01	0.01	< 0.005	82.7
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.05	0.04	0.04	0.50	0.00	0.00	0.60	0.60	0.00	0.15	0.15	—	139	139	< 0.005	0.01	0.21	141
Vendor	0.01	< 0.005	0.15	0.09	< 0.005	< 0.005	0.09	0.09	< 0.005	0.02	0.02	—	103	103	0.01	0.01	0.11	107
Hauling	0.01	< 0.005	0.09	0.06	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	—	56.2	56.2	0.01	0.01	0.05	59.1
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.09	0.00	0.00	0.11	0.11	0.00	0.03	0.03	—	23.1	23.1	< 0.005	< 0.005	0.03	23.4
Vendor	< 0.005	< 0.005	0.03	0.02	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	< 0.005	—	17.0	17.0	< 0.005	< 0.005	0.02	17.8
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	9.30	9.30	< 0.005	< 0.005	0.01	9.79

3.16. Phase 1 - Building Construction (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.05	0.88	8.00	9.29	0.02	0.32	—	0.32	0.29	—	0.29	—	1,839	1,839	0.07	0.01	—	1,845
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.05	0.88	8.00	9.29	0.02	0.32	—	0.32	0.29	—	0.29	—	1,839	1,839	0.07	0.01	—	1,845
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.75	0.63	5.72	6.63	0.01	0.23	—	0.23	0.21	—	0.21	—	1,313	1,313	0.05	0.01	—	1,318
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.14	0.11	1.04	1.21	< 0.005	0.04	—	0.04	0.04	—	0.04	—	217	217	0.01	< 0.005	—	218
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.07	0.06	0.05	0.78	0.00	0.00	0.85	0.85	0.00	0.21	0.21	—	206	206	< 0.005	< 0.005	0.68	207
Vendor	0.02	< 0.005	0.21	0.13	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	144	144	0.01	0.02	0.36	151
Hauling	0.01	< 0.005	0.12	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	78.6	78.6	0.01	0.01	0.16	82.8
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.07	0.06	0.06	0.72	0.00	0.00	0.85	0.85	0.00	0.21	0.21	—	195	195	< 0.005	0.01	0.02	197
Vendor	0.02	< 0.005	0.22	0.13	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	144	144	0.01	0.02	0.01	150
Hauling	0.01	< 0.005	0.13	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	78.6	78.6	0.01	0.01	< 0.005	82.7
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Worker	0.05	0.04	0.04	0.50	0.00	0.00	0.60	0.60	0.00	0.15	0.15	—	139	139	< 0.005	0.01	0.21	141
Vendor	0.01	< 0.005	0.15	0.09	< 0.005	< 0.005	0.09	0.09	< 0.005	0.02	0.02	—	103	103	0.01	0.01	0.11	107
Hauling	0.01	< 0.005	0.09	0.06	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	—	56.2	56.2	0.01	0.01	0.05	59.1
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.09	0.00	0.00	0.11	0.11	0.00	0.03	0.03	—	23.1	23.1	< 0.005	< 0.005	0.03	23.4
Vendor	< 0.005	< 0.005	0.03	0.02	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	< 0.005	—	17.0	17.0	< 0.005	< 0.005	0.02	17.8
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	9.30	9.30	< 0.005	< 0.005	0.01	9.79

3.17. Phase 1 - Building Construction (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.01	0.84	7.60	9.23	0.02	0.28	—	0.28	0.26	—	0.26	—	1,838	1,838	0.07	0.01	—	1,845
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.16	0.13	1.22	1.48	< 0.005	0.05	—	0.05	0.04	—	0.04	—	295	295	0.01	< 0.005	—	296
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.02	0.22	0.27	< 0.005	0.01	—	0.01	0.01	—	0.01	—	48.8	48.8	< 0.005	< 0.005	—	49.0

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.06	0.05	0.67	0.00	0.00	0.85	0.85	0.00	0.21	0.21	—	191	191	< 0.005	0.01	0.02	193
Vendor	0.02	< 0.005	0.20	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	141	141	0.01	0.02	0.01	148
Hauling	0.01	< 0.005	0.12	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	76.9	76.9	0.01	0.01	< 0.005	80.8
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.10	0.00	0.00	0.13	0.13	0.00	0.03	0.03	—	30.7	30.7	< 0.005	< 0.005	0.04	31.1
Vendor	< 0.005	< 0.005	0.03	0.02	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	—	22.7	22.7	< 0.005	< 0.005	0.02	23.7
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	12.3	12.3	< 0.005	< 0.005	0.01	13.0
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.02	0.00	0.00	0.02	0.02	0.00	0.01	0.01	—	5.08	5.08	< 0.005	< 0.005	0.01	5.15
Vendor	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	3.75	3.75	< 0.005	< 0.005	< 0.005	3.92
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.04	2.04	< 0.005	< 0.005	< 0.005	2.15

3.18. Phase 1 - Building Construction (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.01	0.84	7.60	9.23	0.02	0.28	—	0.28	0.26	—	0.26	—	1,838	1,838	0.07	0.01	—	1,845
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.16	0.13	1.22	1.48	< 0.005	0.05	—	0.05	0.04	—	0.04	—	295	295	0.01	< 0.005	—	296
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.02	0.22	0.27	< 0.005	0.01	—	0.01	0.01	—	0.01	—	48.8	48.8	< 0.005	< 0.005	—	49.0
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.06	0.05	0.67	0.00	0.00	0.85	0.85	0.00	0.21	0.21	—	191	191	< 0.005	0.01	0.02	193
Vendor	0.02	< 0.005	0.20	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	141	141	0.01	0.02	0.01	148
Hauling	0.01	< 0.005	0.12	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	76.9	76.9	0.01	0.01	< 0.005	80.8
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.10	0.00	0.00	0.13	0.13	0.00	0.03	0.03	—	30.7	30.7	< 0.005	< 0.005	0.04	31.1
Vendor	< 0.005	< 0.005	0.03	0.02	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	—	22.7	22.7	< 0.005	< 0.005	0.02	23.7
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	12.3	12.3	< 0.005	< 0.005	0.01	13.0

Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.02	0.00	0.00	0.02	0.02	0.00	0.01	0.01	—	5.08	5.08	< 0.005	< 0.005	0.01	5.15
Vendor	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	3.75	3.75	< 0.005	< 0.005	< 0.005	3.92
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.04	2.04	< 0.005	< 0.005	< 0.005	2.15

3.19. Phase 2 - Building Construction (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.90	0.75	6.69	7.56	0.02	0.25	—	0.25	0.23	—	0.23	—	1,584	1,584	0.06	0.01	—	1,590
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.90	0.75	6.69	7.56	0.02	0.25	—	0.25	0.23	—	0.23	—	1,584	1,584	0.06	0.01	—	1,590
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.31	0.26	2.33	2.63	0.01	0.09	—	0.09	0.08	—	0.08	—	552	552	0.02	< 0.005	—	554
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.05	0.43	0.48	< 0.005	0.02	—	0.02	0.01	—	0.01	—	91.4	91.4	< 0.005	< 0.005	—	91.7

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.06	0.04	0.72	0.00	0.00	0.85	0.85	0.00	0.21	0.21	—	202	202	< 0.005	< 0.005	0.60	203
Vendor	0.02	< 0.005	0.19	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	141	141	0.01	0.02	0.33	148
Hauling	0.01	< 0.005	0.11	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	76.9	76.9	0.01	0.01	0.15	80.9
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.06	0.05	0.67	0.00	0.00	0.85	0.85	0.00	0.21	0.21	—	191	191	< 0.005	0.01	0.02	193
Vendor	0.02	< 0.005	0.20	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	141	141	0.01	0.02	0.01	148
Hauling	0.01	< 0.005	0.12	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	76.9	76.9	0.01	0.01	< 0.005	80.8
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.02	0.22	0.00	0.00	0.29	0.29	0.00	0.07	0.07	—	66.6	66.6	< 0.005	< 0.005	0.09	67.6
Vendor	0.01	< 0.005	0.07	0.04	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	—	49.2	49.2	< 0.005	0.01	0.05	51.5
Hauling	< 0.005	< 0.005	0.04	0.03	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	—	26.8	26.8	< 0.005	< 0.005	0.02	28.2
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.04	0.00	0.00	0.05	0.05	0.00	0.01	0.01	—	11.0	11.0	< 0.005	< 0.005	0.01	11.2
Vendor	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	8.14	8.14	< 0.005	< 0.005	0.01	8.52
Hauling	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	4.43	4.43	< 0.005	< 0.005	< 0.005	4.66

3.20. Phase 2 - Building Construction (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.90	0.75	6.69	7.56	0.02	0.25	—	0.25	0.23	—	0.23	—	1,584	1,584	0.06	0.01	—	1,590
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.90	0.75	6.69	7.56	0.02	0.25	—	0.25	0.23	—	0.23	—	1,584	1,584	0.06	0.01	—	1,590
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.31	0.26	2.33	2.63	0.01	0.09	—	0.09	0.08	—	0.08	—	552	552	0.02	< 0.005	—	554
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.05	0.43	0.48	< 0.005	0.02	—	0.02	0.01	—	0.01	—	91.4	91.4	< 0.005	< 0.005	—	91.7
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.06	0.04	0.72	0.00	0.00	0.85	0.85	0.00	0.21	0.21	—	202	202	< 0.005	< 0.005	0.60	203
Vendor	0.02	< 0.005	0.19	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	141	141	0.01	0.02	0.33	148
Hauling	0.01	< 0.005	0.11	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	76.9	76.9	0.01	0.01	0.15	80.9

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.06	0.05	0.67	0.00	0.00	0.85	0.85	0.00	0.21	0.21	—	191	191	< 0.005	0.01	0.02	193
Vendor	0.02	< 0.005	0.20	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	141	141	0.01	0.02	0.01	148
Hauling	0.01	< 0.005	0.12	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	76.9	76.9	0.01	0.01	< 0.005	80.8
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.02	0.22	0.00	0.00	0.29	0.29	0.00	0.07	0.07	—	66.6	66.6	< 0.005	< 0.005	0.09	67.6
Vendor	0.01	< 0.005	0.07	0.04	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	—	49.2	49.2	< 0.005	0.01	0.05	51.5
Hauling	< 0.005	< 0.005	0.04	0.03	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	—	26.8	26.8	< 0.005	< 0.005	0.02	28.2
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.04	0.00	0.00	0.05	0.05	0.00	0.01	0.01	—	11.0	11.0	< 0.005	< 0.005	0.01	11.2
Vendor	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	8.14	8.14	< 0.005	< 0.005	0.01	8.52
Hauling	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	4.43	4.43	< 0.005	< 0.005	< 0.005	4.66

3.21. Phase 2 - Building Construction (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.87	0.73	6.41	7.53	0.02	0.23	—	0.23	0.21	—	0.21	—	1,584	1,584	0.06	0.01	—	1,590
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.87	0.73	6.41	7.53	0.02	0.23	—	0.23	0.21	—	0.21	—	1,584	1,584	0.06	0.01	—	1,590
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.25	0.21	1.81	2.12	< 0.005	0.07	—	0.07	0.06	—	0.06	—	446	446	0.02	< 0.005	—	448
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.04	0.33	0.39	< 0.005	0.01	—	0.01	0.01	—	0.01	—	73.9	73.9	< 0.005	< 0.005	—	74.2
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.05	0.05	0.04	0.67	0.00	0.00	0.85	0.85	0.00	0.21	0.21	—	198	198	< 0.005	< 0.005	0.53	199
Vendor	0.02	< 0.005	0.18	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	138	138	0.01	0.02	0.30	145
Hauling	0.01	< 0.005	0.11	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	74.9	74.9	0.01	0.01	0.14	79.0
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.05	0.05	0.05	0.63	0.00	0.00	0.85	0.85	0.00	0.21	0.21	—	187	187	< 0.005	< 0.005	0.01	188
Vendor	0.02	< 0.005	0.19	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	138	138	0.01	0.02	0.01	144
Hauling	0.01	< 0.005	0.12	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	74.9	74.9	0.01	0.01	< 0.005	78.8
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.01	0.01	0.17	0.00	0.00	0.24	0.24	0.00	0.06	0.06	—	52.9	52.9	< 0.005	< 0.005	0.06	53.1
Vendor	0.01	< 0.005	0.05	0.03	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	—	38.9	38.9	< 0.005	0.01	0.04	40.7

Hauling	< 0.005	< 0.005	0.03	0.02	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	< 0.005	—	21.1	21.1	< 0.005	< 0.005	0.02	22.2
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.03	0.00	0.00	0.04	0.04	0.00	0.01	0.01	—	8.75	8.75	< 0.005	< 0.005	0.01	8.79
Vendor	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	6.44	6.44	< 0.005	< 0.005	0.01	6.73
Hauling	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	3.50	3.50	< 0.005	< 0.005	< 0.005	3.68

3.22. Phase 2 - Building Construction (2027) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.87	0.73	6.41	7.53	0.02	0.23	—	0.23	0.21	—	0.21	—	1,584	1,584	0.06	0.01	—	1,590
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.87	0.73	6.41	7.53	0.02	0.23	—	0.23	0.21	—	0.21	—	1,584	1,584	0.06	0.01	—	1,590
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.25	0.21	1.81	2.12	< 0.005	0.07	—	0.07	0.06	—	0.06	—	446	446	0.02	< 0.005	—	448
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.04	0.04	0.33	0.39	< 0.005	0.01	—	0.01	0.01	—	0.01	—	73.9	73.9	< 0.005	< 0.005	—	74.2
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.05	0.05	0.04	0.67	0.00	0.00	0.85	0.85	0.00	0.21	0.21	—	198	198	< 0.005	< 0.005	0.53	199
Vendor	0.02	< 0.005	0.18	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	138	138	0.01	0.02	0.30	145
Hauling	0.01	< 0.005	0.11	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	74.9	74.9	0.01	0.01	0.14	79.0
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.05	0.05	0.05	0.63	0.00	0.00	0.85	0.85	0.00	0.21	0.21	—	187	187	< 0.005	< 0.005	0.01	188
Vendor	0.02	< 0.005	0.19	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	138	138	0.01	0.02	0.01	144
Hauling	0.01	< 0.005	0.12	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	74.9	74.9	0.01	0.01	< 0.005	78.8
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.01	0.01	0.17	0.00	0.00	0.24	0.24	0.00	0.06	0.06	—	52.9	52.9	< 0.005	< 0.005	0.06	53.1
Vendor	0.01	< 0.005	0.05	0.03	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	—	38.9	38.9	< 0.005	0.01	0.04	40.7
Hauling	< 0.005	< 0.005	0.03	0.02	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	< 0.005	—	21.1	21.1	< 0.005	< 0.005	0.02	22.2
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.03	0.00	0.00	0.04	0.04	0.00	0.01	0.01	—	8.75	8.75	< 0.005	< 0.005	0.01	8.79
Vendor	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	6.44	6.44	< 0.005	< 0.005	0.01	6.73
Hauling	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	3.50	3.50	< 0.005	< 0.005	< 0.005	3.68

3.23. Phase 1 - Paving (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.34	0.29	2.67	3.73	0.01	0.12	—	0.12	0.11	—	0.11	—	566	566	0.02	< 0.005	—	568
Paving	—	0.28	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.34	0.29	2.67	3.73	0.01	0.12	—	0.12	0.11	—	0.11	—	566	566	0.02	< 0.005	—	568
Paving	—	0.28	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.02	0.22	0.31	< 0.005	0.01	—	0.01	0.01	—	0.01	—	46.6	46.6	< 0.005	< 0.005	—	46.7
Paving	—	0.02	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	< 0.005	0.04	0.06	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	7.71	7.71	< 0.005	< 0.005	—	7.73
Paving	—	< 0.005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.14	0.00	0.00	0.17	0.17	0.00	0.04	0.04	—	40.3	40.3	< 0.005	< 0.005	0.12	40.6
Vendor	0.02	< 0.005	0.19	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	141	141	0.01	0.02	0.33	148
Hauling	0.01	< 0.005	0.11	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	76.9	76.9	0.01	0.01	0.15	80.9
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.13	0.00	0.00	0.17	0.17	0.00	0.04	0.04	—	38.1	38.1	< 0.005	< 0.005	< 0.005	38.6
Vendor	0.02	< 0.005	0.20	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	141	141	0.01	0.02	0.01	148
Hauling	0.01	< 0.005	0.12	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	76.9	76.9	0.01	0.01	< 0.005	80.8
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	3.14	3.14	< 0.005	< 0.005	< 0.005	3.19
Vendor	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	11.6	11.6	< 0.005	< 0.005	0.01	12.1
Hauling	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	6.32	6.32	< 0.005	< 0.005	0.01	6.64
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.52	0.52	< 0.005	< 0.005	< 0.005	0.53
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.92	1.92	< 0.005	< 0.005	< 0.005	2.01
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.05	1.05	< 0.005	< 0.005	< 0.005	1.10

3.24. Phase 1 - Paving (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.34	0.29	2.67	3.73	0.01	0.12	—	0.12	0.11	—	0.11	—	566	566	0.02	< 0.005	—	568
Paving	—	0.28	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.34	0.29	2.67	3.73	0.01	0.12	—	0.12	0.11	—	0.11	—	566	566	0.02	< 0.005	—	568
Paving	—	0.28	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.02	0.22	0.31	< 0.005	0.01	—	0.01	0.01	—	0.01	—	46.6	46.6	< 0.005	< 0.005	—	46.7
Paving	—	0.02	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	< 0.005	0.04	0.06	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	7.71	7.71	< 0.005	< 0.005	—	7.73
Paving	—	< 0.005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.14	0.00	0.00	0.17	0.17	0.00	0.04	0.04	—	40.3	40.3	< 0.005	< 0.005	0.12	40.6
Vendor	0.02	< 0.005	0.19	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	141	141	0.01	0.02	0.33	148

Hauling	0.01	< 0.005	0.11	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	76.9	76.9	0.01	0.01	0.15	80.9
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.13	0.00	0.00	0.17	0.17	0.00	0.04	0.04	—	38.1	38.1	< 0.005	< 0.005	< 0.005	38.6
Vendor	0.02	< 0.005	0.20	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	141	141	0.01	0.02	0.01	148
Hauling	0.01	< 0.005	0.12	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	76.9	76.9	0.01	0.01	< 0.005	80.8
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	3.14	3.14	< 0.005	< 0.005	< 0.005	3.19
Vendor	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	11.6	11.6	< 0.005	< 0.005	0.01	12.1
Hauling	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	6.32	6.32	< 0.005	< 0.005	0.01	6.64
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.52	0.52	< 0.005	< 0.005	< 0.005	0.53
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.92	1.92	< 0.005	< 0.005	< 0.005	2.01
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.05	1.05	< 0.005	< 0.005	< 0.005	1.10

3.25. Phase 2 - Paving (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.51	0.42	4.03	5.92	0.01	0.16	—	0.16	0.15	—	0.15	—	906	906	0.04	0.01	—	909
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.02	0.17	0.24	< 0.005	0.01	—	0.01	0.01	—	0.01	—	37.2	37.2	< 0.005	< 0.005	—	37.3
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.03	0.04	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	6.16	6.16	< 0.005	< 0.005	—	6.18
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.13	0.00	0.00	0.17	0.17	0.00	0.04	0.04	—	39.6	39.6	< 0.005	< 0.005	0.11	39.8
Vendor	0.02	< 0.005	0.18	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	138	138	0.01	0.02	0.30	145
Hauling	0.01	< 0.005	0.11	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	74.9	74.9	0.01	0.01	0.14	79.0
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	1.54	1.54	< 0.005	< 0.005	< 0.005	1.55
Vendor	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	5.68	5.68	< 0.005	< 0.005	0.01	5.93
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	3.08	3.08	< 0.005	< 0.005	< 0.005	3.24
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.26	0.26	< 0.005	< 0.005	< 0.005	0.26
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.94	0.94	< 0.005	< 0.005	< 0.005	0.98

Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.51	0.51	< 0.005	< 0.005	< 0.005	0.54

3.26. Phase 2 - Paving (2027) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.51	0.42	4.03	5.92	0.01	0.16	—	0.16	0.15	—	0.15	—	906	906	0.04	0.01	—	909
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.02	0.17	0.24	< 0.005	0.01	—	0.01	0.01	—	0.01	—	37.2	37.2	< 0.005	< 0.005	—	37.3
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.03	0.04	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	6.16	6.16	< 0.005	< 0.005	—	6.18
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.13	0.00	0.00	0.17	0.17	0.00	0.04	0.04	—	39.6	39.6	< 0.005	< 0.005	0.11	39.8

Vendor	0.02	< 0.005	0.18	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	138	138	0.01	0.02	0.30	145
Hauling	0.01	< 0.005	0.11	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	74.9	74.9	0.01	0.01	0.14	79.0
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	1.54	1.54	< 0.005	< 0.005	< 0.005	1.55
Vendor	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	5.68	5.68	< 0.005	< 0.005	0.01	5.93
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	3.08	3.08	< 0.005	< 0.005	< 0.005	3.24
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.26	0.26	< 0.005	< 0.005	< 0.005	0.26
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.94	0.94	< 0.005	< 0.005	< 0.005	0.98
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.51	0.51	< 0.005	< 0.005	< 0.005	0.54

3.27. Phase 1 - Architectural Coating (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.15	0.12	0.86	1.13	< 0.005	0.02	—	0.02	0.02	—	0.02	—	134	134	0.01	< 0.005	—	134
Architectural Coatings	—	11.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.05	0.06	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	7.32	7.32	< 0.005	< 0.005	—	7.34
Architectural Coatings	—	0.64	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	1.21	1.21	< 0.005	< 0.005	—	1.22
Architectural Coatings	—	0.12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.14	0.00	0.00	0.17	0.17	0.00	0.04	0.04	—	40.3	40.3	< 0.005	< 0.005	0.12	40.6
Vendor	0.02	< 0.005	0.19	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	141	141	0.01	0.02	0.33	148
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	2.10	2.10	< 0.005	< 0.005	< 0.005	2.13

Vendor	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	7.74	7.74	< 0.005	< 0.005	0.01	8.09
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.35	0.35	< 0.005	< 0.005	< 0.005	0.35
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.28	1.28	< 0.005	< 0.005	< 0.005	1.34
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.28. Phase 1 - Architectural Coating (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.15	0.12	0.86	1.13	< 0.005	0.02	—	0.02	0.02	—	0.02	—	134	134	0.01	< 0.005	—	134
Architectural Coatings	—	11.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.05	0.06	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	7.32	7.32	< 0.005	< 0.005	—	7.34
Architectural Coatings	—	0.64	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	1.21	1.21	< 0.005	< 0.005	—	1.22
Architectural Coatings	—	0.12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.14	0.00	0.00	0.17	0.17	0.00	0.04	0.04	—	40.3	40.3	< 0.005	< 0.005	0.12	40.6
Vendor	0.02	< 0.005	0.19	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	141	141	0.01	0.02	0.33	148
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	2.10	2.10	< 0.005	< 0.005	< 0.005	2.13
Vendor	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	7.74	7.74	< 0.005	< 0.005	0.01	8.09
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.35	0.35	< 0.005	< 0.005	< 0.005	0.35
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.28	1.28	< 0.005	< 0.005	< 0.005	1.34
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.29. Phase 2 - Architectural Coating (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.14	0.11	0.83	1.13	< 0.005	0.02	—	0.02	0.02	—	0.02	—	134	134	0.01	< 0.005	—	134
Architectural Coatings	—	11.6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	< 0.005	0.03	0.05	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	5.49	5.49	< 0.005	< 0.005	—	5.51
Architectural Coatings	—	0.47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.91	0.91	< 0.005	< 0.005	—	0.91
Architectural Coatings	—	0.09	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.13	0.00	0.00	0.17	0.17	0.00	0.04	0.04	—	39.6	39.6	< 0.005	< 0.005	0.11	39.8
Vendor	0.02	< 0.005	0.18	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	138	138	0.01	0.02	0.30	145
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	1.54	1.54	< 0.005	< 0.005	< 0.005	1.55
Vendor	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	5.68	5.68	< 0.005	< 0.005	0.01	5.93
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.26	0.26	< 0.005	< 0.005	< 0.005	0.26
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.94	0.94	< 0.005	< 0.005	< 0.005	0.98
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.30. Phase 2 - Architectural Coating (2027) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.14	0.11	0.83	1.13	< 0.005	0.02	—	0.02	0.02	—	0.02	—	134	134	0.01	< 0.005	—	134
Architectural Coatings	—	11.6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	< 0.005	0.03	0.05	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	5.49	5.49	< 0.005	< 0.005	—	5.51
Architectural Coatings	—	0.47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.91	0.91	< 0.005	< 0.005	—	0.91
Architectural Coatings	—	0.09	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.13	0.00	0.00	0.17	0.17	0.00	0.04	0.04	—	39.6	39.6	< 0.005	< 0.005	0.11	39.8
Vendor	0.02	< 0.005	0.18	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	138	138	0.01	0.02	0.30	145
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	1.54	1.54	< 0.005	< 0.005	< 0.005	1.55
Vendor	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	5.68	5.68	< 0.005	< 0.005	0.01	5.93
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.26	0.26	< 0.005	< 0.005	< 0.005	0.26
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.94	0.94	< 0.005	< 0.005	< 0.005	0.98
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

4. Operations Emissions Details

4.1. Mobile Emissions by Land Use

4.1.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	4.81	4.37	3.29	44.5	0.14	0.07	13.5	13.6	0.06	3.42	3.48	—	13,928	13,928	0.42	0.42	33.3	14,098
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Total	4.81	4.37	3.29	44.5	0.14	0.07	13.5	13.6	0.06	3.42	3.48	—	13,928	13,928	0.42	0.42	33.3	14,098

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	4.75	4.30	3.89	42.5	0.13	0.07	13.5	13.6	0.06	3.42	3.48	—	13,315	13,315	0.46	0.46	0.86	13,465
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Total	4.75	4.30	3.89	42.5	0.13	0.07	13.5	13.6	0.06	3.42	3.48	—	13,315	13,315	0.46	0.46	0.86	13,465
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	0.65	0.59	0.51	5.73	0.02	0.01	1.85	1.86	0.01	0.47	0.48	—	1,682	1,682	0.06	0.06	1.81	1,702
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.65	0.59	0.51	5.73	0.02	0.01	1.85	1.86	0.01	0.47	0.48	—	1,682	1,682	0.06	0.06	1.81	1,702

4.1.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	4.81	4.37	3.29	44.5	0.14	0.07	13.5	13.6	0.06	3.42	3.48	—	13,928	13,928	0.42	0.42	33.3	14,098
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Total	4.81	4.37	3.29	44.5	0.14	0.07	13.5	13.6	0.06	3.42	3.48	—	13,928	13,928	0.42	0.42	33.3	14,098
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	4.75	4.30	3.89	42.5	0.13	0.07	13.5	13.6	0.06	3.42	3.48	—	13,315	13,315	0.46	0.46	0.86	13,465
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Total	4.75	4.30	3.89	42.5	0.13	0.07	13.5	13.6	0.06	3.42	3.48	—	13,315	13,315	0.46	0.46	0.86	13,465
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	0.65	0.59	0.51	5.73	0.02	0.01	1.85	1.86	0.01	0.47	0.48	—	1,682	1,682	0.06	0.06	1.81	1,702

Unenclos Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.65	0.59	0.51	5.73	0.02	0.01	1.85	1.86	0.01	0.47	0.48	—	1,682	1,682	0.06	0.06	1.81	1,702

4.2. Energy

4.2.1. Electricity Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	—	98.2	98.2	0.27	0.03	—	115
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	—	12.9	12.9	0.04	< 0.005	—	15.1
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	111	111	0.31	0.04	—	130
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Research	—	—	—	—	—	—	—	—	—	—	—	—	98.2	98.2	0.27	0.03	—	115
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	—	12.9	12.9	0.04	< 0.005	—	15.1
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	111	111	0.31	0.04	—	130
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	—	16.3	16.3	0.04	0.01	—	19.0
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	—	2.14	2.14	0.01	< 0.005	—	2.50
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	18.4	18.4	0.05	0.01	—	21.5

4.2.2. Electricity Emissions By Land Use - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Research & Development	—	—	—	—	—	—	—	—	—	—	—	—	98.1	98.1	0.27	0.03	—	115
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	—	12.9	12.9	0.04	< 0.005	—	15.1
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	111	111	0.31	0.04	—	130
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	—	98.1	98.1	0.27	0.03	—	115
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	—	12.9	12.9	0.04	< 0.005	—	15.1
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	111	111	0.31	0.04	—	130
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	—	16.2	16.2	0.04	0.01	—	19.0

Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	—	2.14	2.14	0.01	< 0.005	—	2.50
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	18.4	18.4	0.05	0.01	—	21.5

4.2.3. Natural Gas Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	0.17	0.08	1.51	1.27	0.01	0.11	—	0.11	0.11	—	0.11	—	1,798	1,798	0.16	< 0.005	—	1,803
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.17	0.08	1.51	1.27	0.01	0.11	—	0.11	0.11	—	0.11	—	1,798	1,798	0.16	< 0.005	—	1,803
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Research & Development	0.17	0.08	1.51	1.27	0.01	0.11	—	0.11	0.11	—	0.11	—	1,798	1,798	0.16	< 0.005	—	1,803
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.17	0.08	1.51	1.27	0.01	0.11	—	0.11	0.11	—	0.11	—	1,798	1,798	0.16	< 0.005	—	1,803
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	0.03	0.02	0.28	0.23	< 0.005	0.02	—	0.02	0.02	—	0.02	—	298	298	0.03	< 0.005	—	299
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.03	0.02	0.28	0.23	< 0.005	0.02	—	0.02	0.02	—	0.02	—	298	298	0.03	< 0.005	—	299

4.2.4. Natural Gas Emissions By Land Use - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Research & Development	0.17	0.08	1.51	1.27	0.01	0.11	—	0.11	0.11	—	0.11	—	1,798	1,798	0.16	< 0.005	—	1,803
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.17	0.08	1.51	1.27	0.01	0.11	—	0.11	0.11	—	0.11	—	1,798	1,798	0.16	< 0.005	—	1,803
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	0.17	0.08	1.51	1.27	0.01	0.11	—	0.11	0.11	—	0.11	—	1,798	1,798	0.16	< 0.005	—	1,803
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.17	0.08	1.51	1.27	0.01	0.11	—	0.11	0.11	—	0.11	—	1,798	1,798	0.16	< 0.005	—	1,803
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	0.03	0.02	0.28	0.23	< 0.005	0.02	—	0.02	0.02	—	0.02	—	298	298	0.03	< 0.005	—	299

Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.03	0.02	0.28	0.23	< 0.005	0.02	—	0.02	0.02	—	0.02	—	298	298	0.03	< 0.005	—	299

4.3. Area Emissions by Source

4.3.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Source	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	—	4.90	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	—	0.11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	2.85	2.63	0.13	16.0	< 0.005	0.03	—	0.03	0.02	—	0.02	—	65.8	65.8	< 0.005	< 0.005	—	66.0
Total	2.85	7.64	0.13	16.0	< 0.005	0.03	—	0.03	0.02	—	0.02	—	65.8	65.8	< 0.005	< 0.005	—	66.0
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	—	4.90	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Architect Coatings	—	0.11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	5.02	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	—	0.90	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	—	0.02	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.26	0.24	0.01	1.44	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	5.37	5.37	< 0.005	< 0.005	—	5.39
Total	0.26	1.15	0.01	1.44	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	5.37	5.37	< 0.005	< 0.005	—	5.39

4.3.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Source	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	—	4.90	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	—	0.11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	2.85	2.63	0.13	16.0	< 0.005	0.03	—	0.03	0.02	—	0.02	—	65.8	65.8	< 0.005	< 0.005	—	66.0
Total	2.85	7.64	0.13	16.0	< 0.005	0.03	—	0.03	0.02	—	0.02	—	65.8	65.8	< 0.005	< 0.005	—	66.0

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	—	4.90	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	—	0.11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	5.02	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	—	0.90	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	—	0.02	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.26	0.24	0.01	1.44	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	5.37	5.37	< 0.005	< 0.005	—	5.39
Total	0.26	1.15	0.01	1.44	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	5.37	5.37	< 0.005	< 0.005	—	5.39

4.4. Water Emissions by Land Use

4.4.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Research & Development	—	—	—	—	—	—	—	—	—	—	—	10.1	1.12	11.2	1.04	0.02	—	44.6
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	10.1	1.12	11.2	1.04	0.02	—	44.6
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	10.1	1.12	11.2	1.04	0.02	—	44.6
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	10.1	1.12	11.2	1.04	0.02	—	44.6
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	1.67	0.19	1.86	0.17	< 0.005	—	7.38

Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	1.67	0.19	1.86	0.17	< 0.005	—	7.38

4.4.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	10.1	1.12	11.2	1.04	0.02	—	44.6
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	10.1	1.12	11.2	1.04	0.02	—	44.6
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Research & Development	—	—	—	—	—	—	—	—	—	—	—	10.1	1.12	11.2	1.04	0.02	—	44.6
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	10.1	1.12	11.2	1.04	0.02	—	44.6
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	1.67	0.19	1.86	0.17	< 0.005	—	7.38
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	1.67	0.19	1.86	0.17	< 0.005	—	7.38

4.5. Waste Emissions by Land Use

4.5.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	9.35	0.00	9.35	0.93	0.00	—	32.7
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	9.35	0.00	9.35	0.93	0.00	—	32.7
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	9.35	0.00	9.35	0.93	0.00	—	32.7
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	9.35	0.00	9.35	0.93	0.00	—	32.7
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	1.55	0.00	1.55	0.15	0.00	—	5.42

Unenclos Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	1.55	0.00	1.55	0.15	0.00	—	5.42

4.5.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	9.35	0.00	9.35	0.93	0.00	—	32.7
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	9.35	0.00	9.35	0.93	0.00	—	32.7
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Research & Development	—	—	—	—	—	—	—	—	—	—	—	9.35	0.00	9.35	0.93	0.00	—	32.7
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	9.35	0.00	9.35	0.93	0.00	—	32.7
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	1.55	0.00	1.55	0.15	0.00	—	5.42
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	1.55	0.00	1.55	0.15	0.00	—	5.42

4.6. Refrigerant Emissions by Land Use

4.6.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.84	5.84
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.84	5.84
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.84	5.84
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.84	5.84
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.97	0.97
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.97	0.97

4.6.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.84	5.84

Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.84	5.84
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.84	5.84
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.84	5.84
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.97	0.97
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.97	0.97

4.7. Offroad Emissions By Equipment Type

4.7.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.7.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.8. Stationary Emissions By Equipment Type

4.8.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Emergency Generator	1.45	1.32	5.90	3.37	0.01	0.19	0.00	0.19	0.19	0.00	0.19	0.00	675	675	0.03	0.01	0.00	678
Total	1.45	1.32	5.90	3.37	0.01	0.19	0.00	0.19	0.19	0.00	0.19	0.00	675	675	0.03	0.01	0.00	678

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Emergency Generator	1.45	1.32	5.90	3.37	0.01	0.19	0.00	0.19	0.19	0.00	0.19	0.00	675	675	0.03	0.01	0.00	678
Total	1.45	1.32	5.90	3.37	0.01	0.19	0.00	0.19	0.19	0.00	0.19	0.00	675	675	0.03	0.01	0.00	678
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Emergency Generator	0.07	0.07	0.30	0.17	< 0.005	0.01	0.00	0.01	0.01	0.00	0.01	0.00	30.6	30.6	< 0.005	< 0.005	0.00	30.7
Total	0.07	0.07	0.30	0.17	< 0.005	0.01	0.00	0.01	0.01	0.00	0.01	0.00	30.6	30.6	< 0.005	< 0.005	0.00	30.7

4.8.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Emergency Generator	1.45	1.32	5.90	3.37	0.01	0.19	0.00	0.19	0.19	0.00	0.19	0.00	675	675	0.03	0.01	0.00	678
Total	1.45	1.32	5.90	3.37	0.01	0.19	0.00	0.19	0.19	0.00	0.19	0.00	675	675	0.03	0.01	0.00	678
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Emergency Generator	1.45	1.32	5.90	3.37	0.01	0.19	0.00	0.19	0.19	0.00	0.19	0.00	675	675	0.03	0.01	0.00	678

Total	1.45	1.32	5.90	3.37	0.01	0.19	0.00	0.19	0.19	0.00	0.19	0.00	675	675	0.03	0.01	0.00	678
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Emergency Generator	0.07	0.07	0.30	0.17	< 0.005	0.01	0.00	0.01	0.01	0.00	0.01	0.00	30.6	30.6	< 0.005	< 0.005	0.00	30.7
Total	0.07	0.07	0.30	0.17	< 0.005	0.01	0.00	0.01	0.01	0.00	0.01	0.00	30.6	30.6	< 0.005	< 0.005	0.00	30.7

4.9. User Defined Emissions By Equipment Type

4.9.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.9.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.4. Soil Carbon Accumulation By Vegetation Type - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.5. Above and Belowground Carbon Accumulation by Land Use Type - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.6. Avoided and Sequestered Emissions by Species - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Remove	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Phase 1 - Demolition	Demolition	7/1/2024	8/11/2024	5.00	30.0	—
Phase 2 - Demolition	Demolition	5/5/2026	6/1/2026	5.00	20.0	—
Phase 1 - Site Preparation	Site Preparation	8/13/2024	8/26/2024	5.00	10.0	—
Phase 2 - Site Preparation	Site Preparation	6/2/2026	6/8/2026	5.00	5.00	—
Phase 1 - Grading	Grading	8/27/2024	10/6/2024	5.00	29.0	—
Phase 2 - Grading	Grading	6/9/2026	7/6/2026	5.00	20.0	—
Phase 1 - Building Construction	Building Construction	10/8/2024	3/23/2026	5.00	380	—
Phase 2 - Building Construction	Building Construction	7/7/2026	5/24/2027	5.00	230	—
Phase 1 - Paving	Paving	3/24/2026	5/4/2026	5.00	30.0	—
Phase 2 - Paving	Paving	5/25/2027	6/14/2027	5.00	15.0	—
Phase 1 - Architectural Coating	Architectural Coating	4/7/2026	5/4/2026	5.00	20.0	—
Phase 2 - Architectural Coating	Architectural Coating	5/25/2027	6/14/2027	5.00	15.0	—

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Phase 1 - Demolition	Concrete/Industrial Saws	Diesel	Average	1.00	8.00	33.0	0.73
Phase 1 - Demolition	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Phase 1 - Demolition	Excavators	Diesel	Average	2.00	8.00	36.0	0.38
Phase 2 - Demolition	Concrete/Industrial Saws	Diesel	Average	1.00	8.00	33.0	0.73
Phase 2 - Demolition	Excavators	Diesel	Average	1.00	8.00	36.0	0.38

Phase 2 - Demolition	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Phase 1 - Site Preparation	Tractors/Loaders/Backhoes	Diesel	Average	2.00	8.00	84.0	0.37
Phase 1 - Site Preparation	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Phase 2 - Site Preparation	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Phase 2 - Site Preparation	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
Phase 1 - Grading	Graders	Diesel	Average	1.00	8.00	148	0.41
Phase 1 - Grading	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Phase 1 - Grading	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
Phase 1 - Grading	Excavators	Diesel	Average	2.00	8.00	36.0	0.38
Phase 1 - Grading	Scrapers	Diesel	Average	1.00	8.00	423	0.48
Phase 2 - Grading	Excavators	Diesel	Average	1.00	8.00	36.0	0.38
Phase 2 - Grading	Graders	Diesel	Average	1.00	8.00	148	0.41
Phase 2 - Grading	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Phase 2 - Grading	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
Phase 1 - Building Construction	Cranes	Diesel	Average	1.00	7.00	367	0.29
Phase 1 - Building Construction	Forklifts	Diesel	Average	1.00	8.00	82.0	0.20
Phase 1 - Building Construction	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
Phase 1 - Building Construction	Tractors/Loaders/Backhoes	Diesel	Average	2.00	7.00	84.0	0.37
Phase 1 - Building Construction	Welders	Diesel	Average	1.00	8.00	46.0	0.45
Phase 2 - Building Construction	Cranes	Diesel	Average	1.00	7.00	367	0.29

Phase 2 - Building Construction	Forklifts	Diesel	Average	1.00	8.00	82.0	0.20
Phase 2 - Building Construction	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
Phase 2 - Building Construction	Tractors/Loaders/Backhoes	Diesel	Average	1.00	7.00	84.0	0.37
Phase 2 - Building Construction	Welders	Diesel	Average	1.00	8.00	46.0	0.45
Phase 1 - Paving	Pavers	Diesel	Average	1.00	6.00	81.0	0.42
Phase 1 - Paving	Paving Equipment	Diesel	Average	1.00	6.00	89.0	0.36
Phase 1 - Paving	Rollers	Diesel	Average	1.00	6.00	36.0	0.38
Phase 2 - Paving	Pavers	Diesel	Average	1.00	8.00	81.0	0.42
Phase 2 - Paving	Paving Equipment	Diesel	Average	1.00	6.00	89.0	0.36
Phase 2 - Paving	Rollers	Diesel	Average	1.00	6.00	36.0	0.38
Phase 2 - Paving	Cement and Mortar Mixers	Diesel	Average	1.00	6.00	10.0	0.56
Phase 2 - Paving	Tractors/Loaders/Backhoes	Diesel	Average	1.00	6.00	84.0	0.37
Phase 1 - Architectural Coating	Air Compressors	Diesel	Average	1.00	6.00	37.0	0.48
Phase 2 - Architectural Coating	Air Compressors	Diesel	Average	1.00	6.00	37.0	0.48

5.2.2. Mitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Phase 1 - Demolition	Concrete/Industrial Saws	Diesel	Average	1.00	8.00	33.0	0.73
Phase 1 - Demolition	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Phase 1 - Demolition	Excavators	Diesel	Average	2.00	8.00	36.0	0.38
Phase 2 - Demolition	Concrete/Industrial Saws	Diesel	Average	1.00	8.00	33.0	0.73

Phase 2 - Demolition	Excavators	Diesel	Average	1.00	8.00	36.0	0.38
Phase 2 - Demolition	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Phase 1 - Site Preparation	Tractors/Loaders/Backhoes	Diesel	Average	2.00	8.00	84.0	0.37
Phase 1 - Site Preparation	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Phase 2 - Site Preparation	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Phase 2 - Site Preparation	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
Phase 1 - Grading	Graders	Diesel	Average	1.00	8.00	148	0.41
Phase 1 - Grading	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Phase 1 - Grading	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
Phase 1 - Grading	Excavators	Diesel	Average	2.00	8.00	36.0	0.38
Phase 1 - Grading	Scrapers	Diesel	Average	1.00	8.00	423	0.48
Phase 2 - Grading	Excavators	Diesel	Average	1.00	8.00	36.0	0.38
Phase 2 - Grading	Graders	Diesel	Average	1.00	8.00	148	0.41
Phase 2 - Grading	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Phase 2 - Grading	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
Phase 1 - Building Construction	Cranes	Diesel	Average	1.00	7.00	367	0.29
Phase 1 - Building Construction	Forklifts	Diesel	Average	1.00	8.00	82.0	0.20
Phase 1 - Building Construction	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
Phase 1 - Building Construction	Tractors/Loaders/Backhoes	Diesel	Average	2.00	7.00	84.0	0.37
Phase 1 - Building Construction	Welders	Diesel	Average	1.00	8.00	46.0	0.45

Phase 2 - Building Construction	Cranes	Diesel	Average	1.00	7.00	367	0.29
Phase 2 - Building Construction	Forklifts	Diesel	Average	1.00	8.00	82.0	0.20
Phase 2 - Building Construction	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
Phase 2 - Building Construction	Tractors/Loaders/Backhoes	Diesel	Average	1.00	7.00	84.0	0.37
Phase 2 - Building Construction	Welders	Diesel	Average	1.00	8.00	46.0	0.45
Phase 1 - Paving	Pavers	Diesel	Average	1.00	6.00	81.0	0.42
Phase 1 - Paving	Paving Equipment	Diesel	Average	1.00	6.00	89.0	0.36
Phase 1 - Paving	Rollers	Diesel	Average	1.00	6.00	36.0	0.38
Phase 2 - Paving	Pavers	Diesel	Average	1.00	8.00	81.0	0.42
Phase 2 - Paving	Paving Equipment	Diesel	Average	1.00	6.00	89.0	0.36
Phase 2 - Paving	Rollers	Diesel	Average	1.00	6.00	36.0	0.38
Phase 2 - Paving	Cement and Mortar Mixers	Diesel	Average	1.00	6.00	10.0	0.56
Phase 2 - Paving	Tractors/Loaders/Backhoes	Diesel	Average	1.00	6.00	84.0	0.37
Phase 1 - Architectural Coating	Air Compressors	Diesel	Average	1.00	6.00	37.0	0.48
Phase 2 - Architectural Coating	Air Compressors	Diesel	Average	1.00	6.00	37.0	0.48

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Phase 1 - Demolition	—	—	—	—
Phase 1 - Demolition	Worker	15.0	11.7	LDA,LDT1,LDT2

Phase 1 - Demolition	Vendor	1.00	8.40	HHDT,MHDT
Phase 1 - Demolition	Hauling	12.0	20.0	HHDT
Phase 1 - Demolition	Onsite truck	0.00	0.00	HHDT
Phase 1 - Site Preparation	—	—	—	—
Phase 1 - Site Preparation	Worker	10.0	11.7	LDA,LDT1,LDT2
Phase 1 - Site Preparation	Vendor	2.00	8.40	HHDT,MHDT
Phase 1 - Site Preparation	Hauling	5.00	20.0	HHDT
Phase 1 - Site Preparation	Onsite truck	0.00	0.00	HHDT
Phase 1 - Grading	—	—	—	—
Phase 1 - Grading	Worker	15.0	11.7	LDA,LDT1,LDT2
Phase 1 - Grading	Vendor	3.00	8.40	HHDT,MHDT
Phase 1 - Grading	Hauling	8.00	20.0	HHDT
Phase 1 - Grading	Onsite truck	0.00	0.00	HHDT
Phase 1 - Building Construction	—	—	—	—
Phase 1 - Building Construction	Worker	25.0	11.7	LDA,LDT1,LDT2
Phase 1 - Building Construction	Vendor	5.00	8.40	HHDT,MHDT
Phase 1 - Building Construction	Hauling	1.00	20.0	HHDT
Phase 1 - Building Construction	Onsite truck	0.00	0.00	HHDT
Phase 1 - Paving	—	—	—	—
Phase 1 - Paving	Worker	5.00	11.7	LDA,LDT1,LDT2
Phase 1 - Paving	Vendor	5.00	8.40	HHDT,MHDT
Phase 1 - Paving	Hauling	1.00	20.0	HHDT
Phase 1 - Paving	Onsite truck	0.00	0.00	HHDT
Phase 1 - Architectural Coating	—	—	—	—
Phase 1 - Architectural Coating	Worker	5.00	11.7	LDA,LDT1,LDT2
Phase 1 - Architectural Coating	Vendor	5.00	8.40	HHDT,MHDT
Phase 1 - Architectural Coating	Hauling	0.00	20.0	HHDT

Phase 1 - Architectural Coating	Onsite truck	0.00	0.00	HHDT
Phase 2 - Demolition	—	—	—	—
Phase 2 - Demolition	Worker	12.0	11.7	LDA,LDT1,LDT2
Phase 2 - Demolition	Vendor	0.00	8.40	HHDT,MHDT
Phase 2 - Demolition	Hauling	6.00	20.0	HHDT
Phase 2 - Demolition	Onsite truck	0.00	0.00	HHDT
Phase 2 - Site Preparation	—	—	—	—
Phase 2 - Site Preparation	Worker	10.0	11.7	LDA,LDT1,LDT2
Phase 2 - Site Preparation	Vendor	2.00	8.40	HHDT,MHDT
Phase 2 - Site Preparation	Hauling	5.00	20.0	HHDT
Phase 2 - Site Preparation	Onsite truck	0.00	0.00	HHDT
Phase 2 - Grading	—	—	—	—
Phase 2 - Grading	Worker	15.0	11.7	LDA,LDT1,LDT2
Phase 2 - Grading	Vendor	3.00	8.40	HHDT,MHDT
Phase 2 - Grading	Hauling	4.00	20.0	HHDT
Phase 2 - Grading	Onsite truck	0.00	0.00	HHDT
Phase 2 - Building Construction	—	—	—	—
Phase 2 - Building Construction	Worker	25.0	11.7	LDA,LDT1,LDT2
Phase 2 - Building Construction	Vendor	5.00	8.40	HHDT,MHDT
Phase 2 - Building Construction	Hauling	1.00	20.0	HHDT
Phase 2 - Building Construction	Onsite truck	0.00	0.00	HHDT
Phase 2 - Paving	—	—	—	—
Phase 2 - Paving	Worker	5.00	11.7	LDA,LDT1,LDT2
Phase 2 - Paving	Vendor	5.00	8.40	HHDT,MHDT
Phase 2 - Paving	Hauling	1.00	20.0	HHDT
Phase 2 - Paving	Onsite truck	0.00	0.00	HHDT
Phase 2 - Architectural Coating	—	—	—	—

Phase 2 - Architectural Coating	Worker	5.00	11.7	LDA,LDT1,LDT2
Phase 2 - Architectural Coating	Vendor	5.00	8.40	HHDT,MHDT
Phase 2 - Architectural Coating	Hauling	0.00	20.0	HHDT
Phase 2 - Architectural Coating	Onsite truck	0.00	0.00	HHDT

5.3.2. Mitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Phase 1 - Demolition	—	—	—	—
Phase 1 - Demolition	Worker	15.0	11.7	LDA,LDT1,LDT2
Phase 1 - Demolition	Vendor	1.00	8.40	HHDT,MHDT
Phase 1 - Demolition	Hauling	12.0	20.0	HHDT
Phase 1 - Demolition	Onsite truck	0.00	0.00	HHDT
Phase 1 - Site Preparation	—	—	—	—
Phase 1 - Site Preparation	Worker	10.0	11.7	LDA,LDT1,LDT2
Phase 1 - Site Preparation	Vendor	2.00	8.40	HHDT,MHDT
Phase 1 - Site Preparation	Hauling	5.00	20.0	HHDT
Phase 1 - Site Preparation	Onsite truck	0.00	0.00	HHDT
Phase 1 - Grading	—	—	—	—
Phase 1 - Grading	Worker	15.0	11.7	LDA,LDT1,LDT2
Phase 1 - Grading	Vendor	3.00	8.40	HHDT,MHDT
Phase 1 - Grading	Hauling	8.00	20.0	HHDT
Phase 1 - Grading	Onsite truck	0.00	0.00	HHDT
Phase 1 - Building Construction	—	—	—	—
Phase 1 - Building Construction	Worker	25.0	11.7	LDA,LDT1,LDT2
Phase 1 - Building Construction	Vendor	5.00	8.40	HHDT,MHDT
Phase 1 - Building Construction	Hauling	1.00	20.0	HHDT
Phase 1 - Building Construction	Onsite truck	0.00	0.00	HHDT

Phase 1 - Paving	—	—	—	—
Phase 1 - Paving	Worker	5.00	11.7	LDA,LDT1,LDT2
Phase 1 - Paving	Vendor	5.00	8.40	HHDT,MHDT
Phase 1 - Paving	Hauling	1.00	20.0	HHDT
Phase 1 - Paving	Onsite truck	0.00	0.00	HHDT
Phase 1 - Architectural Coating	—	—	—	—
Phase 1 - Architectural Coating	Worker	5.00	11.7	LDA,LDT1,LDT2
Phase 1 - Architectural Coating	Vendor	5.00	8.40	HHDT,MHDT
Phase 1 - Architectural Coating	Hauling	0.00	20.0	HHDT
Phase 1 - Architectural Coating	Onsite truck	0.00	0.00	HHDT
Phase 2 - Demolition	—	—	—	—
Phase 2 - Demolition	Worker	12.0	11.7	LDA,LDT1,LDT2
Phase 2 - Demolition	Vendor	0.00	8.40	HHDT,MHDT
Phase 2 - Demolition	Hauling	6.00	20.0	HHDT
Phase 2 - Demolition	Onsite truck	0.00	0.00	HHDT
Phase 2 - Site Preparation	—	—	—	—
Phase 2 - Site Preparation	Worker	10.0	11.7	LDA,LDT1,LDT2
Phase 2 - Site Preparation	Vendor	2.00	8.40	HHDT,MHDT
Phase 2 - Site Preparation	Hauling	5.00	20.0	HHDT
Phase 2 - Site Preparation	Onsite truck	0.00	0.00	HHDT
Phase 2 - Grading	—	—	—	—
Phase 2 - Grading	Worker	15.0	11.7	LDA,LDT1,LDT2
Phase 2 - Grading	Vendor	3.00	8.40	HHDT,MHDT
Phase 2 - Grading	Hauling	4.00	20.0	HHDT
Phase 2 - Grading	Onsite truck	0.00	0.00	HHDT
Phase 2 - Building Construction	—	—	—	—
Phase 2 - Building Construction	Worker	25.0	11.7	LDA,LDT1,LDT2

Phase 2 - Building Construction	Vendor	5.00	8.40	HHDT,MHDT
Phase 2 - Building Construction	Hauling	1.00	20.0	HHDT
Phase 2 - Building Construction	Onsite truck	0.00	0.00	HHDT
Phase 2 - Paving	—	—	—	—
Phase 2 - Paving	Worker	5.00	11.7	LDA,LDT1,LDT2
Phase 2 - Paving	Vendor	5.00	8.40	HHDT,MHDT
Phase 2 - Paving	Hauling	1.00	20.0	HHDT
Phase 2 - Paving	Onsite truck	0.00	0.00	HHDT
Phase 2 - Architectural Coating	—	—	—	—
Phase 2 - Architectural Coating	Worker	5.00	11.7	LDA,LDT1,LDT2
Phase 2 - Architectural Coating	Vendor	5.00	8.40	HHDT,MHDT
Phase 2 - Architectural Coating	Hauling	0.00	20.0	HHDT
Phase 2 - Architectural Coating	Onsite truck	0.00	0.00	HHDT

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

Non-applicable. No control strategies activated by user.

5.5. Architectural Coatings

Phase Name	Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
Phase 1 - Architectural Coating	0.00	0.00	200,419	66,005	7,454
Phase 2 - Architectural Coating	0.00	0.00	148,459	48,893	5,522

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (Cubic Yards)	Material Exported (Cubic Yards)	Acres Graded (acres)	Material Demolished (Ton of Debris)	Acres Paved (acres)
Phase 1 - Demolition	0.00	0.00	0.00	0.00	—
Phase 2 - Demolition	0.00	0.00	0.00	0.00	—
Phase 1 - Site Preparation	0.00	0.00	5.00	0.00	—
Phase 2 - Site Preparation	0.00	0.00	2.50	0.00	—
Phase 1 - Grading	0.00	0.00	58.0	0.00	—
Phase 2 - Grading	0.00	0.00	20.0	0.00	—
Phase 1 - Paving	0.00	0.00	0.00	0.00	4.96
Phase 2 - Paving	0.00	0.00	0.00	0.00	4.96

5.6.2. Construction Earthmoving Control Strategies

Control Strategies Applied	Frequency (per day)	PM10 Reduction	PM2.5 Reduction
Water Exposed Area	2	61%	61%
Water Demolished Area	2	36%	36%

5.7. Construction Paving

Land Use	Area Paved (acres)	% Asphalt
Research & Development	0.00	0%
Unenclosed Parking with Elevator	3.20	100%
Other Non-Asphalt Surfaces	1.76	0%

5.8. Construction Electricity Consumption and Emissions Factors

kWh per Year and Emission Factor (lb/MWh)

Year	kWh per Year	CO2	CH4	N2O
2024	0.00	12.0	0.03	< 0.005

2025	0.00	12.0	0.03	< 0.005
2026	0.00	12.0	0.03	< 0.005
2027	0.00	12.0	0.03	< 0.005

5.9. Operational Mobile Sources

5.9.1. Unmitigated

Land Use Type	Trips/Weekday	Trips/Saturday	Trips/Sunday	Trips/Year	VMT/Weekday	VMT/Saturday	VMT/Sunday	VMT/Year
Research & Development	1,645	342	200	457,137	19,181	3,983	2,327	5,329,753
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

5.9.2. Mitigated

Land Use Type	Trips/Weekday	Trips/Saturday	Trips/Sunday	Trips/Year	VMT/Weekday	VMT/Saturday	VMT/Sunday	VMT/Year
Research & Development	1,645	342	200	457,137	19,181	3,983	2,327	5,329,753
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

5.10. Operational Area Sources

5.10.1. Hearths

5.10.1.1. Unmitigated

5.10.1.2. Mitigated

5.10.2. Architectural Coatings

Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
0	0.00	348,877	114,897	12,976

5.10.3. Landscape Equipment

Season	Unit	Value
Snow Days	day/yr	0.00
Summer Days	day/yr	180

5.10.4. Landscape Equipment - Mitigated

Season	Unit	Value
Snow Days	day/yr	0.00
Summer Days	day/yr	180

5.11. Operational Energy Consumption

5.11.1. Unmitigated

Electricity (kWh/yr) and CO2 and CH4 and N2O and Natural Gas (kBTU/yr)

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)
Research & Development	2,987,950	12.0	0.0330	0.0040	5,611,640
Unenclosed Parking with Elevator	393,111	12.0	0.0330	0.0040	0.00
Other Non-Asphalt Surfaces	0.00	12.0	0.0330	0.0040	0.00

5.11.2. Mitigated

Electricity (kWh/yr) and CO2 and CH4 and N2O and Natural Gas (kBTU/yr)

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)
Research & Development	2,982,914	12.0	0.0330	0.0040	5,611,640
Unenclosed Parking with Elevator	393,111	12.0	0.0330	0.0040	0.00
Other Non-Asphalt Surfaces	0.00	12.0	0.0330	0.0040	0.00

5.12. Operational Water and Wastewater Consumption

5.12.1. Unmitigated

Land Use	Indoor Water (gal/year)	Outdoor Water (gal/year)
Research & Development	5,263,700	15,910
Unenclosed Parking with Elevator	0.00	0.00
Other Non-Asphalt Surfaces	0.00	0.00

5.12.2. Mitigated

Land Use	Indoor Water (gal/year)	Outdoor Water (gal/year)
Research & Development	5,263,700	15,910
Unenclosed Parking with Elevator	0.00	0.00
Other Non-Asphalt Surfaces	0.00	0.00

5.13. Operational Waste Generation

5.13.1. Unmitigated

Land Use	Waste (ton/year)	Cogeneration (kWh/year)
Research & Development	17.4	—

Unenclosed Parking with Elevator	0.00	—
Other Non-Asphalt Surfaces	0.00	—

5.13.2. Mitigated

Land Use	Waste (ton/year)	Cogeneration (kWh/year)
Research & Development	17.4	—
Unenclosed Parking with Elevator	0.00	—
Other Non-Asphalt Surfaces	0.00	—

5.14. Operational Refrigeration and Air Conditioning Equipment

5.14.1. Unmitigated

Land Use Type	Equipment Type	Refrigerant	GWP	Quantity (kg)	Operations Leak Rate	Service Leak Rate	Times Serviced
Research & Development	Household refrigerators and/or freezers	R-134a	1,430	0.45	0.60	0.00	1.00
Research & Development	Other commercial A/C and heat pumps	R-410A	2,088	< 0.005	4.00	4.00	18.0

5.14.2. Mitigated

Land Use Type	Equipment Type	Refrigerant	GWP	Quantity (kg)	Operations Leak Rate	Service Leak Rate	Times Serviced
Research & Development	Household refrigerators and/or freezers	R-134a	1,430	0.45	0.60	0.00	1.00
Research & Development	Other commercial A/C and heat pumps	R-410A	2,088	< 0.005	4.00	4.00	18.0

5.15. Operational Off-Road Equipment

5.15.1. Unmitigated

Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor

5.15.2. Mitigated

Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor

5.16. Stationary Sources

5.16.1. Emergency Generators and Fire Pumps

Equipment Type	Fuel Type	Number per Day	Hours per Day	Hours per Year	Horsepower	Load Factor
Emergency Generator	Diesel	1.00	1.00	100	805	0.73

5.16.2. Process Boilers

Equipment Type	Fuel Type	Number	Boiler Rating (MMBtu/hr)	Daily Heat Input (MMBtu/day)	Annual Heat Input (MMBtu/yr)

5.17. User Defined

Equipment Type	Fuel Type

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1.2. Mitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.1.2. Mitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.2. Sequestration

5.18.2.1. Unmitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

5.18.2.2. Mitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

Cal-Adapt midcentury 2040–2059 average projections for four hazards are reported below for your project location. These are under Representation Concentration Pathway (RCP) 8.5 which assumes GHG emissions will continue to rise strongly through 2050 and then plateau around 2100.

Climate Hazard	Result for Project Location	Unit
Temperature and Extreme Heat	11.8	annual days of extreme heat
Extreme Precipitation	4.05	annual days with precipitation above 20 mm
Sea Level Rise	0.00	meters of inundation depth
Wildfire	10.7	annual hectares burned

Temperature and Extreme Heat data are for grid cell in which your project are located. The projection is based on the 98th historical percentile of daily maximum/minimum temperatures from observed historical data (32 climate model ensemble from Cal-Adapt, 2040–2059 average under RCP 8.5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Extreme Precipitation data are for the grid cell in which your project are located. The threshold of 20 mm is equivalent to about ¾ an inch of rain, which would be light to moderate rainfall if received over a full day or heavy rain if received over a period of 2 to 4 hours. Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Sea Level Rise data are for the grid cell in which your project are located. The projections are from Radke et al. (2017), as reported in Cal-Adapt (Radke et al., 2017, CEC-500-2017-008), and consider inundation location and depth for the San Francisco Bay, the Sacramento-San Joaquin River Delta and California coast resulting different increments of sea level rise coupled with extreme storm events. Users may select from four scenarios to view the range in potential inundation depth for the grid cell. The four scenarios are: No rise, 0.5 meter, 1.0 meter, 1.41 meters
Wildfire data are for the grid cell in which your project are located. The projections are from UC Davis, as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider historical data of climate, vegetation, population density, and large (> 400 ha) fire history. Users may select from four model simulations to view the range in potential wildfire probabilities for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	1	0	0	N/A
Sea Level Rise	1	0	0	N/A
Wildfire	1	0	0	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	0	0	0	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	1	1	1	2
Sea Level Rise	1	1	1	2

Wildfire	1	1	1	2
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	1	1	1	2

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Exposure Indicators	—
AQ-Ozone	10.6
AQ-PM	16.9
AQ-DPM	48.7
Drinking Water	44.9
Lead Risk Housing	98.5
Pesticides	0.00
Toxic Releases	23.9
Traffic	59.8
Effect Indicators	—
CleanUp Sites	75.4

Groundwater	95.8
Haz Waste Facilities/Generators	93.4
Impaired Water Bodies	83.0
Solid Waste	42.3
Sensitive Population	—
Asthma	47.0
Cardio-vascular	13.3
Low Birth Weights	22.4
Socioeconomic Factor Indicators	—
Education	84.7
Housing	88.3
Linguistic	42.1
Poverty	63.8
Unemployment	77.8

7.2. Healthy Places Index Scores

The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Economic	—
Above Poverty	34.55665341
Employed	49.83959964
Median HI	52.84229437
Education	—
Bachelor's or higher	15.0006416
High school enrollment	24.98395996
Preschool enrollment	9.790837931
Transportation	—

Auto Access	68.11240857
Active commuting	64.26279995
Social	—
2-parent households	38.27794174
Voting	38.88104709
Neighborhood	—
Alcohol availability	65.0455537
Park access	62.14551521
Retail density	87.57859618
Supermarket access	61.37559348
Tree canopy	60.50301553
Housing	—
Homeownership	56.70473502
Housing habitability	22.12241755
Low-inc homeowner severe housing cost burden	17.2334146
Low-inc renter severe housing cost burden	24.86847171
Uncrowded housing	8.879763891
Health Outcomes	—
Insured adults	43.44924933
Arthritis	0.0
Asthma ER Admissions	47.9
High Blood Pressure	0.0
Cancer (excluding skin)	0.0
Asthma	0.0
Coronary Heart Disease	0.0
Chronic Obstructive Pulmonary Disease	0.0
Diagnosed Diabetes	0.0

Life Expectancy at Birth	40.8
Cognitively Disabled	52.2
Physically Disabled	50.9
Heart Attack ER Admissions	83.8
Mental Health Not Good	0.0
Chronic Kidney Disease	0.0
Obesity	0.0
Pedestrian Injuries	19.6
Physical Health Not Good	0.0
Stroke	0.0
Health Risk Behaviors	—
Binge Drinking	0.0
Current Smoker	0.0
No Leisure Time for Physical Activity	0.0
Climate Change Exposures	—
Wildfire Risk	0.0
SLR Inundation Area	12.5
Children	44.4
Elderly	79.3
English Speaking	49.3
Foreign-born	80.8
Outdoor Workers	28.0
Climate Change Adaptive Capacity	—
Impervious Surface Cover	46.9
Traffic Density	49.4
Traffic Access	62.2
Other Indices	—

Hardship	80.9
Other Decision Support	—
2016 Voting	15.5

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	63.0
Healthy Places Index Score for Project Location (b)	41.0
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	No
Project Located in a Low-Income Community (Assembly Bill 1550)	Yes
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.
b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.4. Health & Equity Measures

No Health & Equity Measures selected.

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

7.6. Health & Equity Custom Measures

No Health & Equity Custom Measures created.

8. User Changes to Default Data

Screen	Justification
Land Use	Existing uses includes 56,696 SF of buildings.
Operations: Vehicle Data	Updated trip rate per transportation assessment.
Characteristics: Utility Information	Adjusted CO2 intensity per Pennensula Clean Energy report: 12 lb of CO2e per MWh.

Construction: Construction Phases	Phase 1 of construction would begin in July 2024 for a duration of 22 months, with buildout in May 2026. Phase 2 of construction would begin in May 2026, for a duration of 14 months, with buildout in June 2027.
Construction: Off-Road Equipment	Updated equipment per applicant.
Construction: Trips and VMT	Updated per applicant.
Construction: On-Road Fugitive Dust	Per BAAQMD, updated silt loading factor to 0.5 g/m2 for all roadways.
Construction: Architectural Coatings	No VOC interior and low-VOC exterior (under 50 grams per liter).
Construction: Electricity	Adjusted CO2 intensity per Pennensula Clean Energy report: 12 lb of CO2e per MWh.
Operations: Architectural Coatings	No VOC interior and low-VOC exterior (under 50 grams per liter).
Operations: Water and Waste Water	Updated per applicant.
Operations: Energy Use	Updated per quantities provided.

1005 O’Brien Drive and 1320 Willow Road (Project) Detailed Report

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8. User Changes to Default Data

1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	1005 O’Brien Drive and 1320 Willow Road (Project)
Construction Start Date	7/1/2024
Operational Year	2028
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	4.20
Precipitation (days)	18.8
Location	37.47566209097283, -122.15210426306923
County	San Mateo
City	Menlo Park
Air District	Bay Area AQMD
Air Basin	San Francisco Bay Area
TAZ	1279
EDFZ	1
Electric Utility	Pacific Gas & Electric Company
Gas Utility	Pacific Gas & Electric
App Version	2022.1.1.29

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
Research & Development	228	1000sqft	5.24	228,400	40,946	0.00	—	—

Unenclosed Parking with Elevator	140	1000sqft	3.20	139,500	0.00	0.00	—	—
Other Non-Asphalt Surfaces	76.8	1000sqft	1.76	0.00	0.00	0.00	—	—

1.3. User-Selected Emission Reduction Measures by Emissions Sector

Sector	#	Measure Title
Energy	E-10-A	Establish Onsite Renewable Energy Systems: Generic

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	12.5	12.4	26.1	23.4	0.05	1.09	4.26	5.35	1.00	1.65	2.65	—	5,271	5,271	0.29	0.18	2.43	5,327
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	3.24	2.64	26.1	23.3	0.05	1.09	4.26	5.35	1.00	1.65	2.65	—	5,264	5,264	0.29	0.16	0.05	5,318
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	1.43	1.29	6.00	7.28	0.01	0.23	0.85	1.06	0.21	0.26	0.45	—	1,612	1,612	0.07	0.04	0.37	1,626
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.26	0.24	1.09	1.33	< 0.005	0.04	0.16	0.19	0.04	0.05	0.08	—	267	267	0.01	0.01	0.06	269

2.2. Construction Emissions by Year, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	3.25	2.64	26.1	23.4	0.05	1.09	4.26	5.35	1.00	1.65	2.65	—	5,271	5,271	0.29	0.18	2.43	5,327
2025	1.15	0.94	8.38	10.3	0.02	0.32	1.04	1.36	0.29	0.26	0.55	—	2,267	2,267	0.10	0.05	1.20	2,286
2026	12.5	12.4	13.5	14.5	0.02	0.58	3.60	4.18	0.54	1.55	2.08	—	2,892	2,892	0.15	0.09	1.18	2,921
2027	12.3	12.1	6.74	8.40	0.02	0.23	1.04	1.28	0.21	0.26	0.47	—	1,995	1,995	0.09	0.06	0.97	2,012
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	3.24	2.64	26.1	23.3	0.05	1.09	4.26	5.35	1.00	1.65	2.65	—	5,264	5,264	0.29	0.16	0.05	5,318
2025	1.15	0.94	8.41	10.2	0.02	0.32	1.04	1.36	0.29	0.26	0.55	—	2,256	2,256	0.11	0.06	0.03	2,275
2026	1.10	0.90	7.97	10.1	0.02	0.29	1.04	1.33	0.26	0.26	0.52	—	2,247	2,247	0.10	0.06	0.03	2,266
2027	0.96	0.79	6.77	8.36	0.02	0.23	1.04	1.28	0.21	0.26	0.47	—	1,984	1,984	0.09	0.05	0.03	2,000
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	0.67	0.54	5.20	5.06	0.01	0.21	0.70	0.91	0.19	0.24	0.43	—	1,112	1,112	0.06	0.04	0.26	1,125
2025	0.82	0.67	6.00	7.28	0.01	0.23	0.74	0.96	0.21	0.18	0.39	—	1,612	1,612	0.07	0.04	0.37	1,626
2026	1.43	1.29	5.55	6.46	0.01	0.21	0.85	1.06	0.19	0.26	0.45	—	1,455	1,455	0.07	0.04	0.33	1,470
2027	0.77	0.72	2.13	2.66	0.01	0.07	0.32	0.39	0.07	0.08	0.15	—	620	620	0.03	0.02	0.13	625
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	0.12	0.10	0.95	0.92	< 0.005	0.04	0.13	0.17	0.04	0.04	0.08	—	184	184	0.01	0.01	0.04	186
2025	0.15	0.12	1.09	1.33	< 0.005	0.04	0.13	0.18	0.04	0.03	0.07	—	267	267	0.01	0.01	0.06	269
2026	0.26	0.24	1.01	1.18	< 0.005	0.04	0.16	0.19	0.03	0.05	0.08	—	241	241	0.01	0.01	0.05	243
2027	0.14	0.13	0.39	0.49	< 0.005	0.01	0.06	0.07	0.01	0.01	0.03	—	103	103	< 0.005	< 0.005	0.02	103

2.3. Construction Emissions by Year, Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	3.25	2.64	26.1	23.4	0.05	1.09	4.26	5.35	1.00	1.65	2.65	—	5,271	5,271	0.29	0.18	2.43	5,327
2025	1.15	0.94	8.38	10.3	0.02	0.32	1.04	1.36	0.29	0.26	0.55	—	2,267	2,267	0.10	0.05	1.20	2,286
2026	12.5	12.4	13.5	14.5	0.02	0.58	3.60	4.18	0.54	1.55	2.08	—	2,892	2,892	0.15	0.09	1.18	2,921
2027	12.3	12.1	6.74	8.40	0.02	0.23	1.04	1.28	0.21	0.26	0.47	—	1,995	1,995	0.09	0.06	0.97	2,012
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	3.24	2.64	26.1	23.3	0.05	1.09	4.26	5.35	1.00	1.65	2.65	—	5,264	5,264	0.29	0.16	0.05	5,318
2025	1.15	0.94	8.41	10.2	0.02	0.32	1.04	1.36	0.29	0.26	0.55	—	2,256	2,256	0.11	0.06	0.03	2,275
2026	1.10	0.90	7.97	10.1	0.02	0.29	1.04	1.33	0.26	0.26	0.52	—	2,247	2,247	0.10	0.06	0.03	2,266
2027	0.96	0.79	6.77	8.36	0.02	0.23	1.04	1.28	0.21	0.26	0.47	—	1,984	1,984	0.09	0.05	0.03	2,000
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	0.67	0.54	5.20	5.06	0.01	0.21	0.70	0.91	0.19	0.24	0.43	—	1,112	1,112	0.06	0.04	0.26	1,125
2025	0.82	0.67	6.00	7.28	0.01	0.23	0.74	0.96	0.21	0.18	0.39	—	1,612	1,612	0.07	0.04	0.37	1,626
2026	1.43	1.29	5.55	6.46	0.01	0.21	0.85	1.06	0.19	0.26	0.45	—	1,455	1,455	0.07	0.04	0.33	1,470
2027	0.77	0.72	2.13	2.66	0.01	0.07	0.32	0.39	0.07	0.08	0.15	—	620	620	0.03	0.02	0.13	625
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	0.12	0.10	0.95	0.92	< 0.005	0.04	0.13	0.17	0.04	0.04	0.08	—	184	184	0.01	0.01	0.04	186
2025	0.15	0.12	1.09	1.33	< 0.005	0.04	0.13	0.18	0.04	0.03	0.07	—	267	267	0.01	0.01	0.06	269
2026	0.26	0.24	1.01	1.18	< 0.005	0.04	0.16	0.19	0.03	0.05	0.08	—	241	241	0.01	0.01	0.05	243
2027	0.14	0.13	0.39	0.49	< 0.005	0.01	0.06	0.07	0.01	0.01	0.03	—	103	103	< 0.005	< 0.005	0.02	103

2.4. Operations Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	20.1	18.7	34.5	78.6	0.18	1.18	13.5	14.7	1.17	3.42	4.59	19.4	19,282	19,302	3.00	0.51	39.1	19,569
Mit.	20.1	18.7	34.5	78.6	0.18	1.18	13.5	14.7	1.17	3.42	4.59	19.4	19,282	19,302	3.00	0.51	39.1	19,569
% Reduced	—	—	—	—	—	—	—	—	—	—	—	—	< 0.5%	< 0.5%	—	—	—	< 0.5%
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	17.2	16.0	34.9	60.6	0.17	1.15	13.5	14.7	1.15	3.42	4.57	19.4	18,603	18,622	3.03	0.56	6.70	18,870
Mit.	17.2	16.0	34.9	60.6	0.17	1.15	13.5	14.7	1.15	3.42	4.57	19.4	18,603	18,622	3.03	0.55	6.70	18,870
% Reduced	—	—	—	—	—	—	—	—	—	—	—	—	< 0.5%	< 0.5%	—	—	—	< 0.5%
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	13.6	12.8	12.5	53.3	0.12	0.46	10.2	10.6	0.45	2.57	3.02	19.4	13,063	13,083	2.82	0.41	16.8	13,293
Mit.	13.6	12.8	12.5	53.3	0.12	0.46	10.2	10.6	0.45	2.57	3.02	19.4	13,063	13,082	2.82	0.41	16.8	13,293
% Reduced	—	—	—	—	—	—	—	—	—	—	—	—	< 0.5%	< 0.5%	—	—	—	< 0.5%
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	2.48	2.33	2.29	9.72	0.02	0.08	1.85	1.94	0.08	0.47	0.55	3.22	2,163	2,166	0.47	0.07	2.78	2,201
Mit.	2.48	2.33	2.29	9.72	0.02	0.08	1.85	1.94	0.08	0.47	0.55	3.22	2,163	2,166	0.47	0.07	2.78	2,201
% Reduced	—	—	—	—	—	—	—	—	—	—	—	—	< 0.5%	< 0.5%	< 0.5%	< 0.5%	—	< 0.5%

2.5. Operations Emissions by Sector, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Sector	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	4.81	4.37	3.29	44.5	0.14	0.07	13.5	13.6	0.06	3.42	3.48	—	13,928	13,928	0.42	0.42	33.3	14,098
Area	7.86	7.64	0.13	16.0	< 0.005	0.03	—	0.03	0.02	—	0.02	—	65.8	65.8	< 0.005	< 0.005	—	66.0
Energy	0.17	0.08	1.51	1.27	0.01	0.11	—	0.11	0.11	—	0.11	—	1,910	1,910	0.46	0.04	—	1,933
Water	—	—	—	—	—	—	—	—	—	—	—	10.1	1.12	11.2	1.04	0.02	—	44.6
Waste	—	—	—	—	—	—	—	—	—	—	—	9.35	0.00	9.35	0.93	0.00	—	32.7
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.84	5.84
Stationary	7.25	6.60	29.5	16.8	0.03	0.97	0.00	0.97	0.97	0.00	0.97	0.00	3,377	3,377	0.14	0.03	0.00	3,389
Total	20.1	18.7	34.5	78.6	0.18	1.18	13.5	14.7	1.17	3.42	4.59	19.4	19,282	19,302	3.00	0.51	39.1	19,569
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	4.75	4.30	3.89	42.5	0.13	0.07	13.5	13.6	0.06	3.42	3.48	—	13,315	13,315	0.46	0.46	0.86	13,465
Area	5.02	5.02	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Energy	0.17	0.08	1.51	1.27	0.01	0.11	—	0.11	0.11	—	0.11	—	1,910	1,910	0.46	0.04	—	1,933
Water	—	—	—	—	—	—	—	—	—	—	—	10.1	1.12	11.2	1.04	0.02	—	44.6
Waste	—	—	—	—	—	—	—	—	—	—	—	9.35	0.00	9.35	0.93	0.00	—	32.7
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.84	5.84
Stationary	7.25	6.60	29.5	16.8	0.03	0.97	0.00	0.97	0.97	0.00	0.97	0.00	3,377	3,377	0.14	0.03	0.00	3,389
Total	17.2	16.0	34.9	60.6	0.17	1.15	13.5	14.7	1.15	3.42	4.57	19.4	18,603	18,622	3.03	0.56	6.70	18,870
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	3.57	3.22	2.79	31.4	0.10	0.05	10.2	10.2	0.05	2.57	2.62	—	10,161	10,161	0.34	0.34	10.9	10,282

Area	7.86	7.64	0.13	16.0	< 0.005	0.03	—	0.03	0.02	—	0.02	—	65.8	65.8	< 0.005	< 0.005	—	66.0
Energy	0.17	0.08	1.51	1.27	0.01	0.11	—	0.11	0.11	—	0.11	—	1,910	1,910	0.46	0.04	—	1,933
Water	—	—	—	—	—	—	—	—	—	—	—	10.1	1.12	11.2	1.04	0.02	—	44.6
Waste	—	—	—	—	—	—	—	—	—	—	—	9.35	0.00	9.35	0.93	0.00	—	32.7
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.84	5.84
Stationary	1.99	1.81	8.09	4.61	0.01	0.27	0.00	0.27	0.27	0.00	0.27	0.00	925	925	0.04	0.01	0.00	928
Total	13.6	12.8	12.5	53.3	0.12	0.46	10.2	10.6	0.45	2.57	3.02	19.4	13,063	13,083	2.82	0.41	16.8	13,293
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.65	0.59	0.51	5.73	0.02	0.01	1.85	1.86	0.01	0.47	0.48	—	1,682	1,682	0.06	0.06	1.81	1,702
Area	1.44	1.40	0.02	2.92	< 0.005	0.01	—	0.01	< 0.005	—	< 0.005	—	10.9	10.9	< 0.005	< 0.005	—	10.9
Energy	0.03	0.02	0.28	0.23	< 0.005	0.02	—	0.02	0.02	—	0.02	—	316	316	0.08	0.01	—	320
Water	—	—	—	—	—	—	—	—	—	—	—	1.67	0.19	1.86	0.17	< 0.005	—	7.38
Waste	—	—	—	—	—	—	—	—	—	—	—	1.55	0.00	1.55	0.15	0.00	—	5.42
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.97	0.97
Stationary	0.36	0.33	1.48	0.84	< 0.005	0.05	0.00	0.05	0.05	0.00	0.05	0.00	153	153	0.01	< 0.005	0.00	154
Total	2.48	2.33	2.29	9.72	0.02	0.08	1.85	1.94	0.08	0.47	0.55	3.22	2,163	2,166	0.47	0.07	2.78	2,201

2.6. Operations Emissions by Sector, Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Sector	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	4.81	4.37	3.29	44.5	0.14	0.07	13.5	13.6	0.06	3.42	3.48	—	13,928	13,928	0.42	0.42	33.3	14,098
Area	7.86	7.64	0.13	16.0	< 0.005	0.03	—	0.03	0.02	—	0.02	—	65.8	65.8	< 0.005	< 0.005	—	66.0
Energy	0.17	0.08	1.51	1.27	0.01	0.11	—	0.11	0.11	—	0.11	—	1,909	1,909	0.46	0.04	—	1,933
Water	—	—	—	—	—	—	—	—	—	—	—	10.1	1.12	11.2	1.04	0.02	—	44.6

Waste	—	—	—	—	—	—	—	—	—	—	—	9.35	0.00	9.35	0.93	0.00	—	32.7
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.84	5.84
Stationary	7.25	6.60	29.5	16.8	0.03	0.97	0.00	0.97	0.97	0.00	0.97	0.00	3,377	3,377	0.14	0.03	0.00	3,389
Total	20.1	18.7	34.5	78.6	0.18	1.18	13.5	14.7	1.17	3.42	4.59	19.4	19,282	19,302	3.00	0.51	39.1	19,569
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	4.75	4.30	3.89	42.5	0.13	0.07	13.5	13.6	0.06	3.42	3.48	—	13,315	13,315	0.46	0.46	0.86	13,465
Area	5.02	5.02	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Energy	0.17	0.08	1.51	1.27	0.01	0.11	—	0.11	0.11	—	0.11	—	1,909	1,909	0.46	0.04	—	1,933
Water	—	—	—	—	—	—	—	—	—	—	—	10.1	1.12	11.2	1.04	0.02	—	44.6
Waste	—	—	—	—	—	—	—	—	—	—	—	9.35	0.00	9.35	0.93	0.00	—	32.7
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.84	5.84
Stationary	7.25	6.60	29.5	16.8	0.03	0.97	0.00	0.97	0.97	0.00	0.97	0.00	3,377	3,377	0.14	0.03	0.00	3,389
Total	17.2	16.0	34.9	60.6	0.17	1.15	13.5	14.7	1.15	3.42	4.57	19.4	18,603	18,622	3.03	0.55	6.70	18,870
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	3.57	3.22	2.79	31.4	0.10	0.05	10.2	10.2	0.05	2.57	2.62	—	10,161	10,161	0.34	0.34	10.9	10,282
Area	7.86	7.64	0.13	16.0	< 0.005	0.03	—	0.03	0.02	—	0.02	—	65.8	65.8	< 0.005	< 0.005	—	66.0
Energy	0.17	0.08	1.51	1.27	0.01	0.11	—	0.11	0.11	—	0.11	—	1,909	1,909	0.46	0.04	—	1,933
Water	—	—	—	—	—	—	—	—	—	—	—	10.1	1.12	11.2	1.04	0.02	—	44.6
Waste	—	—	—	—	—	—	—	—	—	—	—	9.35	0.00	9.35	0.93	0.00	—	32.7
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.84	5.84
Stationary	1.99	1.81	8.09	4.61	0.01	0.27	0.00	0.27	0.27	0.00	0.27	0.00	925	925	0.04	0.01	0.00	928
Total	13.6	12.8	12.5	53.3	0.12	0.46	10.2	10.6	0.45	2.57	3.02	19.4	13,063	13,082	2.82	0.41	16.8	13,293
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.65	0.59	0.51	5.73	0.02	0.01	1.85	1.86	0.01	0.47	0.48	—	1,682	1,682	0.06	0.06	1.81	1,702
Area	1.44	1.40	0.02	2.92	< 0.005	0.01	—	0.01	< 0.005	—	< 0.005	—	10.9	10.9	< 0.005	< 0.005	—	10.9

Energy	0.03	0.02	0.28	0.23	< 0.005	0.02	—	0.02	0.02	—	0.02	—	316	316	0.08	0.01	—	320
Water	—	—	—	—	—	—	—	—	—	—	—	1.67	0.19	1.86	0.17	< 0.005	—	7.38
Waste	—	—	—	—	—	—	—	—	—	—	—	1.55	0.00	1.55	0.15	0.00	—	5.42
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.97	0.97
Stationary	0.36	0.33	1.48	0.84	< 0.005	0.05	0.00	0.05	0.05	0.00	0.05	0.00	153	153	0.01	< 0.005	0.00	154
Total	2.48	2.33	2.29	9.72	0.02	0.08	1.85	1.94	0.08	0.47	0.55	3.22	2,163	2,166	0.47	0.07	2.78	2,201

3. Construction Emissions Details

3.1. Phase 1 - Demolition (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.74	1.46	13.7	12.3	0.02	0.57	—	0.57	0.52	—	0.52	—	1,906	1,906	0.08	0.02	—	1,912
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.14	0.12	1.12	1.01	< 0.005	0.05	—	0.05	0.04	—	0.04	—	157	157	0.01	< 0.005	—	157
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.02	0.20	0.18	< 0.005	0.01	—	0.01	0.01	—	0.01	—	25.9	25.9	< 0.005	< 0.005	—	26.0
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.04	0.04	0.03	0.51	0.00	0.00	0.51	0.51	0.00	0.13	0.13	—	126	126	< 0.005	< 0.005	0.46	128
Vendor	< 0.005	< 0.005	0.04	0.03	< 0.005	< 0.005	0.03	0.03	< 0.005	0.01	0.01	—	29.3	29.3	< 0.005	< 0.005	0.07	30.7
Hauling	0.18	0.02	1.53	1.00	0.01	0.01	0.75	0.76	0.01	0.19	0.20	—	965	965	0.15	0.16	1.89	1,017
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.04	0.00	0.00	0.04	0.04	0.00	0.01	0.01	—	9.84	9.84	< 0.005	< 0.005	0.02	9.98
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.41	2.41	< 0.005	< 0.005	< 0.005	2.52
Hauling	0.01	< 0.005	0.13	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	79.3	79.3	0.01	0.01	0.07	83.5
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	1.63	1.63	< 0.005	< 0.005	< 0.005	1.65

Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.40	0.40	< 0.005	< 0.005	< 0.005	0.42
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	13.1	13.1	< 0.005	< 0.005	0.01	13.8

3.2. Phase 1 - Demolition (2024) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.74	1.46	13.7	12.3	0.02	0.57	—	0.57	0.52	—	0.52	—	1,906	1,906	0.08	0.02	—	1,912
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.14	0.12	1.12	1.01	< 0.005	0.05	—	0.05	0.04	—	0.04	—	157	157	0.01	< 0.005	—	157
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipm	0.03	0.02	0.20	0.18	< 0.005	0.01	—	0.01	0.01	—	0.01	—	25.9	25.9	< 0.005	< 0.005	—	26.0
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.04	0.04	0.03	0.51	0.00	0.00	0.51	0.51	0.00	0.13	0.13	—	126	126	< 0.005	< 0.005	0.46	128
Vendor	< 0.005	< 0.005	0.04	0.03	< 0.005	< 0.005	0.03	0.03	< 0.005	0.01	0.01	—	29.3	29.3	< 0.005	< 0.005	0.07	30.7
Hauling	0.18	0.02	1.53	1.00	0.01	0.01	0.75	0.76	0.01	0.19	0.20	—	965	965	0.15	0.16	1.89	1,017
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.04	0.00	0.00	0.04	0.04	0.00	0.01	0.01	—	9.84	9.84	< 0.005	< 0.005	0.02	9.98
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.41	2.41	< 0.005	< 0.005	< 0.005	2.52
Hauling	0.01	< 0.005	0.13	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	79.3	79.3	0.01	0.01	0.07	83.5
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	1.63	1.63	< 0.005	< 0.005	< 0.005	1.65
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.40	0.40	< 0.005	< 0.005	< 0.005	0.42
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	13.1	13.1	< 0.005	< 0.005	0.01	13.8

3.3. Phase 2 - Demolition (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.41	1.18	10.7	9.91	0.02	0.43	—	0.43	0.39	—	0.39	—	1,764	1,764	0.07	0.01	—	1,771
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.08	0.06	0.58	0.54	< 0.005	0.02	—	0.02	0.02	—	0.02	—	96.7	96.7	< 0.005	< 0.005	—	97.0
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.11	0.10	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	16.0	16.0	< 0.005	< 0.005	—	16.1
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Worker	0.03	0.03	0.02	0.35	0.00	0.00	0.41	0.41	0.00	0.10	0.10	—	96.8	96.8	< 0.005	< 0.005	0.29	97.4
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.08	0.01	0.69	0.49	< 0.005	0.01	0.38	0.38	0.01	0.10	0.10	—	461	461	0.07	0.07	0.89	486
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.02	0.00	0.00	0.02	0.02	0.00	0.01	0.01	—	5.03	5.03	< 0.005	< 0.005	0.01	5.10
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.04	0.03	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	—	25.3	25.3	< 0.005	< 0.005	0.02	26.6
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.83	0.83	< 0.005	< 0.005	< 0.005	0.84
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	4.18	4.18	< 0.005	< 0.005	< 0.005	4.40

3.4. Phase 2 - Demolition (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.41	1.18	10.7	9.91	0.02	0.43	—	0.43	0.39	—	0.39	—	1,764	1,764	0.07	0.01	—	1,771
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.08	0.06	0.58	0.54	< 0.005	0.02	—	0.02	0.02	—	0.02	—	96.7	96.7	< 0.005	< 0.005	—	97.0
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.11	0.10	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	16.0	16.0	< 0.005	< 0.005	—	16.1
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.02	0.35	0.00	0.00	0.41	0.41	0.00	0.10	0.10	—	96.8	96.8	< 0.005	< 0.005	0.29	97.4
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.08	0.01	0.69	0.49	< 0.005	0.01	0.38	0.38	0.01	0.10	0.10	—	461	461	0.07	0.07	0.89	486
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.02	0.00	0.00	0.02	0.02	0.00	0.01	0.01	—	5.03	5.03	< 0.005	< 0.005	0.01	5.10

Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.04	0.03	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	—	25.3	25.3	< 0.005	< 0.005	0.02	26.6
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.83	0.83	< 0.005	< 0.005	< 0.005	0.84
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	4.18	4.18	< 0.005	< 0.005	< 0.005	4.40

3.5. Phase 1 - Site Preparation (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.54	1.29	12.8	12.3	0.02	0.57	—	0.57	0.52	—	0.52	—	1,959	1,959	0.08	0.02	—	1,966
Dust From Material Movement	—	—	—	—	—	—	2.56	2.56	—	1.31	1.31	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.04	0.35	0.34	< 0.005	0.02	—	0.02	0.01	—	0.01	—	53.7	53.7	< 0.005	< 0.005	—	53.9

Dust From Material Movement	—	—	—	—	—	—	0.07	0.07	—	0.04	0.04	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.06	0.06	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	8.89	8.89	< 0.005	< 0.005	—	8.92
Dust From Material Movement	—	—	—	—	—	—	0.01	0.01	—	0.01	0.01	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.02	0.34	0.00	0.00	0.34	0.34	0.00	0.08	0.08	—	84.2	84.2	< 0.005	< 0.005	0.31	85.5
Vendor	0.01	< 0.005	0.09	0.05	< 0.005	< 0.005	0.05	0.05	< 0.005	0.01	0.01	—	58.6	58.6	0.01	0.01	0.14	61.5
Hauling	0.07	0.01	0.64	0.42	< 0.005	< 0.005	0.31	0.32	< 0.005	0.08	0.08	—	402	402	0.06	0.07	0.79	424
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	2.19	2.19	< 0.005	< 0.005	< 0.005	2.22
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.61	1.61	< 0.005	< 0.005	< 0.005	1.68
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	11.0	11.0	< 0.005	< 0.005	0.01	11.6
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.36	0.36	< 0.005	< 0.005	< 0.005	0.37

Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.27	0.27	< 0.005	< 0.005	< 0.005	0.28
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.82	1.82	< 0.005	< 0.005	< 0.005	1.92

3.6. Phase 1 - Site Preparation (2024) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.54	1.29	12.8	12.3	0.02	0.57	—	0.57	0.52	—	0.52	—	1,959	1,959	0.08	0.02	—	1,966
Dust From Material Movement	—	—	—	—	—	—	2.56	2.56	—	1.31	1.31	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.04	0.35	0.34	< 0.005	0.02	—	0.02	0.01	—	0.01	—	53.7	53.7	< 0.005	< 0.005	—	53.9
Dust From Material Movement	—	—	—	—	—	—	0.07	0.07	—	0.04	0.04	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.06	0.06	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	8.89	8.89	< 0.005	< 0.005	—	8.92
Dust From Material Movement	—	—	—	—	—	—	0.01	0.01	—	0.01	0.01	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.02	0.34	0.00	0.00	0.34	0.34	0.00	0.08	0.08	—	84.2	84.2	< 0.005	< 0.005	0.31	85.5
Vendor	0.01	< 0.005	0.09	0.05	< 0.005	< 0.005	0.05	0.05	< 0.005	0.01	0.01	—	58.6	58.6	0.01	0.01	0.14	61.5
Hauling	0.07	0.01	0.64	0.42	< 0.005	< 0.005	0.31	0.32	< 0.005	0.08	0.08	—	402	402	0.06	0.07	0.79	424
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	2.19	2.19	< 0.005	< 0.005	< 0.005	2.22
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.61	1.61	< 0.005	< 0.005	< 0.005	1.68
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	11.0	11.0	< 0.005	< 0.005	0.01	11.6
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.36	0.36	< 0.005	< 0.005	< 0.005	0.37
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.27	0.27	< 0.005	< 0.005	< 0.005	0.28
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.82	1.82	< 0.005	< 0.005	< 0.005	1.92

3.7. Phase 2 - Site Preparation (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.21	1.01	9.38	8.97	0.02	0.40	—	0.40	0.37	—	0.37	—	1,669	1,669	0.07	0.01	—	1,675
Dust From Material Movement	—	—	—	—	—	—	2.56	2.56	—	1.31	1.31	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.01	0.13	0.12	< 0.005	0.01	—	0.01	0.01	—	0.01	—	22.9	22.9	< 0.005	< 0.005	—	22.9
Dust From Material Movement	—	—	—	—	—	—	0.04	0.04	—	0.02	0.02	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	3.79	3.79	< 0.005	< 0.005	—	3.80

Dust From Material Movement	—	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.02	0.29	0.00	0.00	0.34	0.34	0.00	0.08	0.08	—	80.7	80.7	< 0.005	< 0.005	0.24	81.2
Vendor	0.01	< 0.005	0.08	0.05	< 0.005	< 0.005	0.05	0.05	< 0.005	0.01	0.01	—	56.5	56.5	0.01	0.01	0.13	59.2
Hauling	0.07	0.01	0.57	0.41	< 0.005	< 0.005	0.31	0.32	< 0.005	0.08	0.08	—	384	384	0.06	0.06	0.74	405
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	1.05	1.05	< 0.005	< 0.005	< 0.005	1.06
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.77	0.77	< 0.005	< 0.005	< 0.005	0.81
Hauling	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	5.27	5.27	< 0.005	< 0.005	< 0.005	5.54
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.17	0.17	< 0.005	< 0.005	< 0.005	0.18
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.13	0.13	< 0.005	< 0.005	< 0.005	0.13
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.87	0.87	< 0.005	< 0.005	< 0.005	0.92

3.8. Phase 2 - Site Preparation (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.21	1.01	9.38	8.97	0.02	0.40	—	0.40	0.37	—	0.37	—	1,669	1,669	0.07	0.01	—	1,675
Dust From Material Movement	—	—	—	—	—	—	2.56	2.56	—	1.31	1.31	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.01	0.13	0.12	< 0.005	0.01	—	0.01	0.01	—	0.01	—	22.9	22.9	< 0.005	< 0.005	—	22.9
Dust From Material Movement	—	—	—	—	—	—	0.04	0.04	—	0.02	0.02	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	3.79	3.79	< 0.005	< 0.005	—	3.80
Dust From Material Movement	—	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—	—	—	—	—	—	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.02	0.29	0.00	0.00	0.34	0.34	0.00	0.08	0.08	—	80.7	80.7	< 0.005	< 0.005	0.24	81.2
Vendor	0.01	< 0.005	0.08	0.05	< 0.005	< 0.005	0.05	0.05	< 0.005	0.01	0.01	—	56.5	56.5	0.01	0.01	0.13	59.2
Hauling	0.07	0.01	0.57	0.41	< 0.005	< 0.005	0.31	0.32	< 0.005	0.08	0.08	—	384	384	0.06	0.06	0.74	405
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	1.05	1.05	< 0.005	< 0.005	< 0.005	1.06
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.77	0.77	< 0.005	< 0.005	< 0.005	0.81
Hauling	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	5.27	5.27	< 0.005	< 0.005	< 0.005	5.54
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.17	0.17	< 0.005	< 0.005	< 0.005	0.18
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.13	0.13	< 0.005	< 0.005	< 0.005	0.13
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.87	0.87	< 0.005	< 0.005	< 0.005	0.92

3.9. Phase 1 - Grading (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	3.07	2.58	24.9	22.1	0.04	1.08	—	1.08	0.99	—	0.99	—	4,413	4,413	0.18	0.04	—	4,429
Dust From Material Movement	—	—	—	—	—	—	3.18	3.18	—	1.38	1.38	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	3.07	2.58	24.9	22.1	0.04	1.08	—	1.08	0.99	—	0.99	—	4,413	4,413	0.18	0.04	—	4,429
Dust From Material Movement	—	—	—	—	—	—	3.18	3.18	—	1.38	1.38	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.24	0.21	1.98	1.76	< 0.005	0.09	—	0.09	0.08	—	0.08	—	351	351	0.01	< 0.005	—	352
Dust From Material Movement	—	—	—	—	—	—	0.25	0.25	—	0.11	0.11	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipm	0.04	0.04	0.36	0.32	< 0.005	0.02	—	0.02	0.01	—	0.01	—	58.1	58.1	< 0.005	< 0.005	—	58.3
Dust From Material Movement	—	—	—	—	—	—	0.05	0.05	—	0.02	0.02	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.04	0.04	0.03	0.51	0.00	0.00	0.51	0.51	0.00	0.13	0.13	—	126	126	< 0.005	< 0.005	0.46	128
Vendor	0.01	< 0.005	0.13	0.08	< 0.005	< 0.005	0.08	0.08	< 0.005	0.02	0.02	—	88.0	88.0	0.01	0.01	0.22	92.2
Hauling	0.12	0.01	1.02	0.67	0.01	0.01	0.50	0.51	0.01	0.13	0.14	—	643	643	0.10	0.10	1.26	678
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.04	0.04	0.04	0.47	0.00	0.00	0.51	0.51	0.00	0.13	0.13	—	119	119	< 0.005	< 0.005	0.01	121
Vendor	0.01	< 0.005	0.14	0.08	< 0.005	< 0.005	0.08	0.08	< 0.005	0.02	0.02	—	87.9	87.9	0.01	0.01	0.01	92.0
Hauling	0.12	0.01	1.07	0.67	0.01	0.01	0.50	0.51	0.01	0.13	0.14	—	643	643	0.10	0.10	0.03	677
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.04	0.00	0.00	0.04	0.04	0.00	0.01	0.01	—	9.51	9.51	< 0.005	< 0.005	0.02	9.65
Vendor	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	6.99	6.99	< 0.005	< 0.005	0.01	7.32
Hauling	0.01	< 0.005	0.08	0.05	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	—	51.1	51.1	0.01	0.01	0.04	53.8
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	1.57	1.57	< 0.005	< 0.005	< 0.005	1.60
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.16	1.16	< 0.005	< 0.005	< 0.005	1.21
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	8.46	8.46	< 0.005	< 0.005	0.01	8.91

3.10. Phase 1 - Grading (2024) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	3.07	2.58	24.9	22.1	0.04	1.08	—	1.08	0.99	—	0.99	—	4,413	4,413	0.18	0.04	—	4,429
Dust From Material Movement	—	—	—	—	—	—	3.18	3.18	—	1.38	1.38	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	3.07	2.58	24.9	22.1	0.04	1.08	—	1.08	0.99	—	0.99	—	4,413	4,413	0.18	0.04	—	4,429
Dust From Material Movement	—	—	—	—	—	—	3.18	3.18	—	1.38	1.38	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.24	0.21	1.98	1.76	< 0.005	0.09	—	0.09	0.08	—	0.08	—	351	351	0.01	< 0.005	—	352

Dust From Material Movement	—	—	—	—	—	—	0.25	0.25	—	0.11	0.11	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.04	0.36	0.32	< 0.005	0.02	—	0.02	0.01	—	0.01	—	58.1	58.1	< 0.005	< 0.005	—	58.3
Dust From Material Movement	—	—	—	—	—	—	0.05	0.05	—	0.02	0.02	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.04	0.04	0.03	0.51	0.00	0.00	0.51	0.51	0.00	0.13	0.13	—	126	126	< 0.005	< 0.005	0.46	128
Vendor	0.01	< 0.005	0.13	0.08	< 0.005	< 0.005	0.08	0.08	< 0.005	0.02	0.02	—	88.0	88.0	0.01	0.01	0.22	92.2
Hauling	0.12	0.01	1.02	0.67	0.01	0.01	0.50	0.51	0.01	0.13	0.14	—	643	643	0.10	0.10	1.26	678
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.04	0.04	0.04	0.47	0.00	0.00	0.51	0.51	0.00	0.13	0.13	—	119	119	< 0.005	< 0.005	0.01	121
Vendor	0.01	< 0.005	0.14	0.08	< 0.005	< 0.005	0.08	0.08	< 0.005	0.02	0.02	—	87.9	87.9	0.01	0.01	0.01	92.0
Hauling	0.12	0.01	1.07	0.67	0.01	0.01	0.50	0.51	0.01	0.13	0.14	—	643	643	0.10	0.10	0.03	677
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.04	0.00	0.00	0.04	0.04	0.00	0.01	0.01	—	9.51	9.51	< 0.005	< 0.005	0.02	9.65
Vendor	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	6.99	6.99	< 0.005	< 0.005	0.01	7.32

Hauling	0.01	< 0.005	0.08	0.05	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	—	51.1	51.1	0.01	0.01	0.04	53.8
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	1.57	1.57	< 0.005	< 0.005	< 0.005	1.60
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.16	1.16	< 0.005	< 0.005	< 0.005	1.21
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	8.46	8.46	< 0.005	< 0.005	0.01	8.91

3.11. Phase 2 - Grading (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.72	1.44	12.9	13.6	0.02	0.58	—	0.58	0.53	—	0.53	—	2,379	2,379	0.10	0.02	—	2,387
Dust From Material Movement	—	—	—	—	—	—	2.76	2.76	—	1.34	1.34	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.09	0.08	0.71	0.75	< 0.005	0.03	—	0.03	0.03	—	0.03	—	130	130	0.01	< 0.005	—	131

Dust From Material Movement	—	—	—	—	—	—	0.15	0.15	—	0.07	0.07	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.01	0.13	0.14	< 0.005	0.01	—	0.01	0.01	—	0.01	—	21.6	21.6	< 0.005	< 0.005	—	21.7
Dust From Material Movement	—	—	—	—	—	—	0.03	0.03	—	0.01	0.01	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.04	0.03	0.03	0.43	0.00	0.00	0.51	0.51	0.00	0.13	0.13	—	121	121	< 0.005	< 0.005	0.36	122
Vendor	0.01	< 0.005	0.12	0.07	< 0.005	< 0.005	0.08	0.08	< 0.005	0.02	0.02	—	84.7	84.7	0.01	0.01	0.20	88.7
Hauling	0.05	0.01	0.46	0.33	< 0.005	< 0.005	0.25	0.25	< 0.005	0.06	0.07	—	307	307	0.05	0.05	0.59	324
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.02	0.00	0.00	0.03	0.03	0.00	0.01	0.01	—	6.29	6.29	< 0.005	< 0.005	0.01	6.38
Vendor	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	4.64	4.64	< 0.005	< 0.005	< 0.005	4.86
Hauling	< 0.005	< 0.005	0.03	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	16.8	16.8	< 0.005	< 0.005	0.01	17.7
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	1.04	1.04	< 0.005	< 0.005	< 0.005	1.06

Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.77	0.77	< 0.005	< 0.005	< 0.005	0.80
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.79	2.79	< 0.005	< 0.005	< 0.005	2.93

3.12. Phase 2 - Grading (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.72	1.44	12.9	13.6	0.02	0.58	—	0.58	0.53	—	0.53	—	2,379	2,379	0.10	0.02	—	2,387
Dust From Material Movement	—	—	—	—	—	—	2.76	2.76	—	1.34	1.34	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.09	0.08	0.71	0.75	< 0.005	0.03	—	0.03	0.03	—	0.03	—	130	130	0.01	< 0.005	—	131
Dust From Material Movement	—	—	—	—	—	—	0.15	0.15	—	0.07	0.07	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.01	0.13	0.14	< 0.005	0.01	—	0.01	0.01	—	0.01	—	21.6	21.6	< 0.005	< 0.005	—	21.7
Dust From Material Movement	—	—	—	—	—	—	0.03	0.03	—	0.01	0.01	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.04	0.03	0.03	0.43	0.00	0.00	0.51	0.51	0.00	0.13	0.13	—	121	121	< 0.005	< 0.005	0.36	122
Vendor	0.01	< 0.005	0.12	0.07	< 0.005	< 0.005	0.08	0.08	< 0.005	0.02	0.02	—	84.7	84.7	0.01	0.01	0.20	88.7
Hauling	0.05	0.01	0.46	0.33	< 0.005	< 0.005	0.25	0.25	< 0.005	0.06	0.07	—	307	307	0.05	0.05	0.59	324
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.02	0.00	0.00	0.03	0.03	0.00	0.01	0.01	—	6.29	6.29	< 0.005	< 0.005	0.01	6.38
Vendor	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	4.64	4.64	< 0.005	< 0.005	< 0.005	4.86
Hauling	< 0.005	< 0.005	0.03	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	16.8	16.8	< 0.005	< 0.005	0.01	17.7
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	1.04	1.04	< 0.005	< 0.005	< 0.005	1.06
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.77	0.77	< 0.005	< 0.005	< 0.005	0.80
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.79	2.79	< 0.005	< 0.005	< 0.005	2.93

3.13. Phase 1 - Building Construction (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.11	0.93	8.58	9.35	0.02	0.36	—	0.36	0.33	—	0.33	—	1,839	1,839	0.07	0.01	—	1,845
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.19	0.15	1.43	1.55	< 0.005	0.06	—	0.06	0.06	—	0.06	—	306	306	0.01	< 0.005	—	307
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.03	0.26	0.28	< 0.005	0.01	—	0.01	0.01	—	0.01	—	50.6	50.6	< 0.005	< 0.005	—	50.8
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.07	0.06	0.07	0.79	0.00	0.00	0.85	0.85	0.00	0.21	0.21	—	199	199	< 0.005	0.01	0.02	201
Vendor	0.02	0.01	0.23	0.13	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	147	147	0.02	0.02	0.01	153
Hauling	0.01	< 0.005	0.13	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	80.4	80.4	0.01	0.01	< 0.005	84.6
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.13	0.00	0.00	0.14	0.14	0.00	0.03	0.03	—	33.2	33.2	< 0.005	< 0.005	0.06	33.7
Vendor	< 0.005	< 0.005	0.04	0.02	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	—	24.4	24.4	< 0.005	< 0.005	0.03	25.5
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	13.4	13.4	< 0.005	< 0.005	0.01	14.1
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.02	0.00	0.00	0.03	0.03	0.00	0.01	0.01	—	5.49	5.49	< 0.005	< 0.005	0.01	5.57
Vendor	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	4.04	4.04	< 0.005	< 0.005	< 0.005	4.23
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.21	2.21	< 0.005	< 0.005	< 0.005	2.33

3.14. Phase 1 - Building Construction (2024) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.11	0.93	8.58	9.35	0.02	0.36	—	0.36	0.33	—	0.33	—	1,839	1,839	0.07	0.01	—	1,845
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.19	0.15	1.43	1.55	< 0.005	0.06	—	0.06	0.06	—	0.06	—	306	306	0.01	< 0.005	—	307
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.03	0.26	0.28	< 0.005	0.01	—	0.01	0.01	—	0.01	—	50.6	50.6	< 0.005	< 0.005	—	50.8
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.07	0.06	0.07	0.79	0.00	0.00	0.85	0.85	0.00	0.21	0.21	—	199	199	< 0.005	0.01	0.02	201
Vendor	0.02	0.01	0.23	0.13	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	147	147	0.02	0.02	0.01	153
Hauling	0.01	< 0.005	0.13	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	80.4	80.4	0.01	0.01	< 0.005	84.6
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.13	0.00	0.00	0.14	0.14	0.00	0.03	0.03	—	33.2	33.2	< 0.005	< 0.005	0.06	33.7
Vendor	< 0.005	< 0.005	0.04	0.02	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	—	24.4	24.4	< 0.005	< 0.005	0.03	25.5
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	13.4	13.4	< 0.005	< 0.005	0.01	14.1
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.02	0.00	0.00	0.03	0.03	0.00	0.01	0.01	—	5.49	5.49	< 0.005	< 0.005	0.01	5.57
Vendor	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	4.04	4.04	< 0.005	< 0.005	< 0.005	4.23
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.21	2.21	< 0.005	< 0.005	< 0.005	2.33

3.15. Phase 1 - Building Construction (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.05	0.88	8.00	9.29	0.02	0.32	—	0.32	0.29	—	0.29	—	1,839	1,839	0.07	0.01	—	1,845
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.05	0.88	8.00	9.29	0.02	0.32	—	0.32	0.29	—	0.29	—	1,839	1,839	0.07	0.01	—	1,845
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.75	0.63	5.72	6.63	0.01	0.23	—	0.23	0.21	—	0.21	—	1,313	1,313	0.05	0.01	—	1,318
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.14	0.11	1.04	1.21	< 0.005	0.04	—	0.04	0.04	—	0.04	—	217	217	0.01	< 0.005	—	218

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.07	0.06	0.05	0.78	0.00	0.00	0.85	0.85	0.00	0.21	0.21	—	206	206	< 0.005	< 0.005	0.68	207
Vendor	0.02	< 0.005	0.21	0.13	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	144	144	0.01	0.02	0.36	151
Hauling	0.01	< 0.005	0.12	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	78.6	78.6	0.01	0.01	0.16	82.8
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.07	0.06	0.06	0.72	0.00	0.00	0.85	0.85	0.00	0.21	0.21	—	195	195	< 0.005	0.01	0.02	197
Vendor	0.02	< 0.005	0.22	0.13	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	144	144	0.01	0.02	0.01	150
Hauling	0.01	< 0.005	0.13	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	78.6	78.6	0.01	0.01	< 0.005	82.7
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.05	0.04	0.04	0.50	0.00	0.00	0.60	0.60	0.00	0.15	0.15	—	139	139	< 0.005	0.01	0.21	141
Vendor	0.01	< 0.005	0.15	0.09	< 0.005	< 0.005	0.09	0.09	< 0.005	0.02	0.02	—	103	103	0.01	0.01	0.11	107
Hauling	0.01	< 0.005	0.09	0.06	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	—	56.2	56.2	0.01	0.01	0.05	59.1
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.09	0.00	0.00	0.11	0.11	0.00	0.03	0.03	—	23.1	23.1	< 0.005	< 0.005	0.03	23.4
Vendor	< 0.005	< 0.005	0.03	0.02	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	< 0.005	—	17.0	17.0	< 0.005	< 0.005	0.02	17.8
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	9.30	9.30	< 0.005	< 0.005	0.01	9.79

3.16. Phase 1 - Building Construction (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.05	0.88	8.00	9.29	0.02	0.32	—	0.32	0.29	—	0.29	—	1,839	1,839	0.07	0.01	—	1,845
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.05	0.88	8.00	9.29	0.02	0.32	—	0.32	0.29	—	0.29	—	1,839	1,839	0.07	0.01	—	1,845
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.75	0.63	5.72	6.63	0.01	0.23	—	0.23	0.21	—	0.21	—	1,313	1,313	0.05	0.01	—	1,318
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.14	0.11	1.04	1.21	< 0.005	0.04	—	0.04	0.04	—	0.04	—	217	217	0.01	< 0.005	—	218
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Worker	0.07	0.06	0.05	0.78	0.00	0.00	0.85	0.85	0.00	0.21	0.21	—	206	206	< 0.005	< 0.005	0.68	207
Vendor	0.02	< 0.005	0.21	0.13	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	144	144	0.01	0.02	0.36	151
Hauling	0.01	< 0.005	0.12	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	78.6	78.6	0.01	0.01	0.16	82.8
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.07	0.06	0.06	0.72	0.00	0.00	0.85	0.85	0.00	0.21	0.21	—	195	195	< 0.005	0.01	0.02	197
Vendor	0.02	< 0.005	0.22	0.13	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	144	144	0.01	0.02	0.01	150
Hauling	0.01	< 0.005	0.13	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	78.6	78.6	0.01	0.01	< 0.005	82.7
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.05	0.04	0.04	0.50	0.00	0.00	0.60	0.60	0.00	0.15	0.15	—	139	139	< 0.005	0.01	0.21	141
Vendor	0.01	< 0.005	0.15	0.09	< 0.005	< 0.005	0.09	0.09	< 0.005	0.02	0.02	—	103	103	0.01	0.01	0.11	107
Hauling	0.01	< 0.005	0.09	0.06	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	—	56.2	56.2	0.01	0.01	0.05	59.1
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.09	0.00	0.00	0.11	0.11	0.00	0.03	0.03	—	23.1	23.1	< 0.005	< 0.005	0.03	23.4
Vendor	< 0.005	< 0.005	0.03	0.02	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	< 0.005	—	17.0	17.0	< 0.005	< 0.005	0.02	17.8
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	9.30	9.30	< 0.005	< 0.005	0.01	9.79

3.17. Phase 1 - Building Construction (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipm	1.01	0.84	7.60	9.23	0.02	0.28	—	0.28	0.26	—	0.26	—	1,838	1,838	0.07	0.01	—	1,845
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.16	0.13	1.22	1.48	< 0.005	0.05	—	0.05	0.04	—	0.04	—	295	295	0.01	< 0.005	—	296
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.02	0.22	0.27	< 0.005	0.01	—	0.01	0.01	—	0.01	—	48.8	48.8	< 0.005	< 0.005	—	49.0
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.06	0.05	0.67	0.00	0.00	0.85	0.85	0.00	0.21	0.21	—	191	191	< 0.005	0.01	0.02	193
Vendor	0.02	< 0.005	0.20	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	141	141	0.01	0.02	0.01	148
Hauling	0.01	< 0.005	0.12	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	76.9	76.9	0.01	0.01	< 0.005	80.8
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.10	0.00	0.00	0.13	0.13	0.00	0.03	0.03	—	30.7	30.7	< 0.005	< 0.005	0.04	31.1
Vendor	< 0.005	< 0.005	0.03	0.02	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	—	22.7	22.7	< 0.005	< 0.005	0.02	23.7
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	12.3	12.3	< 0.005	< 0.005	0.01	13.0

Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.02	0.00	0.00	0.02	0.02	0.00	0.01	0.01	—	5.08	5.08	< 0.005	< 0.005	0.01	5.15
Vendor	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	3.75	3.75	< 0.005	< 0.005	< 0.005	3.92
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.04	2.04	< 0.005	< 0.005	< 0.005	2.15

3.18. Phase 1 - Building Construction (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.01	0.84	7.60	9.23	0.02	0.28	—	0.28	0.26	—	0.26	—	1,838	1,838	0.07	0.01	—	1,845
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.16	0.13	1.22	1.48	< 0.005	0.05	—	0.05	0.04	—	0.04	—	295	295	0.01	< 0.005	—	296
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.02	0.22	0.27	< 0.005	0.01	—	0.01	0.01	—	0.01	—	48.8	48.8	< 0.005	< 0.005	—	49.0

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.06	0.05	0.67	0.00	0.00	0.85	0.85	0.00	0.21	0.21	—	191	191	< 0.005	0.01	0.02	193
Vendor	0.02	< 0.005	0.20	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	141	141	0.01	0.02	0.01	148
Hauling	0.01	< 0.005	0.12	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	76.9	76.9	0.01	0.01	< 0.005	80.8
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.10	0.00	0.00	0.13	0.13	0.00	0.03	0.03	—	30.7	30.7	< 0.005	< 0.005	0.04	31.1
Vendor	< 0.005	< 0.005	0.03	0.02	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	—	22.7	22.7	< 0.005	< 0.005	0.02	23.7
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	12.3	12.3	< 0.005	< 0.005	0.01	13.0
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.02	0.00	0.00	0.02	0.02	0.00	0.01	0.01	—	5.08	5.08	< 0.005	< 0.005	0.01	5.15
Vendor	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	3.75	3.75	< 0.005	< 0.005	< 0.005	3.92
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.04	2.04	< 0.005	< 0.005	< 0.005	2.15

3.19. Phase 2 - Building Construction (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.90	0.75	6.69	7.56	0.02	0.25	—	0.25	0.23	—	0.23	—	1,584	1,584	0.06	0.01	—	1,590
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.90	0.75	6.69	7.56	0.02	0.25	—	0.25	0.23	—	0.23	—	1,584	1,584	0.06	0.01	—	1,590
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.31	0.26	2.33	2.63	0.01	0.09	—	0.09	0.08	—	0.08	—	552	552	0.02	< 0.005	—	554
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.05	0.43	0.48	< 0.005	0.02	—	0.02	0.01	—	0.01	—	91.4	91.4	< 0.005	< 0.005	—	91.7
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.06	0.04	0.72	0.00	0.00	0.85	0.85	0.00	0.21	0.21	—	202	202	< 0.005	< 0.005	0.60	203
Vendor	0.02	< 0.005	0.19	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	141	141	0.01	0.02	0.33	148

Hauling	0.01	< 0.005	0.11	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	76.9	76.9	0.01	0.01	0.15	80.9
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.06	0.05	0.67	0.00	0.00	0.85	0.85	0.00	0.21	0.21	—	191	191	< 0.005	0.01	0.02	193
Vendor	0.02	< 0.005	0.20	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	141	141	0.01	0.02	0.01	148
Hauling	0.01	< 0.005	0.12	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	76.9	76.9	0.01	0.01	< 0.005	80.8
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.02	0.22	0.00	0.00	0.29	0.29	0.00	0.07	0.07	—	66.6	66.6	< 0.005	< 0.005	0.09	67.6
Vendor	0.01	< 0.005	0.07	0.04	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	—	49.2	49.2	< 0.005	0.01	0.05	51.5
Hauling	< 0.005	< 0.005	0.04	0.03	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	—	26.8	26.8	< 0.005	< 0.005	0.02	28.2
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.04	0.00	0.00	0.05	0.05	0.00	0.01	0.01	—	11.0	11.0	< 0.005	< 0.005	0.01	11.2
Vendor	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	8.14	8.14	< 0.005	< 0.005	0.01	8.52
Hauling	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	4.43	4.43	< 0.005	< 0.005	< 0.005	4.66

3.20. Phase 2 - Building Construction (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.90	0.75	6.69	7.56	0.02	0.25	—	0.25	0.23	—	0.23	—	1,584	1,584	0.06	0.01	—	1,590
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.90	0.75	6.69	7.56	0.02	0.25	—	0.25	0.23	—	0.23	—	1,584	1,584	0.06	0.01	—	1,590
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.31	0.26	2.33	2.63	0.01	0.09	—	0.09	0.08	—	0.08	—	552	552	0.02	< 0.005	—	554
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.05	0.43	0.48	< 0.005	0.02	—	0.02	0.01	—	0.01	—	91.4	91.4	< 0.005	< 0.005	—	91.7
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.06	0.04	0.72	0.00	0.00	0.85	0.85	0.00	0.21	0.21	—	202	202	< 0.005	< 0.005	0.60	203
Vendor	0.02	< 0.005	0.19	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	141	141	0.01	0.02	0.33	148
Hauling	0.01	< 0.005	0.11	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	76.9	76.9	0.01	0.01	0.15	80.9
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.06	0.05	0.67	0.00	0.00	0.85	0.85	0.00	0.21	0.21	—	191	191	< 0.005	0.01	0.02	193

Vendor	0.02	< 0.005	0.20	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	141	141	0.01	0.02	0.01	148
Hauling	0.01	< 0.005	0.12	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	76.9	76.9	0.01	0.01	< 0.005	80.8
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.02	0.22	0.00	0.00	0.29	0.29	0.00	0.07	0.07	—	66.6	66.6	< 0.005	< 0.005	0.09	67.6
Vendor	0.01	< 0.005	0.07	0.04	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	—	49.2	49.2	< 0.005	0.01	0.05	51.5
Hauling	< 0.005	< 0.005	0.04	0.03	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	—	26.8	26.8	< 0.005	< 0.005	0.02	28.2
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.04	0.00	0.00	0.05	0.05	0.00	0.01	0.01	—	11.0	11.0	< 0.005	< 0.005	0.01	11.2
Vendor	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	8.14	8.14	< 0.005	< 0.005	0.01	8.52
Hauling	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	4.43	4.43	< 0.005	< 0.005	< 0.005	4.66

3.21. Phase 2 - Building Construction (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.87	0.73	6.41	7.53	0.02	0.23	—	0.23	0.21	—	0.21	—	1,584	1,584	0.06	0.01	—	1,590
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.87	0.73	6.41	7.53	0.02	0.23	—	0.23	0.21	—	0.21	—	1,584	1,584	0.06	0.01	—	1,590

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.25	0.21	1.81	2.12	< 0.005	0.07	—	0.07	0.06	—	0.06	—	446	446	0.02	< 0.005	—	448
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.04	0.33	0.39	< 0.005	0.01	—	0.01	0.01	—	0.01	—	73.9	73.9	< 0.005	< 0.005	—	74.2
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.05	0.05	0.04	0.67	0.00	0.00	0.85	0.85	0.00	0.21	0.21	—	198	198	< 0.005	< 0.005	0.53	199
Vendor	0.02	< 0.005	0.18	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	138	138	0.01	0.02	0.30	145
Hauling	0.01	< 0.005	0.11	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	74.9	74.9	0.01	0.01	0.14	79.0
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.05	0.05	0.05	0.63	0.00	0.00	0.85	0.85	0.00	0.21	0.21	—	187	187	< 0.005	< 0.005	0.01	188
Vendor	0.02	< 0.005	0.19	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	138	138	0.01	0.02	0.01	144
Hauling	0.01	< 0.005	0.12	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	74.9	74.9	0.01	0.01	< 0.005	78.8
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.01	0.01	0.17	0.00	0.00	0.24	0.24	0.00	0.06	0.06	—	52.9	52.9	< 0.005	< 0.005	0.06	53.1
Vendor	0.01	< 0.005	0.05	0.03	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	—	38.9	38.9	< 0.005	0.01	0.04	40.7

Hauling	< 0.005	< 0.005	0.03	0.02	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	< 0.005	—	21.1	21.1	< 0.005	< 0.005	0.02	22.2
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.03	0.00	0.00	0.04	0.04	0.00	0.01	0.01	—	8.75	8.75	< 0.005	< 0.005	0.01	8.79
Vendor	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	6.44	6.44	< 0.005	< 0.005	0.01	6.73
Hauling	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	3.50	3.50	< 0.005	< 0.005	< 0.005	3.68

3.22. Phase 2 - Building Construction (2027) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.87	0.73	6.41	7.53	0.02	0.23	—	0.23	0.21	—	0.21	—	1,584	1,584	0.06	0.01	—	1,590
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.87	0.73	6.41	7.53	0.02	0.23	—	0.23	0.21	—	0.21	—	1,584	1,584	0.06	0.01	—	1,590
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.25	0.21	1.81	2.12	< 0.005	0.07	—	0.07	0.06	—	0.06	—	446	446	0.02	< 0.005	—	448

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.04	0.33	0.39	< 0.005	0.01	—	0.01	0.01	—	0.01	—	73.9	73.9	< 0.005	< 0.005	—	74.2
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.05	0.05	0.04	0.67	0.00	0.00	0.85	0.85	0.00	0.21	0.21	—	198	198	< 0.005	< 0.005	0.53	199
Vendor	0.02	< 0.005	0.18	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	138	138	0.01	0.02	0.30	145
Hauling	0.01	< 0.005	0.11	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	74.9	74.9	0.01	0.01	0.14	79.0
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.05	0.05	0.05	0.63	0.00	0.00	0.85	0.85	0.00	0.21	0.21	—	187	187	< 0.005	< 0.005	0.01	188
Vendor	0.02	< 0.005	0.19	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	138	138	0.01	0.02	0.01	144
Hauling	0.01	< 0.005	0.12	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	74.9	74.9	0.01	0.01	< 0.005	78.8
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.01	0.01	0.17	0.00	0.00	0.24	0.24	0.00	0.06	0.06	—	52.9	52.9	< 0.005	< 0.005	0.06	53.1
Vendor	0.01	< 0.005	0.05	0.03	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	—	38.9	38.9	< 0.005	0.01	0.04	40.7
Hauling	< 0.005	< 0.005	0.03	0.02	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	< 0.005	—	21.1	21.1	< 0.005	< 0.005	0.02	22.2
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.03	0.00	0.00	0.04	0.04	0.00	0.01	0.01	—	8.75	8.75	< 0.005	< 0.005	0.01	8.79
Vendor	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	6.44	6.44	< 0.005	< 0.005	0.01	6.73
Hauling	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	3.50	3.50	< 0.005	< 0.005	< 0.005	3.68

3.23. Phase 1 - Paving (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.34	0.29	2.67	3.73	0.01	0.12	—	0.12	0.11	—	0.11	—	566	566	0.02	< 0.005	—	568
Paving	0.28	0.28	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.34	0.29	2.67	3.73	0.01	0.12	—	0.12	0.11	—	0.11	—	566	566	0.02	< 0.005	—	568
Paving	0.28	0.28	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.02	0.22	0.31	< 0.005	0.01	—	0.01	0.01	—	0.01	—	46.6	46.6	< 0.005	< 0.005	—	46.7
Paving	0.02	0.02	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Roa Equipment	0.01	< 0.005	0.04	0.06	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	7.71	7.71	< 0.005	< 0.005	—	7.73
Paving	< 0.005	< 0.005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.14	0.00	0.00	0.17	0.17	0.00	0.04	0.04	—	40.3	40.3	< 0.005	< 0.005	0.12	40.6
Vendor	0.02	< 0.005	0.19	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	141	141	0.01	0.02	0.33	148
Hauling	0.01	< 0.005	0.11	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	76.9	76.9	0.01	0.01	0.15	80.9
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.13	0.00	0.00	0.17	0.17	0.00	0.04	0.04	—	38.1	38.1	< 0.005	< 0.005	< 0.005	38.6
Vendor	0.02	< 0.005	0.20	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	141	141	0.01	0.02	0.01	148
Hauling	0.01	< 0.005	0.12	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	76.9	76.9	0.01	0.01	< 0.005	80.8
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	3.14	3.14	< 0.005	< 0.005	< 0.005	3.19
Vendor	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	11.6	11.6	< 0.005	< 0.005	0.01	12.1
Hauling	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	6.32	6.32	< 0.005	< 0.005	0.01	6.64
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.52	0.52	< 0.005	< 0.005	< 0.005	0.53
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.92	1.92	< 0.005	< 0.005	< 0.005	2.01
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.05	1.05	< 0.005	< 0.005	< 0.005	1.10

3.24. Phase 1 - Paving (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.34	0.29	2.67	3.73	0.01	0.12	—	0.12	0.11	—	0.11	—	566	566	0.02	< 0.005	—	568
Paving	0.28	0.28	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.34	0.29	2.67	3.73	0.01	0.12	—	0.12	0.11	—	0.11	—	566	566	0.02	< 0.005	—	568
Paving	0.28	0.28	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.02	0.22	0.31	< 0.005	0.01	—	0.01	0.01	—	0.01	—	46.6	46.6	< 0.005	< 0.005	—	46.7
Paving	0.02	0.02	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	< 0.005	0.04	0.06	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	7.71	7.71	< 0.005	< 0.005	—	7.73
Paving	< 0.005	< 0.005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.14	0.00	0.00	0.17	0.17	0.00	0.04	0.04	—	40.3	40.3	< 0.005	< 0.005	0.12	40.6
Vendor	0.02	< 0.005	0.19	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	141	141	0.01	0.02	0.33	148
Hauling	0.01	< 0.005	0.11	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	76.9	76.9	0.01	0.01	0.15	80.9
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.13	0.00	0.00	0.17	0.17	0.00	0.04	0.04	—	38.1	38.1	< 0.005	< 0.005	< 0.005	38.6
Vendor	0.02	< 0.005	0.20	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	141	141	0.01	0.02	0.01	148
Hauling	0.01	< 0.005	0.12	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	76.9	76.9	0.01	0.01	< 0.005	80.8
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	3.14	3.14	< 0.005	< 0.005	< 0.005	3.19
Vendor	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	11.6	11.6	< 0.005	< 0.005	0.01	12.1
Hauling	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	6.32	6.32	< 0.005	< 0.005	0.01	6.64
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.52	0.52	< 0.005	< 0.005	< 0.005	0.53
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.92	1.92	< 0.005	< 0.005	< 0.005	2.01
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.05	1.05	< 0.005	< 0.005	< 0.005	1.10

3.25. Phase 2 - Paving (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.51	0.42	4.03	5.92	0.01	0.16	—	0.16	0.15	—	0.15	—	906	906	0.04	0.01	—	909
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.02	0.17	0.24	< 0.005	0.01	—	0.01	0.01	—	0.01	—	37.2	37.2	< 0.005	< 0.005	—	37.3
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.03	0.04	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	6.16	6.16	< 0.005	< 0.005	—	6.18
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.13	0.00	0.00	0.17	0.17	0.00	0.04	0.04	—	39.6	39.6	< 0.005	< 0.005	0.11	39.8
Vendor	0.02	< 0.005	0.18	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	138	138	0.01	0.02	0.30	145
Hauling	0.01	< 0.005	0.11	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	74.9	74.9	0.01	0.01	0.14	79.0

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	1.54	1.54	< 0.005	< 0.005	< 0.005	1.55
Vendor	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	5.68	5.68	< 0.005	< 0.005	0.01	5.93
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	3.08	3.08	< 0.005	< 0.005	< 0.005	3.24
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.26	0.26	< 0.005	< 0.005	< 0.005	0.26
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.94	0.94	< 0.005	< 0.005	< 0.005	0.98
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.51	0.51	< 0.005	< 0.005	< 0.005	0.54

3.26. Phase 2 - Paving (2027) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.51	0.42	4.03	5.92	0.01	0.16	—	0.16	0.15	—	0.15	—	906	906	0.04	0.01	—	909
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipm	0.02	0.02	0.17	0.24	< 0.005	0.01	—	0.01	0.01	—	0.01	—	37.2	37.2	< 0.005	< 0.005	—	37.3
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.03	0.04	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	6.16	6.16	< 0.005	< 0.005	—	6.18
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.13	0.00	0.00	0.17	0.17	0.00	0.04	0.04	—	39.6	39.6	< 0.005	< 0.005	0.11	39.8
Vendor	0.02	< 0.005	0.18	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	138	138	0.01	0.02	0.30	145
Hauling	0.01	< 0.005	0.11	0.08	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	74.9	74.9	0.01	0.01	0.14	79.0
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	1.54	1.54	< 0.005	< 0.005	< 0.005	1.55
Vendor	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	5.68	5.68	< 0.005	< 0.005	0.01	5.93
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	3.08	3.08	< 0.005	< 0.005	< 0.005	3.24
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.26	0.26	< 0.005	< 0.005	< 0.005	0.26
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.94	0.94	< 0.005	< 0.005	< 0.005	0.98
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.51	0.51	< 0.005	< 0.005	< 0.005	0.54

3.27. Phase 1 - Architectural Coating (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.15	0.12	0.86	1.13	< 0.005	0.02	—	0.02	0.02	—	0.02	—	134	134	0.01	< 0.005	—	134
Architectural Coatings	11.7	11.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.05	0.06	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	7.32	7.32	< 0.005	< 0.005	—	7.34
Architectural Coatings	0.64	0.64	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	1.21	1.21	< 0.005	< 0.005	—	1.22
Architectural Coatings	0.12	0.12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.14	0.00	0.00	0.17	0.17	0.00	0.04	0.04	—	40.3	40.3	< 0.005	< 0.005	0.12	40.6
Vendor	0.02	< 0.005	0.19	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	141	141	0.01	0.02	0.33	148
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	2.10	2.10	< 0.005	< 0.005	< 0.005	2.13
Vendor	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	7.74	7.74	< 0.005	< 0.005	0.01	8.09
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.35	0.35	< 0.005	< 0.005	< 0.005	0.35
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.28	1.28	< 0.005	< 0.005	< 0.005	1.34
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.28. Phase 1 - Architectural Coating (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.15	0.12	0.86	1.13	< 0.005	0.02	—	0.02	0.02	—	0.02	—	134	134	0.01	< 0.005	—	134
Architectural Coatings	11.7	11.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.05	0.06	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	7.32	7.32	< 0.005	< 0.005	—	7.34
Architectural Coatings	0.64	0.64	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	1.21	1.21	< 0.005	< 0.005	—	1.22

Architectural Coating	0.12	0.12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.14	0.00	0.00	0.17	0.17	0.00	0.04	0.04	—	40.3	40.3	< 0.005	< 0.005	0.12	40.6
Vendor	0.02	< 0.005	0.19	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	141	141	0.01	0.02	0.33	148
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	2.10	2.10	< 0.005	< 0.005	< 0.005	2.13
Vendor	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	7.74	7.74	< 0.005	< 0.005	0.01	8.09
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.35	0.35	< 0.005	< 0.005	< 0.005	0.35
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.28	1.28	< 0.005	< 0.005	< 0.005	1.34
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.29. Phase 2 - Architectural Coating (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Roa Equipment	0.14	0.11	0.83	1.13	< 0.005	0.02	—	0.02	0.02	—	0.02	—	134	134	0.01	< 0.005	—	134
Architectural Coatings	11.6	11.6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	< 0.005	0.03	0.05	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	5.49	5.49	< 0.005	< 0.005	—	5.51
Architectural Coatings	0.47	0.47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.91	0.91	< 0.005	< 0.005	—	0.91
Architectural Coatings	0.09	0.09	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.13	0.00	0.00	0.17	0.17	0.00	0.04	0.04	—	39.6	39.6	< 0.005	< 0.005	0.11	39.8
Vendor	0.02	< 0.005	0.18	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	138	138	0.01	0.02	0.30	145
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	1.54	1.54	< 0.005	< 0.005	< 0.005	1.55
Vendor	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	5.68	5.68	< 0.005	< 0.005	0.01	5.93
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.26	0.26	< 0.005	< 0.005	< 0.005	0.26
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.94	0.94	< 0.005	< 0.005	< 0.005	0.98
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.30. Phase 2 - Architectural Coating (2027) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.14	0.11	0.83	1.13	< 0.005	0.02	—	0.02	0.02	—	0.02	—	134	134	0.01	< 0.005	—	134

Architectural Coating	11.6	11.6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	< 0.005	0.03	0.05	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	5.49	5.49	< 0.005	< 0.005	—	5.51
Architectural Coatings	0.47	0.47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.91	0.91	< 0.005	< 0.005	—	0.91
Architectural Coatings	0.09	0.09	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.13	0.00	0.00	0.17	0.17	0.00	0.04	0.04	—	39.6	39.6	< 0.005	< 0.005	0.11	39.8
Vendor	0.02	< 0.005	0.18	0.12	< 0.005	< 0.005	0.13	0.13	< 0.005	0.03	0.03	—	138	138	0.01	0.02	0.30	145

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	1.54	1.54	< 0.005	< 0.005	< 0.005	1.55
Vendor	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	5.68	5.68	< 0.005	< 0.005	0.01	5.93
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.26	0.26	< 0.005	< 0.005	< 0.005	0.26
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.94	0.94	< 0.005	< 0.005	< 0.005	0.98
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

4. Operations Emissions Details

4.1. Mobile Emissions by Land Use

4.1.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	4.81	4.37	3.29	44.5	0.14	0.07	13.5	13.6	0.06	3.42	3.48	—	13,928	13,928	0.42	0.42	33.3	14,098

Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Total	4.81	4.37	3.29	44.5	0.14	0.07	13.5	13.6	0.06	3.42	3.48	—	13,928	13,928	0.42	0.42	33.3	14,098
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	4.75	4.30	3.89	42.5	0.13	0.07	13.5	13.6	0.06	3.42	3.48	—	13,315	13,315	0.46	0.46	0.86	13,465
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Total	4.75	4.30	3.89	42.5	0.13	0.07	13.5	13.6	0.06	3.42	3.48	—	13,315	13,315	0.46	0.46	0.86	13,465
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	0.65	0.59	0.51	5.73	0.02	0.01	1.85	1.86	0.01	0.47	0.48	—	1,682	1,682	0.06	0.06	1.81	1,702
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Total	0.65	0.59	0.51	5.73	0.02	0.01	1.85	1.86	0.01	0.47	0.48	—	1,682	1,682	0.06	0.06	1.81	1,702

4.1.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	4.81	4.37	3.29	44.5	0.14	0.07	13.5	13.6	0.06	3.42	3.48	—	13,928	13,928	0.42	0.42	33.3	14,098
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Total	4.81	4.37	3.29	44.5	0.14	0.07	13.5	13.6	0.06	3.42	3.48	—	13,928	13,928	0.42	0.42	33.3	14,098
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	4.75	4.30	3.89	42.5	0.13	0.07	13.5	13.6	0.06	3.42	3.48	—	13,315	13,315	0.46	0.46	0.86	13,465
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Total	4.75	4.30	3.89	42.5	0.13	0.07	13.5	13.6	0.06	3.42	3.48	—	13,315	13,315	0.46	0.46	0.86	13,465
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	0.65	0.59	0.51	5.73	0.02	0.01	1.85	1.86	0.01	0.47	0.48	—	1,682	1,682	0.06	0.06	1.81	1,702
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.65	0.59	0.51	5.73	0.02	0.01	1.85	1.86	0.01	0.47	0.48	—	1,682	1,682	0.06	0.06	1.81	1,702

4.2. Energy

4.2.1. Electricity Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	—	98.2	98.2	0.27	0.03	—	115
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	—	12.9	12.9	0.04	< 0.005	—	15.1

Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	111	111	0.31	0.04	—	130
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	—	98.2	98.2	0.27	0.03	—	115
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	—	12.9	12.9	0.04	< 0.005	—	15.1
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	111	111	0.31	0.04	—	130
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	—	16.3	16.3	0.04	0.01	—	19.0
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	—	2.14	2.14	0.01	< 0.005	—	2.50
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	18.4	18.4	0.05	0.01	—	21.5

4.2.2. Electricity Emissions By Land Use - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	—	98.1	98.1	0.27	0.03	—	115
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	—	12.9	12.9	0.04	< 0.005	—	15.1
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	111	111	0.31	0.04	—	130
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	—	98.1	98.1	0.27	0.03	—	115
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	—	12.9	12.9	0.04	< 0.005	—	15.1
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	111	111	0.31	0.04	—	130
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Research	—	—	—	—	—	—	—	—	—	—	—	—	16.2	16.2	0.04	0.01	—	19.0
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	—	2.14	2.14	0.01	< 0.005	—	2.50
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	18.4	18.4	0.05	0.01	—	21.5

4.2.3. Natural Gas Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	0.17	0.08	1.51	1.27	0.01	0.11	—	0.11	0.11	—	0.11	—	1,798	1,798	0.16	< 0.005	—	1,803
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.17	0.08	1.51	1.27	0.01	0.11	—	0.11	0.11	—	0.11	—	1,798	1,798	0.16	< 0.005	—	1,803
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Research	0.17	0.08	1.51	1.27	0.01	0.11	—	0.11	0.11	—	0.11	—	1,798	1,798	0.16	< 0.005	—	1,803
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.17	0.08	1.51	1.27	0.01	0.11	—	0.11	0.11	—	0.11	—	1,798	1,798	0.16	< 0.005	—	1,803
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	0.03	0.02	0.28	0.23	< 0.005	0.02	—	0.02	0.02	—	0.02	—	298	298	0.03	< 0.005	—	299
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.03	0.02	0.28	0.23	< 0.005	0.02	—	0.02	0.02	—	0.02	—	298	298	0.03	< 0.005	—	299

4.2.4. Natural Gas Emissions By Land Use - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Research & Development	0.17	0.08	1.51	1.27	0.01	0.11	—	0.11	0.11	—	0.11	—	1,798	1,798	0.16	< 0.005	—	1,803
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.17	0.08	1.51	1.27	0.01	0.11	—	0.11	0.11	—	0.11	—	1,798	1,798	0.16	< 0.005	—	1,803
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	0.17	0.08	1.51	1.27	0.01	0.11	—	0.11	0.11	—	0.11	—	1,798	1,798	0.16	< 0.005	—	1,803
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.17	0.08	1.51	1.27	0.01	0.11	—	0.11	0.11	—	0.11	—	1,798	1,798	0.16	< 0.005	—	1,803
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	0.03	0.02	0.28	0.23	< 0.005	0.02	—	0.02	0.02	—	0.02	—	298	298	0.03	< 0.005	—	299

Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.03	0.02	0.28	0.23	< 0.005	0.02	—	0.02	0.02	—	0.02	—	298	298	0.03	< 0.005	—	299

4.3. Area Emissions by Source

4.3.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Source	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	4.90	4.90	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.11	0.11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	2.85	2.63	0.13	16.0	< 0.005	0.03	—	0.03	0.02	—	0.02	—	65.8	65.8	< 0.005	< 0.005	—	66.0
Total	7.86	7.64	0.13	16.0	< 0.005	0.03	—	0.03	0.02	—	0.02	—	65.8	65.8	< 0.005	< 0.005	—	66.0
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Consumer Product	4.90	4.90	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.11	0.11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	5.02	5.02	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	0.90	0.90	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.02	0.02	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.52	0.48	0.02	2.92	< 0.005	0.01	—	0.01	< 0.005	—	< 0.005	—	10.9	10.9	< 0.005	< 0.005	—	10.9
Total	1.44	1.40	0.02	2.92	< 0.005	0.01	—	0.01	< 0.005	—	< 0.005	—	10.9	10.9	< 0.005	< 0.005	—	10.9

4.3.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Source	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	4.90	4.90	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Architectural Coatings	0.11	0.11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	2.85	2.63	0.13	16.0	< 0.005	0.03	—	0.03	0.02	—	0.02	—	65.8	65.8	< 0.005	< 0.005	—	66.0
Total	7.86	7.64	0.13	16.0	< 0.005	0.03	—	0.03	0.02	—	0.02	—	65.8	65.8	< 0.005	< 0.005	—	66.0
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	4.90	4.90	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.11	0.11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	5.02	5.02	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	0.90	0.90	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.02	0.02	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.52	0.48	0.02	2.92	< 0.005	0.01	—	0.01	< 0.005	—	< 0.005	—	10.9	10.9	< 0.005	< 0.005	—	10.9
Total	1.44	1.40	0.02	2.92	< 0.005	0.01	—	0.01	< 0.005	—	< 0.005	—	10.9	10.9	< 0.005	< 0.005	—	10.9

4.4. Water Emissions by Land Use

4.4.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	10.1	1.12	11.2	1.04	0.02	—	44.6
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	10.1	1.12	11.2	1.04	0.02	—	44.6
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	10.1	1.12	11.2	1.04	0.02	—	44.6
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00

Total	—	—	—	—	—	—	—	—	—	—	—	10.1	1.12	11.2	1.04	0.02	—	44.6
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	1.67	0.19	1.86	0.17	< 0.005	—	7.38
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	1.67	0.19	1.86	0.17	< 0.005	—	7.38

4.4.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	10.1	1.12	11.2	1.04	0.02	—	44.6
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	10.1	1.12	11.2	1.04	0.02	—	44.6

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	10.1	1.12	11.2	1.04	0.02	—	44.6
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	10.1	1.12	11.2	1.04	0.02	—	44.6
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	1.67	0.19	1.86	0.17	< 0.005	—	7.38
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	1.67	0.19	1.86	0.17	< 0.005	—	7.38

4.5. Waste Emissions by Land Use

4.5.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	9.35	0.00	9.35	0.93	0.00	—	32.7
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	9.35	0.00	9.35	0.93	0.00	—	32.7
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	9.35	0.00	9.35	0.93	0.00	—	32.7
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	9.35	0.00	9.35	0.93	0.00	—	32.7
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Research & Development	—	—	—	—	—	—	—	—	—	—	—	1.55	0.00	1.55	0.15	0.00	—	5.42
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	1.55	0.00	1.55	0.15	0.00	—	5.42

4.5.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	9.35	0.00	9.35	0.93	0.00	—	32.7
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	9.35	0.00	9.35	0.93	0.00	—	32.7
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Research & Development	—	—	—	—	—	—	—	—	—	—	—	9.35	0.00	9.35	0.93	0.00	—	32.7
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	9.35	0.00	9.35	0.93	0.00	—	32.7
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	1.55	0.00	1.55	0.15	0.00	—	5.42
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	1.55	0.00	1.55	0.15	0.00	—	5.42

4.6. Refrigerant Emissions by Land Use

4.6.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Research & Development	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.84	5.84
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.84	5.84
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.84	5.84
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.84	5.84
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.97	0.97
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.97	0.97

4.6.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.84	5.84
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.84	5.84
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Research	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.84	5.84
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.84	5.84
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.97	0.97
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.97	0.97

4.7. Offroad Emissions By Equipment Type

4.7.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.7.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.8. Stationary Emissions By Equipment Type

4.8.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Emergency Generator	7.25	6.60	29.5	16.8	0.03	0.97	0.00	0.97	0.97	0.00	0.97	0.00	3,377	3,377	0.14	0.03	0.00	3,389
Total	7.25	6.60	29.5	16.8	0.03	0.97	0.00	0.97	0.97	0.00	0.97	0.00	3,377	3,377	0.14	0.03	0.00	3,389
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Emergency Generator	7.25	6.60	29.5	16.8	0.03	0.97	0.00	0.97	0.97	0.00	0.97	0.00	3,377	3,377	0.14	0.03	0.00	3,389
Total	7.25	6.60	29.5	16.8	0.03	0.97	0.00	0.97	0.97	0.00	0.97	0.00	3,377	3,377	0.14	0.03	0.00	3,389

Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Emergency Generator	0.36	0.33	1.48	0.84	< 0.005	0.05	0.00	0.05	0.05	0.00	0.05	0.00	153	153	0.01	< 0.005	0.00	154
Total	0.36	0.33	1.48	0.84	< 0.005	0.05	0.00	0.05	0.05	0.00	0.05	0.00	153	153	0.01	< 0.005	0.00	154

4.8.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Emergency Generator	7.25	6.60	29.5	16.8	0.03	0.97	0.00	0.97	0.97	0.00	0.97	0.00	3,377	3,377	0.14	0.03	0.00	3,389
Total	7.25	6.60	29.5	16.8	0.03	0.97	0.00	0.97	0.97	0.00	0.97	0.00	3,377	3,377	0.14	0.03	0.00	3,389
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Emergency Generator	7.25	6.60	29.5	16.8	0.03	0.97	0.00	0.97	0.97	0.00	0.97	0.00	3,377	3,377	0.14	0.03	0.00	3,389
Total	7.25	6.60	29.5	16.8	0.03	0.97	0.00	0.97	0.97	0.00	0.97	0.00	3,377	3,377	0.14	0.03	0.00	3,389
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Emergency Generator	0.36	0.33	1.48	0.84	< 0.005	0.05	0.00	0.05	0.05	0.00	0.05	0.00	153	153	0.01	< 0.005	0.00	154
Total	0.36	0.33	1.48	0.84	< 0.005	0.05	0.00	0.05	0.05	0.00	0.05	0.00	153	153	0.01	< 0.005	0.00	154

4.9. User Defined Emissions By Equipment Type

4.9.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.9.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.4. Soil Carbon Accumulation By Vegetation Type - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.5. Above and Belowground Carbon Accumulation by Land Use Type - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.6. Avoided and Sequestered Emissions by Species - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Phase 1 - Demolition	Demolition	7/1/2024	8/11/2024	5.00	30.0	—
Phase 2 - Demolition	Demolition	5/5/2026	6/1/2026	5.00	20.0	—
Phase 1 - Site Preparation	Site Preparation	8/13/2024	8/26/2024	5.00	10.0	—
Phase 2 - Site Preparation	Site Preparation	6/2/2026	6/8/2026	5.00	5.00	—
Phase 1 - Grading	Grading	8/27/2024	10/6/2024	5.00	29.0	—
Phase 2 - Grading	Grading	6/9/2026	7/6/2026	5.00	20.0	—
Phase 1 - Building Construction	Building Construction	10/8/2024	3/23/2026	5.00	380	—
Phase 2 - Building Construction	Building Construction	7/7/2026	5/24/2027	5.00	230	—
Phase 1 - Paving	Paving	3/24/2026	5/4/2026	5.00	30.0	—

Phase 2 - Paving	Paving	5/25/2027	6/14/2027	5.00	15.0	—
Phase 1 - Architectural Coating	Architectural Coating	4/7/2026	5/4/2026	5.00	20.0	—
Phase 2 - Architectural Coating	Architectural Coating	5/25/2027	6/14/2027	5.00	15.0	—

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Phase 1 - Demolition	Concrete/Industrial Saws	Diesel	Average	1.00	8.00	33.0	0.73
Phase 1 - Demolition	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Phase 1 - Demolition	Excavators	Diesel	Average	2.00	8.00	36.0	0.38
Phase 2 - Demolition	Concrete/Industrial Saws	Diesel	Average	1.00	8.00	33.0	0.73
Phase 2 - Demolition	Excavators	Diesel	Average	1.00	8.00	36.0	0.38
Phase 2 - Demolition	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Phase 1 - Site Preparation	Tractors/Loaders/Backhoes	Diesel	Average	2.00	8.00	84.0	0.37
Phase 1 - Site Preparation	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Phase 2 - Site Preparation	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Phase 2 - Site Preparation	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
Phase 1 - Grading	Graders	Diesel	Average	1.00	8.00	148	0.41
Phase 1 - Grading	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Phase 1 - Grading	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
Phase 1 - Grading	Excavators	Diesel	Average	2.00	8.00	36.0	0.38
Phase 1 - Grading	Scrapers	Diesel	Average	1.00	8.00	423	0.48

Phase 2 - Grading	Excavators	Diesel	Average	1.00	8.00	36.0	0.38
Phase 2 - Grading	Graders	Diesel	Average	1.00	8.00	148	0.41
Phase 2 - Grading	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Phase 2 - Grading	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
Phase 1 - Building Construction	Cranes	Diesel	Average	1.00	7.00	367	0.29
Phase 1 - Building Construction	Forklifts	Diesel	Average	1.00	8.00	82.0	0.20
Phase 1 - Building Construction	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
Phase 1 - Building Construction	Tractors/Loaders/Backhoes	Diesel	Average	2.00	7.00	84.0	0.37
Phase 1 - Building Construction	Welders	Diesel	Average	1.00	8.00	46.0	0.45
Phase 2 - Building Construction	Cranes	Diesel	Average	1.00	7.00	367	0.29
Phase 2 - Building Construction	Forklifts	Diesel	Average	1.00	8.00	82.0	0.20
Phase 2 - Building Construction	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
Phase 2 - Building Construction	Tractors/Loaders/Backhoes	Diesel	Average	1.00	7.00	84.0	0.37
Phase 2 - Building Construction	Welders	Diesel	Average	1.00	8.00	46.0	0.45
Phase 1 - Paving	Pavers	Diesel	Average	1.00	6.00	81.0	0.42
Phase 1 - Paving	Paving Equipment	Diesel	Average	1.00	6.00	89.0	0.36
Phase 1 - Paving	Rollers	Diesel	Average	1.00	6.00	36.0	0.38
Phase 2 - Paving	Pavers	Diesel	Average	1.00	8.00	81.0	0.42
Phase 2 - Paving	Paving Equipment	Diesel	Average	1.00	6.00	89.0	0.36
Phase 2 - Paving	Rollers	Diesel	Average	1.00	6.00	36.0	0.38
Phase 2 - Paving	Cement and Mortar Mixers	Diesel	Average	1.00	6.00	10.0	0.56

Phase 2 - Paving	Tractors/Loaders/Back	Diesel	Average	1.00	6.00	84.0	0.37
Phase 1 - Architectural Coating	Air Compressors	Diesel	Average	1.00	6.00	37.0	0.48
Phase 2 - Architectural Coating	Air Compressors	Diesel	Average	1.00	6.00	37.0	0.48

5.2.2. Mitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Phase 1 - Demolition	Concrete/Industrial Saws	Diesel	Average	1.00	8.00	33.0	0.73
Phase 1 - Demolition	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Phase 1 - Demolition	Excavators	Diesel	Average	2.00	8.00	36.0	0.38
Phase 2 - Demolition	Concrete/Industrial Saws	Diesel	Average	1.00	8.00	33.0	0.73
Phase 2 - Demolition	Excavators	Diesel	Average	1.00	8.00	36.0	0.38
Phase 2 - Demolition	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Phase 1 - Site Preparation	Tractors/Loaders/Backhoes	Diesel	Average	2.00	8.00	84.0	0.37
Phase 1 - Site Preparation	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Phase 2 - Site Preparation	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Phase 2 - Site Preparation	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
Phase 1 - Grading	Graders	Diesel	Average	1.00	8.00	148	0.41
Phase 1 - Grading	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Phase 1 - Grading	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
Phase 1 - Grading	Excavators	Diesel	Average	2.00	8.00	36.0	0.38
Phase 1 - Grading	Scrapers	Diesel	Average	1.00	8.00	423	0.48
Phase 2 - Grading	Excavators	Diesel	Average	1.00	8.00	36.0	0.38

Phase 2 - Grading	Graders	Diesel	Average	1.00	8.00	148	0.41
Phase 2 - Grading	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Phase 2 - Grading	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
Phase 1 - Building Construction	Cranes	Diesel	Average	1.00	7.00	367	0.29
Phase 1 - Building Construction	Forklifts	Diesel	Average	1.00	8.00	82.0	0.20
Phase 1 - Building Construction	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
Phase 1 - Building Construction	Tractors/Loaders/Backhoes	Diesel	Average	2.00	7.00	84.0	0.37
Phase 1 - Building Construction	Welders	Diesel	Average	1.00	8.00	46.0	0.45
Phase 2 - Building Construction	Cranes	Diesel	Average	1.00	7.00	367	0.29
Phase 2 - Building Construction	Forklifts	Diesel	Average	1.00	8.00	82.0	0.20
Phase 2 - Building Construction	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
Phase 2 - Building Construction	Tractors/Loaders/Backhoes	Diesel	Average	1.00	7.00	84.0	0.37
Phase 2 - Building Construction	Welders	Diesel	Average	1.00	8.00	46.0	0.45
Phase 1 - Paving	Pavers	Diesel	Average	1.00	6.00	81.0	0.42
Phase 1 - Paving	Paving Equipment	Diesel	Average	1.00	6.00	89.0	0.36
Phase 1 - Paving	Rollers	Diesel	Average	1.00	6.00	36.0	0.38
Phase 2 - Paving	Pavers	Diesel	Average	1.00	8.00	81.0	0.42
Phase 2 - Paving	Paving Equipment	Diesel	Average	1.00	6.00	89.0	0.36
Phase 2 - Paving	Rollers	Diesel	Average	1.00	6.00	36.0	0.38
Phase 2 - Paving	Cement and Mortar Mixers	Diesel	Average	1.00	6.00	10.0	0.56

Phase 2 - Paving	Tractors/Loaders/Backhoes	Diesel	Average	1.00	6.00	84.0	0.37
Phase 1 - Architectural Coating	Air Compressors	Diesel	Average	1.00	6.00	37.0	0.48
Phase 2 - Architectural Coating	Air Compressors	Diesel	Average	1.00	6.00	37.0	0.48

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Phase 1 - Demolition	—	—	—	—
Phase 1 - Demolition	Worker	15.0	11.7	LDA,LDT1,LDT2
Phase 1 - Demolition	Vendor	1.00	8.40	HHDT,MHDT
Phase 1 - Demolition	Hauling	12.0	20.0	HHDT
Phase 1 - Demolition	Onsite truck	0.00	0.00	HHDT
Phase 1 - Site Preparation	—	—	—	—
Phase 1 - Site Preparation	Worker	10.0	11.7	LDA,LDT1,LDT2
Phase 1 - Site Preparation	Vendor	2.00	8.40	HHDT,MHDT
Phase 1 - Site Preparation	Hauling	5.00	20.0	HHDT
Phase 1 - Site Preparation	Onsite truck	0.00	0.00	HHDT
Phase 1 - Grading	—	—	—	—
Phase 1 - Grading	Worker	15.0	11.7	LDA,LDT1,LDT2
Phase 1 - Grading	Vendor	3.00	8.40	HHDT,MHDT
Phase 1 - Grading	Hauling	8.00	20.0	HHDT
Phase 1 - Grading	Onsite truck	0.00	0.00	HHDT
Phase 1 - Building Construction	—	—	—	—
Phase 1 - Building Construction	Worker	25.0	11.7	LDA,LDT1,LDT2
Phase 1 - Building Construction	Vendor	5.00	8.40	HHDT,MHDT

Phase 1 - Building Construction	Hauling	1.00	20.0	HHDT
Phase 1 - Building Construction	Onsite truck	0.00	0.00	HHDT
Phase 1 - Paving	—	—	—	—
Phase 1 - Paving	Worker	5.00	11.7	LDA,LDT1,LDT2
Phase 1 - Paving	Vendor	5.00	8.40	HHDT,MHDT
Phase 1 - Paving	Hauling	1.00	20.0	HHDT
Phase 1 - Paving	Onsite truck	0.00	0.00	HHDT
Phase 1 - Architectural Coating	—	—	—	—
Phase 1 - Architectural Coating	Worker	5.00	11.7	LDA,LDT1,LDT2
Phase 1 - Architectural Coating	Vendor	5.00	8.40	HHDT,MHDT
Phase 1 - Architectural Coating	Hauling	0.00	20.0	HHDT
Phase 1 - Architectural Coating	Onsite truck	0.00	0.00	HHDT
Phase 2 - Demolition	—	—	—	—
Phase 2 - Demolition	Worker	12.0	11.7	LDA,LDT1,LDT2
Phase 2 - Demolition	Vendor	0.00	8.40	HHDT,MHDT
Phase 2 - Demolition	Hauling	6.00	20.0	HHDT
Phase 2 - Demolition	Onsite truck	0.00	0.00	HHDT
Phase 2 - Site Preparation	—	—	—	—
Phase 2 - Site Preparation	Worker	10.0	11.7	LDA,LDT1,LDT2
Phase 2 - Site Preparation	Vendor	2.00	8.40	HHDT,MHDT
Phase 2 - Site Preparation	Hauling	5.00	20.0	HHDT
Phase 2 - Site Preparation	Onsite truck	0.00	0.00	HHDT
Phase 2 - Grading	—	—	—	—
Phase 2 - Grading	Worker	15.0	11.7	LDA,LDT1,LDT2
Phase 2 - Grading	Vendor	3.00	8.40	HHDT,MHDT
Phase 2 - Grading	Hauling	4.00	20.0	HHDT
Phase 2 - Grading	Onsite truck	0.00	0.00	HHDT
Phase 2 - Building Construction	—	—	—	—

Phase 2 - Building Construction	Worker	25.0	11.7	LDA,LDT1,LDT2
Phase 2 - Building Construction	Vendor	5.00	8.40	HHDT,MHDT
Phase 2 - Building Construction	Hauling	1.00	20.0	HHDT
Phase 2 - Building Construction	Onsite truck	0.00	0.00	HHDT
Phase 2 - Paving	—	—	—	—
Phase 2 - Paving	Worker	5.00	11.7	LDA,LDT1,LDT2
Phase 2 - Paving	Vendor	5.00	8.40	HHDT,MHDT
Phase 2 - Paving	Hauling	1.00	20.0	HHDT
Phase 2 - Paving	Onsite truck	0.00	0.00	HHDT
Phase 2 - Architectural Coating	—	—	—	—
Phase 2 - Architectural Coating	Worker	5.00	11.7	LDA,LDT1,LDT2
Phase 2 - Architectural Coating	Vendor	5.00	8.40	HHDT,MHDT
Phase 2 - Architectural Coating	Hauling	0.00	20.0	HHDT
Phase 2 - Architectural Coating	Onsite truck	0.00	0.00	HHDT

5.3.2. Mitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Phase 1 - Demolition	—	—	—	—
Phase 1 - Demolition	Worker	15.0	11.7	LDA,LDT1,LDT2
Phase 1 - Demolition	Vendor	1.00	8.40	HHDT,MHDT
Phase 1 - Demolition	Hauling	12.0	20.0	HHDT
Phase 1 - Demolition	Onsite truck	0.00	0.00	HHDT
Phase 1 - Site Preparation	—	—	—	—
Phase 1 - Site Preparation	Worker	10.0	11.7	LDA,LDT1,LDT2
Phase 1 - Site Preparation	Vendor	2.00	8.40	HHDT,MHDT
Phase 1 - Site Preparation	Hauling	5.00	20.0	HHDT
Phase 1 - Site Preparation	Onsite truck	0.00	0.00	HHDT
Phase 1 - Grading	—	—	—	—

Phase 1 - Grading	Worker	15.0	11.7	LDA,LDT1,LDT2
Phase 1 - Grading	Vendor	3.00	8.40	HHDT,MHDT
Phase 1 - Grading	Hauling	8.00	20.0	HHDT
Phase 1 - Grading	Onsite truck	0.00	0.00	HHDT
Phase 1 - Building Construction	—	—	—	—
Phase 1 - Building Construction	Worker	25.0	11.7	LDA,LDT1,LDT2
Phase 1 - Building Construction	Vendor	5.00	8.40	HHDT,MHDT
Phase 1 - Building Construction	Hauling	1.00	20.0	HHDT
Phase 1 - Building Construction	Onsite truck	0.00	0.00	HHDT
Phase 1 - Paving	—	—	—	—
Phase 1 - Paving	Worker	5.00	11.7	LDA,LDT1,LDT2
Phase 1 - Paving	Vendor	5.00	8.40	HHDT,MHDT
Phase 1 - Paving	Hauling	1.00	20.0	HHDT
Phase 1 - Paving	Onsite truck	0.00	0.00	HHDT
Phase 1 - Architectural Coating	—	—	—	—
Phase 1 - Architectural Coating	Worker	5.00	11.7	LDA,LDT1,LDT2
Phase 1 - Architectural Coating	Vendor	5.00	8.40	HHDT,MHDT
Phase 1 - Architectural Coating	Hauling	0.00	20.0	HHDT
Phase 1 - Architectural Coating	Onsite truck	0.00	0.00	HHDT
Phase 2 - Demolition	—	—	—	—
Phase 2 - Demolition	Worker	12.0	11.7	LDA,LDT1,LDT2
Phase 2 - Demolition	Vendor	0.00	8.40	HHDT,MHDT
Phase 2 - Demolition	Hauling	6.00	20.0	HHDT
Phase 2 - Demolition	Onsite truck	0.00	0.00	HHDT
Phase 2 - Site Preparation	—	—	—	—
Phase 2 - Site Preparation	Worker	10.0	11.7	LDA,LDT1,LDT2
Phase 2 - Site Preparation	Vendor	2.00	8.40	HHDT,MHDT
Phase 2 - Site Preparation	Hauling	5.00	20.0	HHDT

Phase 2 - Site Preparation	Onsite truck	0.00	0.00	HHDT
Phase 2 - Grading	—	—	—	—
Phase 2 - Grading	Worker	15.0	11.7	LDA,LDT1,LDT2
Phase 2 - Grading	Vendor	3.00	8.40	HHDT,MHDT
Phase 2 - Grading	Hauling	4.00	20.0	HHDT
Phase 2 - Grading	Onsite truck	0.00	0.00	HHDT
Phase 2 - Building Construction	—	—	—	—
Phase 2 - Building Construction	Worker	25.0	11.7	LDA,LDT1,LDT2
Phase 2 - Building Construction	Vendor	5.00	8.40	HHDT,MHDT
Phase 2 - Building Construction	Hauling	1.00	20.0	HHDT
Phase 2 - Building Construction	Onsite truck	0.00	0.00	HHDT
Phase 2 - Paving	—	—	—	—
Phase 2 - Paving	Worker	5.00	11.7	LDA,LDT1,LDT2
Phase 2 - Paving	Vendor	5.00	8.40	HHDT,MHDT
Phase 2 - Paving	Hauling	1.00	20.0	HHDT
Phase 2 - Paving	Onsite truck	0.00	0.00	HHDT
Phase 2 - Architectural Coating	—	—	—	—
Phase 2 - Architectural Coating	Worker	5.00	11.7	LDA,LDT1,LDT2
Phase 2 - Architectural Coating	Vendor	5.00	8.40	HHDT,MHDT
Phase 2 - Architectural Coating	Hauling	0.00	20.0	HHDT
Phase 2 - Architectural Coating	Onsite truck	0.00	0.00	HHDT

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

Non-applicable. No control strategies activated by user.

5.5. Architectural Coatings

Phase Name	Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
Phase 1 - Architectural Coating	0.00	0.00	200,419	66,005	7,454
Phase 2 - Architectural Coating	0.00	0.00	148,459	48,893	5,522

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (Cubic Yards)	Material Exported (Cubic Yards)	Acres Graded (acres)	Material Demolished (Ton of Debris)	Acres Paved (acres)
Phase 1 - Demolition	0.00	0.00	0.00	0.00	—
Phase 2 - Demolition	0.00	0.00	0.00	0.00	—
Phase 1 - Site Preparation	0.00	0.00	5.00	0.00	—
Phase 2 - Site Preparation	0.00	0.00	2.50	0.00	—
Phase 1 - Grading	0.00	0.00	58.0	0.00	—
Phase 2 - Grading	0.00	0.00	20.0	0.00	—
Phase 1 - Paving	0.00	0.00	0.00	0.00	4.96
Phase 2 - Paving	0.00	0.00	0.00	0.00	4.96

5.6.2. Construction Earthmoving Control Strategies

Control Strategies Applied	Frequency (per day)	PM10 Reduction	PM2.5 Reduction
Water Exposed Area	2	61%	61%
Water Demolished Area	2	36%	36%

5.7. Construction Paving

Land Use	Area Paved (acres)	% Asphalt
Research & Development	0.00	0%

Unenclosed Parking with Elevator	3.20	100%
Other Non-Asphalt Surfaces	1.76	0%

5.8. Construction Electricity Consumption and Emissions Factors

kWh per Year and Emission Factor (lb/MWh)

Year	kWh per Year	CO2	CH4	N2O
2024	0.00	12.0	0.03	< 0.005
2025	0.00	12.0	0.03	< 0.005
2026	0.00	12.0	0.03	< 0.005
2027	0.00	12.0	0.03	< 0.005

5.9. Operational Mobile Sources

5.9.1. Unmitigated

Land Use Type	Trips/Weekday	Trips/Saturday	Trips/Sunday	Trips/Year	VMT/Weekday	VMT/Saturday	VMT/Sunday	VMT/Year
Research & Development	1,645	342	200	457,137	19,181	3,983	2,327	5,329,753
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

5.9.2. Mitigated

Land Use Type	Trips/Weekday	Trips/Saturday	Trips/Sunday	Trips/Year	VMT/Weekday	VMT/Saturday	VMT/Sunday	VMT/Year
Research & Development	1,645	342	200	457,137	19,181	3,983	2,327	5,329,753
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

5.10. Operational Area Sources

5.10.1. Hearths

5.10.1.1. Unmitigated

5.10.1.2. Mitigated

5.10.2. Architectural Coatings

Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
0	0.00	348,877	114,897	12,976

5.10.3. Landscape Equipment

Season	Unit	Value
Snow Days	day/yr	0.00
Summer Days	day/yr	365

5.10.4. Landscape Equipment - Mitigated

Season	Unit	Value
Snow Days	day/yr	0.00
Summer Days	day/yr	365

5.11. Operational Energy Consumption

5.11.1. Unmitigated

Electricity (kWh/yr) and CO2 and CH4 and N2O and Natural Gas (kBTU/yr)

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)
Research & Development	2,987,950	12.0	0.0330	0.0040	5,611,640
Unenclosed Parking with Elevator	393,111	12.0	0.0330	0.0040	0.00
Other Non-Asphalt Surfaces	0.00	12.0	0.0330	0.0040	0.00

5.11.2. Mitigated

Electricity (kWh/yr) and CO2 and CH4 and N2O and Natural Gas (kBTU/yr)

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)
Research & Development	2,982,914	12.0	0.0330	0.0040	5,611,640
Unenclosed Parking with Elevator	393,111	12.0	0.0330	0.0040	0.00
Other Non-Asphalt Surfaces	0.00	12.0	0.0330	0.0040	0.00

5.12. Operational Water and Wastewater Consumption

5.12.1. Unmitigated

Land Use	Indoor Water (gal/year)	Outdoor Water (gal/year)
Research & Development	5,263,700	15,910
Unenclosed Parking with Elevator	0.00	0.00
Other Non-Asphalt Surfaces	0.00	0.00

5.12.2. Mitigated

Land Use	Indoor Water (gal/year)	Outdoor Water (gal/year)
Research & Development	5,263,700	15,910
Unenclosed Parking with Elevator	0.00	0.00
Other Non-Asphalt Surfaces	0.00	0.00

5.13. Operational Waste Generation

5.13.1. Unmitigated

Land Use	Waste (ton/year)	Cogeneration (kWh/year)
Research & Development	17.4	—
Unenclosed Parking with Elevator	0.00	—
Other Non-Asphalt Surfaces	0.00	—

5.13.2. Mitigated

Land Use	Waste (ton/year)	Cogeneration (kWh/year)
Research & Development	17.4	—
Unenclosed Parking with Elevator	0.00	—
Other Non-Asphalt Surfaces	0.00	—

5.14. Operational Refrigeration and Air Conditioning Equipment

5.14.1. Unmitigated

Land Use Type	Equipment Type	Refrigerant	GWP	Quantity (kg)	Operations Leak Rate	Service Leak Rate	Times Serviced
Research & Development	Household refrigerators and/or freezers	R-134a	1,430	0.45	0.60	0.00	1.00
Research & Development	Other commercial A/C and heat pumps	R-410A	2,088	< 0.005	4.00	4.00	18.0

5.14.2. Mitigated

Land Use Type	Equipment Type	Refrigerant	GWP	Quantity (kg)	Operations Leak Rate	Service Leak Rate	Times Serviced
Research & Development	Household refrigerators and/or freezers	R-134a	1,430	0.45	0.60	0.00	1.00

Research & Development	Other commercial A/C and heat pumps	R-410A	2,088	< 0.005	4.00	4.00	18.0

5.15. Operational Off-Road Equipment

5.15.1. Unmitigated

Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor

5.15.2. Mitigated

Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor

5.16. Stationary Sources

5.16.1. Emergency Generators and Fire Pumps

Equipment Type	Fuel Type	Number per Day	Hours per Day	Hours per Year	Horsepower	Load Factor
Emergency Generator	Diesel	2.00	1.00	100	2,012	0.73

5.16.2. Process Boilers

Equipment Type	Fuel Type	Number	Boiler Rating (MMBtu/hr)	Daily Heat Input (MMBtu/day)	Annual Heat Input (MMBtu/yr)

5.17. User Defined

Equipment Type	Fuel Type

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1.2. Mitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.1.2. Mitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.2. Sequestration

5.18.2.1. Unmitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

5.18.2.2. Mitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

Cal-Adapt midcentury 2040–2059 average projections for four hazards are reported below for your project location. These are under Representation Concentration Pathway (RCP) 8.5 which assumes GHG emissions will continue to rise strongly through 2050 and then plateau around 2100.

Climate Hazard	Result for Project Location	Unit
Temperature and Extreme Heat	11.8	annual days of extreme heat
Extreme Precipitation	4.05	annual days with precipitation above 20 mm
Sea Level Rise	0.00	meters of inundation depth
Wildfire	10.7	annual hectares burned

Temperature and Extreme Heat data are for grid cell in which your project are located. The projection is based on the 98th historical percentile of daily maximum/minimum temperatures from observed historical data (32 climate model ensemble from Cal-Adapt, 2040–2059 average under RCP 8.5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Extreme Precipitation data are for the grid cell in which your project are located. The threshold of 20 mm is equivalent to about ¾ an inch of rain, which would be light to moderate rainfall if received over a full day or heavy rain if received over a period of 2 to 4 hours. Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Sea Level Rise data are for the grid cell in which your project are located. The projections are from Radke et al. (2017), as reported in Cal-Adapt (Radke et al., 2017, CEC-500-2017-008), and consider inundation location and depth for the San Francisco Bay, the Sacramento-San Joaquin River Delta and California coast resulting different increments of sea level rise coupled with extreme storm events. Users may select from four scenarios to view the range in potential inundation depth for the grid cell. The four scenarios are: No rise, 0.5 meter, 1.0 meter, 1.41 meters
Wildfire data are for the grid cell in which your project are located. The projections are from UC Davis, as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider historical data of climate, vegetation, population density, and large (> 400 ha) fire history. Users may select from four model simulations to view the range in potential wildfire probabilities for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	1	0	0	N/A
Sea Level Rise	1	0	0	N/A
Wildfire	1	0	0	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	0	0	0	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	1	1	1	2
Sea Level Rise	1	1	1	2
Wildfire	1	1	1	2
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	1	1	1	2

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Exposure Indicators	—
AQ-Ozone	10.6
AQ-PM	16.9
AQ-DPM	48.7
Drinking Water	44.9
Lead Risk Housing	98.5

Pesticides	0.00
Toxic Releases	23.9
Traffic	59.8
Effect Indicators	—
CleanUp Sites	75.4
Groundwater	95.8
Haz Waste Facilities/Generators	93.4
Impaired Water Bodies	83.0
Solid Waste	42.3
Sensitive Population	—
Asthma	47.0
Cardio-vascular	13.3
Low Birth Weights	22.4
Socioeconomic Factor Indicators	—
Education	84.7
Housing	88.3
Linguistic	42.1
Poverty	63.8
Unemployment	77.8

7.2. Healthy Places Index Scores

The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Economic	—
Above Poverty	34.55665341
Employed	49.83959964
Median HI	52.84229437
Education	—

Bachelor's or higher	15.0006416
High school enrollment	24.98395996
Preschool enrollment	9.790837931
Transportation	—
Auto Access	68.11240857
Active commuting	64.26279995
Social	—
2-parent households	38.27794174
Voting	38.88104709
Neighborhood	—
Alcohol availability	65.0455537
Park access	62.14551521
Retail density	87.57859618
Supermarket access	61.37559348
Tree canopy	60.50301553
Housing	—
Homeownership	56.70473502
Housing habitability	22.12241755
Low-inc homeowner severe housing cost burden	17.2334146
Low-inc renter severe housing cost burden	24.86847171
Uncrowded housing	8.879763891
Health Outcomes	—
Insured adults	43.44924933
Arthritis	0.0
Asthma ER Admissions	47.9
High Blood Pressure	0.0
Cancer (excluding skin)	0.0
Asthma	0.0

Coronary Heart Disease	0.0
Chronic Obstructive Pulmonary Disease	0.0
Diagnosed Diabetes	0.0
Life Expectancy at Birth	40.8
Cognitively Disabled	52.2
Physically Disabled	50.9
Heart Attack ER Admissions	83.8
Mental Health Not Good	0.0
Chronic Kidney Disease	0.0
Obesity	0.0
Pedestrian Injuries	19.6
Physical Health Not Good	0.0
Stroke	0.0
Health Risk Behaviors	—
Binge Drinking	0.0
Current Smoker	0.0
No Leisure Time for Physical Activity	0.0
Climate Change Exposures	—
Wildfire Risk	0.0
SLR Inundation Area	12.5
Children	44.4
Elderly	79.3
English Speaking	49.3
Foreign-born	80.8
Outdoor Workers	28.0
Climate Change Adaptive Capacity	—
Impervious Surface Cover	46.9
Traffic Density	49.4

Traffic Access	62.2
Other Indices	—
Hardship	80.9
Other Decision Support	—
2016 Voting	15.5

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	63.0
Healthy Places Index Score for Project Location (b)	41.0
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	No
Project Located in a Low-Income Community (Assembly Bill 1550)	Yes
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.
b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.4. Health & Equity Measures

No Health & Equity Measures selected.

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

7.6. Health & Equity Custom Measures

No Health & Equity Custom Measures created.

8. User Changes to Default Data

Screen	Justification
Land Use	Existing uses includes 56,696 SF of buildings.
Operations: Vehicle Data	Updated trip rate per transportation assessment.
Characteristics: Utility Information	Adjusted CO2 intensity per Pennensula Clean Energy report: 12 lb of CO2e per MWh.

Construction: Construction Phases	Phase 1 of construction would begin in July 2024 for a duration of 22 months, with buildout in May 2026. Phase 2 of construction would begin in May 2026, for a duration of 14 months, with buildout in June 2027.
Construction: Off-Road Equipment	Updated equipment per applicant.
Construction: Trips and VMT	Updated per applicant.
Construction: On-Road Fugitive Dust	Per BAAQMD, updated silt loading factor to 0.5 g/m2 for all roadways.
Construction: Architectural Coatings	No VOC interior and low-VOC exterior (under 50 grams per liter).
Construction: Electricity	Adjusted CO2 intensity per Pennensula Clean Energy report: 12 lb of CO2e per MWh.
Operations: Architectural Coatings	No VOC interior and low-VOC exterior (under 50 grams per liter).
Operations: Water and Waste Water	Updated per applicant.
Operations: Energy Use	Updated per quantities provided.
Operations: Landscape Equipment	Accounted for landscaping emissions throughout year.
Operations: Emergency Generators and Fire Pumps	Assumed two emergency generators.

1005 O’Brien Drive and 1320 Willow Road (Project) Con HRA v2 Detailed Report

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8. User Changes to Default Data

1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	1005 O’Brien Drive and 1320 Willow Road (Project) Con HRA v2
Construction Start Date	7/1/2024
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	4.20
Precipitation (days)	18.8
Location	37.47566209097283, -122.15210426306923
County	San Mateo
City	Menlo Park
Air District	Bay Area AQMD
Air Basin	San Francisco Bay Area
TAZ	1279
EDFZ	1
Electric Utility	Pacific Gas & Electric Company
Gas Utility	Pacific Gas & Electric
App Version	2022.1.1.22

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
Research & Development	228	1000sqft	5.24	228,400	40,946	0.00	—	—

Unenclosed Parking with Elevator	140	1000sqft	3.20	139,500	0.00	0.00	—	—
Other Non-Asphalt Surfaces	76.8	1000sqft	1.76	0.00	0.00	0.00	—	—

1.3. User-Selected Emission Reduction Measures by Emissions Sector

Sector	#	Measure Title
Construction	C-5	Use Advanced Engine Tiers
Energy	E-10-A	Establish Onsite Renewable Energy Systems: Generic

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	3.09	12.4	25.0	22.2	0.04	1.08	3.18	4.26	0.99	1.38	2.37	—	4,440	4,440	0.19	0.04	0.03	4,457
Mit.	0.45	12.1	3.52	24.1	0.04	0.08	3.18	3.27	0.08	1.38	1.47	—	4,440	4,440	0.19	0.04	0.03	4,457
% Reduced	85%	3%	86%	-8%	—	92%	—	23%	92%	—	38%	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	3.09	2.59	25.0	22.2	0.04	1.08	3.18	4.26	0.99	1.38	2.37	—	4,440	4,440	0.19	0.04	< 0.005	4,457
Mit.	0.45	0.44	3.52	24.1	0.04	0.08	3.18	3.27	0.08	1.38	1.47	—	4,440	4,440	0.19	0.04	< 0.005	4,457
% Reduced	85%	83%	86%	-8%	—	92%	—	23%	92%	—	38%	—	—	—	—	—	—	—

Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.75	1.25	5.77	6.67	0.01	0.23	0.32	0.53	0.21	0.15	0.34	—	1,322	1,322	0.06	0.01	< 0.005	1,327
Mit.	0.22	0.83	1.87	7.83	0.01	0.05	0.32	0.35	0.04	0.15	0.17	—	1,322	1,322	0.06	0.01	< 0.005	1,327
% Reduced	71%	34%	68%	-17%	—	79%	—	35%	79%	—	50%	—	—	—	—	—	—	—
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.14	0.23	1.05	1.22	< 0.005	0.04	0.06	0.10	0.04	0.03	0.06	—	219	219	0.01	< 0.005	< 0.005	220
Mit.	0.04	0.15	0.34	1.43	< 0.005	0.01	0.06	0.06	0.01	0.03	0.03	—	219	219	0.01	< 0.005	< 0.005	220
% Reduced	71%	34%	68%	-17%	—	79%	—	35%	79%	—	50%	—	—	—	—	—	—	—

2.2. Construction Emissions by Year, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	3.09	2.59	25.0	22.2	0.04	1.08	3.18	4.26	0.99	1.38	2.37	—	4,440	4,440	0.19	0.04	0.03	4,457
2025	1.06	0.88	8.08	9.33	0.02	0.32	< 0.005	0.32	0.29	< 0.005	0.29	—	1,851	1,851	0.08	0.02	0.01	1,858
2026	1.73	12.4	13.0	13.7	0.02	0.58	2.77	3.34	0.53	1.34	1.87	—	2,395	2,395	0.10	0.02	0.02	2,404
2027	0.88	12.1	6.48	7.58	0.02	0.23	0.01	0.24	0.21	< 0.005	0.21	—	1,596	1,596	0.07	0.01	0.02	1,602
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	3.09	2.59	25.0	22.2	0.04	1.08	3.18	4.26	0.99	1.38	2.37	—	4,440	4,440	0.19	0.04	< 0.005	4,457
2025	1.06	0.88	8.08	9.34	0.02	0.32	< 0.005	0.32	0.29	< 0.005	0.29	—	1,851	1,851	0.08	0.02	< 0.005	1,857
2026	1.01	0.84	7.67	9.28	0.02	0.28	< 0.005	0.29	0.26	< 0.005	0.26	—	1,850	1,850	0.08	0.02	< 0.005	1,857

2027	0.88	0.73	6.48	7.58	0.02	0.23	< 0.005	0.24	0.21	< 0.005	0.21	—	1,596	1,596	0.07	0.01	< 0.005	1,602
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	0.62	0.52	4.92	4.69	0.01	0.21	0.32	0.53	0.19	0.15	0.34	—	874	874	0.04	0.01	< 0.005	878
2025	0.75	0.63	5.77	6.67	0.01	0.23	< 0.005	0.23	0.21	< 0.005	0.21	—	1,322	1,322	0.06	0.01	< 0.005	1,327
2026	0.70	1.25	5.29	5.93	0.01	0.21	0.19	0.40	0.19	0.09	0.28	—	1,160	1,160	0.05	0.01	< 0.005	1,164
2027	0.27	0.70	2.03	2.43	< 0.005	0.07	< 0.005	0.07	0.07	< 0.005	0.07	—	493	493	0.02	< 0.005	< 0.005	495
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	0.11	0.09	0.90	0.86	< 0.005	0.04	0.06	0.10	0.03	0.03	0.06	—	145	145	0.01	< 0.005	< 0.005	145
2025	0.14	0.11	1.05	1.22	< 0.005	0.04	< 0.005	0.04	0.04	< 0.005	0.04	—	219	219	0.01	< 0.005	< 0.005	220
2026	0.13	0.23	0.97	1.08	< 0.005	0.04	0.03	0.07	0.03	0.02	0.05	—	192	192	0.01	< 0.005	< 0.005	193
2027	0.05	0.13	0.37	0.44	< 0.005	0.01	< 0.005	0.01	0.01	< 0.005	0.01	—	81.7	81.7	< 0.005	< 0.005	< 0.005	82.0

2.3. Construction Emissions by Year, Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	0.45	0.44	3.52	24.1	0.04	0.08	3.18	3.27	0.08	1.38	1.47	—	4,440	4,440	0.19	0.04	0.03	4,457
2025	0.30	0.28	2.62	11.0	0.02	0.06	< 0.005	0.07	0.06	< 0.005	0.06	—	1,851	1,851	0.08	0.02	0.01	1,858
2026	0.28	12.1	2.60	13.8	0.02	0.06	2.77	2.81	0.06	1.34	1.38	—	2,395	2,395	0.10	0.02	0.02	2,404
2027	0.28	11.7	2.48	9.18	0.02	0.06	0.01	0.06	0.06	< 0.005	0.06	—	1,596	1,596	0.07	0.01	0.02	1,602
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	0.45	0.44	3.52	24.1	0.04	0.08	3.18	3.27	0.08	1.38	1.47	—	4,440	4,440	0.19	0.04	< 0.005	4,457
2025	0.30	0.28	2.62	11.0	0.02	0.06	< 0.005	0.07	0.06	< 0.005	0.06	—	1,851	1,851	0.08	0.02	< 0.005	1,857
2026	0.30	0.34	2.62	11.0	0.02	0.06	< 0.005	0.07	0.06	< 0.005	0.06	—	1,850	1,850	0.08	0.02	< 0.005	1,857

2027	0.28	0.25	2.49	9.18	0.02	0.06	< 0.005	0.06	0.06	< 0.005	0.06	—	1,596	1,596	0.07	0.01	< 0.005	1,602
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	0.11	0.10	1.02	4.91	0.01	0.02	0.32	0.35	0.02	0.15	0.17	—	874	874	0.04	0.01	< 0.005	878
2025	0.22	0.20	1.87	7.83	0.01	0.05	< 0.005	0.05	0.04	< 0.005	0.05	—	1,322	1,322	0.06	0.01	< 0.005	1,327
2026	0.18	0.83	1.65	6.74	0.01	0.04	0.19	0.23	0.04	0.09	0.13	—	1,160	1,160	0.05	0.01	< 0.005	1,164
2027	0.09	0.55	0.78	2.89	< 0.005	0.02	< 0.005	0.02	0.02	< 0.005	0.02	—	493	493	0.02	< 0.005	< 0.005	495
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	0.02	0.02	0.19	0.90	< 0.005	< 0.005	0.06	0.06	< 0.005	0.03	0.03	—	145	145	0.01	< 0.005	< 0.005	145
2025	0.04	0.04	0.34	1.43	< 0.005	0.01	< 0.005	0.01	0.01	< 0.005	0.01	—	219	219	0.01	< 0.005	< 0.005	220
2026	0.03	0.15	0.30	1.23	< 0.005	0.01	0.03	0.04	0.01	0.02	0.02	—	192	192	0.01	< 0.005	< 0.005	193
2027	0.02	0.10	0.14	0.53	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	81.7	81.7	< 0.005	< 0.005	< 0.005	82.0

3. Construction Emissions Details

3.1. Phase 1 - Demolition (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.74	1.46	13.7	12.3	0.02	0.57	—	0.57	0.52	—	0.52	—	1,906	1,906	0.08	0.02	—	1,912
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.14	0.12	1.12	1.01	< 0.005	0.05	—	0.05	0.04	—	0.04	—	157	157	0.01	< 0.005	—	157
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.02	0.20	0.18	< 0.005	0.01	—	0.01	0.01	—	0.01	—	25.9	25.9	< 0.005	< 0.005	—	26.0
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.89	1.89	< 0.005	< 0.005	< 0.005	2.00
Hauling	0.02	0.01	0.20	0.12	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	31.8	31.8	0.01	0.01	0.02	33.7
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.16	0.16	< 0.005	< 0.005	< 0.005	0.16
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.61	2.61	< 0.005	< 0.005	< 0.005	2.76

Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.03	0.03	< 0.005	< 0.005	< 0.005	0.03
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.43	0.43	< 0.005	< 0.005	< 0.005	0.46

3.2. Phase 1 - Demolition (2024) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.21	0.21	3.17	10.5	0.02	0.03	—	0.03	0.03	—	0.03	—	1,906	1,906	0.08	0.02	—	1,912
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.02	0.26	0.86	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	157	157	0.01	< 0.005	—	157
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.05	0.16	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	25.9	25.9	< 0.005	< 0.005	—	26.0

Demolitio	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.89	1.89	< 0.005	< 0.005	< 0.005	2.00
Hauling	0.02	0.01	0.20	0.12	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	31.8	31.8	0.01	0.01	0.02	33.7
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.16	0.16	< 0.005	< 0.005	< 0.005	0.16
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.61	2.61	< 0.005	< 0.005	< 0.005	2.76
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.03	0.03	< 0.005	< 0.005	< 0.005	0.03
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.43	0.43	< 0.005	< 0.005	< 0.005	0.46

3.3. Phase 2 - Demolition (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	1.41	1.18	10.7	9.91	0.02	0.43	—	0.43	0.39	—	0.39	—	1,764	1,764	0.07	0.01	—	1,771
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.08	0.06	0.58	0.54	< 0.005	0.02	—	0.02	0.02	—	0.02	—	96.7	96.7	< 0.005	< 0.005	—	97.0
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.11	0.10	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	16.0	16.0	< 0.005	< 0.005	—	16.1
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	< 0.005	0.09	0.06	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	15.4	15.4	0.01	< 0.005	0.01	16.3

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.85	0.85	< 0.005	< 0.005	< 0.005	0.89
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.14	0.14	< 0.005	< 0.005	< 0.005	0.15

3.4. Phase 2 - Demolition (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.19	0.19	2.51	9.46	0.02	0.03	—	0.03	0.03	—	0.03	—	1,764	1,764	0.07	0.01	—	1,771
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.01	0.01	0.14	0.52	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	96.7	96.7	< 0.005	< 0.005	—	97.0
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.03	0.09	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	16.0	16.0	< 0.005	< 0.005	—	16.1
Demolition	—	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	< 0.005	0.09	0.06	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	15.4	15.4	0.01	< 0.005	0.01	16.3
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.85	0.85	< 0.005	< 0.005	< 0.005	0.89
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.14	0.14	< 0.005	< 0.005	< 0.005	0.15

3.5. Phase 1 - Site Preparation (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.54	1.29	12.8	12.3	0.02	0.57	—	0.57	0.52	—	0.52	—	1,959	1,959	0.08	0.02	—	1,966
Dust From Material Movement	—	—	—	—	—	—	2.56	2.56	—	1.31	1.31	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.04	0.35	0.34	< 0.005	0.02	—	0.02	0.01	—	0.01	—	53.7	53.7	< 0.005	< 0.005	—	53.9
Dust From Material Movement	—	—	—	—	—	—	0.07	0.07	—	0.04	0.04	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.06	0.06	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	8.89	8.89	< 0.005	< 0.005	—	8.92

Dust From Material Movement	—	—	—	—	—	—	0.01	0.01	—	0.01	0.01	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	3.79	3.79	< 0.005	< 0.005	< 0.005	4.00
Hauling	0.01	< 0.005	0.08	0.05	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	13.2	13.2	0.01	< 0.005	0.01	14.0
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.10	0.10	< 0.005	< 0.005	< 0.005	0.11
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.36	0.36	< 0.005	< 0.005	< 0.005	0.38
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.02	0.02	< 0.005	< 0.005	< 0.005	0.02
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.06	0.06	< 0.005	< 0.005	< 0.005	0.06

3.6. Phase 1 - Site Preparation (2024) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.18	0.18	0.96	10.8	0.02	0.04	—	0.04	0.04	—	0.04	—	1,959	1,959	0.08	0.02	—	1,966
Dust From Material Movement	—	—	—	—	—	—	2.56	2.56	—	1.31	1.31	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.03	0.30	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	53.7	53.7	< 0.005	< 0.005	—	53.9
Dust From Material Movement	—	—	—	—	—	—	0.07	0.07	—	0.04	0.04	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	< 0.005	0.05	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	8.89	8.89	< 0.005	< 0.005	—	8.92
Dust From Material Movement	—	—	—	—	—	—	0.01	0.01	—	0.01	0.01	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	3.79	3.79	< 0.005	< 0.005	< 0.005	4.00
Hauling	0.01	< 0.005	0.08	0.05	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	13.2	13.2	0.01	< 0.005	0.01	14.0
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.10	0.10	< 0.005	< 0.005	< 0.005	0.11
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.36	0.36	< 0.005	< 0.005	< 0.005	0.38
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.02	0.02	< 0.005	< 0.005	< 0.005	0.02
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.06	0.06	< 0.005	< 0.005	< 0.005	0.06

3.7. Phase 2 - Site Preparation (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.21	1.01	9.38	8.97	0.02	0.40	—	0.40	0.37	—	0.37	—	1,669	1,669	0.07	0.01	—	1,675

Dust From Material Movement	—	—	—	—	—	—	2.56	2.56	—	1.31	1.31	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.01	0.13	0.12	< 0.005	0.01	—	0.01	0.01	—	0.01	—	22.9	22.9	< 0.005	< 0.005	—	22.9
Dust From Material Movement	—	—	—	—	—	—	0.04	0.04	—	0.02	0.02	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	3.79	3.79	< 0.005	< 0.005	—	3.80
Dust From Material Movement	—	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	3.68	3.68	< 0.005	< 0.005	< 0.005	3.88
Hauling	0.01	< 0.005	0.08	0.05	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	12.9	12.9	< 0.005	< 0.005	0.01	13.6

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.05	0.05	< 0.005	< 0.005	< 0.005	0.05
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.18	0.18	< 0.005	< 0.005	< 0.005	0.19
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.01	0.01	< 0.005	< 0.005	< 0.005	0.01
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.03	0.03	< 0.005	< 0.005	< 0.005	0.03

3.8. Phase 2 - Site Preparation (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.16	0.16	0.82	8.76	0.02	0.03	—	0.03	0.03	—	0.03	—	1,669	1,669	0.07	0.01	—	1,675
Dust From Material Movement	—	—	—	—	—	—	2.56	2.56	—	1.31	1.31	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.01	0.12	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	22.9	22.9	< 0.005	< 0.005	—	22.9
Dust From Material Movement	—	—	—	—	—	—	0.04	0.04	—	0.02	0.02	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	< 0.005	0.02	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	3.79	3.79	< 0.005	< 0.005	—	3.80
Dust From Material Movement	—	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	3.68	3.68	< 0.005	< 0.005	< 0.005	3.88
Hauling	0.01	< 0.005	0.08	0.05	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	12.9	12.9	< 0.005	< 0.005	0.01	13.6
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.05	0.05	< 0.005	< 0.005	< 0.005	0.05

Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.18	0.18	< 0.005	< 0.005	< 0.005	0.19
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.01	0.01	< 0.005	< 0.005	< 0.005	0.01
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.03	0.03	< 0.005	< 0.005	< 0.005	0.03

3.9. Phase 1 - Grading (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	3.07	2.58	24.9	22.1	0.04	1.08	—	1.08	0.99	—	0.99	—	4,413	4,413	0.18	0.04	—	4,429
Dust From Material Movement	—	—	—	—	—	—	3.18	3.18	—	1.38	1.38	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	3.07	2.58	24.9	22.1	0.04	1.08	—	1.08	0.99	—	0.99	—	4,413	4,413	0.18	0.04	—	4,429
Dust From Material Movement	—	—	—	—	—	—	3.18	3.18	—	1.38	1.38	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.24	0.21	1.98	1.76	< 0.005	0.09	—	0.09	0.08	—	0.08	—	351	351	0.01	< 0.005	—	352
Dust From Material Movement	—	—	—	—	—	—	0.25	0.25	—	0.11	0.11	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.04	0.36	0.32	< 0.005	0.02	—	0.02	0.01	—	0.01	—	58.1	58.1	< 0.005	< 0.005	—	58.3
Dust From Material Movement	—	—	—	—	—	—	0.05	0.05	—	0.02	0.02	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.03	0.02	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	5.68	5.68	< 0.005	< 0.005	0.01	5.99
Hauling	0.01	< 0.005	0.13	0.08	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	21.2	21.2	0.01	< 0.005	0.02	22.5
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.03	0.02	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	5.66	5.66	< 0.005	< 0.005	< 0.005	5.97
Hauling	0.01	< 0.005	0.13	0.08	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	21.1	21.1	0.01	< 0.005	< 0.005	22.4

Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.45	0.45	< 0.005	< 0.005	< 0.005	0.48
Hauling	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.68	1.68	< 0.005	< 0.005	< 0.005	1.78
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.07	0.07	< 0.005	< 0.005	< 0.005	0.08
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.28	0.28	< 0.005	< 0.005	< 0.005	0.29

3.10. Phase 1 - Grading (2024) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.43	0.43	3.35	24.0	0.04	0.08	—	0.08	0.08	—	0.08	—	4,413	4,413	0.18	0.04	—	4,429
Dust From Material Movement	—	—	—	—	—	—	3.18	3.18	—	1.38	1.38	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.43	0.43	3.35	24.0	0.04	0.08	—	0.08	0.08	—	0.08	—	4,413	4,413	0.18	0.04	—	4,429

Dust From Material Movement	—	—	—	—	—	—	3.18	3.18	—	1.38	1.38	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.03	0.27	1.91	< 0.005	0.01	—	0.01	0.01	—	0.01	—	351	351	0.01	< 0.005	—	352
Dust From Material Movement	—	—	—	—	—	—	0.25	0.25	—	0.11	0.11	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.05	0.35	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	58.1	58.1	< 0.005	< 0.005	—	58.3
Dust From Material Movement	—	—	—	—	—	—	0.05	0.05	—	0.02	0.02	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.03	0.02	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	5.68	5.68	< 0.005	< 0.005	0.01	5.99
Hauling	0.01	< 0.005	0.13	0.08	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	21.2	21.2	0.01	< 0.005	0.02	22.5
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.03	0.02	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	5.66	5.66	< 0.005	< 0.005	< 0.005	5.97
Hauling	0.01	< 0.005	0.13	0.08	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	21.1	21.1	0.01	< 0.005	< 0.005	22.4
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.45	0.45	< 0.005	< 0.005	< 0.005	0.48
Hauling	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.68	1.68	< 0.005	< 0.005	< 0.005	1.78
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.07	0.07	< 0.005	< 0.005	< 0.005	0.08
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.28	0.28	< 0.005	< 0.005	< 0.005	0.29

3.11. Phase 2 - Grading (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.72	1.44	12.9	13.6	0.02	0.58	—	0.58	0.53	—	0.53	—	2,379	2,379	0.10	0.02	—	2,387
Dust From Material Movement	—	—	—	—	—	—	2.76	2.76	—	1.34	1.34	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.09	0.08	0.71	0.75	< 0.005	0.03	—	0.03	0.03	—	0.03	—	130	130	0.01	< 0.005	—	131
Dust From Material Movement	—	—	—	—	—	—	0.15	0.15	—	0.07	0.07	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.01	0.13	0.14	< 0.005	0.01	—	0.01	0.01	—	0.01	—	21.6	21.6	< 0.005	< 0.005	—	21.7
Dust From Material Movement	—	—	—	—	—	—	0.03	0.03	—	0.01	0.01	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.03	0.02	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	5.52	5.52	< 0.005	< 0.005	0.01	5.82
Hauling	0.01	< 0.005	0.06	0.04	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	10.3	10.3	< 0.005	< 0.005	0.01	10.9
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.30	0.30	< 0.005	< 0.005	< 0.005	0.32

Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.56	0.56	< 0.005	< 0.005	< 0.005	0.60
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.05	0.05	< 0.005	< 0.005	< 0.005	0.05
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.09	0.09	< 0.005	< 0.005	< 0.005	0.10

3.12. Phase 2 - Grading (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.23	0.23	1.76	13.7	0.02	0.04	—	0.04	0.04	—	0.04	—	2,379	2,379	0.10	0.02	—	2,387
Dust From Material Movement	—	—	—	—	—	—	2.76	2.76	—	1.34	1.34	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.10	0.75	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	130	130	0.01	< 0.005	—	131
Dust From Material Movement	—	—	—	—	—	—	0.15	0.15	—	0.07	0.07	—	—	—	—	—	—	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.02	0.14	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	21.6	21.6	< 0.005	< 0.005	—	21.7
Dust From Material Movement	—	—	—	—	—	—	0.03	0.03	—	0.01	0.01	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.03	0.02	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	5.52	5.52	< 0.005	< 0.005	0.01	5.82
Hauling	0.01	< 0.005	0.06	0.04	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	10.3	10.3	< 0.005	< 0.005	0.01	10.9
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.30	0.30	< 0.005	< 0.005	< 0.005	0.32
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.56	0.56	< 0.005	< 0.005	< 0.005	0.60
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.05	0.05	< 0.005	< 0.005	< 0.005	0.05
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.09	0.09	< 0.005	< 0.005	< 0.005	0.10

3.13. Phase 1 - Building Construction (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.11	0.93	8.58	9.35	0.02	0.36	—	0.36	0.33	—	0.33	—	1,839	1,839	0.07	0.01	—	1,845
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.19	0.15	1.43	1.55	< 0.005	0.06	—	0.06	0.06	—	0.06	—	306	306	0.01	< 0.005	—	307
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.03	0.26	0.28	< 0.005	0.01	—	0.01	0.01	—	0.01	—	50.6	50.6	< 0.005	< 0.005	—	50.8
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.06	0.04	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.44	9.44	< 0.005	< 0.005	< 0.005	9.95
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.64	2.64	< 0.005	< 0.005	< 0.005	2.79
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.57	1.57	< 0.005	< 0.005	< 0.005	1.66
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.44	0.44	< 0.005	< 0.005	< 0.005	0.47
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.26	0.26	< 0.005	< 0.005	< 0.005	0.27
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.07	0.07	< 0.005	< 0.005	< 0.005	0.08

3.14. Phase 1 - Building Construction (2024) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.30	0.28	2.55	10.9	0.02	0.07	—	0.07	0.06	—	0.06	—	1,839	1,839	0.07	0.01	—	1,845
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.05	0.05	0.42	1.82	< 0.005	0.01	—	0.01	0.01	—	0.01	—	306	306	0.01	< 0.005	—	307
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.08	0.33	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	50.6	50.6	< 0.005	< 0.005	—	50.8
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.06	0.04	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.44	9.44	< 0.005	< 0.005	< 0.005	9.95
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.64	2.64	< 0.005	< 0.005	< 0.005	2.79
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.57	1.57	< 0.005	< 0.005	< 0.005	1.66
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.44	0.44	< 0.005	< 0.005	< 0.005	0.47
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.26	0.26	< 0.005	< 0.005	< 0.005	0.27
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.07	0.07	< 0.005	< 0.005	< 0.005	0.08

3.15. Phase 1 - Building Construction (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.05	0.88	8.00	9.29	0.02	0.32	—	0.32	0.29	—	0.29	—	1,839	1,839	0.07	0.01	—	1,845
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.05	0.88	8.00	9.29	0.02	0.32	—	0.32	0.29	—	0.29	—	1,839	1,839	0.07	0.01	—	1,845
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.75	0.63	5.72	6.63	0.01	0.23	—	0.23	0.21	—	0.21	—	1,313	1,313	0.05	0.01	—	1,318
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.14	0.11	1.04	1.21	< 0.005	0.04	—	0.04	0.04	—	0.04	—	217	217	0.01	< 0.005	—	218
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Vendor	< 0.005	< 0.005	0.05	0.04	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.33	9.33	< 0.005	< 0.005	0.01	9.84
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.61	2.61	< 0.005	< 0.005	< 0.005	2.77
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.06	0.04	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.32	9.32	< 0.005	< 0.005	< 0.005	9.82
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.60	2.60	< 0.005	< 0.005	< 0.005	2.75
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.04	0.03	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	6.66	6.66	< 0.005	< 0.005	< 0.005	7.02
Hauling	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.86	1.86	< 0.005	< 0.005	< 0.005	1.97
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.10	1.10	< 0.005	< 0.005	< 0.005	1.16
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.31	0.31	< 0.005	< 0.005	< 0.005	0.33

3.16. Phase 1 - Building Construction (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.30	0.28	2.55	10.9	0.02	0.06	—	0.06	0.06	—	0.06	—	1,839	1,839	0.07	0.01	—	1,845
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.30	0.28	2.55	10.9	0.02	0.06	—	0.06	0.06	—	0.06	—	1,839	1,839	0.07	0.01	—	1,845
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.21	0.20	1.82	7.79	0.01	0.05	—	0.05	0.04	—	0.04	—	1,313	1,313	0.05	0.01	—	1,318
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.04	0.33	1.42	< 0.005	0.01	—	0.01	0.01	—	0.01	—	217	217	0.01	< 0.005	—	218
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.05	0.04	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.33	9.33	< 0.005	< 0.005	0.01	9.84
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.61	2.61	< 0.005	< 0.005	< 0.005	2.77
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.06	0.04	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.32	9.32	< 0.005	< 0.005	< 0.005	9.82
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.60	2.60	< 0.005	< 0.005	< 0.005	2.75
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.04	0.03	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	6.66	6.66	< 0.005	< 0.005	< 0.005	7.02
Hauling	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.86	1.86	< 0.005	< 0.005	< 0.005	1.97
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.10	1.10	< 0.005	< 0.005	< 0.005	1.16
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.31	0.31	< 0.005	< 0.005	< 0.005	0.33

3.17. Phase 1 - Building Construction (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.01	0.84	7.60	9.23	0.02	0.28	—	0.28	0.26	—	0.26	—	1,838	1,838	0.07	0.01	—	1,845
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.16	0.13	1.22	1.48	< 0.005	0.05	—	0.05	0.04	—	0.04	—	295	295	0.01	< 0.005	—	296
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.02	0.22	0.27	< 0.005	0.01	—	0.01	0.01	—	0.01	—	48.8	48.8	< 0.005	< 0.005	—	49.0

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.05	0.04	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.20	9.20	< 0.005	< 0.005	< 0.005	9.70
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.57	2.57	< 0.005	< 0.005	< 0.005	2.72
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.48	1.48	< 0.005	< 0.005	< 0.005	1.56
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.41	0.41	< 0.005	< 0.005	< 0.005	0.44
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.24	0.24	< 0.005	< 0.005	< 0.005	0.26
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.07	0.07	< 0.005	< 0.005	< 0.005	0.07

3.18. Phase 1 - Building Construction (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.30	0.28	2.55	10.9	0.02	0.06	—	0.06	0.06	—	0.06	—	1,838	1,838	0.07	0.01	—	1,845
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.04	0.41	1.75	< 0.005	0.01	—	0.01	0.01	—	0.01	—	295	295	0.01	< 0.005	—	296
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.07	0.32	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	48.8	48.8	< 0.005	< 0.005	—	49.0
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.05	0.04	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.20	9.20	< 0.005	< 0.005	< 0.005	9.70
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.57	2.57	< 0.005	< 0.005	< 0.005	2.72
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.48	1.48	< 0.005	< 0.005	< 0.005	1.56
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.41	0.41	< 0.005	< 0.005	< 0.005	0.44

Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.24	0.24	< 0.005	< 0.005	< 0.005	0.26
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.07	0.07	< 0.005	< 0.005	< 0.005	0.07

3.19. Phase 2 - Building Construction (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.90	0.75	6.69	7.56	0.02	0.25	—	0.25	0.23	—	0.23	—	1,584	1,584	0.06	0.01	—	1,590
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.90	0.75	6.69	7.56	0.02	0.25	—	0.25	0.23	—	0.23	—	1,584	1,584	0.06	0.01	—	1,590
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.31	0.26	2.33	2.63	0.01	0.09	—	0.09	0.08	—	0.08	—	552	552	0.02	< 0.005	—	554
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.05	0.43	0.48	< 0.005	0.02	—	0.02	0.01	—	0.01	—	91.4	91.4	< 0.005	< 0.005	—	91.7

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.05	0.04	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.20	9.20	< 0.005	< 0.005	0.01	9.71
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.57	2.57	< 0.005	< 0.005	< 0.005	2.72
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.05	0.04	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.20	9.20	< 0.005	< 0.005	< 0.005	9.70
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.57	2.57	< 0.005	< 0.005	< 0.005	2.72
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	3.20	3.20	< 0.005	< 0.005	< 0.005	3.38
Hauling	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.90	0.90	< 0.005	< 0.005	< 0.005	0.95
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.53	0.53	< 0.005	< 0.005	< 0.005	0.56
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.15	0.15	< 0.005	< 0.005	< 0.005	0.16

3.20. Phase 2 - Building Construction (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.27	0.25	2.42	9.13	0.02	0.06	—	0.06	0.06	—	0.06	—	1,584	1,584	0.06	0.01	—	1,590
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.27	0.25	2.42	9.13	0.02	0.06	—	0.06	0.06	—	0.06	—	1,584	1,584	0.06	0.01	—	1,590
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.09	0.09	0.84	3.18	0.01	0.02	—	0.02	0.02	—	0.02	—	552	552	0.02	< 0.005	—	554
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.02	0.15	0.58	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	91.4	91.4	< 0.005	< 0.005	—	91.7
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.05	0.04	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.20	9.20	< 0.005	< 0.005	0.01	9.71
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.57	2.57	< 0.005	< 0.005	< 0.005	2.72

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.05	0.04	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.20	9.20	< 0.005	< 0.005	< 0.005	9.70
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.57	2.57	< 0.005	< 0.005	< 0.005	2.72
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	3.20	3.20	< 0.005	< 0.005	< 0.005	3.38
Hauling	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.90	0.90	< 0.005	< 0.005	< 0.005	0.95
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.53	0.53	< 0.005	< 0.005	< 0.005	0.56
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.15	0.15	< 0.005	< 0.005	< 0.005	0.16

3.21. Phase 2 - Building Construction (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.87	0.73	6.41	7.53	0.02	0.23	—	0.23	0.21	—	0.21	—	1,584	1,584	0.06	0.01	—	1,590
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.87	0.73	6.41	7.53	0.02	0.23	—	0.23	0.21	—	0.21	—	1,584	1,584	0.06	0.01	—	1,590
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.25	0.21	1.81	2.12	< 0.005	0.07	—	0.07	0.06	—	0.06	—	446	446	0.02	< 0.005	—	448
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.04	0.33	0.39	< 0.005	0.01	—	0.01	0.01	—	0.01	—	73.9	73.9	< 0.005	< 0.005	—	74.2
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.05	0.04	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.06	9.06	< 0.005	< 0.005	0.01	9.55
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.54	2.54	< 0.005	< 0.005	< 0.005	2.68
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.05	0.04	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.06	9.06	< 0.005	< 0.005	< 0.005	9.55
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.53	2.53	< 0.005	< 0.005	< 0.005	2.68
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.55	2.55	< 0.005	< 0.005	< 0.005	2.69

Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.71	0.71	< 0.005	< 0.005	< 0.005	0.76
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.42	0.42	< 0.005	< 0.005	< 0.005	0.45
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.12	0.12	< 0.005	< 0.005	< 0.005	0.13

3.22. Phase 2 - Building Construction (2027) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.27	0.25	2.42	9.13	0.02	0.06	—	0.06	0.06	—	0.06	—	1,584	1,584	0.06	0.01	—	1,590
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.27	0.25	2.42	9.13	0.02	0.06	—	0.06	0.06	—	0.06	—	1,584	1,584	0.06	0.01	—	1,590
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.08	0.07	0.68	2.57	< 0.005	0.02	—	0.02	0.02	—	0.02	—	446	446	0.02	< 0.005	—	448
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.01	0.01	0.12	0.47	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	73.9	73.9	< 0.005	< 0.005	—	74.2
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.05	0.04	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.06	9.06	< 0.005	< 0.005	0.01	9.55
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.54	2.54	< 0.005	< 0.005	< 0.005	2.68
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.05	0.04	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.06	9.06	< 0.005	< 0.005	< 0.005	9.55
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.53	2.53	< 0.005	< 0.005	< 0.005	2.68
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.55	2.55	< 0.005	< 0.005	< 0.005	2.69
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.71	0.71	< 0.005	< 0.005	< 0.005	0.76
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.42	0.42	< 0.005	< 0.005	< 0.005	0.45
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.12	0.12	< 0.005	< 0.005	< 0.005	0.13

3.23. Phase 1 - Paving (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.34	0.29	2.67	3.73	0.01	0.12	—	0.12	0.11	—	0.11	—	566	566	0.02	< 0.005	—	568
Paving	—	0.28	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.34	0.29	2.67	3.73	0.01	0.12	—	0.12	0.11	—	0.11	—	566	566	0.02	< 0.005	—	568
Paving	—	0.28	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.02	0.22	0.31	< 0.005	0.01	—	0.01	0.01	—	0.01	—	46.6	46.6	< 0.005	< 0.005	—	46.7
Paving	—	0.02	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	< 0.005	0.04	0.06	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	7.71	7.71	< 0.005	< 0.005	—	7.73
Paving	—	< 0.005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.05	0.04	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.20	9.20	< 0.005	< 0.005	0.01	9.71
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.57	2.57	< 0.005	< 0.005	< 0.005	2.72
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.05	0.04	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.20	9.20	< 0.005	< 0.005	< 0.005	9.70
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.57	2.57	< 0.005	< 0.005	< 0.005	2.72
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.76	0.76	< 0.005	< 0.005	< 0.005	0.80
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.21	0.21	< 0.005	< 0.005	< 0.005	0.22
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.13	0.13	< 0.005	< 0.005	< 0.005	0.13
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.04	0.04	< 0.005	< 0.005	< 0.005	0.04

3.24. Phase 1 - Paving (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.06	0.06	0.72	3.98	0.01	0.01	—	0.01	0.01	—	0.01	—	566	566	0.02	< 0.005	—	568
Paving	—	0.28	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.06	0.72	3.98	0.01	0.01	—	0.01	0.01	—	0.01	—	566	566	0.02	< 0.005	—	568
Paving	—	0.28	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.06	0.33	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	46.6	46.6	< 0.005	< 0.005	—	46.7
Paving	—	0.02	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.01	0.06	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	7.71	7.71	< 0.005	< 0.005	—	7.73
Paving	—	< 0.005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.05	0.04	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.20	9.20	< 0.005	< 0.005	0.01	9.71

Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.57	2.57	< 0.005	< 0.005	< 0.005	2.72
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.05	0.04	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.20	9.20	< 0.005	< 0.005	< 0.005	9.70
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.57	2.57	< 0.005	< 0.005	< 0.005	2.72
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.76	0.76	< 0.005	< 0.005	< 0.005	0.80
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.21	0.21	< 0.005	< 0.005	< 0.005	0.22
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.13	0.13	< 0.005	< 0.005	< 0.005	0.13
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.04	0.04	< 0.005	< 0.005	< 0.005	0.04

3.25. Phase 2 - Paving (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.51	0.42	4.03	5.92	0.01	0.16	—	0.16	0.15	—	0.15	—	906	906	0.04	0.01	—	909
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.02	0.17	0.24	< 0.005	0.01	—	0.01	0.01	—	0.01	—	37.2	37.2	< 0.005	< 0.005	—	37.3
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.03	0.04	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	6.16	6.16	< 0.005	< 0.005	—	6.18
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.05	0.04	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.06	9.06	< 0.005	< 0.005	0.01	9.55
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.54	2.54	< 0.005	< 0.005	< 0.005	2.68
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.37	0.37	< 0.005	< 0.005	< 0.005	0.39
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.10	0.10	< 0.005	< 0.005	< 0.005	0.11
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.06	0.06	< 0.005	< 0.005	< 0.005	0.07

Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.02	0.02	< 0.005	< 0.005	< 0.005	0.02

3.26. Phase 2 - Paving (2027) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.14	0.13	1.18	6.29	0.01	0.03	—	0.03	0.03	—	0.03	—	906	906	0.04	0.01	—	909
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.05	0.26	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	37.2	37.2	< 0.005	< 0.005	—	37.3
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.01	0.05	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	6.16	6.16	< 0.005	< 0.005	—	6.18
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Vendor	< 0.005	< 0.005	0.05	0.04	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.06	9.06	< 0.005	< 0.005	0.01	9.55
Hauling	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.54	2.54	< 0.005	< 0.005	< 0.005	2.68
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.37	0.37	< 0.005	< 0.005	< 0.005	0.39
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.10	0.10	< 0.005	< 0.005	< 0.005	0.11
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.06	0.06	< 0.005	< 0.005	< 0.005	0.07
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.02	0.02	< 0.005	< 0.005	< 0.005	0.02

3.27. Phase 1 - Architectural Coating (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.15	0.12	0.86	1.13	< 0.005	0.02	—	0.02	0.02	—	0.02	—	134	134	0.01	< 0.005	—	134
Architectural Coatings	—	11.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.05	0.06	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	7.32	7.32	< 0.005	< 0.005	—	7.34
Architectural Coatings	—	0.64	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	1.21	1.21	< 0.005	< 0.005	—	1.22
Architectural Coatings	—	0.12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.05	0.04	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.20	9.20	< 0.005	< 0.005	0.01	9.71
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.50	0.50	< 0.005	< 0.005	< 0.005	0.53
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.08	0.08	< 0.005	< 0.005	< 0.005	0.09
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.28. Phase 1 - Architectural Coating (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.02	0.65	0.96	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	134	134	0.01	< 0.005	—	134
Architectural Coatings	—	11.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.04	0.05	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	7.32	7.32	< 0.005	< 0.005	—	7.34
Architectural Coatings	—	0.64	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	1.21	1.21	< 0.005	< 0.005	—	1.22
Architectural Coatings	—	0.12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.05	0.04	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.20	9.20	< 0.005	< 0.005	0.01	9.71
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.50	0.50	< 0.005	< 0.005	< 0.005	0.53
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.08	0.08	< 0.005	< 0.005	< 0.005	0.09
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.29. Phase 2 - Architectural Coating (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.14	0.11	0.83	1.13	< 0.005	0.02	—	0.02	0.02	—	0.02	—	134	134	0.01	< 0.005	—	134
Architectural Coatings	—	11.6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	< 0.005	0.03	0.05	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	5.49	5.49	< 0.005	< 0.005	—	5.51
Architectural Coatings	—	0.47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.91	0.91	< 0.005	< 0.005	—	0.91
Architectural Coatings	—	0.09	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.05	0.04	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.06	9.06	< 0.005	< 0.005	0.01	9.55
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.37	0.37	< 0.005	< 0.005	< 0.005	0.39
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.06	0.06	< 0.005	< 0.005	< 0.005	0.07
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.30. Phase 2 - Architectural Coating (2027) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.02	0.65	0.96	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	134	134	0.01	< 0.005	—	134
Architectural Coatings	—	11.6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.03	0.04	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	5.49	5.49	< 0.005	< 0.005	—	5.51
Architectural Coatings	—	0.47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	< 0.005	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.91	0.91	< 0.005	< 0.005	—	0.91
Architectural Coatings	—	0.09	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	0.05	0.04	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.06	9.06	< 0.005	< 0.005	0.01	9.55
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.37	0.37	< 0.005	< 0.005	< 0.005	0.39
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.06	0.06	< 0.005	< 0.005	< 0.005	0.07
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

4. Operations Emissions Details

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.4. Soil Carbon Accumulation By Vegetation Type - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.5. Above and Belowground Carbon Accumulation by Land Use Type - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.6. Avoided and Sequestered Emissions by Species - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Remove	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Phase 1 - Demolition	Demolition	7/1/2024	8/11/2024	5.00	30.0	—
Phase 2 - Demolition	Demolition	5/5/2026	6/1/2026	5.00	20.0	—
Phase 1 - Site Preparation	Site Preparation	8/13/2024	8/26/2024	5.00	10.0	—
Phase 2 - Site Preparation	Site Preparation	6/2/2026	6/8/2026	5.00	5.00	—
Phase 1 - Grading	Grading	8/27/2024	10/6/2024	5.00	29.0	—
Phase 2 - Grading	Grading	6/9/2026	7/6/2026	5.00	20.0	—
Phase 1 - Building Construction	Building Construction	10/8/2024	3/23/2026	5.00	380	—
Phase 2 - Building Construction	Building Construction	7/7/2026	5/24/2027	5.00	230	—
Phase 1 - Paving	Paving	3/24/2026	5/4/2026	5.00	30.0	—
Phase 2 - Paving	Paving	5/25/2027	6/14/2027	5.00	15.0	—
Phase 1 - Architectural Coating	Architectural Coating	4/7/2026	5/4/2026	5.00	20.0	—
Phase 2 - Architectural Coating	Architectural Coating	5/25/2027	6/14/2027	5.00	15.0	—

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Phase 1 - Demolition	Concrete/Industrial Saws	Diesel	Average	1.00	8.00	33.0	0.73
Phase 1 - Demolition	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Phase 1 - Demolition	Excavators	Diesel	Average	2.00	8.00	36.0	0.38
Phase 2 - Demolition	Concrete/Industrial Saws	Diesel	Average	1.00	8.00	33.0	0.73
Phase 2 - Demolition	Excavators	Diesel	Average	1.00	8.00	36.0	0.38

Phase 2 - Demolition	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Phase 1 - Site Preparation	Tractors/Loaders/Backhoes	Diesel	Average	2.00	8.00	84.0	0.37
Phase 1 - Site Preparation	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Phase 2 - Site Preparation	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Phase 2 - Site Preparation	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
Phase 1 - Grading	Graders	Diesel	Average	1.00	8.00	148	0.41
Phase 1 - Grading	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Phase 1 - Grading	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
Phase 1 - Grading	Excavators	Diesel	Average	2.00	8.00	36.0	0.38
Phase 1 - Grading	Scrapers	Diesel	Average	1.00	8.00	423	0.48
Phase 2 - Grading	Excavators	Diesel	Average	1.00	8.00	36.0	0.38
Phase 2 - Grading	Graders	Diesel	Average	1.00	8.00	148	0.41
Phase 2 - Grading	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Phase 2 - Grading	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
Phase 1 - Building Construction	Cranes	Diesel	Average	1.00	7.00	367	0.29
Phase 1 - Building Construction	Forklifts	Diesel	Average	1.00	8.00	82.0	0.20
Phase 1 - Building Construction	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
Phase 1 - Building Construction	Tractors/Loaders/Backhoes	Diesel	Average	2.00	7.00	84.0	0.37
Phase 1 - Building Construction	Welders	Diesel	Average	1.00	8.00	46.0	0.45
Phase 2 - Building Construction	Cranes	Diesel	Average	1.00	7.00	367	0.29

Phase 2 - Building Construction	Forklifts	Diesel	Average	1.00	8.00	82.0	0.20
Phase 2 - Building Construction	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
Phase 2 - Building Construction	Tractors/Loaders/Backhoes	Diesel	Average	1.00	7.00	84.0	0.37
Phase 2 - Building Construction	Welders	Diesel	Average	1.00	8.00	46.0	0.45
Phase 1 - Paving	Pavers	Diesel	Average	1.00	6.00	81.0	0.42
Phase 1 - Paving	Paving Equipment	Diesel	Average	1.00	6.00	89.0	0.36
Phase 1 - Paving	Rollers	Diesel	Average	1.00	6.00	36.0	0.38
Phase 2 - Paving	Pavers	Diesel	Average	1.00	8.00	81.0	0.42
Phase 2 - Paving	Paving Equipment	Diesel	Average	1.00	6.00	89.0	0.36
Phase 2 - Paving	Rollers	Diesel	Average	1.00	6.00	36.0	0.38
Phase 2 - Paving	Cement and Mortar Mixers	Diesel	Average	1.00	6.00	10.0	0.56
Phase 2 - Paving	Tractors/Loaders/Backhoes	Diesel	Average	1.00	6.00	84.0	0.37
Phase 1 - Architectural Coating	Air Compressors	Diesel	Average	1.00	6.00	37.0	0.48
Phase 2 - Architectural Coating	Air Compressors	Diesel	Average	1.00	6.00	37.0	0.48

5.2.2. Mitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Phase 1 - Demolition	Concrete/Industrial Saws	Diesel	Tier 4 Final	1.00	8.00	33.0	0.73
Phase 1 - Demolition	Rubber Tired Dozers	Diesel	Tier 4 Final	1.00	8.00	367	0.40
Phase 1 - Demolition	Excavators	Diesel	Tier 4 Final	2.00	8.00	36.0	0.38
Phase 2 - Demolition	Concrete/Industrial Saws	Diesel	Tier 4 Final	1.00	8.00	33.0	0.73

Phase 2 - Demolition	Excavators	Diesel	Tier 4 Final	1.00	8.00	36.0	0.38
Phase 2 - Demolition	Rubber Tired Dozers	Diesel	Tier 4 Final	1.00	8.00	367	0.40
Phase 1 - Site Preparation	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	2.00	8.00	84.0	0.37
Phase 1 - Site Preparation	Rubber Tired Dozers	Diesel	Tier 4 Final	1.00	8.00	367	0.40
Phase 2 - Site Preparation	Rubber Tired Dozers	Diesel	Tier 4 Final	1.00	8.00	367	0.40
Phase 2 - Site Preparation	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	8.00	84.0	0.37
Phase 1 - Grading	Graders	Diesel	Tier 4 Final	1.00	8.00	148	0.41
Phase 1 - Grading	Rubber Tired Dozers	Diesel	Tier 4 Final	1.00	8.00	367	0.40
Phase 1 - Grading	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	8.00	84.0	0.37
Phase 1 - Grading	Excavators	Diesel	Tier 4 Final	2.00	8.00	36.0	0.38
Phase 1 - Grading	Scrapers	Diesel	Tier 4 Final	1.00	8.00	423	0.48
Phase 2 - Grading	Excavators	Diesel	Tier 4 Final	1.00	8.00	36.0	0.38
Phase 2 - Grading	Graders	Diesel	Tier 4 Final	1.00	8.00	148	0.41
Phase 2 - Grading	Rubber Tired Dozers	Diesel	Tier 4 Final	1.00	8.00	367	0.40
Phase 2 - Grading	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	8.00	84.0	0.37
Phase 1 - Building Construction	Cranes	Diesel	Tier 4 Final	1.00	7.00	367	0.29
Phase 1 - Building Construction	Forklifts	Diesel	Tier 4 Final	1.00	8.00	82.0	0.20
Phase 1 - Building Construction	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
Phase 1 - Building Construction	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	2.00	7.00	84.0	0.37
Phase 1 - Building Construction	Welders	Diesel	Tier 4 Final	1.00	8.00	46.0	0.45

Phase 2 - Building Construction	Cranes	Diesel	Tier 4 Final	1.00	7.00	367	0.29
Phase 2 - Building Construction	Forklifts	Diesel	Tier 4 Final	1.00	8.00	82.0	0.20
Phase 2 - Building Construction	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
Phase 2 - Building Construction	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	7.00	84.0	0.37
Phase 2 - Building Construction	Welders	Diesel	Tier 4 Final	1.00	8.00	46.0	0.45
Phase 1 - Paving	Pavers	Diesel	Tier 4 Final	1.00	6.00	81.0	0.42
Phase 1 - Paving	Paving Equipment	Diesel	Tier 4 Final	1.00	6.00	89.0	0.36
Phase 1 - Paving	Rollers	Diesel	Tier 4 Final	1.00	6.00	36.0	0.38
Phase 2 - Paving	Pavers	Diesel	Tier 4 Final	1.00	8.00	81.0	0.42
Phase 2 - Paving	Paving Equipment	Diesel	Tier 4 Final	1.00	6.00	89.0	0.36
Phase 2 - Paving	Rollers	Diesel	Tier 4 Final	1.00	6.00	36.0	0.38
Phase 2 - Paving	Cement and Mortar Mixers	Diesel	Average	1.00	6.00	10.0	0.56
Phase 2 - Paving	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	6.00	84.0	0.37
Phase 1 - Architectural Coating	Air Compressors	Diesel	Tier 4 Final	1.00	6.00	37.0	0.48
Phase 2 - Architectural Coating	Air Compressors	Diesel	Tier 4 Final	1.00	6.00	37.0	0.48

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Phase 1 - Demolition	—	—	—	—
Phase 1 - Demolition	Worker	0.00	11.7	LDA,LDT1,LDT2

Phase 1 - Demolition	Vendor	1.00	0.25	HHDT,MHDT
Phase 1 - Demolition	Hauling	12.0	0.25	HHDT
Phase 1 - Demolition	Onsite truck	0.00	0.00	HHDT
Phase 1 - Site Preparation	—	—	—	—
Phase 1 - Site Preparation	Worker	0.00	11.7	LDA,LDT1,LDT2
Phase 1 - Site Preparation	Vendor	2.00	0.25	HHDT,MHDT
Phase 1 - Site Preparation	Hauling	5.00	0.25	HHDT
Phase 1 - Site Preparation	Onsite truck	0.00	0.00	HHDT
Phase 1 - Grading	—	—	—	—
Phase 1 - Grading	Worker	0.00	11.7	LDA,LDT1,LDT2
Phase 1 - Grading	Vendor	3.00	0.25	HHDT,MHDT
Phase 1 - Grading	Hauling	8.00	0.25	HHDT
Phase 1 - Grading	Onsite truck	0.00	0.00	HHDT
Phase 1 - Building Construction	—	—	—	—
Phase 1 - Building Construction	Worker	0.00	11.7	LDA,LDT1,LDT2
Phase 1 - Building Construction	Vendor	5.00	0.25	HHDT,MHDT
Phase 1 - Building Construction	Hauling	1.00	0.25	HHDT
Phase 1 - Building Construction	Onsite truck	0.00	0.00	HHDT
Phase 1 - Paving	—	—	—	—
Phase 1 - Paving	Worker	0.00	11.7	LDA,LDT1,LDT2
Phase 1 - Paving	Vendor	5.00	0.25	HHDT,MHDT
Phase 1 - Paving	Hauling	1.00	0.25	HHDT
Phase 1 - Paving	Onsite truck	0.00	0.00	HHDT
Phase 1 - Architectural Coating	—	—	—	—
Phase 1 - Architectural Coating	Worker	0.00	11.7	LDA,LDT1,LDT2
Phase 1 - Architectural Coating	Vendor	5.00	0.25	HHDT,MHDT
Phase 1 - Architectural Coating	Hauling	0.00	0.25	HHDT

Phase 1 - Architectural Coating	Onsite truck	0.00	0.00	HHDT
Phase 2 - Demolition	—	—	—	—
Phase 2 - Demolition	Worker	0.00	11.7	LDA,LDT1,LDT2
Phase 2 - Demolition	Vendor	0.00	0.25	HHDT,MHDT
Phase 2 - Demolition	Hauling	6.00	0.25	HHDT
Phase 2 - Demolition	Onsite truck	0.00	0.00	HHDT
Phase 2 - Site Preparation	—	—	—	—
Phase 2 - Site Preparation	Worker	0.00	11.7	LDA,LDT1,LDT2
Phase 2 - Site Preparation	Vendor	2.00	0.25	HHDT,MHDT
Phase 2 - Site Preparation	Hauling	5.00	0.25	HHDT
Phase 2 - Site Preparation	Onsite truck	0.00	0.00	HHDT
Phase 2 - Grading	—	—	—	—
Phase 2 - Grading	Worker	0.00	11.7	LDA,LDT1,LDT2
Phase 2 - Grading	Vendor	3.00	0.25	HHDT,MHDT
Phase 2 - Grading	Hauling	4.00	0.25	HHDT
Phase 2 - Grading	Onsite truck	0.00	0.00	HHDT
Phase 2 - Building Construction	—	—	—	—
Phase 2 - Building Construction	Worker	0.00	11.7	LDA,LDT1,LDT2
Phase 2 - Building Construction	Vendor	5.00	0.25	HHDT,MHDT
Phase 2 - Building Construction	Hauling	1.00	0.25	HHDT
Phase 2 - Building Construction	Onsite truck	0.00	0.00	HHDT
Phase 2 - Paving	—	—	—	—
Phase 2 - Paving	Worker	0.00	11.7	LDA,LDT1,LDT2
Phase 2 - Paving	Vendor	5.00	0.25	HHDT,MHDT
Phase 2 - Paving	Hauling	1.00	0.25	HHDT
Phase 2 - Paving	Onsite truck	0.00	0.00	HHDT
Phase 2 - Architectural Coating	—	—	—	—

Phase 2 - Architectural Coating	Worker	0.00	11.7	LDA,LDT1,LDT2
Phase 2 - Architectural Coating	Vendor	5.00	0.25	HHDT,MHDT
Phase 2 - Architectural Coating	Hauling	0.00	0.25	HHDT
Phase 2 - Architectural Coating	Onsite truck	0.00	0.00	HHDT

5.3.2. Mitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Phase 1 - Demolition	—	—	—	—
Phase 1 - Demolition	Worker	0.00	11.7	LDA,LDT1,LDT2
Phase 1 - Demolition	Vendor	1.00	0.25	HHDT,MHDT
Phase 1 - Demolition	Hauling	12.0	0.25	HHDT
Phase 1 - Demolition	Onsite truck	0.00	0.00	HHDT
Phase 1 - Site Preparation	—	—	—	—
Phase 1 - Site Preparation	Worker	0.00	11.7	LDA,LDT1,LDT2
Phase 1 - Site Preparation	Vendor	2.00	0.25	HHDT,MHDT
Phase 1 - Site Preparation	Hauling	5.00	0.25	HHDT
Phase 1 - Site Preparation	Onsite truck	0.00	0.00	HHDT
Phase 1 - Grading	—	—	—	—
Phase 1 - Grading	Worker	0.00	11.7	LDA,LDT1,LDT2
Phase 1 - Grading	Vendor	3.00	0.25	HHDT,MHDT
Phase 1 - Grading	Hauling	8.00	0.25	HHDT
Phase 1 - Grading	Onsite truck	0.00	0.00	HHDT
Phase 1 - Building Construction	—	—	—	—
Phase 1 - Building Construction	Worker	0.00	11.7	LDA,LDT1,LDT2
Phase 1 - Building Construction	Vendor	5.00	0.25	HHDT,MHDT
Phase 1 - Building Construction	Hauling	1.00	0.25	HHDT
Phase 1 - Building Construction	Onsite truck	0.00	0.00	HHDT

Phase 1 - Paving	—	—	—	—
Phase 1 - Paving	Worker	0.00	11.7	LDA,LDT1,LDT2
Phase 1 - Paving	Vendor	5.00	0.25	HHDT,MHDT
Phase 1 - Paving	Hauling	1.00	0.25	HHDT
Phase 1 - Paving	Onsite truck	0.00	0.00	HHDT
Phase 1 - Architectural Coating	—	—	—	—
Phase 1 - Architectural Coating	Worker	0.00	11.7	LDA,LDT1,LDT2
Phase 1 - Architectural Coating	Vendor	5.00	0.25	HHDT,MHDT
Phase 1 - Architectural Coating	Hauling	0.00	0.25	HHDT
Phase 1 - Architectural Coating	Onsite truck	0.00	0.00	HHDT
Phase 2 - Demolition	—	—	—	—
Phase 2 - Demolition	Worker	0.00	11.7	LDA,LDT1,LDT2
Phase 2 - Demolition	Vendor	0.00	0.25	HHDT,MHDT
Phase 2 - Demolition	Hauling	6.00	0.25	HHDT
Phase 2 - Demolition	Onsite truck	0.00	0.00	HHDT
Phase 2 - Site Preparation	—	—	—	—
Phase 2 - Site Preparation	Worker	0.00	11.7	LDA,LDT1,LDT2
Phase 2 - Site Preparation	Vendor	2.00	0.25	HHDT,MHDT
Phase 2 - Site Preparation	Hauling	5.00	0.25	HHDT
Phase 2 - Site Preparation	Onsite truck	0.00	0.00	HHDT
Phase 2 - Grading	—	—	—	—
Phase 2 - Grading	Worker	0.00	11.7	LDA,LDT1,LDT2
Phase 2 - Grading	Vendor	3.00	0.25	HHDT,MHDT
Phase 2 - Grading	Hauling	4.00	0.25	HHDT
Phase 2 - Grading	Onsite truck	0.00	0.00	HHDT
Phase 2 - Building Construction	—	—	—	—
Phase 2 - Building Construction	Worker	0.00	11.7	LDA,LDT1,LDT2

Phase 2 - Building Construction	Vendor	5.00	0.25	HHDT,MHDT
Phase 2 - Building Construction	Hauling	1.00	0.25	HHDT
Phase 2 - Building Construction	Onsite truck	0.00	0.00	HHDT
Phase 2 - Paving	—	—	—	—
Phase 2 - Paving	Worker	0.00	11.7	LDA,LDT1,LDT2
Phase 2 - Paving	Vendor	5.00	0.25	HHDT,MHDT
Phase 2 - Paving	Hauling	1.00	0.25	HHDT
Phase 2 - Paving	Onsite truck	0.00	0.00	HHDT
Phase 2 - Architectural Coating	—	—	—	—
Phase 2 - Architectural Coating	Worker	0.00	11.7	LDA,LDT1,LDT2
Phase 2 - Architectural Coating	Vendor	5.00	0.25	HHDT,MHDT
Phase 2 - Architectural Coating	Hauling	0.00	0.25	HHDT
Phase 2 - Architectural Coating	Onsite truck	0.00	0.00	HHDT

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

Non-applicable. No control strategies activated by user.

5.5. Architectural Coatings

Phase Name	Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
Phase 1 - Architectural Coating	0.00	0.00	200,419	66,005	7,454
Phase 2 - Architectural Coating	0.00	0.00	148,459	48,893	5,522

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (Cubic Yards)	Material Exported (Cubic Yards)	Acres Graded (acres)	Material Demolished (Ton of Debris)	Acres Paved (acres)
Phase 1 - Demolition	0.00	0.00	0.00	0.00	—
Phase 2 - Demolition	0.00	0.00	0.00	0.00	—
Phase 1 - Site Preparation	0.00	0.00	5.00	0.00	—
Phase 2 - Site Preparation	0.00	0.00	2.50	0.00	—
Phase 1 - Grading	0.00	0.00	58.0	0.00	—
Phase 2 - Grading	0.00	0.00	20.0	0.00	—
Phase 1 - Paving	0.00	0.00	0.00	0.00	4.96
Phase 2 - Paving	0.00	0.00	0.00	0.00	4.96

5.6.2. Construction Earthmoving Control Strategies

Control Strategies Applied	Frequency (per day)	PM10 Reduction	PM2.5 Reduction
Water Exposed Area	2	61%	61%
Water Demolished Area	2	36%	36%

5.7. Construction Paving

Land Use	Area Paved (acres)	% Asphalt
Research & Development	0.00	0%
Unenclosed Parking with Elevator	3.20	100%
Other Non-Asphalt Surfaces	1.76	0%

5.8. Construction Electricity Consumption and Emissions Factors

kWh per Year and Emission Factor (lb/MWh)

Year	kWh per Year	CO2	CH4	N2O
2024	0.00	12.0	0.03	< 0.005

2025	0.00	12.0	0.03	< 0.005
2026	0.00	12.0	0.03	< 0.005
2027	0.00	12.0	0.03	< 0.005

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1.2. Mitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.1.2. Mitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.2. Sequestration

5.18.2.1. Unmitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

5.18.2.2. Mitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

Cal-Adapt midcentury 2040–2059 average projections for four hazards are reported below for your project location. These are under Representation Concentration Pathway (RCP) 8.5 which assumes GHG emissions will continue to rise strongly through 2050 and then plateau around 2100.

Climate Hazard	Result for Project Location	Unit
Temperature and Extreme Heat	11.8	annual days of extreme heat
Extreme Precipitation	4.05	annual days with precipitation above 20 mm
Sea Level Rise	0.00	meters of inundation depth
Wildfire	10.7	annual hectares burned

Temperature and Extreme Heat data are for grid cell in which your project are located. The projection is based on the 98th historical percentile of daily maximum/minimum temperatures from observed historical data (32 climate model ensemble from Cal-Adapt, 2040–2059 average under RCP 8.5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Extreme Precipitation data are for the grid cell in which your project are located. The threshold of 20 mm is equivalent to about ¾ an inch of rain, which would be light to moderate rainfall if received over a full day or heavy rain if received over a period of 2 to 4 hours. Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Sea Level Rise data are for the grid cell in which your project are located. The projections are from Radke et al. (2017), as reported in Cal-Adapt (Radke et al., 2017, CEC-500-2017-008), and consider inundation location and depth for the San Francisco Bay, the Sacramento-San Joaquin River Delta and California coast resulting different increments of sea level rise coupled with extreme storm events. Users may select from four scenarios to view the range in potential inundation depth for the grid cell. The four scenarios are: No rise, 0.5 meter, 1.0 meter, 1.41 meters
Wildfire data are for the grid cell in which your project are located. The projections are from UC Davis, as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider historical data of climate, vegetation, population density, and large (> 400 ha) fire history. Users may select from four model simulations to view the range in potential wildfire probabilities for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	1	0	0	N/A
Sea Level Rise	1	0	0	N/A
Wildfire	1	0	0	N/A

Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	0	0	0	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	1	1	1	2
Sea Level Rise	1	1	1	2
Wildfire	1	1	1	2
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	1	1	1	2

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Exposure Indicators	—
AQ-Ozone	10.6
AQ-PM	16.9
AQ-DPM	48.7
Drinking Water	44.9
Lead Risk Housing	98.5
Pesticides	0.00
Toxic Releases	23.9
Traffic	59.8
Effect Indicators	—
CleanUp Sites	75.4
Groundwater	95.8
Haz Waste Facilities/Generators	93.4
Impaired Water Bodies	83.0
Solid Waste	42.3
Sensitive Population	—
Asthma	47.0
Cardio-vascular	13.3
Low Birth Weights	22.4
Socioeconomic Factor Indicators	—
Education	84.7
Housing	88.3
Linguistic	42.1
Poverty	63.8

Unemployment	77.8

7.2. Healthy Places Index Scores

The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Economic	—
Above Poverty	34.55665341
Employed	49.83959964
Median HI	52.84229437
Education	—
Bachelor's or higher	15.0006416
High school enrollment	24.98395996
Preschool enrollment	9.790837931
Transportation	—
Auto Access	68.11240857
Active commuting	64.26279995
Social	—
2-parent households	38.27794174
Voting	38.88104709
Neighborhood	—
Alcohol availability	65.0455537
Park access	62.14551521
Retail density	87.57859618
Supermarket access	61.37559348
Tree canopy	60.50301553
Housing	—
Homeownership	56.70473502

Housing habitability	22.12241755
Low-inc homeowner severe housing cost burden	17.2334146
Low-inc renter severe housing cost burden	24.86847171
Uncrowded housing	8.879763891
Health Outcomes	—
Insured adults	43.44924933
Arthritis	0.0
Asthma ER Admissions	47.9
High Blood Pressure	0.0
Cancer (excluding skin)	0.0
Asthma	0.0
Coronary Heart Disease	0.0
Chronic Obstructive Pulmonary Disease	0.0
Diagnosed Diabetes	0.0
Life Expectancy at Birth	40.8
Cognitively Disabled	52.2
Physically Disabled	50.9
Heart Attack ER Admissions	83.8
Mental Health Not Good	0.0
Chronic Kidney Disease	0.0
Obesity	0.0
Pedestrian Injuries	19.6
Physical Health Not Good	0.0
Stroke	0.0
Health Risk Behaviors	—
Binge Drinking	0.0
Current Smoker	0.0

No Leisure Time for Physical Activity	0.0
Climate Change Exposures	—
Wildfire Risk	0.0
SLR Inundation Area	12.5
Children	44.4
Elderly	79.3
English Speaking	49.3
Foreign-born	80.8
Outdoor Workers	28.0
Climate Change Adaptive Capacity	—
Impervious Surface Cover	46.9
Traffic Density	49.4
Traffic Access	62.2
Other Indices	—
Hardship	80.9
Other Decision Support	—
2016 Voting	15.5

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	63.0
Healthy Places Index Score for Project Location (b)	41.0
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	No
Project Located in a Low-Income Community (Assembly Bill 1550)	Yes
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.
b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.4. Health & Equity Measures

No Health & Equity Measures selected.

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

7.6. Health & Equity Custom Measures

No Health & Equity Custom Measures created.

8. User Changes to Default Data

Screen	Justification
Land Use	Existing uses includes 56,696 SF of buildings.
Operations: Vehicle Data	Updated trip rate per transportation assessment.
Characteristics: Utility Information	Adjusted CO2 intensity per Pennensula Clean Energy report: 12 lb of CO2e per MWh.
Construction: Construction Phases	Phase 1 of construction would begin in July 2024 for a duration of 22 months, with buildout in May 2026. Phase 2 of construction would begin in May 2026, for a duration of 14 months, with buildout in June 2027.
Construction: Off-Road Equipment	Updated equipment per applicant.
Construction: Trips and VMT	Updated per applicant. Updated trip length of truck trips to 0.25 miles for construction HRA.
Construction: On-Road Fugitive Dust	Per BAAQMD, updated silt loading factor to 0.5 g/m2 for all roadways.
Construction: Architectural Coatings	No VOC interior and low-VOC exterior (under 50 grams per liter).
Construction: Electricity	Adjusted CO2 intensity per Pennensula Clean Energy report: 12 lb of CO2e per MWh.
Operations: Architectural Coatings	No VOC interior and low-VOC exterior (under 50 grams per liter).
Operations: Water and Waste Water	Updated per applicant.

NREL

Caution: Photovoltaic system performance predictions calculated by PVWatts® include many inherent assumptions and uncertainties and do not reflect variations between PV technologies nor site-specific characteristics except as represented by PVWatts® inputs. For example, PV modules with better performance are not differentiated within PVWatts® from lesser performing modules. Both NREL and private companies provide more sophisticated PV modeling tools (such as the System Advisor Model at //sam.nrel.gov) that allow for more precise and complex modeling of PV systems.

The expected range is based on 30 years of actual weather data at the given location and is intended to provide an indication of the variation you might see. For more information, please refer to this NREL report: The Error Report.

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The energy output range is based on analysis of 30 years of historical weather data, and is intended to provide an indication of the possible interannual variability in generation for a Fixed (open rack) PV system at this location.

RESULTS

8,149 kWh/Year*

System output may range from 7,830 to 8,288 kWh per year near this location.

Month	Solar Radiation (kWh / m^2 / day)	AC Energy (kWh)
January	3.05	383
February	4.49	502
March	5.59	683
April	6.84	801
May	7.14	853
June	7.65	884
July	7.79	915
August	7.17	841
September	6.60	746
October	5.59	671
November	4.02	477
December	3.14	393
Annual	**5.76**	**8,149**

Location and Station Identification

Requested Location	1005 O'Brien Drive Menlo Park CA
Weather Data Source	Lat, Lng: 37.49, -122.14 1.2 mi
Latitude	37.49° N
Longitude	122.14° W

PV System Specifications

DC System Size	5 kW
Module Type	Standard
Array Type	Fixed (open rack)
System Losses	14.08%
Array Tilt	20°
Array Azimuth	180°
DC to AC Size Ratio	1.2
Inverter Efficiency	96%
Ground Coverage Ratio	0.4
Albedo	*From weather file*
Bifacial	No (0)
Monthly Irradiance Loss	Jan 0% Feb 0% Mar 0% Apr 0% May 0% June 0% July 0% Aug 0% Sept 0% Oct 0% Nov 0% Dec 0%

Performance Metrics

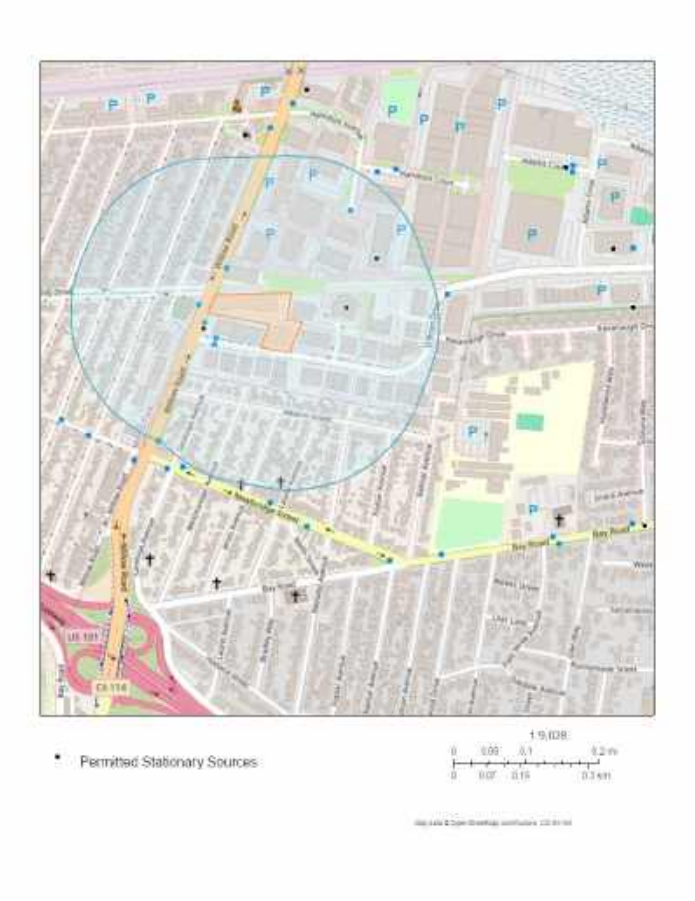
DC Capacity Factor	18.6%

Screening Report

Area of Interest (AOI) Information

Area : 5,182,589.38 ft²

May 15 2024 14:46:05 Pacific Daylight Time



Summary

Name	Count	Area(ft²)	Length(ft)
Permitted Stationary Sources	3	N/A	N/A

Permitted Stationary Sources

#	Facility_I	Facility_N	Address	City	State
1	21312	West Bay Sanitary District	1298 Willow Road	Menlo Park	CA
2	22664	Cs Bio Company	20 Kelly Court	Menlo Park	CA
3	23407	Facebook	1080 Hamilton Court	Menlo Park	CA

#	Zip	County	Latitude	Longitude	Details
1	94025	San Mateo	37.475351	-122.152978	Generator
2	94025	San Mateo	37.475770	-122.149366	Generator
3	94025	San Mateo	37.476750	-122.148612	Generator

#	NAICS	NAICS_Sect	NAICS_Subs	NAICS_Indu	Cancer_Ris
1	221320	Utilities	Utilities	Sewage Treatment Facilities	0.503000
2	541711	Professional, Scientific, and Technical Services	Professional, Scientific, and Technical Services	Research and Development in Biotechnology	1.488000
3	519130	Information	Other Information Services	Internet Publishing and Broadcasting and Web Search Portals	5.350000

#	Chronic_Ha	PM25	Count
1	0.000000	0.001000	1
2	0.000000	0.002000	1
3	0.015000	0.007000	1

NOTE: A larger buffer than 1000 feet may be warranted depending on proximity to significant sources.

14456 O'Brien Drive and Willow Road

Construction HRA

Project Construction Emissions

	Unmitigated	Mitigated
Year	**DPM tons/year**	**DPM tons/year**
2024	0.0380	0.0039
2025	0.0413	0.0085
2026	0.0375	0.0067
2027	0.0133	0.0033
Total	**0.130**	**0.022**
Total Lbs	**259.951**	**44.707**
Lbs/year	**88.336**	**15.192**
Lbs/hour	**0.04**	**0.0072**

	Start	End	Days
	7/1/2024	6/14/2027	771

Conversions:

Total Days **771**

1 ton = 2,000 lb 2.1123288 years

Construction = 8 hours/day

2096 hours/year

262 days/year

12 months

Project Construction: 771 days

2.94 years

AERMOD Assumptions

Source Name	Description	No. of Vol. Sources	Emission Rate g/s	Release Height m	Plume Height m	Plume Width m
SLINE1	Construction	47	1.00	5.00	10.00	9.00

Receptor Grid

Name	Grid Size	Spacing
UCART1	1 km x 1 km	20 m

Meteorological Data

Station Name	Years	Lat	Long	Elev (m)
San Carlos Airport	2011-2015	37.52	-122.25	1

Source: BAAQMD Public Records Request... OR

Source: https://ww2.arb.ca.gov/resources/documents/harp-aermod-meteorological-files

Population

County	2020 Population
San Mateo County	726,353

Source: https://www.census.gov/quickfacts/sanmateocountycalifornia

Other Model Assumption

Terrain Data	NED 1/3
Lakes Version	11.2.0
AERMOD Version	22112

Unmitigated

Receptor	*RecID - 1050*
Cancer	*15.8400*
Chronic	*0.0091*
PM2.5	*0.0010*

Mitigated

Receptor	*RecID - 1050*
Cancer	*2.7242*
Chronic	*0.0016*
PM2.5	*0.0010*

Western Allied MECHANICAL

ALL ELECTRIC FEASIBILITY STUDY

Tarlton Properties, Inc.

1530 O'Brien Drive, Suite C
Menlo Park, CA 94025

Date: November 15, 2024

Attention: Chris Middlebrooks

Subject: All Electric Feasibility Study
1005 O'Brien Drive
LAB/OFFICE WARM UP
MENLO PARK, CA

Dear Chris:

Western Allied Mechanical is pleased to present this report analyzing multiple proposed systems for each building as a feasibility study for future lab/office buildings at the subject project. There are a couple of reasons that we feel that the all-electric option, currently, is not a feasible design for these buildings.

Western Allied Mechanical Background with All-Electric:
Western Allied has been dedicated to providing energy efficient designs for decades. We understand and agree that moving toward carbon neutral buildings and net zero energy buildings is the future of construction.

We have completed and are currently completing several Net Zero buildings including: (Partial list)

- Lucille Packard Foundation in Los Altos – Net zero, all electric design utilizing chilled beam, radiant heating, air source heat pumps and energy recovery
- Fortinet – Ground up all-electric, chilled wall, radiant heating building in Santa Clara
- Millbrae Recreation Center – Ground up, all electric recreation center
- SLAC Science and User Support building - Net zero, all electric design utilizing chilled beam, radiant heating, air source heat pumps and energy recovery in Palo Alto.
- ARE Amenities Center – All Electric, net zero amenities building in South San Francisco
- Skyline College B12 – Ground up, 22,000 SF environmental science building with ground source heat pumps, dual duct VAV coupled with radiant in floor heating and cooling.

Please note that all these buildings are primarily office buildings and do not include life science laboratory space similar to the proposed project. The use of all electric design for office, residential, and other uses is fully feasible with the technologies that have been in place and vetted for years. With the recirculation function of office and the relatively light loads as compared to laboratory buildings coupled with the less "mission critical" issues of the HVAC systems, the use of all-electric design can and should be implemented as much as possible to reduce carbon emissions and increase energy performance of

these type buildings. By contrast, buildings including laboratory space must be designed with tight tolerance of space conditioning to maintain the viability of science functionality taking place within the laboratory setting. Further, laboratory spaces require 100% outside air circulation ("OSA"). The introduction of variable OSA conditions requires tighter control from the mechanical equipment for laboratory environments. Unlike occupant comfort, which is the main design function of office and residential uses, compromise of space conditioning in laboratory settings can lead to failure of occupant science, either experimentation and/or production.

Western Allied has recently finished two all-electric office/lab buildings.

- Building A – 220,000 SF, 12 story, lab/office retrofit completed 6/30/23. This building uses air source heat pump heating plant, exhaust heat recovery and water-cooled chilled water-cooling plant. This building has been commissioned and is partially occupied. With partial occupancy loading (approximately 50%), we have experienced issues with equipment refrigerant leaks and warranty repairs on the heat pumps over the last year. These are issues that we would not normally see a year after the system is installed and conditioned in an office building. They are also issues we would not normally see in a lab building that uses natural gas.

  As this building is of similar size and usage, this building is a relevant comparison to this study

- Building B – 33,000 SF single story lab/office building completed 7/30/24. This building utilizes DX VAV package unit for cooling and air source heat pump plant for heating and supplemental cooling. Although the space is installed and commissioned, there is not sufficient operating data to ensure that the system will be reliable long term.

  As this building is much smaller and not complex, it is not relevant to this study.

The following is the specific analysis of this proposed project.

Scope of work:

1. Perform energy load calculations for both buildings for system and equipment selection and conceptual system design. 1005 O'Brien Drive is an approximately 154,580 SF life science building which is expected to include approximately 60/40 laboratory use to office but must be able to accommodate up to 70% laboratory. Due to the design and scale of each building, similar base and all-electric approaches are warranted for each building. See Appendix B for conceptual design drawings. See Appendix C for Energy Analysis Report.

   a. **Option 1 - Base design** – 60/40 lab-office (up to 70% lab). 100% OSA for office, recirculating for office with economizer, VAV with hot water reheat; High efficiency gas heating, high efficiency water cooled chilled water plant with cooling towers, chilled/hot water air handlers, exhaust fans

   b. **Option 2 – All-electric design** – 60/40 lab-office (up to 70% lab). 100% OSA for lab, recirculating for office with economizer, VAV with reheat for building; air cooled heat pump plant handling heating and cooling load, chilled/hot water air handlers, exhaust system with heat recovery.

2. Provide mechanical installation cost estimates for each system

3. Provide maintenance and operation cost analysis

4. Provide reliability and feasibility report

Mechanical Cost Summary:

The base system for each building to comply with California Energy Code and LEED is a high efficiency water cooled plant with cooling towers, and high efficiency natural gas boiler plant.

The all-electric options are to provide a combo heating/cooling plant with air source heat pumps staged to handle either heating or cooling load depending on demand. The zone temperature control can be achieved with VAV reheat approach. For equivalent efficiency, heat recovery is required on the exhaust system.

From a cost perspective, the all-electric design is roughly 20% higher at installation than the traditional gas-powered system. This does not take in account the elimination of gas to the buildings or the increase in electrical, structural, and extended roof screen cost as the all-electric systems have more points of connection and a slightly higher kW requirement and takes up more space. The roof screen may be lowered 2-3 feet as cooling towers will not be needed.

From a capital cost perspective, the all-electric design is significantly more expensive and may be cost prohibitive.

The tables below show the cost results. See appendix A for full cost estimate proposal and Appendix B for conceptual design.

1005 O'Brien:

Item:	Description	Cost:
1.	1005 O'Brien Drive – Option 1 (Gas Heating, Water cooled)	$ 7,564,992
2.	1005 O'Brien Drive – Option 2 (All-electric)	$ 9,071,452
3.	**Difference**	**$ 1,506,460**

Structural Impact:

Option 1 – Traditional gas fired system. Total approximate roof weight including all equipment, ductwork, and piping = 225,000 lbs

Option 2 – All Electric system. Total approximate roof weight including all equipment, ductwork, and piping = 220,000 lbs.

Although there are more pieces of equipment associated with the all-electric system, the overall impact of weight to the roof for the 1005 O'Brien Drive building is similar to the traditional system

Electrical Impact:

Option 1 – Traditional gas fired heating system total connected load requirements: 2,200 Amps

Option 2 – All-Electric system total connected load requirements: 3,000 Amps

Due to the decreased efficiency of the air-cooled air source heat pumps, the all-electric system will require approximately 800 more amps of 406/3/60 power. This will be a significant cost for the additional power and would add increased utility requirements for the 1005 O'Brien Drive building.

Plumbing Impact:

With the elimination of gas to the building and the elimination of make-up water to the cooling tower, the all-electric option 2 will provide some cost savings for plumbing installation for the 1005 O'Brien Drive building. The cost savings due to plumbing savings does not offset the increased capital cost for the all-electric option 2.

Ongoing Maintenance:

Option 1 – Traditional gas fired system ongoing estimated maintenance costs: $ 10,000.00 per year
Water treatment required for cooling tower system: $4,000.00 per year
Total ongoing maintenance costs: ~ 14,000.00 per year

Option 2 – All-Electric system ongoing maintenance costs: $ 14,000.00 per year

The ongoing maintenance costs between the systems is negligible for the 1005 O'Brien Drive building regardless of system chosen. However, reliability of maintenance for Option 2 is a potential feasibility issue as described below. Shortages of reliable service providers and parts would be likely to have multiplier effects on estimated maintenance costs, as well as increased costs related to equipment downtimes, the prediction of which does not have a reliable track record. This is a potential feasibility issue for Option 2 due to the inability to accurately forecast actual maintenance cost.

Feasibility Issue #1 - System Reliability:

Life Science buildings, as opposed to other building uses, require a tight level of temperature control and system reliability. If we cannot maintain consistent building temperature in the lab areas, fluctuation could affect or destroy experimentation, production, and R&D and other aspects that are mission critical for lab facilities.

Option 1 – Traditional water-cooled central systems and gas heating hot water boilers.

The traditional natural gas boiler approach has been proven over the decades to provide adequate temperature control and reliability. Specifically, we have hundreds of projects of the last 25+ years that have utilized high efficiency condensing boilers and have found them to be very reliable. As we service our installations, we have direct feedback from technicians on boiler manufacturer performance and

reliability and there are many certified technicians in the Bay Area to service these types of systems and provide emergency repairs. Replacement parts for natural gas boilers are also readily available as well as local technical support for rapid response to equipment service issues effecting “mission critical” life science applications.

These systems have been installed, operating, and maintained for life science building for decades. The equipment, controls designs, and controls sequences have been vetted to produce very consistent and reliable operation. Associated parts and available qualified service providers familiar with the systems are readily available to keep these systems functional for critical environments.

Equipment utilized for these systems are produced by many reputable national equipment manufacturers and most, if not all, potential equipment trouble points have been identified and solved and there is vast manufacturer support to help work through troubleshooting making the continued operation of the systems reliable.

Option 2 – All-Electric heating and cooling system coupled with dual duct.

One of the largest causes of concern with these systems is proven reliability. The industry simply does not have a track record of experience in running, maintaining, and servicing these types of systems. This is particularly of concern with a large load operation such as the 1005 O’Brien Drive project, which will be used by life science tenants that cannot have a climate system failure, even for brief periods, as such fluctuation could lead to catastrophic failure of occupant science. There is currently no data that supports reliable operation under either full load condition or during a power outage using back up power supply.

Air Source Heat Pump chiller/boiler’s (ASHP’s) are relatively new to the United States and very new to critical life science environments. For the current all-electric ASHP, it is a new application. Although the units are similar to air cooled chillers, the heat pump function requires additional technical support, parts, and service that are not readily available. Below is a list of manufacturers with our experience with each.

ASHP Manufacturer’s and Experience:

a. Multistack is an American made product and we can attain parts for repairs with acceptable lead times to decrease down time, however the reliability of this product renders it infeasible for this project. In our experience with the product, we have utilized in a number of installations and have had major issues with equipment functional reliability. Due to its reliability issues, Multistack is infeasible for this project.

b. Aermec – These products are produced outside of the US and air source heat pumps are fabricated in Italy. This product’s application to life science is a recent change, and therefore there is no data on long-term effectiveness. What we have found with this product are major shipping delays, quality control of the delivered product, and lack of qualified and available tech support. Attaining replacement parts is also an issue. With life science, rapid response and repair is required to prevent science failure. Lack of enough local technical support is detrimental to servicing and maintaining life science

buildings. Due to quality control issues, lack of qualified and available tech support and difficulty in attaining replacement parts, Aermec is infeasible for this project.

c. Geoclima – Similar issues the Aermec as Geoclima is an offshoot company of Aermec, therefore Geoclima is infeasible for this project.

d. Trane Ascend, York, Daikin – We are happy to see major US manufacturers have new producst available for ASHP's. These are new to the market, and we aren't aware of any lab facilities using this product in order to confirm current reliability. We are confident that replacement parts will be available for Trane and Daikin and they will have adequate local technical support in the coming years, however reliable supply of replacement parts and adequate local support are not yet in place. Therefore, at the current time, these manufacturers are infeasible because the equipment has not been adequately tested and proven reliable nor are repair and replacement contingencies currently adequate for critical space conditioning applications.

e. LG ASHP – The option 2 All-Electric system is designed around multiple 60-ton LG air source heat pumps. Each heat pump has multiple circuits and multiple compressors. With 14 ASHP's in the design, there is built in redundancy. If one unit (or one circuit in an ASHP) fails, there are multiple units that can handle the heating and/or cooling load which helps the reliability of the system. LG also comes with 10 year compressor warranties with factory certified start-up which is why we selected this equipment as it is the most reliable.

   With that said, these ASHP's are new to North America and do not have a long track record of reliability, specifically in the life science critical building environment. Although parts may be available, there is not a large number of service providers available at this time to troubleshoot and repair the equipment. This reduces the reliability.

Building Management Systems (BMS) Controllability:

The system is designed so that each ASHP can be utilized for cooling or heating depending on demand. This is achieved through BMS controls system with several motorized control valves and complicated staging sequence. This system will need to be thoroughly commissioned prior to turnover to assure that it is functionally reliable.

The increased number of valves, ASHP's, and complicated BMS control strategy does introduce many more modes of failure that could negatively impact the space if multiple failures occur. Due to the number of failure points and increased complication of controls sequencing, there is a potential for decreased reliability.

<u>Reliability Summary</u>

As all-electric heating systems for labs is a new concept to the industry, there is not a long track record of proven reliability. Although, in theory, it should have similar reliability, the increased complexity of the system introduces more modes of failure and the relative unfamiliarity in system operation makes

the system more difficult to troubleshoot. Lack of reliable replacement parts and experienced service support makes system breakdowns longer and more difficult to resolve. Recent experience with Building A has demonstrated that all-electric system reliability issues for laboratory spaces are a real, not just a potential, problem because systems are failing at faster than expected rates. This problem is exacerbated by the unreliability of parts and service. This lack of reliability could have a negative impact, including science failure, for a life science building which are critical facilities.

Feasibility Issue #2 - Back Up Power Analysis:

Another area of concern are the power requirements for emergency back-up power. As a comparison on this building, the two natural gas boilers for this project would need single phase 208/3/60 power at 10 Amps each.

Based on the necessity of a stable indoor environment for laboratory space and the uncertainty of power supply, laboratory tenants would requires their HVAC systems to be backed up fully on emergency generator. We are assuming that 46,500 SF of laboratory space (~50%) will need to be backed up on HVAC and the following is the analysis of the generator size required for Option 1 with gas-fired heating, and Option 2 with all electric heating.

Option 1: Gas Fired heating and water cooled cooling required for emergency power.

1 – 6,000 MBH Boiler requiring 3 kW
1 – 7.5 HP heating hot pump running at 75% requires 5 kW
1 – AHU at 50,000 CFM requires 15 kW
1 – EF at 50,000 CFM requires 8 kW
1 – Water cooled chiller running 40% = 150 kW
1 – Cooling tower running at 40% requires 5 kW
1 – Chilled water pump running at 40% requires 5 kW
1 – Condenser water pump running at 50% requires 9 kW

Total Emergency generator load ~ 200 kW which includes safety factor

Note: This is not the connected load. This assumes that we can utilize load limiting thru the building BMS.

Option 2: All-Electric heating and cooling required for emergency power.

4 – 60-ton Air source heat pumps running at full load for both cooling and heating: 420 kW
2 – 7.5 HP heating hot water pump running at 50% requires 3 kW each
1 –AHU at 50,000 CFM requires 15 kW
1 – EF at 50,000 CFM requires 8 kW
1 – Chilled water pump running at 40% requires 5 kW

Total Emergency generator load ~ 454 kW which includes safety factor

Note: This is not the connected load. This assumes that we can utilize load limiting through the building BMS.

Based on the calculations above, the all-electric system would require the emergency generator to be increased by ~ 260 kW, representing an additional back-up generator of at least an additional 300Kw Genset for each building, or two to three times the required backup capacity for mechanical. In addition to air quality, noise, and diesel usage associated with the additional generator power, each generator would need an additional 300 square foot footprint beyond what is currently proposed.

This may be prohibitive to the building and jurisdictional requirements with increased generator size.

Feasibility Issue #3 – Case Study – Allogene 7400 Gateway Blvd, Newark

On September 23, 2022, Western Allied conferenced with building energy and systems engineers to review and compare the recently completed Allogene project at 7400 Gateway in Newark with LS District life science projects. Below is a table with some of the comparison between the two projects.

Item	Description	Allogene – 7400 Gateway	1005 O'Brien
1.	Total building square footage	138,000	155,000
2.	Number of floors	1 story[1]	5 stories
3.	Ratio of lab/office[2]	33% Lab, 67% Office	Up to 70% lab
4.	% Once thru air for lab area	50%	100%
5.	Where is air handling equipment installed?	Mezzanine	Roof
6.	Where is the heating/cooling plant installed?	Yard	Roof
7.	Available area for mechanical equipment[3]	20,000 SF	12,500 SF
8.	Equivalent heating and cooling capacity	720 Tons	840 tons
9.	Solar Availability and back-up power	Full roof[4] and battery backup	Limited roof space/Generator backup

Notes:

1. Data given was essentially a single story for Allogene with 5,000 SF of 2nd floor office and 17,000 SF of mechanical mezzanine
2. Office includes other spaces like warehouse, shipping receiving, etc. that do not have a lab function.
3. For Allogene, the equipment mezzanine is 17,000 SF and we estimated yard mechanical at 3,000 SF from Google Earth

The Allogene building and 1005 O'Brien project are different in size, and additionally are vastly different in many aspects. 1005 O'Brien includes a 4-story and 5-story building with all mechanical airside and plant equipment mounted on the roof with an allotted space of 12,500 SF. Allogene is a single story with yard space and a mezzanine allowing for ~ 20,000 SF for mechanical equipment.

Allogene is 33% lab, whereas 1005 O'Brien will be up to 70% lab. Additional lab increases load and equipment sizing. Allogene also has about 50% recirculation in the lab spaces whereas 1005 O'Brien has

0% recirculation. These factors contribute to ~ 25% more capacity required in the heating/cooling plant size.

As mentioned in Feasibility Issue #3, this comparison shows that due to 1005 O'Brien having lab and outside air usage increases the size of the plant. With the restrictions in available geography on both the roof and the site, it is not currently feasible to install an all-electric plant with the current building's configuration and usage.

Summary:

Due to system cost, infeasibility of reliability and infeasibility of necessary backup power, all-electric conditioning is infeasible for the project at this time. Science failure is an unacceptable risk for a speculative life science facility and until all-electric systems demonstrate consistent performance without the risk of operational failure, these systems will not be feasible for this type of Project. The Project proposes all-electric cooling, natural gas boilers space heating. Air handling equipment and piping sizing will be designed to accommodate future conversion to all-electric when feasible.

Western Allied MECHANICAL

WAM BUDGET PROPOSAL

Tarlton Properties, Inc.
1530 O'Brien Drive, Suite C
Menlo Park, CA 94025

Date: November 15, 2024

Attention: Yusef Masjedi

Subject: BUDGET H.V.A.C. PROPOSAL
1005 OBD – 1320 WILLOW
LAB/OFFICE WARM UP
MENLO PARK, CA

Dear Yusef:

Western Allied Mechanical is pleased to present this proposal to design, furnish and install the heating, ventilating and air conditioning systems for the subject project.

The pricing has been based in accordance with the following:

- Update drawings dated 7-13-21 as prepared by DES
- Conceptual Design drawings attached
- Assumed 2024-2025 Construction

Summary:

1005 Obrien:

Item:	Description	Cost:
1.	1005 O'Brien Drive – Base (Gas Heating, Water cooled)	$ 7,564,992.00
2.	1005 O'Brien Drive – (All-electric)	$ 9,071,452.00
3.	**Difference**	**$ 1,506,460.00**

1005 O'Brien Drive – Base Warm Up Inclusions:

Item	Qty.	Description
1.	2	420 ton high efficiency water cooled chillers including: • BACNet interface • Vibration Isolation
2.	2	CHW pumps, including: • 1020 GPM • Premium-efficiency TEFC inverter duty motors • 12.5 HP variable frequency drives (no bypass) with NEMA-1 enclosure • Indoor-rated • Untrimmed impeller
3.	2	420 ton Cooling towers including: • 20 HP premium efficiency motor with VFD • Stainless steel hot and cold water basins • Internal service walkway and wier dam • Rails and access ladders • Factory installed sweeper system
4.	1	Centrifugal separator for cooling tower
5.	2	CW pumps, including: • 2500 GPM • Premium-efficiency TEFC inverter duty motors • 40 HP variable frequency drives (no bypass) with NEMA-1 enclosure • Indoor-rated • Untrimmed impeller
6.	1	AHU including: • 165,000 CFM • 100% OSA • Stainless steel cooling coils with Electrofin UV topcoat • MERV 8 pre-filter section • MERV 14 final filter section • Premium efficiency supply fan with VFD • Internal vibration isolation • Horizontal discharge supply ductwork

Item	Qty.	Description
7.	1	AHU including: • 70,000 CFM • 100% Economizer • Stainless steel heating coils with Electrofin UV topcoat • MERV 8 pre-filter section • MERV 14 final filter section • Premium efficiency supply fan with VFD • Internal vibration isolation • Horizontal discharge supply and return ductwork
8.	3	Utility set exhaust fan, including: • 55,000 CFM @ 3'' ESP • 40 HP VFD-rated, premium efficiency inverter duty TEFC motor • Backdraft damper • OSA bypass damper • Fan isolation damper • Vibration Isolation • Discharge nozzle sized at 3000-3500 fpm • Weather hood • Spark "B" Resistance
9.	2	10-ton Rooftop Heat pumps for conference center including • Factory Roof Curb • 100% Economizer • Power Exhaust • BACNet interface
10.	5	Restroom Exhaust including: • (1) Exhaust valve per floor.
11.	1	500 CFM Conference Center exhaust fan
12.	2	12,000 CFM Elevator hoistway pressurization fans with VFD's
13.	5	500 CFM electrical room inline exhaust fans with line voltage thermostats
14.	1	500 CFM trash enclosure exhaust fan
15.	1	500 CFM chiller room exhaust fan
16.	1	5-ton split system for 1st Floor Electrical Room with condensing unit mounted in adjacent yard

Item	Qty.	Description
17.	2	Heating hot water boiler, including: • 4,000 MBH input • 95% efficiency • Natural Gas • Condensing • 230V/1-phase electrical requirements.
18.	2	HHW pumps, including: • 520 GPM • Premium-efficiency TEFC inverter duty motors • 7.5 HP variable frequency drives (no bypass) with NEMA-1 enclosure • Indoor-rated • Untrimmed impeller
19.	4	Lobby Dual Duct VAV
20.	64	Grilles, registers and diffusers, including: • (12) Non ducted transfer/return grilles • (20) Ducted Return/exhaust diffusers for restrooms • (14) lobby Linear supply diffusers • (14) lobby linear return diffusers • (4) supply air diffuser for conference rooms • (20) supply air diffuser for rooftop conference center • (8) return grilles for rooftop conference center
21.	34	Combination fire/smoke dampers **Note: Smoke detector to be provided and located by fire/life safety contractor. Detector to be mounted by Mechanical Contractor.**
22.	Lot	Vibration isolation, including: • New utility set exhaust fans • New inline exhaust fans • New chillers • New pumps will be on concrete inertia base
23.	Lot	Seismic anchorage calculations, including: • Air handling unit anchorage calculations • Boiler anchorage calculations • Cooling Tower anchorage calculations • Chiller anchorage calculations • Ductwork and piping, as required by Code

Item	Qty.	Description
24.	Lot	Ductwork: • All supply ductwork upstream of VAV boxes will be medium pressure round or rectangular galvanized sheetmetal ductwork built in accordance with S.M.A.C.N.A. • All supply ductwork downstream of VAV boxes will be low pressure round or rectangular galvanized sheetmetal ductwork built in accordance with S.M.A.C.N.A. • All exhaust systems shall be galvanized, round or rectangular, sheetmetal ductwork built in accordance with S.M.A.C.N.A. • Ductwork will be stubbed to each floor • **Lobby Supply Mains**
25.	Lot	Piping: • All chilled, condenser, and hot water piping above 2.5" will be Schedule 40 black steel pipe and fittings. Piping will utilize mechanical grooved couplings. • All chilled, condenser, and hot water piping 2" and below will be Type "L" copper pipe and fittings. Joints will be soldered or pressfit
26.	Lot	Startup, test and balance of mechanical systems by in-house TABB certified technicians.
27.	Lot	DDC Controls system including: • (2) Rooftop air handling units • (5) Exhaust fans with VFD's • (2) Exhaust fans • (1) split system • (2) Boilers • (2) Chillers • (2) Cooling towers • (6) Pumps • (4) Dual duct VAV boxes • (5) Exhaust valves for restroom core • Article 63 refrigeration monitoring panel • Engineering • Graphics • 16 hours training • 40 hours commissioning support • 24 hours balance support

Item	Qty.	Description
		• Advanced Metering Noted: • We will need 120V to (6) control panels and other locations required by controls. • We are carrying $ 40,000.00 for advanced metering
28.	Lot	Insulation: • All new ductwork will be insulated to meet Title 24 requirements. • All new piping systems will be insulated in accordance with Title 24.
29.	Lot	Water treatment including: • Flushing, cleaning and water treatment for closed loop systems. • Water treatment system for evaporative cooled sumps
30.	Lot	Material and Labor Escalation assuming work to be done starting in mid-2024 and completed in mid-2025.
31.	Lot	T.A.B.B. certified start-up and air balance of units and exhaust
32.	Lot	Project management including attendance of all design coordination meetings, pre-construction meetings, construction meetings, and all job management functions.
33.	Lot	Ductwork and piping stansion supports including: • (50) Duct Stansions • (50) piping stansions • Mechanical room piping supports as required
34.	Lot	Flashings, including: • (6) Ducts through roof • (20) sleeper flashings • (3) unit counter flashing
35.	Lot	Commissioning support including: • 40 Field hours • 40 PM hours
36.	Lot	All rigging, hoisting and material handling as required to accommodate this scope of work.
37.	Lot	BIM Detailing
38.	Lot	Professionally engineered drawings for city submittal

1005 O'Brien Drive Warm up – Base Inclusions:

The total net lump sum price for the H.V.A.C. work as described including all taxes, licenses, and insurance; excluding bond, is: $ 7,564,992.00

1005 O'Brien Drive Warm up – All Electric Inclusions:

Item	Qty.	Description
1.	1	AHU including: • 165,000 CFM • 100% OSA • Stainless steel cooling coils with Electrofin UV topcoat • MERV 8 pre-filter section • MERV 14 final filter section • Premium efficiency supply fan with VFD • Internal vibration isolation • Horizontal discharge supply ductwork
2.	1	AHU including: • 70,000 CFM • 100% Economizer • Stainless steel heating coils with Electrofin UV topcoat • MERV 8 pre-filter section • MERV 14 final filter section • Premium efficiency supply fan with VFD • Internal vibration isolation • Horizontal discharge supply and return ductwork
3.	1	HRU-1 Exhaust Heat Recovery unit including: • 165,000 CFM • (6) Motorized bypass dampers • (6) Coated Copper Aluminum heat exchange coils • (3) Motorized fan isolation dampers • (1) motorized bypass damper • Double wall construction
4.	10	Air-source heat pumps to include: • Nominal 60 ton cooling/heating capacity per module • Variable speed compressors

Item	Qty.	Description
5.	3	Utility set exhaust fan, including: • 55,000 CFM @ 3'' ESP • 60 HP VFD-rated, premium efficiency inverter duty TEFC motor • Backdraft damper • OSA bypass damper • Fan isolation damper • Vibration Isolation • Discharge nozzle sized at 3000-3500 fpm • Weather hood • Spark "B" Resistance
6.	2	10-ton Rooftop Heat pumps for conference center including • Factory Roof Curb • 100% Economizer • Power Exhaust • BACNet interface
7.	5	Restroom Exhaust including: • (1) Exhaust valve per floor.
8.	1	500 CFM Conference Center exhaust fan
9.	2	12,000 CFM Elevator hoistway pressurization fans with VFD's
10.	5	500 CFM electrical room inline exhaust fans with line voltage thermostats
11.	1	500 CFM trash enclosure exhaust fan
12.	1	5-ton split system for 1st Floor Electrical Room with condensing unit mounted in adjacent yard
13.	4	Lobby Dual duct VAV
14.	64	Grilles, registers, and diffusers, including: • (12) Non ducted transfer/return grilles • (20) Ducted Return/exhaust diffusers for restrooms • (14) lobby Linear supply diffusers • (14) lobby linear return diffusers • (4) supply air diffuser for conference rooms • (20) supply air diffuser for rooftop conference center • (8) return grilles for rooftop conference center
15.	34	Combination fire/smoke dampers

Item	Qty.	Description
		Note: Smoke detector to be provided and located by fire/life safety contractor. Detector to be mounted by Mechanical Contractor.
16.	2	Hot water pumps, including: • 300 GPM • Premium-efficiency TEFC inverter duty motors • Outdoor-rated • 5 HP variable frequency drives (no bypass) with NEMA-3 enclosure • Untrimmed impeller
17.	2	Chilled water pumps, including: • 440 GPM • Premium-efficiency TEFC inverter duty motors • Outdoor-rated • 7.5 HP variable frequency drives (no bypass) with NEMA-3 enclosure • Untrimmed impeller
18.	Lot	Vibration isolation, including: • New utility set exhaust fans • New inline exhaust fans • New air-source heat pumps • New pumps will be on concrete inertia base
19.	Lot	Seismic anchorage calculations, including: • Air handling unit anchorage calculations • Air-source heat pump anchorage calculations • Ductwork and piping, as required by Code
20.	Lot	Ductwork: • All supply ductwork upstream of VAV boxes will be medium pressure round or rectangular galvanized sheetmetal ductwork built in accordance with S.M.A.C.N.A. • All supply ductwork downstream of VAV boxes will be low pressure round or rectangular galvanized sheetmetal ductwork built in accordance with S.M.A.C.N.A. • All exhaust systems shall be galvanized, round or rectangular, sheetmetal ductwork built in accordance with S.M.A.C.N.A.

Item	Qty.	Description
		• Ductwork will be stubbed to each floor • **Lobby Supply Mains**
21.	Lot	Piping • All chilled, condenser, and hot water piping above 2.5" will be Schedule 40 black steel pipe and fittings. Piping will utilize mechanical grooved couplings. • All chilled, condenser, and hot water piping 2" and below will be Type "L" copper pipe and fittings. Joints will be soldered or pressfit
22.	Lot	Startup, test and balance of mechanical systems by in-house TABB certified technicians.
23.	Lot	DDC Controls system including: • (2) Rooftop air handling units • (4) Exhaust fans with VFD's • (14) ASHP's • (1) Heat recovery unit • (2) exhaust fans • (1) split system • (4) Pumps • (4) Dual duct VAV boxes • (5) Restroom exhaust valves • Engineering • Graphics • 16 hours training • 40 hours commissioning support • 24 hours balance support • Advanced Metering Noted: • We will need 120V to (6) control panels and other locations required by controls. • We are carrying $ 40,000.00 for advanced metering
24.	Lot	Insulation: • All new ductwork will be insulated to meet Title-24 requirements. • All new piping systems will be insulated in accordance with Title-24.
25.	Lot	Water treatment including: • Flushing, cleaning, and water treatment for closed loop systems.

Item	Qty.	Description
26.	Lot	Material and Labor Escalation assuming work to be done starting in mid-2024 and completed in mid-2025.
27.	Lot	T.A.B.B. certified start-up and air balance of units and exhaust
28.	Lot	Project management including attendance of all design coordination meetings, pre-construction meetings, construction meetings, and all job management functions.
29.	Lot	Ductwork and piping stanchion supports including: • (50) Duct Stanchions • (50) piping stanchions • Mechanical room piping supports as required
30.	Lot	Flashings, including: • (6) Ducts through roof • (20) sleeper flashings • (4) unit counter flashing
31.	Lot	Commissioning support including: • 40 Field hours • 40 PM hours
32.	Lot	All rigging, hoisting and material handling as required to accommodate this scope of work.
33.	Lot	BIM Detailing
34.	Lot	Professionally engineered drawings for city submittal

1005 O'Brien Drive Warm Up – Energy Upgrade Inclusions:

The total net lump sum price for the H.V.A.C. work as described including all taxes, licenses, and insurance; excluding bond, is: $ 9,072,452.00

Breakout Pricing:

1. **Pre-Construction Breakout Pricing (Not including BIM)**
    a. **Phase 1 – 1005 O'Brien: $ 60,000.00**

Exclusions:

1. **DDC controls associated with smoke control for high-rise buildings has been excluded from all pricing proposed above.**
2. All electrical work including power and 120 volt wiring, conduit, disconnect switches, motor starters, interlock wiring of smoke/fire dampers, smoke detectors and smoke detector wiring.
3. All plumbing work including gas, make-up water, and condensate piping.
4. All structural engineering and/or support work as required to accommodate mechanical equipment including all steel or wood air conditioning supports.
5. All cutting, caulking, coring, patching, painting, roofing, roof screens, etc.
6. All overtime work.
7. Removal and/or replacement of ceiling tile or grid as required to accommodate mechanical modifications.
8. All architectural sheetmetal and/or louvers.
9. All work associated with hazardous materials (lead, asbestos, etc.).
10. All permits and fees.

Western Allied Mechanical appreciates the opportunity to present this proposal and looks forward to working with you on this project.

Should you have any questions, or if I can be of further assistance, please feel free to call.

Sincerely,

Zachary Russi, P.E. LEED AP
President

Note: This price is valid for 30 days from date of issuance. Should this proposal expire, a revised proposal can be provided upon request.

HEAT PUMPS

TAG	MANUFACTURER & MODEL	SERVING	NOM. TON	CFM			SUPPLY FAN					RELIEF/RETURN FAN					REF	COOLING COIL								HEATING DATA (MBH)				ELECTRICAL			OP WT (LBS)	ACCESSORIES	REMARKS
				DESIGN	OSA		ESP	QTY.	FAN TYPE	RPM	BHP	HP	ESP	QTY.	FAN TYPE	RPM	BHP	HP	TYPE	SYS 1 CHAR SYS 2 CHAR	CAPACITY (MBH)		EDB	LDB	AMB	CIRC.	SEER/ EER SEER2/ EER2	IEER	ROWS FPI	CAPACITY (MBH)	EDB LDB	COP (47°F)	COP (17°F)	FINAL TYPE	FINAL DEPTH	FINAL MERV	MCA	MOCP	V/PH			
					DES	ABS	TSP						TSP								TOTAL	SENS	EWB	LWB															
PHP-1	TEMPMASTER XXE12A4B3AB1B111A3	CONF	10	4000	535	535	0.6	1	BELT	839	2.31	3.7	-	1	DIRECT DRIVE	-	-	-	R-410A	12.25	108	99.5	83	58.3	95	2	- / 11	14.6	-	114	55	3.4	2.25	PLEATED	4"	13	25.3	30	460/3	1240	DRY BULB ECONOMIZER, POWER EXHAUST, REUSE EXISTING DUCT SMOKE DETECTOR AT UNIT, 10 KW ELEC RESISTANCE HEATER	
							0.85						-							12.25			64	54.2			- / -		-		82.5										
PHP-2	TEMPMASTER XXE12A4B3AB1B111A3	CONF	10	4000	415	415	0.6	1	BELT	839	2.31	3.7	-	1	DIRECT DRIVE	-	-	-	R-410A	12.25	108	99.5	83	58.3	95	2	- / 11	14.6	-	114	55	3.4	2.25	PLEATED	4"	13	25.3	30	460/3	1240	DRY BULB ECONOMIZER, POWER EXHAUST, REUSE EXISTING DUCT SMOKE DETECTOR AT UNIT, 10 KW ELEC RESISTANCE HEATER	
							0.85						-							12.25			64	54.2			- / -		-		82.5										

AIR HANDLING UNITS

TAG	MANUFACTURER & MODEL	SERVING	CFM			SUPPLY FAN				RELIEF/RETURN FAN				COILS		FILTER									ELECTRICAL			OP WT (LBS)	ACCESSORIES	REMARKS
			TOTAL	OSA		ESP	RPM	BHP	HP	ESP	RPM	BHP	HP	CHW	HHW	PREFILTER			CARBON			FINAL			MCA	MOCP	V/PH			
				DES	ABS	TSP				TSP						EFF	QTY	SIZE	EFF	QTY	SIZE	EFF	QTY	SIZE						
AHU-1	SCOTT SPRINGFIELD	LABORATORY	165,000						330																		460 / 3	61,050	120V FOR OUTLET AND LIGHTS, 460V SINGLE POINT POWER CONNECTION, RETURN AIR DAMPER	N-1 SUPPLY FAN REDUNDANCY, DUCT SMOKE DETECTOR MOUNTED BY MECHANICAL, PROVDED AND WIRED BY FIRE AND LIFE SAFETY
AHU-2	SCOTT SPRINGFIELD	OFFICE	70,000						140																		460 / 3	26,000	120V FOR OUTLET AND LIGHTS, 460V SINGLE POINT POWER CONNECTION, RETURN AIR DAMPER	N-1 SUPPLY FAN REDUNDANCY, DUCT SMOKE DETECTOR MOUNTED BY MECHANICAL, PROVDED AND WIRED BY FIRE AND LIFE SAFETY
HRU-1	SCOTT SPRINGFIELD	LABORATORY	165,000						N/A																		N/A	45,000	(6) BYPASS DAMPERS, (1) OSA BYPASS DAMPER, (3) FAN ISOLATION DAMPERS	

AIR SOURCE HEAT PUMPS

NO.	MANUFACTURER & MODEL	TYPE	REFRIGERANT			COOLING SYSTEM													HEATING SYSTEM										ELECTRICAL			OP WT (LBS)	ACCESSORIES	REMARKS
			TYPE	CIRCUITS	CHARGE	CAPACITY (TONS)		INPUT POWER (KW)	COOLING TOTAL INPUT CURRENT (A)	AMB (°F)	EER	NPLV	GPM			EWT (F)	LWT (F)	OUTLET WT (F)		WPD	CAPACITY (MBH)		INPUT POWER (KW)	HEATING TOTAL INPUT CURRENT	AMB (°F)	COP	GPM			EWT (F)	LWT (F)	OUTLET WT (F)		WPD	MCA	MOCP	V/Φ/HZ			
						CALC	NOM						DESIGN	MAX	MIN			MAX	MIN		CALC	NOM					DESIGN	MAX	MIN			MAX	MIN							
HP-1	LG KCHH060HDGC	HEAT PUMP	R32				60			92	-	-	217.5			62	42	-	-	-	-	-	-	-	33	-	56	-	-	115	135	-	-	-	132	150	460/3/60	3,500		
HP-2	LG KCHH060HDGC	HEAT PUMP	R32				60			92	-	-	217.5			62	42	-	-	-	-	-	-	-	33	-	56	-	-	115	135	-	-	-	132	150	460/3/60	3,500		
HP-3	LG KCHH060HDGC	HEAT PUMP	R32				60			92	-	-	217.5			62	42	-	-	-	-	-	-	-	33	-	56	-	-	115	135	-	-	-	132	150	460/3/60	3,500		
HP-4	LG KCHH060HDGC	HEAT PUMP	R32				60			92	-	-	217.5			62	42	-	-	-	-	-	-	-	33	-	56	-	-	115	135	-	-	-	132	150	460/3/60	3,500		
HP-5	LG KCHH060HDGC	HEAT PUMP	R32				60			92	-	-	217.5			62	42	-	-	-	-	-	-	-	33	-	56	-	-	115	135	-	-	-	132	150	460/3/60	3,500		
HP-6	LG KCHH060HDGC	HEAT PUMP	R32				60			92	-	-	217.5			62	42	-	-	-	-	-	-	-	33	-	56	-	-	115	135	-	-	-	132	150	460/3/60	3,500		
HP-7	LG KCHH060HDGC	HEAT PUMP	R32				60			92	-	-	217.5			62	42	-	-	-	-	-	-	-	33	-	56	-	-	115	135	-	-	-	132	150	460/3/60	3,500		
HP-8	LG KCHH060HDGC	HEAT PUMP	R32				60			92	-	-	217.5			62	42	-	-	-	-	-	-	-	33	-	56	-	-	115	135	-	-	-	132	150	460/3/60	3,500		
HP-9	LG KCHH060HDGC	HEAT PUMP	R32				60			92	-	-	217.5			62	42	-	-	-	-	-	-	-	33	-	56	-	-	115	135	-	-	-	132	150	460/3/60	3,500		
HP-10	LG KCHH060HDGC	HEAT PUMP	R32				60			92	-	-	217.5			62	42	-	-	-	-	-	-	-	33	-	56	-	-	115	135	-	-	-	132	150	460/3/60	3,500		

FANS

TAG	MANUFACTURER & MODEL	SERVES	AREA SERVED	LOCATION	TYPE	DRIVE	DISCHARGE	CFM	TSP	ESP	DESIGN FAN RPM	MAX FAN RPM	MOTOR RPM	V/PH	BHP	HP	SONES	ROOF OPENING	OP WT (LBS)	ACCESSORIES	REMARKS
LEF-1A		LABS	LABS	ROOF	CW	BELT DRIVE	UB	55,000	3	3				460/3		60		-	2500	PREMIUM EFF, TEFC, VFD RATED MOTOR WITH SHAFT GROUNDING; BOLTED ACCESS DOOR; DRAIN W/PLUG; WEATHER HOOD; SPARK B RESISTANCE; HI-PRO POLYESTER COATING	
LEF-1B		LABS	LABS	ROOF	CCW	BELT DRIVE	UB	55,000	3	3				460/3		60		-	2500	PREMIUM EFF, TEFC, VFD RATED MOTOR WITH SHAFT GROUNDING; BOLTED ACCESS DOOR; DRAIN W/PLUG; WEATHER HOOD; SPARK B RESISTANCE; HI-PRO POLYESTER COATING	
LEF-1C		LABS	LABS	ROOF	CCW	BELT DRIVE	UB	55,000	3	3				460/3		60		-	2500	PREMIUM EFF, TEFC, VFD RATED MOTOR WITH SHAFT GROUNDING; BOLTED ACCESS DOOR; DRAIN W/PLUG; WEATHER HOOD; SPARK B RESISTANCE; HI-PRO POLYESTER COATING	
EF-1		ELEVATOR HOISTWAY VENT	ELEVATOR	ROOF	CW	BELT DRIVE	UB							460/3		3			400		
EF-2		ELEVATOR HOISTWAY VENT	ELEVATOR	ROOF	CW	BELT DRIVE	UB							460/3		3			400		
EF-4		ELEC ROOM	ELEC ROOM	ELEC ROOM ROOF	ROOF	DIRECT DRIVE	DOWNBLAST							115/1		1			100	EC MOTOR; BACKDRAFT DAMPER; 12" ROOF CURB; SPEED CONTROLLER WITH 0-10 VDC LEAD; DISCONNECT SWITCH	
EF-5		RESTROOMS	RESTROOMS	ROOF	ROOF	DIRECT DRIVE	DOWNBLAST							460/3		3			400		

VARIABLE FREQUENCY DRIVE

TAG	MANUFACTURER & MODEL	SERVING	HP	EFF	TEMP F		LOCATION	V/PH	OP WT (LBS)	ACCESSORIES	REMARKS
					MAX	MIN					
VFD LEF-1A	DANFOSS FC-102	LEF	60	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD LEF-1B	DANFOSS FC-102	LEF	60	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD LEF-1C	DANFOSS FC-102	LEF	60	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD EF-1	DANFOSS FC-102	EF	3	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD EF-2	DANFOSS FC-102	EF	3	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD EF-5	DANFOSS FC-102	EF	3	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD CHWP-1	DANFOSS FC-102	CHWP	15	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD CHWP-2	DANFOSS FC-102	CHWP	15	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD HHWP-1	DANFOSS FC-102	HHWP	7.5	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD HHWP-2	DANFOSS FC-102	HHWP	7.5	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD AHU-1	DANFOSS FC-102	AHU-1	90	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD AHU-1	DANFOSS FC-102	AHU-1	90	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD AHU-1	DANFOSS FC-102	AHU-1	90	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD AHU-1	DANFOSS FC-102	AHU-1	90	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD AHU-2	DANFOSS FC-102	AHU-2	70	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD AHU-2	DANFOSS FC-102	AHU-2	70	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	

PUMPS

TAG	MANUFACTURER & MODEL	SERVES	AREA SERVED	LOCATION	SHUT OFF TDH	TYPE	GPM	HEAD (FT)	%EFF	NPSH (FT)	INLET (IN)	OUTLET (IN)	RPM	IMPELLER SIZE (IN)	ELECTRICAL			OP WT (LBS)	ACCESSORIES	REMARKS
															BHP	HP	V/PH			
CHWP-1		AHU-1, AHU-2	BUILDING	ROOF		CLOSED-COUPLED END SUCTION	1020	40								15	460/3	625	VFD-CHWP-1	N+1
CHWP-2		AHU-1, AHU-2	BUILDING	ROOF		CLOSED-COUPLED END SUCTION	1020	40								15	460/3	625	VFD-CHWP-2	N+1
HHWP-1		AHU-1, AHU-2	BUILDING	ROOF		CLOSED-COUPLED END SUCTION	520	40								7.5	460/3	380	VFD-HHWP-1	N+1
HHWP-2		AHU-1, AHU-2	BUILDING	ROOF		CLOSED-COUPLED END SUCTION	520	40								7.5	460/3	380	VFD-HHWP-2	N+1

MISCELLANEOUS EQUIPMENT

TAG	MANUFACTURER & MODEL	SERVING	DESCRIPTION	CAPACITY	DESIGN CONDITIONS	ELECTRICAL		OP WT (LBS)	ACCESSORIES	REMARKS
						PWR	V/PH			
GH-201, 202, 203	GREENHECK FGR	ELEV SHAFTS	SMOKE RELIEF HOOD	N/A	N/A	N/A	N/A	100	NO DAMPER, HOOD ONLY	24X24
ST-1		CHW BUFFER TANK		1600 GAL						
ST-2		HHW BUFFER TANK		840 GAL						

ARCHITECT:

Western Allied MECHANICAL

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(650) 326-0750
CA State License No. 826782

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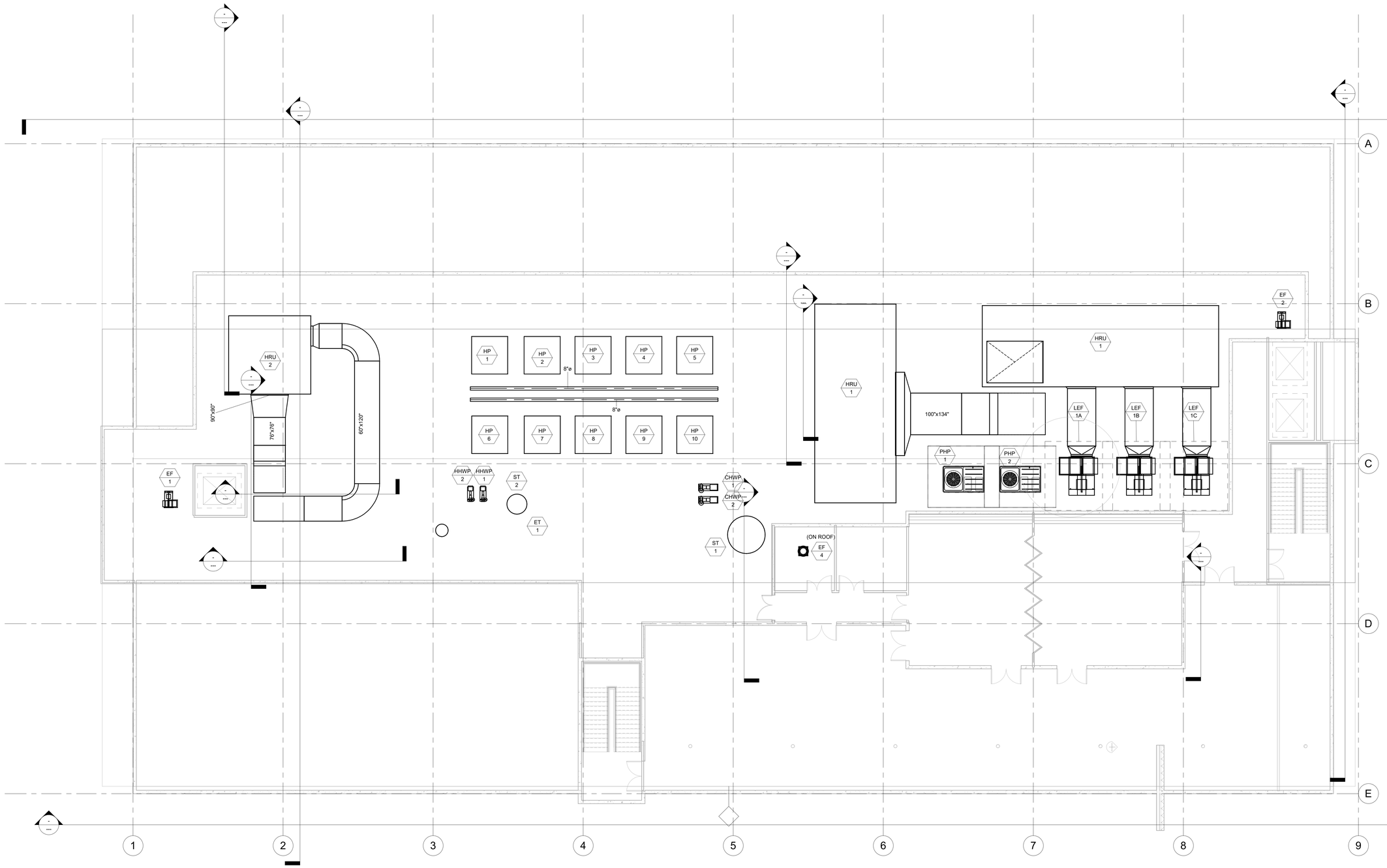
NO.	DESCRIPTION	DATE
1	Revision 1	Date

SCHEDULES - ELECTRIC PLANT

SCALE:	12" = 1'-0"
DRN BY:	Author
CHK BY:	Checker
JOB NO:	PROJECT #
DATE:	Issue Date

SHEET NO:
M0.3 - ALL ELEC

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STAMP:

NO.	DESCRIPTION	DATE

MECHANICAL ROOF - ELECTRIC PLANT

SCALE:	1/8" = 1'-0"
DRN BY:	Author
CHK BY:	Checker
JOB NO:	PROJECT #
DATE:	Issue Date

SHEET NO:
M2.6
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ELEC

11/15/2024 3:09:57 PM \\jeffersonusers\rzruss\1005 O' Brien Dr_R20_zruss@westernallied.com.rvt

WATER COOLED CHILLER

TAG	MANUFACTURER & MODEL	TYPE	REFRIGERANT			CAPACITY-TONS			KW	KW/ TON	NPLV	EVAPORATOR								CONDENSER								ELECTRICAL			OP WT (LBS)	ACCESSORIES	REMARKS
			TYPE	CIRCUITS	CHARGE (LBS)	CALC	NOM	ACT				INLET (IN)	OUTLET (IN)	EWT	LWT	DES GPM	DES WPD	MIN GPM	MIN WPD	INLET (IN)	OUTLET (IN)	EWT	LWT	DES GPM	DES WPD	MIN GPM	MIN WPD	MCA	MOCP	V/PH			
CH-1	YORK YMC2-S1477BBS	CENTIFUGAL	-	-	-		420		210.8																		346	600	460/3	15700		
CH-2	YORK YMC2-S1477BBS	CENTIFUGAL	-	-	-		420		210.8																		346	600	460/3	15700		

HEAT PUMPS

TAG	MANUFACTURER & MODEL	SERVING	NOM. TON	CFM			SUPPLY FAN					RELIEF/RETURN FAN					REF	COOLING COIL							HEATING DATA (MBH)				FINAL			ELECTRICAL			OP WT (LBS)	ACCESSORIES	REMARKS
				DESIGN	OSA		ESP	QTY.	FAN TYPE	RPM	BHP	HP	ESP	QTY.	FAN TYPE	RPM	BHP	HP	TYPE	SYS 1 CHAR. SYS 2 CHAR.	CAPACITY (MBH)		EDB	LDB	AMB	CIRC.	SEER/ EER SEER2	IEER	ROWS	CAPACITY (MBH)	EDB	COP (47°F)	COP (17°F)	TYPE	DEPTH	MERV	MCA	MOCP	V/PH			
					DES	ABS	TSP						TSP								TOTAL	SENS	EWB	LWB						FPI	LDB										
PHP-1	TEMPMASTER XXE12A4B3AB1B111A3	CONF	10	4000	535	535	0.6	1	BELT	839	2.31	3.7	-	1	DIRECT DRIVE	-	-	-	R-410A	12.25	108	99.5	83	58.3	95	2	- / 11	14.6	-	114	55	3.4	2.25	PLEAT ED	4"	13	25.3	30	460/3	1240	DRY BULB ECONOMIZER, POWER EXHAUST, REUSE EXISTING DUCT SMOKE DETECTOR AT UNIT, 10 KW ELEC RESISTANCE HEATER	
							0.85						-							12.25			64	54.2			- / -		-		82.5										
PHP-2	TEMPMASTER XXE12A4B3AB1B111A3	CONF	10	4000	415	415	0.6	1	BELT	839	2.31	3.7	-	1	DIRECT DRIVE	-	-	-	R-410A	12.25	108	99.5	83	58.3	95	2	- / 11	14.6	-	114	55	3.4	2.25	PLEAT ED	4"	13	25.3	30	460/3	1240	DRY BULB ECONOMIZER, POWER EXHAUST, REUSE EXISTING DUCT SMOKE DETECTOR AT UNIT, 10 KW ELEC RESISTANCE HEATER	
							0.85						-							12.25			64	54.2			- / -		-		82.5										

COOLING TOWER

TAG	MANUFACTURER & MODEL	SERVICE	AREA SERVED	LOCATION	DESIGN PERFORMANCE				WPD PSI	T-24 PERFORMANCE				WPD PSI	STATIC HEAD	MIN FLOW	FANS			OP WT (LBS)	ACCESSORIES	REMARKS
					GPM	OAWB	EWT	LWT		GPM	OAWB	EWT	LWT				QTY	HP/EA	V/PH			
CT-1	BAC-3000 S3E-1222-07N	CHILLER	MECH ROOM	ROOF												-	1	25	460V/3PH	25150	SWEEPER PIPING, VIBRATION SWITCH, EXTERNAL LADDER AND SERVICE PLATFORM,	
CT-2	BAC-3000 S3E-1222-07N	CHILLER	MECH ROOM	ROOF												-	1	25	460V/3PH	25150	SWEEPER PIPING, VIBRATION SWITCH, EXTERNAL LADDER AND SERVICE PLATFORM,	

CHILLED WATER AIR HANDLING UNIT

TAG	MANUFACTURER & MODEL	SERVING	CFM			SUPPLY FAN				RELIEF/RETURN FAN				COILS		FILTER									ELECTRICAL			OP WT (LBS)	ACCESSORIES	REMARKS
			TOTAL	OSA		ESP	RPM	BHP	HP	ESP	RPM	BHP	HP	CHW	HHW	PREFILTER			CARBON			FINAL			MCA	MOCP	V/PH			
				DES	ABS	TSP				TSP						EFF	QTY	SIZE	EFF	QTY	SIZE	EFF	QTY	SIZE						
AHU-1	SCOTT SPRINGFIELD	COLD DECK	165,000						330																		460 / 3	61,050	120V FOR OUTLET AND LIGHTS, 460V SINGLE POINT POWER CONNECTION, RETURN AIR DAMPER	N-1 SUPPLY FAN REDUNDANCY, DUCT SMOKE DETECTOR MOUNTED BY MECHANICAL., PROVDED AND WIRED BY FIRE AND LIFE SAFETY
AHU-2	SCOTT SPRINGFIELD	HOT/TEMPERED DECK	70,000						140																		460 / 3	26,000	120V FOR OUTLET AND LIGHTS, 460V SINGLE POINT POWER CONNECTION, RETURN AIR DAMPER	N-1 SUPPLY FAN REDUNDANCY, DUCT SMOKE DETECTOR MOUNTED BY MECHANICAL., PROVDED AND WIRED BY FIRE AND LIFE SAFETY

BOILERS

TAG	MANUFACTURER & MODEL	AREA SERVED	LOCATION	SERVING	TYPE	CAP (MBH)				TEMP		GPM			WATER CONN.	WPD (FT)	GAS				WP MAX	FLUE			ELECTRICAL			OP WT (LBS)	ACCESSORIES	REMARKS
						CALC	IN	OUT	EFF %	EWT (F)	LWT (F)	DESIGN	MAX	MIN			FUEL	CONN (IN)	PRESSURE			CAT	MATERIAL	SIZE	AMPS	MOCP	V/PH			
																			MAX	MIN										
B-1	CLEAVERBROOKS CFC-E-700-4000-125HW	AHU-1/AHU-2	PENTHOUSE	LABS & OFFICE	CONDENSING		4000												14" WC	7" WC	-	IV	POLY-PROPYLENE	12"	-	20	460/3	5400	BMS GATEWAY; OUTDOOR VENT KIT; CONDENSATE TREATMENT KIT; HIGH LIMIT MANUAL RESET	
B-2	CLEAVERBROOKS CFC-E-700-4000-125HW	AHU-1/AHU-2	PENTHOUSE	LABS & OFFICE	CONDENSING		4000												14" WC	7" WC	-	IV	POLY-PROPYLENE	12"	-	20	460/3	5400	BMS GATEWAY; OUTDOOR VENT KIT; CONDENSATE TREATMENT KIT; HIGH LIMIT MANUAL RESET	

FANS

TAG	MANUFACTURER & MODEL	SERVES	AREA SERVED	LOCATION	TYPE	DRIVE	DISCHARGE	CFM	TSP	ESP	DESIGN FAN RPM	MAX FAN RPM	MOTOR RPM	V/PH	BHP	HP	SONES	ROOF OPENING	OP WT (LBS)	ACCESSORIES	REMARKS
LEF-1A		LABS	LABS	ROOF	CW	BELT DRIVE	UB	55,000	3	3				460/3		60		-	2500	PREMIUM EFF, TEFC, VFD RATED MOTOR WITH SHAFT GROUNDING; BOLTED ACCESS DOOR; DRAIN W/PLUG; WEATHER HOOD; SPARK B RESISTANCE; HI-PRO POLYESTER COATING	
LEF-1B		LABS	LABS	ROOF	CW	BELT DRIVE	UB	55,000	3	3				460/3		60		-	2500	PREMIUM EFF, TEFC, VFD RATED MOTOR WITH SHAFT GROUNDING; BOLTED ACCESS DOOR; DRAIN W/PLUG; WEATHER HOOD; SPARK B RESISTANCE; HI-PRO POLYESTER COATING	
LEF-1C		LABS	LABS	ROOF	CW	BELT DRIVE	UB	55,000	3	3				460/3		60		-	2500	PREMIUM EFF, TEFC, VFD RATED MOTOR WITH SHAFT GROUNDING; BOLTED ACCESS DOOR; DRAIN W/PLUG; WEATHER HOOD; SPARK B RESISTANCE; HI-PRO POLYESTER COATING	
EF-1		ELEVATOR HOISTWAY VENT	ELEVATOR	ROOF	CW	BELT DRIVE	UB							460/3		3			400		
EF-2		ELEVATOR HOISTWAY VENT	ELEVATOR	ROOF	CW	BELT DRIVE	UB							460/3		3			400		
EF-3		CHILLER ROOM	CHILLER ROOM	CHILLER ROOM ROOF	ROOF	DIRECT DRIVE	DOWNBLAST							115/1		1			100	EC MOTOR; BACKDRAFT DAMPER; 12" ROOF CURB; SPEED CONTROLLER WITH 0-10 VDC LEAD; DISCONNECT SWITCH	
EF-4		ELEC ROOM	ELEC ROOM	ELEC ROOM ROOF	ROOF	DIRECT DRIVE	DOWNBLAST							115/1		1			100	EC MOTOR; BACKDRAFT DAMPER; 12" ROOF CURB; SPEED CONTROLLER WITH 0-10 VDC LEAD; DISCONNECT SWITCH	
EF-5		RESTROOMS	RESTROOMS	ROOF	ROOF	DIRECT DRIVE	DOWNBLAST							460/3		3			400		

VARIABLE FREQUENCY DRIVE

TAG	MANUFACTURER & MODEL	SERVING	HP	EFF	TEMP F		LOCATION	V/PH	OP WT (LBS)	ACCESSORIES	REMARKS
					MAX	MIN					
VFD LEF-1A	DANFOSS FC-102	LEF	60	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD LEF-1B	DANFOSS FC-102	LEF	60	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD LEF-1C	DANFOSS FC-102	LEF	60	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD EF-1	DANFOSS FC-102	EF	3	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD EF-2	DANFOSS FC-102	EF	3	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD EF-5	DANFOSS FC-102	EF	3	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD CT-1	DANFOSS FC-102	CT	25	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD CT-2	DANFOSS FC-102	CT	25	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD CHWP-1	DANFOSS FC-102	CHWP	15	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD CHWP-2	DANFOSS FC-102	CHWP	15	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD CWP-1	DANFOSS FC-102	CWP	40	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD CWP-2	DANFOSS FC-102	CWP	40	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD HHWP-1	DANFOSS FC-102	HHWP	7.5	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD HHWP-2	DANFOSS FC-102	HHWP	7.5	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD AHU-1	DANFOSS FC-102	AHU-1	90	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD AHU-1	DANFOSS FC-102	AHU-1	90	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD AHU-1	DANFOSS FC-102	AHU-1	90	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD AHU-1	DANFOSS FC-102	AHU-1	90	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD AHU-2	DANFOSS FC-102	AHU-2	70	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD AHU-2	DANFOSS FC-102	AHU-2	70	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	

PUMPS

TAG	MANUFACTURER & MODEL	SERVES	AREA SERVED	LOCATION	SHUT OFF TDH	TYPE	GPM	HEAD (FT)	%EFF	NPSH (FT)	INLET (IN)	OUTLET (IN)	RPM	IMPELLER SIZE (IN)	ELECTRICAL			OP WT (LBS)	ACCESSORIES	REMARKS
															BHP	HP	V/PH			
CHWP-1		AHU-1, AHU-2	BUILDING	ROOF		CLOSED-COUPLED END SUCTION	1020	40								15	460/3	625	VFD-CHWP-1	N+1
CHWP-2		AHU-1, AHU-2	BUILDING	ROOF		CLOSED-COUPLED END SUCTION	1020	40								15	460/3	625	VFD-CHWP-2	N+1
CWP-1		CT-1	BUILDING	ROOF		CLOSED-COUPLED END SUCTION	2500	40								40	460/3	1500	VFD-CWP-1	N+1
CWP-2		CT-1	BUILDING	ROOF		CLOSED-COUPLED END SUCTION	2500	40								40	460/3	1500	VFD-CWP-2	N+1
HHWP-1		AHU-1, AHU-2	BUILDING	ROOF		CLOSED-COUPLED END SUCTION	520	40								7.5	460/3	380	VFD-HHWP-1	N+1
HHWP-2		AHU-1, AHU-2	BUILDING	ROOF		CLOSED-COUPLED END SUCTION	520	40								7.5	460/3	380	VFD-HHWP-2	N+1

MISCELLANEOUS EQUIPMENT

TAG	MANUFACTURER & MODEL	SERVING	DESCRIPTION	CAPACITY	DESIGN CONDITIONS	ELECTRICAL		OP WT (LBS)	ACCESSORIES	REMARKS
						PWR	V/PH			
CS-1	PUROFLUX PF-64-030-AP	CT-1	CENTRIFUGAL SEPARATOR	220 GPM	1 CELL	7.5 HP	460/3	645		
GH-201, 202, 203	GREENHECK FGR	ELEV SHAFTS	SMOKE RELIEF HOOD	N/A	N/A	N/A	N/A	100	NO DAMPER, HOOD ONLY	24X24
ST-1		CHW BUFFER TANK		1600 GAL						

ARCHITECT:

Western Allied MECHANICAL

33210 Central Ave, Union City, CA 94587
(650) 326-0750
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STAMP:

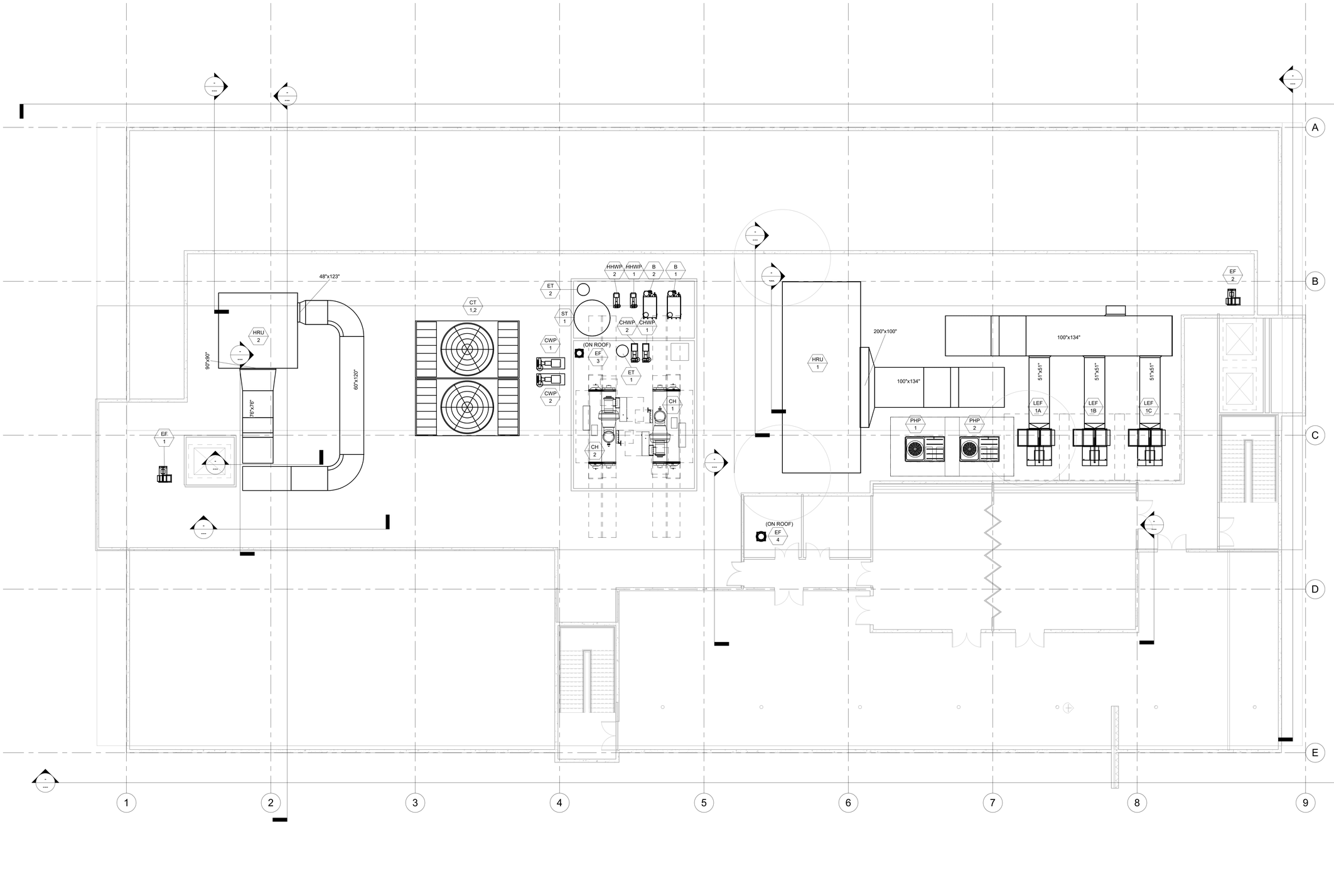
NO.	DESCRIPTION	DATE
1	Revision 1	Date

SCHEDULES - TRADITIONAL PLANT

SCALE: 12" = 1'-0"
DRN BY: Author
CHK BY: Checker
JOB NO: PROJECT #
DATE: Issue Date

SHEET NO:
M0.3 TRAD

11/15/2024 3:09:57 PM \\jeffersoniusers\zrussell100$ O' Brien Dr_R20_zrussell@westernallied.com.rvt



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STAMP:

NO.	DESCRIPTION	DATE

MECHANICAL ROOF - TRADITIONAL PLANT

SCALE:	1/8" = 1'-0"
DRN BY:	Author
CHK BY:	Checker
JOB NO:	PROJECT #
DATE:	Issue Date

SHEET NO:
M2.6
-TRAD

11/15/2024 3:10:00 PM \\jefferson\users\rzurush1\005 O' Brien Dr_ R20_zrussi@westernallied.com.rvt

NRG ENGINEERING
eNeRGy + Building Performance

Tom Hyde
DES Architects + Engineers
399 Bradford St.
Redwood City, CA 94063

September 12, 2024

Subject: 1005 O'Brien Drive All-Electric Analysis

City of Menlo Park's Cost Effectiveness Calculator

Step 1: Incremental construction costs	($1,506,460)
Step 2: Incremental operational time dependent valuation (TDV) costs/benefits	($16,719)
Step 3: Cost effectiveness calculations	($1,523,179)
To demonstrate the cost effectiveness exception, add the incremental construction cost of the electric system (per Step 1) to the on-going TDV impact of the baseline system to the proposed system (per Step 2). This will determine the Net Present Value (NPV) of the electric system. For example, if the incremental cost of the electric system is determined to be $1,000 more than the gas system in Step 1 (and thus a negative number), then the NPV of the electric system would be -$1,000 + $890 = -$110 NPV. If the NPV is positive, then the electric system is cost-effective. If the NPV is negative, the electric system is not cost-effective.	NPV is negative/not cost-effective

City of Menlo Park's NPV Calculation

Design Option	Step 1 TDV	Step 2 Bldg SF	Step 3 TDV kBtu	Step 4 NPV
All Elec design	81.94	155,491	12,740,433	$ 1,133,899
Gas/Elec design	80.73	155,491	12,552,578	$ 1,117,179
	TDV Cost of All-Electric Design			**$ (16,719)**

Respectfully,
NRG ENGINEERING

Erik Dyrr

CERTIFICATE OF COMPLIANCE - NONRESIDENTIAL PERFORMANCE COMPLIANCE METHOD	NRCC-PRF-E
Nonresidential Performance Compliance Method	(Page 1 of 28)

Project Name:	1005_OBD	Date Prepared:	2024-09-11

A. General Information					
1	Project Name	1005_OBD			
2	Run Title	Title 24 Analysis			
3	Project Location	1005 O Brien Dr.			
4	City	Menlo Park	5	Standards Version	Compliance 2022
6	Zip code	94027	7	Compliance Software (version)	CBECC 2022.3.0 (1302)
8	Climate Zone	3	9	Building Orientation (deg)	0
10	Building Type(s)	• Nonresidential	11	Weather File	OAKLAND-INTL_STYP20.epw
12	Project Scope	• New complete scope	13	Number of Dwelling Units	0
14	Total Conditioned Floor Area in Scope (ft^2)	155491	15	Total # of hotel/motel rooms	0
16	Total Unconditioned Floor Area (ft^2)	449.72	17	Fuel Type	Natural gas
18	Nonresidential Conditioned Floor Area	155491	19	Total # of Stories (Habitable Above Grade)	6
20	Residential Conditioned Floor Area	0			

B. PROJECT SUMMARY

Table B shows which building components are included in the performance calculation. If indicated as not included, the project must show compliance prescriptively if within the permit application.

<table>
<tr><th colspan="6">Building Components Complying via Performance</th><th colspan="2">Building Components Complying Prescriptively</th></tr>
<tr><td rowspan="2">Envelope (See Table G)</td><td>Nonres</td><td>Performance</td><td rowspan="2">Solar Thermal Water Heating (See Table I3)</td><td>☐</td><td>Performance</td><td colspan="2" rowspan="2">The following building components are ONLY eligible for prescriptive compliance and should be documented on the NRCC form listed if within the scope of the permit application (i.e. compliance will not be shown on the NRCC-PRF-E).</td></tr>
<tr><td>MultiFam</td><td>Not Included</td><td>☒</td><td>Not Included</td></tr>
<tr><td rowspan="2">Mechanical (See Table H)</td><td>Nonres</td><td>Performance</td><td rowspan="2">Covered Process: Commercial Kitchens (see Table J)</td><td>☐</td><td>Performance</td><td>Indoor Lighting (Unconditioned) 140.6 & 170.2(e)</td><td>NRCC-LTI-E is required</td></tr>
<tr><td>MultiFam</td><td>Not Included</td><td>☒</td><td>Not Included</td><td>Outdoor Lighting 140.7 & 170.2(e)</td><td>NRCC-LTO-E is required</td></tr>
<tr><td rowspan="2">Domestic Hot Water (See Table I)</td><td>Nonres</td><td>Performance</td><td rowspan="2">Covered Process: Laboratory Exhaust (see Table J)</td><td>☒</td><td>Performance</td><td>Sign Lighting 140.8 & 170.2(e)</td><td>NRCC-LTS-E is required</td></tr>
<tr><td>MultiFam</td><td>Not Included</td><td>☐</td><td>Not Included</td><td colspan="2">Building Components Complying with Mandatory Measures</td></tr>
<tr><td rowspan="2">Lighting (Indoor Conditioned, see Table K)</td><td>Nonres</td><td>Performance</td><td rowspan="2">Photovoltaics (see Table F)</td><td>☐</td><td>Performance</td><td colspan="2">Electrical power systems, commissioning, solar ready, elevator and escalator requirements are mandatory and should be documented on the NRCC form listed if applicable (i.e. compliance will not be shown on the NRCC-PRF-E.)</td></tr>
<tr><td>MultiFam</td><td>Not Included</td><td>☒</td><td>Not Included</td><td>Electrical Power Distribution 110.11</td><td>NRCC-ELC-E is required</td></tr>
<tr><td colspan="3" rowspan="2"></td><td rowspan="2">Battery (see Table F)</td><td>☐</td><td>Performance</td><td>Commissioning 120.8</td><td>NRCC-CXR-E is required</td></tr>
<tr><td>☒</td><td>Not Included</td><td>Solar and Battery 110.10</td><td>NRCC-SAB-E is required</td></tr>
</table>

C1. COMPLIANCE SUMMARY

COMPLIES[3]

	Time Dependent Valuaton (TDV)		Source Energy Use
	Efficiency[1] (kBtu/ft^2 - yr)	**Total[2] (kBtu/ft^2 - yr)**	**Total[2] (kBtu/ft^2 - yr)**
Standard Design	303.01	303.01	56.87
Proposed Design	278.03	278.03	45.28
Compliance Margins	**24.98**	**24.98**	**11.59**
	Pass	**Pass**	**Pass**

[1] Efficiency measures include improvements like a better building envelope and more efficient equipment

[2] Compliance Totals include efficiency, photovoltaics and batteries

[3] New Construction, Complete Addition Scope: Building complies when all efficiency and total compliance margins are greater than or equal to zero and unmet load hour limits are not exceeded
Existing, Addition and Alteration Scope: Building complies when efficiency compliance margin is greater than or equal to zero and unmet load hour limits are not exceeded

C2. TDV ENERGY COMPLIANCE RESULTS FOR PERFORMANCE COMPONENTS (Annual TDV Energy Use, kBtu/ft^2 - yr)

COMPLIES[2]

Energy Component	Standard Design (TDV)	Proposed Design (TDV)	Compliance Margin (TDV)[1]
Space Heating	112.58	80.73	31.85
Space Cooling	20.42	16.2	4.22
Indoor Fans	96.76	103.78	-7.02
Heat Rejection	2.31	0.29	2.02
Pumps & Misc.	10.4	16.78	-6.38
Domestic Hot Water	5.24	4.95	0.29
Indoor Lighting	55.3	55.3	0
Flexibility	---	---	---
EFFICIENCY COMPLIANCE TOTAL	**303.01**	**278.03**	**24.98 (8.2%)**
Photovoltaics	---	---	---
Batteries	---	---	---
TOTAL COMPLIANCE	**303.01**	**278.03**	**24.98 (8.2%)**

[1] *Notes: This number in parenthesis following the Compliance Margin in column 4, represents the Percent Better than Standard.*

C3. TDV ENERGY RESULTS FOR NON-REGULATED COMPONENTS[1]

Non-Regulated Energy Component	Standard Design (TDV)	Proposed Design (TDV)	Compliance Margin (TDV)[1]
Receptacle	125.27	125.27	---
Process	25.6	25.6	---
Other Ltg	---	---	---
Process Motors	---	---	---
TOTAL (TOTAL COMPLIANCE + NON-REGULATED COMPONENTS)	**453.88**	**428.9**	**24.98 (5.5%)**

[1] *Notes: This table is not used for Energy Code Compliance.*

C4. SOURCE ENERGY COMPLIANCE RESULTS FOR PERFORMANCE COMPONENTS (Annual SOURCE Energy Use, kBtu/ft^2 /yr)

COMPLIES[2]

Energy Component	Standard Design (SOURCE)	Proposed Design (SOURCE)	Compliance Margin (SOURCE)[1]
Space Heating	39.89	28.29	11.6
Space Cooling	0.7	0.5	0.2
Indoor Fans	10.14	10.59	-0.45
Heat Rejection	0.07	0.01	0.06
Pumps & Misc.	0.68	0.84	-0.16
Domestic Hot Water	0.79	0.45	0.34
Indoor Lighting	4.6	4.6	0
Flexibility	---	---	---
EFFICIENCY COMPLIANCE TOTAL	**56.87**	**45.28**	**11.59 (20.4%)**
Photovoltaics	---	---	---
Batteries	---	---	---
TOTAL COMPLIANCE	**56.87**	**45.28**	**11.59 (20.4%)**

[1] *Notes: This number in parenthesis following the Compliance Margin in column 4, represents the Percent Better than Standard.*

C5. SOURCE ENERGY RESULTS FOR NON-REGULATED COMPONENTS[1]

Non-Regulated Energy Component	Standard Design (SOURCE)	Proposed Design (SOURCE)	Compliance Margin (SOURCE)[1]
Receptacle	15.24	15.24	---
Process	2.8	2.8	---
Other Ltg	---	---	---
Process Motors	---	---	---
TOTAL (TOTAL COMPLIANCE + NON-REGULATED COMPONENTS)	**74.91**	**63.32**	**11.59 (15.5%)**

[1] *Notes: This table is not used for Energy Code Compliance.*

C6. 'ABOVE CODE' QUALIFICATIONS

☐ This project is pursuing CalGreen Tier 1 ☐ This project is pursuing CalGreen Tier 2

C7. ENERGY USE SUMMARY

Energy Component	Standard Design Site (MWh)	Proposed Design Site (MWh)	Margin (MWh)	Standard Design Site (MBtu)	Proposed Design Site (MBtu)	Margin (MBtu)
Space Heating	0.5	---	---	6657.3	4722.6	1934.7
Space Cooling	70.6	60.9	9.7	---	---	---
Indoor Fans	545.6	585.2	-39.6	---	---	---
Heat Rejection	7	0.8	6.2	---	---	---
Pumps & Misc.	51.6	85.4	-33.8	---	---	---
Domestic Hot Water	24.6	27.5	-2.9	76.9	---	---
Indoor Lighting	338.5	338.5	0	---	---	---
Flexibility	---	---	---	---	---	---
EFFICIENCY TOTAL	**1038.4**	**1098.3**	**-59.9**	**6734.2**	**4722.6**	**2011.6**
Photovoltaics	---	---	---	---	---	---
Batteries	---	---	---	---	---	---
ENERGY USE SUBTOTAL	**1038.4**	**1098.3**	**-59.9**	**6734.2**	**4722.6**	**2011.6**
Receptacle	679.8	679.8	0	1123.4	1123.4	0
Process	141.5	141.5	0	---	---	---
Other Ltg	---	---	---	---	---	---
Process Motors	---	---	---	---	---	---
ENERGY USE TOTAL	**1859.7**	**1919.6**	**-59.9**	**7857.6**	**5846**	**2011.6**

C8. ENERGY USE INTENSITY (EUI)

	Standard Design (kBtu/ft^2 / yr)	Proposed Design (kBtu/ft^2 / yr)	Margin (kBtu/ft^2 / yr)	Margin Percentage
GROSS EUI[1]	91.08	79.49	11.59	12.73
NET EUI[1]	91.08	79.49	11.59	12.73

[1] Notes: Gross EUI is Energy Use Total (not including PV)/Total Building Area. Net EUI is Energy Use Total (including PV)/Total Building Area.

D1. EXCEPTIONAL CONDITIONS

• The aged solar reflectance and aged thermal emittance must be listed in the Cool Roof Rating Council database of certified products. For projects where initial reflectance is used, the initial reflectance must be listed, and the aged reflectance is calculated by the software program and used in the compliance model.
• The project uses the Simplified Geometry Performance Modeling Approach which is not capable of modeling daylighting controls and assumes the prescriptive Secondary Daylit Control requirements are met. PRESCRIPTIVE COMPLIANCE documentation (form NRCC-LTI-02-E) for the requirements of section 140.6(d) Automatic Daylighting Controls in Secondary Daylit Zones is required.
• Project is claiming Exception 1 to Section 140.10(b): No battery storage system is required if the installed PV system size is less than 15 percent of the size determined by Equation 140.10-A.
• PV/Battery Building Type has been modified from software defaults for one or more spaces. Review project's PV/Battery Building Type(s) with documentation author. Refer to Energy Code section 140.10 for Nonresidential or 170.2(g) for more information.

G1. ENVELOPE GENERAL INFORMATION (conditioned spaces only)

01	02	03	04
Opaque Surfaces & Orientation	**Total Gross Surface Area (ft^2)**	**Total Fenestration Area (ft^2)**	**Window to Wall Ratio (%)**
North-Facing[1]	28717.6	12056.8	41.98
East-Facing[2]	11476.3	4349.5	37.9
South-Facing[3]	18586	12036	64.76

Notes
[1]North-Facing is oriented to within 45 degrees of true north, including 45 00'00" east of north (NE), but excluding 45 00'00" west of north (NW),
[2]East-Facing is oriented to within 45 degrees of true east, including 45 00'00" south of east (SE), but excluding 45 00'00" north of east (NE),
[3]South-Facing is oriented to within 45 degrees of true south, including 45 00'00" west of south (SW), but excluding 45 00'00" east of south (SE),
[4]West-Facing is oriented to within 45 degrees of true west, including 45 00'00" north of west (NW), but excluding 45 00'00" south of west (SW),

G1. ENVELOPE GENERAL INFORMATION (conditioned spaces only)

01	02	03	04
Opaque Surfaces & Orientation	**Total Gross Surface Area (ft^2)**	**Total Fenestration Area (ft^2)**	**Window to Wall Ratio (%)**
West-Facing[4]	9701.5	4968	51.21
Total	**68481.4**	**33410.3**	**48.79**
Roof	31559.1	0	0

Notes

[1]North-Facing is oriented to within 45 degrees of true north, including 45 00'00" east of north (NE), but excluding 45 00'00" west of north (NW),

[2]East-Facing is oriented to within 45 degrees of true east, including 45 00'00" south of east (SE), but excluding 45 00'00" north of east (NE),

[3]South-Facing is oriented to within 45 degrees of true south, including 45 00'00" west of south (SW), but excluding 45 00'00" east of south (SE),

[4]West-Facing is oriented to within 45 degrees of true west, including 45 00'00" north of west (NW), but excluding 45 00'00" south of west (SW),

G2A. ROOFING PRODUCT SUMMARY (NONRESIDENTIAL)

01	02	03	04	05	06
Assembly Name	**Roof Pitch**	**Roof Rise (x in 12)**	**Aged Solar Reflectance**	**Thermal Emittance**	**SRI**
R-30 Conc Roof	LowSlope	N/A	0.7	0.86	0

G4. NONRESIDENTIAL AIR BARRIER

01	02
Building Story Name	**Air Barrier**
Floor 1	Air barrier - not verified
Floor 2	Air barrier - not verified
Floor 3	Air barrier - not verified
Floor 4	Air barrier - not verified
Floor 5	Air barrier - not verified
Floor 6	Air barrier - not verified

G5. OPAQUE SURFACE ASSEMBLY SUMMARY

01	02	03	04	05	06		07	08	09	10
Surface Name	**Construction Type**	**Area (ft^2)**	**Framing Type**	**Cavity R-Value**	**Continuous R-Value**		**Units**	**Value**	**Description of Assembly Layers**	**Status[1]**
					Interior	**Exterior**				
Slab On Grade	Underground Floor	29,486.8	N/A	0	N/A	N/A	F-factor	0.73	Slab Type =Unheated slab on grade Insulation Orientation =None Insulation R-Value =none	N
R-13 Wall	Interior Wall	92,029.5	Metal	13	N/A	N/A	U-factor	0.1802	Gypsum Board - 5/8 in. Wall Metal Framed 2x4 R-13 Gypsum Board - 5/8 in.	N
GFRC Walls	Exterior Wall	59,324.2	Metal	19	N/A	5	U-factor	0.0857	Stone - 1 in. Vapor permeable felt - 1/8 in. Gypsum Board - 5/8 in. Compliance Insulation R5.00 Wall Metal Framed 2x8 R-19 Gypsum Board - 5/8 in.	N
Spandrel Panel w/Insulation	Exterior Wall	9,412	N/A	0	N/A	N/A	U-factor	0.2563	Aluminum w/ Thrml Break - Triple or low e glass - R10 Ins. Gypsum Board - 5/8 in.	N
Uninsulated Raised Slab	Exterior Floor	1,895	N/A	0	N/A	N/A	U-factor	0.2653	Concrete - 140 lb/ft3 - 4 in. Carpet - 3/4 in.	N
Uninsulated Raised Floor	Interior Floor	124,559	N/A	0	N/A	N/A	U-factor	0.2375	Concrete - 140 lb/ft3 - 4 in. Carpet - 3/4 in.	N
R-30 Conc Roof	Roof	31,559.1	N/A	0	N/A	30	U-factor	0.0298	Single Ply Roofing - 1/4 in. Plywood - 1/2 in. Concrete - 80 lb/ft3 - 8 in. Glass fiber batt - 10 in. R30 (CEC Default)	N

[1] *Status: N - New, A - Altered, E - Existing*

G7A. FENESTRATION ASSEMBLY SUMMARY (NONRESIDENTIAL)

01	02	03	04	05	06	07	08	09
Fenestration Assembly Name	**Fenestration Type/ Product Type / Frame Type**	**Certification Method[1]**	**Assembly Method**	**Area (ft^2)**	**Overall U-factor**	**Overall SHGC**	**Overall VT**	**Status[2]**
Solarban70 on Solar Blue	Vertical fenestration Curtain wall N/A	NFRC	Site built	33,410.3	0.39	0.29	0.56	N

[1] Notes: Newly installed fenestration shall have a certified NFRC Label Certificate or use the CEC default tables found in Table 110.6-A and Table 110.6-B. Center of Glass (COG) values are for the glass-only, determined by the manufacturer, and are shown for ease of verification. Site-built fenestration values are calculated per Nonresidential Appendix NA6 and are used in the analysis.

[2] Status: N - New, A - Altered, E - Existing

H1. DRY SYSTEM EQUIPMENT (FURNACES, AIR HANDLING UNITS, HEAT PUMPS, VRF, ECONOMIZERS ETC.)

01	02	03	04	05	06	07	08	09	10	11	12
			Heating				**Cooling**				
Equipment Name	**Equipment Type**	**Qty**	**Total Heating Output (kBtu/h)**	**Supp Heat Output (kBtu/h)**	**Efficiency Unit**	**Efficiency**	**Total Cooling Output (kBtu/h)**	**Efficiency Unit**	**Efficiency**	**Economizer Type (if present)**	**Status[1]**
Lab RTU	Variable Air Volume Air System	1	2349.74	0	N/A	NA - See Boiler	3002.37	N/A	NA - See Chiller	No Economizer	N
Office RTU	Variable Air Volume Air System	1	2912.16	0	N/A	NA - See Boiler	2075.07	N/A	NA - See Chiller	Fixed DB	N

[1] Status: N - New, A - Altered, E - Existing

H3. NONRESIDENTIAL / COMMON USE AREA FAN SYSTEMS SUMMARY

01	02	03	04	05	06	07	08	09	10	11	12	13
Name or Item Tag	Qty	Design OA CFM	Supply Fan				Return / Relief Fan					Status[1]
			CFM	Power	Power Units	Control	Fan Type	CFM	Power	Power Units	Control	
Lab RTU	1	106867	165,000	330	BHP	VSD	N/A	N/A	N/A	N/A	N/A	N
Office RTU	1	15714.1	70,000	140	BHP	VSD	N/A	N/A	N/A	N/A	N/A	N

[1] *Status: N - New, A - Altered, E - Existing*

H5. GENERAL EXHAUST FAN SUMMARY

01	02	03	04	05	06	07	08
System ID	Zone Name	Qty	CFM	Power	Power Units	Continuous Operation?	Status[1]
Lab Exhaust	1-01-LabC 2-01-LabN 3-02-LabW 4-02-LabN 5-02-LabC 6-02-LabE 7-03-LabW 8-03-LabN 9-03-LabE 10-03-LabC 11-04-LabW 12-04-LabN 13-04-LabE 14-04-LabC 15-05-LabW 16-05-LabN 17-05-LabE 18-05-LabC	1	110000	3	InH2O	No	N

[1] *Status: N - New, A - Altered, E - Existing*

H6. WET SYSTEM EQUIPMENT (boilers, chillers, cooling towers, etc.)

01	02	03	04	05	06	07	08	09	10
Name or Item Tag	**Equipment Type**	**Parent Fluid System Name**	**Qty**	**Vol (gal)**	**Rated Capacity**	**Capacity Unit**	**Rating**	**Rating Unit**	**Status[1]**
Boiler 1	Hot Water	HHW Loop	1	N/A	4,000	kBtu/Hr	0.94	TE	N
Boiler 2	Hot Water	HHW Loop	1	N/A	4,000	kBtu/Hr	0.94	TE	N
CH-1	Centrifugal	CHW Loop	1	N/A	5,040	kBtu/Hr	0.5	kWperTon	N
CH-2	Centrifugal	CHW Loop	1	N/A	5,040	kBtu/Hr	0.5	kWperTon	N
CT1	Open Tower	CW Loop	1	N/A	6,250	kBtu/Hr	12.5	HP	N
CT2	Open Tower	CW Loop	1	N/A	6,250	kBtu/Hr	12.5	HP	N

[1] *Status: N - New, A - Altered, E - Existing*

H7. PUMPS

01	02	03	04	05	06	07	08
Name or Item Tag	**Parent Equipment**	**Qty**	**Power**	**Power Units**	**GPM**	**VSD**	**Status[1]**
HHWP1	Boiler 1	1	7.5	BHP	520	☒	N
HHWP2	Boiler 2	1	7.5	BHP	520	☒	N
CWP	CW Loop	1	40	BHP	2500	☐	N
CHWP-1	CH-1	1	15	BHP	1020	☒	N
CHWP-2	CH-2	1	15	BHP	1020	☒	N

[1] *Status: N - New, A - Altered, E - Existing*

H8. SYSTEM SPECIAL FEATURES

01	02	03	04
System Name	**Equipment Type**	**Interlocks per 140.4(n)[1]**	**Other Special Features and Controls**
Lab RTU	Variable Air Volume Air System	N/A	DDC Controls Dual Maximum Reheat Controls Warmest Zone Supply Air Temp. Reset
Office RTU	Variable Air Volume Air System	N/A	DDC Controls Dual Maximum Reheat Controls Zone(s) With CO2 Sensor Vent. Control Warmest Zone Supply Air Temp. Reset Optimum Start Fixed DB
HHW Loop	Hot Water System	N/A	DDC Controls Fixed Temperature Control
SHW	Service Hot Water	N/A	Fixed Temperature Control
CW Loop	Condenser Water	N/A	DDC Controls Fixed Temperature Control
CHW Loop	Chilled Water System	N/A	DDC Controls Fixed Temperature Control

Notes: This table includes controls related to the performance path only. For projects using the prescriptive path, mandatory and prescriptive controls requirements are documented on the NRCC-MCH-E.

[1] Yes = interlocks are provided, No = interlocks are not provided, NA means no operable openings.

H9. NONRESIDENTIAL / COMMON USE AREA & HOTEL/MOTEL VENTILATION

01	02	03	04	05	06	07
Zone Name	**Mechanical Ventilation**				**Conditioned Area (sf)**	**DCV or Occupant Sensor Controls, or Both**
	Ventilation Function	**# of People**	**Supply OA CFM**	**Exhaust CFM**		
1-01-LabC	Misc - General manufacturing (excludes heavy industrial and process using chemicals)	37.8	12600	5040	7560	N/A

H9. NONRESIDENTIAL / COMMON USE AREA & HOTEL/MOTEL VENTILATION

01	02	03	04	05	06	07
Zone Name	Mechanical Ventilation				Conditioned Area (sf)	DCV or Occupant Sensor Controls, or Both
	Ventilation Function	# of People	Supply OA CFM	Exhaust CFM		
2-01-LabN	Misc - General manufacturing (excludes heavy industrial and process using chemicals)	13.43	4475	1790	2685	N/A
3-02-LabW	Misc - General manufacturing (excludes heavy industrial and process using chemicals)	6.64	2212.5	885	1327.5	N/A
4-02-LabN	Misc - General manufacturing (excludes heavy industrial and process using chemicals)	14.55	4850	1940	2910	N/A
5-02-LabC	Misc - General manufacturing (excludes heavy industrial and process using chemicals)	37.8	12598.8	5039.52	7559.28	N/A
6-02-LabE	Misc - General manufacturing (excludes heavy industrial and process using chemicals)	4.7	1565	626	939	N/A
7-03-LabW	Misc - General manufacturing (excludes heavy industrial and process using chemicals)	6.64	2212.5	885	1327.5	N/A
8-03-LabN	Misc - General manufacturing (excludes heavy industrial and process using chemicals)	16.31	5437.5	2175	3262.5	N/A

H9. NONRESIDENTIAL / COMMON USE AREA & HOTEL/MOTEL VENTILATION

01	02	03	04	05	06	07
Zone Name	Mechanical Ventilation				Conditioned Area (sf)	DCV or Occupant Sensor Controls, or Both
	Ventilation Function	# of People	Supply OA CFM	Exhaust CFM		
9-03-LabE	Misc - General manufacturing (excludes heavy industrial and process using chemicals)	7.82	2606.67	1042.67	1564	N/A
10-03-LabC	Misc - General manufacturing (excludes heavy industrial and process using chemicals)	37.8	12598.8	5039.52	7559.28	N/A
11-04-LabW	Misc - General manufacturing (excludes heavy industrial and process using chemicals)	6.64	2212.5	885	1327.5	N/A
12-04-LabN	Misc - General manufacturing (excludes heavy industrial and process using chemicals)	16.31	5437.5	2175	3262.5	N/A
13-04-LabE	Misc - General manufacturing (excludes heavy industrial and process using chemicals)	7.82	2606.25	1042.5	1563.75	N/A
14-04-LabC	Misc - General manufacturing (excludes heavy industrial and process using chemicals)	37.8	12598.8	5039.52	7559.28	N/A
15-05-LabW	Misc - General manufacturing (excludes heavy industrial and process using chemicals)	6.64	2212.5	885	1327.5	N/A

H9. NONRESIDENTIAL / COMMON USE AREA & HOTEL/MOTEL VENTILATION

01	02	03	04	05	06	07
Zone Name	Mechanical Ventilation				Conditioned Area (sf)	DCV or Occupant Sensor Controls, or Both
	Ventilation Function	# of People	Supply OA CFM	Exhaust CFM		
16-05-LabN	Misc - General manufacturing (excludes heavy industrial and process using chemicals)	16.31	5437.5	2175	3262.5	N/A
17-05-LabE	Misc - General manufacturing (excludes heavy industrial and process using chemicals)	7.82	2606.25	1042.5	1563.75	N/A
18-05-LabC	Misc - General manufacturing (excludes heavy industrial and process using chemicals)	37.8	12598.8	5039.52	7559.28	N/A
19-01_RD C	Office - Office space	30.33	909.96	0	6066.39	N/A
20-01_Shipping	Misc - Shipping/receiving	2.44	146.3	0	975.32	N/A
21-01_Conf	General - Conference/meeting	12.5	187.5	0	375	DCV
23-01_IDF	General - Unoccupied	0.44	0	0	291	N/A
24-01_Corridor	General - Corridors	11.63	348.91	0	2326.09	N/A
25-01_Elec	General - Unoccupied	0.7	0	0	464.88	N/A
26-01_RD W	Office - Office space	4.31	129.39	0	862.62	N/A
27-01_RD S	Office - Office space	14.47	434.21	0	2894.74	N/A
28-01_Lobby RR	Office - Main entry lobbies	151.21	2268	0	4536	DCV
29-02_RD S	Office - Office space	14.47	434.25	0	2895	N/A
30-02_RD C	Office - Office space	43.02	1290.63	0	8604.22	N/A
31-02_RD E	Office - Office space	14.03	420.9	0	2806	N/A
32-02_IDF	General - Unoccupied	0.44	0	0	291	N/A

H9. NONRESIDENTIAL / COMMON USE AREA & HOTEL/MOTEL VENTILATION

01	02	03	04	05	06	07
Zone Name	Mechanical Ventilation				Conditioned Area (sf)	DCV or Occupant Sensor Controls, or Both
	Ventilation Function	# of People	Supply OA CFM	Exhaust CFM		
33-02_RD W	Office - Office space	11.41	342.3	0	2282	N/A
34-03_RD E	Office - Office space	9.07	272.25	0	1815	N/A
35-03_RD S	Office - Office space	15.75	472.5	0	3150	N/A
36-03_RD C	Office - Office space	51.54	1546.2	0	10308	N/A
37-03_IDF	General - Unoccupied	0.44	0	0	291	N/A
38-04_IDF	General - Unoccupied	0.44	0	0	291	N/A
39-03_RD W	Office - Office space	11.41	342.3	0	2282	N/A
40-04_RD C	Office - Office space	51.54	1546.2	0	10308	N/A
41-04_RD S	Office - Office space	15.75	472.5	0	3150	N/A
42-04_RD E	Office - Office space	9.07	272.25	0	1815	N/A
43-04_RD W	Office - Office space	11.41	342.3	0	2282	N/A
44-05_RD W	Office - Office space	11.41	342.3	0	2282	N/A
45-05_IDF	General - Unoccupied	0.44	0	0	291	N/A
46-05_RD C	Office - Office space	51.54	1546.2	0	10308	N/A
47-05_RD E	Office - Office space	9.07	272.25	0	1815	N/A
48-05_RD S	Office - Office space	15.75	472.5	0	3150	N/A
49-06_Storage	Misc - All others	0	76.95	0	513	N/A
50-06_Conf	General - Conference/meeting	55	825	0	1650	DCV

H11. ZONAL SYSTEM AND TERMINAL UNIT SUMMARY

01	02	03	04	05	06	07	08	09	10	11	12
System ID	System Type	Qty	Rated Capacity (kBtuh)		Airflow (cfm)			Fan			VSD
			Heating	Cooling	Design	MIn.	Min. Ratio	Power	Power Units	Cycles	
18-05-LabC-Trm	Variable Air Volume Reheat Box	1	170	N/A	6,000	5,040	0.84	N/A	N/A	N/A	☐
17-05-LabE-Trm	Variable Air Volume Reheat Box	1	75	N/A	2,600	1,043	0.4	N/A	N/A	N/A	☐
16-05-LabN-Trm	Variable Air Volume Reheat Box	1	275	N/A	7,400	2,220	0.3	N/A	N/A	N/A	☐
15-05-LabW-Trm	Variable Air Volume Reheat Box	1	71.82	N/A	4,200	1,260	0.3	N/A	N/A	N/A	☐
14-04-LabC-Trm	Variable Air Volume Reheat Box	1	172.37	N/A	5,400	5,040	0.93	N/A	N/A	N/A	☐
13-04-LabE-Trm	Variable Air Volume Reheat Box	1	45	N/A	2,600	1,043	0.4	N/A	N/A	N/A	☐
12-04-LabN-Trm	Variable Air Volume Reheat Box	1	200	N/A	7,400	2,220	0.3	N/A	N/A	N/A	☐
11-04-LabW-Trm	Variable Air Volume Reheat Box	1	71.82	N/A	4,200	1,260	0.3	N/A	N/A	N/A	☐
10-03-LabC-Trm	Variable Air Volume Reheat Box	1	172.37	N/A	5,400	5,040	0.93	N/A	N/A	N/A	☐
9-03-LabE-Trm	Variable Air Volume Reheat Box	1	45	N/A	2,600	1,043	0.4	N/A	N/A	N/A	☐
8-03-LabN-Trm	Variable Air Volume Reheat Box	1	200	N/A	6,600	2,175	0.33	N/A	N/A	N/A	☐
7-03-LabW-Trm	Variable Air Volume Reheat Box	1	72	N/A	4,200	1,260	0.3	N/A	N/A	N/A	☐
6-02-LabE-Trm	Variable Air Volume Reheat Box	1	60	N/A	3,400	1,020	0.3	N/A	N/A	N/A	☐

H11. ZONAL SYSTEM AND TERMINAL UNIT SUMMARY

01	02	03	04	05	06	07	08	09	10	11	12
System ID	System Type	Qty	Rated Capacity (kBtuh)		Airflow (cfm)			Fan			VSD
			Heating	Cooling	Design	MIn.	Min. Ratio	Power	Power Units	Cycles	
5-02-LabC-Trm	Variable Air Volume Reheat Box	1	175	N/A	5,400	5,040	0.93	N/A	N/A	N/A	☐
4-02-LabN-Trm	Variable Air Volume Reheat Box	1	200	N/A	6,600	1,980	0.3	N/A	N/A	N/A	☐
3-02-LabW-Trm	Variable Air Volume Reheat Box	1	72	N/A	4,200	1,260	0.3	N/A	N/A	N/A	☐
2-01-LabN-Trm	Variable Air Volume Reheat Box	1	100	N/A	4,410	1,800	0.41	N/A	N/A	N/A	☐
1-01-LabC-Trm	Variable Air Volume Reheat Box	1	172.37	N/A	7,560	5,040	0.67	N/A	N/A	N/A	☐
50-06_Conf-Trm	Variable Air Volume Reheat Box	1	116.28	N/A	6,800	1,360	0.2	N/A	N/A	N/A	☐
49-06_Storage-Trm	Variable Air Volume Reheat Box	1	12	N/A	300	90	0.3	N/A	N/A	N/A	☐
48-05_RD S-Trm	Variable Air Volume Reheat Box	1	300.96	N/A	17,600	3,520	0.2	N/A	N/A	N/A	☐
47-05_RD E-Trm	Variable Air Volume Reheat Box	1	51.3	N/A	3,000	600	0.2	N/A	N/A	N/A	☐
46-05_RD C-Trm	Variable Air Volume Reheat Box	1	102.6	N/A	6,000	1,800	0.3	N/A	N/A	N/A	☐
45-05_IDF-Trm	Variable Air Volume Reheat Box	1	1.71	N/A	150	45	0.3	N/A	N/A	N/A	☐
44-05_RD W-Trm	Variable Air Volume Reheat Box	1	88.92	N/A	5,200	1,040	0.2	N/A	N/A	N/A	☐
43-04_RD W-Trm	Variable Air Volume Reheat Box	1	85.5	N/A	5,000	1,000	0.2	N/A	N/A	N/A	☐

H11. ZONAL SYSTEM AND TERMINAL UNIT SUMMARY

01	02	03	04	05	06	07	08	09	10	11	12
System ID	System Type	Qty	Rated Capacity (kBtuh)		Airflow (cfm)			Fan			VSD
			Heating	Cooling	Design	MIn.	Min. Ratio	Power	Power Units	Cycles	
42-04_RD E-Trm	Variable Air Volume Reheat Box	1	51.3	N/A	3,000	600	0.2	N/A	N/A	N/A	☐
41-04_RD S-Trm	Variable Air Volume Reheat Box	1	300.96	N/A	17,600	3,520	0.2	N/A	N/A	N/A	☐
40-04_RD C-Trm	Variable Air Volume Reheat Box	1	88.92	N/A	5,200	1,560	0.3	N/A	N/A	N/A	☐
39-03_RD W-Trm	Variable Air Volume Reheat Box	1	85.5	N/A	5,000	1,000	0.2	N/A	N/A	N/A	☐
38-04_IDF-Trm	Variable Air Volume Reheat Box	1	1.71	N/A	150	45	0.3	N/A	N/A	N/A	☐
37-03_IDF-Trm	Variable Air Volume Reheat Box	1	1.71	N/A	150	45	0.3	N/A	N/A	N/A	☐
36-03_RD C-Trm	Variable Air Volume Reheat Box	1	88.92	N/A	5,200	1,560	0.3	N/A	N/A	N/A	☐
35-03_RD S-Trm	Variable Air Volume Reheat Box	1	300.96	N/A	17,600	3,520	0.2	N/A	N/A	N/A	☐
34-03_RD E-Trm	Variable Air Volume Reheat Box	1	51.3	N/A	3,000	600	0.2	N/A	N/A	N/A	☐
33-02_RD W-Trm	Variable Air Volume Reheat Box	1	85.5	N/A	5,000	1,000	0.2	N/A	N/A	N/A	☐
32-02_IDF-Trm	Variable Air Volume Reheat Box	1	1.71	N/A	150	45	0.3	N/A	N/A	N/A	☐
31-02_RD E-Trm	Variable Air Volume Reheat Box	1	102.6	N/A	6,000	1,200	0.2	N/A	N/A	N/A	☐
30-02_RD C-Trm	Variable Air Volume Reheat Box	1	75.24	N/A	4,400	1,320	0.3	N/A	N/A	N/A	☐

H11. ZONAL SYSTEM AND TERMINAL UNIT SUMMARY

01	02	03	04	05	06	07	08	09	10	11	12
System ID	System Type	Qty	Rated Capacity (kBtuh)		Airflow (cfm)			Fan			VSD
			Heating	Cooling	Design	MIn.	Min. Ratio	Power	Power Units	Cycles	
29-02_RD S-Trm	Variable Air Volume Reheat Box	1	263.34	N/A	15,400	3,080	0.2	N/A	N/A	N/A	☐
28-01_Lobby RR-Trm	Variable Air Volume Reheat Box	1	194.94	N/A	11,400	2,280	0.2	N/A	N/A	N/A	☐
27-01_RD S-Trm	Variable Air Volume Reheat Box	1	266.76	N/A	15,600	3,120	0.2	N/A	N/A	N/A	☐
26-01_RD W-Trm	Variable Air Volume Reheat Box	1	41.04	N/A	2,400	480	0.2	N/A	N/A	N/A	☐
25-01_Elec-Trm	Variable Air Volume Reheat Box	1	20.52	N/A	1,200	240	0.2	N/A	N/A	N/A	☐
24-01_Corridor-Trm	Variable Air Volume Reheat Box	1	20.52	N/A	1,200	360	0.3	N/A	N/A	N/A	☐
23-01_IDF-Trm	Variable Air Volume Reheat Box	1	1.71	N/A	150	45	0.3	N/A	N/A	N/A	☐
21-01_Conf-Trm	Variable Air Volume Reheat Box	1	41.04	N/A	2,400	480	0.2	N/A	N/A	N/A	☐
20-01_Shipping-Trm	Variable Air Volume Reheat Box	1	8.55	N/A	500	150	0.3	N/A	N/A	N/A	☐
19-01_RD C-Trm	Variable Air Volume Reheat Box	1	58.14	N/A	3,400	1,020	0.3	N/A	N/A	N/A	☐

I1. WATER HEATER EQUIPMENT SUMMARY

01	02	03	04	05	06	07	08	09	10	11	12	13	14
Name	Heater Element Type	Tank Type	Qty	Tank Vol (gal)	Rated Input	Rated Input Unit	Efficiency	Efficiency Unit	Tank Insulation R-value Int/Ext	Standby Loss Fraction	1st Hr. Rating or Flow Rate (gal)	Heat Pump Type	Tank Location or Ambient Condition
DHW Tank	Electricity	Storage	1	119	4.5	kW	0.94	UEF	N/A	N/A	99	N/A	N/A

J3. LABORATORY/PROCESS EXHAUST

1	2	3	4	5	6
Space Name	Design Exhaust Flow Rate (cfm)	Minimum Exhaust Flow Rate (cfm)	Total Fume Hood Length (ft)	Exhaust Flow for Fume Hoods with Vertical Sashes (cfm)	Fraction of Fume Hoods with Vertical Sash with automatic control (%)
S-1-01-LabC	12600	5040	0	12,600	1
S-2-01-LabN	4475	1790	0	4,475	1
S-6-02-LabE	1565	626	0	1,565	1
S-5-02-LabC	12598.8	5039.52	0	12,599	1
S-4-02-LabN	4850	1940	0	4,850	1
S-3-02-LabW	2212.5	885	0	2,213	1
S-10-03-LabC	12598.8	5039.52	0	12,599	1
S-9-03-LabE	2606.67	1042.67	0	2,607	1
S-8-03-LabN	5437.5	2175	0	5,438	1
S-7-03-LabW	2212.5	885	0	2,213	1
S-14-04-LabC	12598.8	5039.52	0	12,599	1
S-13-04-LabE	2606.25	1042.5	0	2,606	1
S-12-04-LabN	5437.5	2175	0	5,438	1
S-11-04-LabW	2212.5	885	0	2,213	1
S-18-05-LabC	12598.8	5039.52	0	12,599	1
S-17-05-LabE	2606.25	1042.5	0	2,606	1
S-16-05-LabN	5437.5	2175	0	5,438	1

J3. LABORATORY/PROCESS EXHAUST

1	2	3	4	5	6
Space Name	**Design Exhaust Flow Rate (cfm)**	**Minimum Exhaust Flow Rate (cfm)**	**Total Fume Hood Length (ft)**	**Exhaust Flow for Fume Hoods with Vertical Sashes (cfm)**	**Fraction of Fume Hoods with Vertical Sash with automatic control (%)**
S-15-05-LabW	2212.5	885	0	2,213	1

K1. INDOOR CONDITIONED LIGHTING GENERAL INFO

01	02	03	04	05	06
Occupancy Type[1]	**Conditioned Floor Area[2] (ft^2)**	**Installed Lighting Power (Watts)**	**Lighting Control Credits (Watts)**	**Additional (Custom) Allowance**	
				Area Category Footnotes (Watts)	**Area Category Footnotes (Watts)**
Convention, Conference, Multipurpose and Meeting Center	2025	1518.75	0	0	0
Corridor	2326.09	930.44	0	0	0
Electrical Mechanical Telephone Room	1919.88	767.95	0	0	0
Laboratory Area, Scientific	64120.1	57708.1	0	0	0
Main Entry Lobby	4536	3175.2	0	0	0
Commercial Industrial Storage Shipping	975.32	585.19	0	0	0
Unleased Tenant Area	79076	47445.6	0	0	0
GeneralStorage	513	205.2	0	0	0
Building Totals:	**155491**	**112336**	**0**	**0**	**0**

[1]See Table 140.6-C

[2]See NRCC-LTI--E for unconditioned spaces

[3]Lighting information for existing spaces modeled is not included in this table

K4. INDOOR CONDITIONED LIGHTING MANDATORY LIGHTING CONTROL

See NRCC-LTI-E for mandatory controls

L. DECLARATION OF REQUIRED CERTIFICATES OF INSTALLATION

Selections made by Documentation Author indicate which Certificates of Installation must be submitted for the features to be recognized for compliance. These documents must be retained and provided to the building inspector during construction and can be found online

Building Component	Form/Title
Envelope	NRCI-ENV-01-E - Must be submitted for all buildings
Envelope	NRCI-ENV-E - Envelope (for all buildings)
Mechanical	NRCI-MCH-01-E - Must be submitted for all buildings
Mechanical	NRCI-MCH-E - For all buildings with Mechanical Systems
Plumbing	NRCI-PLB-01-E - Must be submitted for all buildings
Plumbing	NRCI-PLB-E - For all buildings with Plumbing Systems
Indoor Lighting	NRCI-LTI-01-E - Must be submitted for all buildings
Indoor Lighting	NRCI-LTI-E - Indoor Lighting (for all buildings)

M. DECLARATION OF REQUIRED CERTIFICATES OF ACCEPTANCE

Selections made by Documentation Author indicate which Certificates of Acceptance must be submitted for the features to be recognized for compliance. These documents must be provided to the building inspector during construction and must be completed through an Acceptance Test Technician Certification Provider (ATTCP).

Building Component	Form/Title
Envelope	NRCA-ENV-02-F - NRFC label verification for fenestration
Indoor Lighting	NRCA-LTI-02-A - Occupancy Sensors and Automatic Time Switch Controls.
Indoor Lighting	NRCA-LTI-04-A - Demand Responsive Lighting Controls.
Covered Process	NRCA-PRC-12-F Elevator Lighting & Ventilation Controls
Covered Process	NRCA-PRC-13-F Escalators & Moving Walkways Speed Controls
Covered Process	NRCA-PRC-14-F Lab Exhaust Ventilation System
Covered Process	NRCA-PRC-15-F Fume Hood Automatic Sash Closure System
Mechanical	NRCA-MCH-02-A - Outdoor Air must be submitted for all newly installed HVAC units. Note: MCH-02-A can be performed in conjunction with MCH-07-A Supply Fan VFD Acceptance (if applicable) since testing activities overlap

M. DECLARATION OF REQUIRED CERTIFICATES OF ACCEPTANCE

Selections made by Documentation Author indicate which Certificates of Acceptance must be submitted for the features to be recognized for compliance. These documents must be provided to the building inspector during construction and must be completed through an Acceptance Test Technician Certification Provider (ATTCP).

Building Component	Form/Title
Mechanical	NRCA-MCH-05-A - Air Economizer Controls
Mechanical	NRCA-MCH-06-A Demand Control Ventilation Systems must be submitted for all systems required to employ demand controlled ventilation (refer to) can vary outside ventilation flow rates based on maintaining interior carbon dioxide (CO2) concentration setpoints.
Mechanical	NRCA-MCH-07-A Supply Fan Variable Flow Controls
Mechanical	NRCA-MCH-08-A Valve Leakage Test
Mechanical	NRCA-MCH-09-A Supply Water Temperature Reset Controls
Mechanical	NRCA-MCH-10-A Hydronic System Variable Flow Controls
Mechanical	NRCA-MCH-11-A Automatic Demand Shed Controls
Mechanical	NRCA-MCH-13-A Automatic FDD for Air Handling Units and Zone Terminal Units Acceptance
Mechanical	NRCA-MCH-16-A Supply Air Temperature Reset Controls
Mechanical	NRCA-MCH-17-A Condenser Water Temperature Reset Controls
Mechanical	NRCA-MCH-19-A Occupancy Sensor Controls

N. DECLARATION OF REQUIRED CERTIFICATES OF VERIFICATION

Selections made by Documentation Author indicate which Certificates of Verification must be submitted for the features to be recognized for compliance. These documents must be retained and provided to the building inspector during construction and can be found online

Building Component	Form/Title
Mechanical	NRCV-MCH-27 Indoor Air Quality & Mechanical Ventilation
Mechanical	NRCV-MCH-32 Local Mechanical Exhaust

Documentation Author's Declaration Statement

1. I certify that this Certificate of Compliance documentation is accurate and complete.	
Documentation Author Name: Erik Dyrr	Documentation Author Signature:
Company: NRG Engineering	Signature Date:
Address: 234 W. 3rd St, Suite C	CEA/HERS Certification Identification (if applicable):
City/State/Zip: Chico, CA 95928	Phone: 415-275-4265

Responsible Person's Declaration statement

I certify the following under penalty of perjury, under the laws of the State of California:

1. The information provided on this Certificate of Compliance is true and correct.
2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer)
3. The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
5. I understand that a registered copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections, and I will take the necessary steps to accomplish this requirement.
6. I understand that a registered copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy, and I will take the necessary steps to accomplish these requirements.

Responsible Designer Name:	Responsible Designer Signature:	
Company:		
Address:	Date Signed:	
City/State/Zip: ,	License #:	
Phone:	Title:	Scope:

ENERGY·SOFT

Energy Efficiency Services • Software Development

Christopher R. Turner
Senior Planner
City Hall - 1st Floor
701 Laurel St.
Menlo Park, CA 94025

10/3/2024

RE: Phase 1 1005 O'Brien Dr. Natural Gas Exemption Request

Christopher,

I have reviewed the Phase 1 documents provided on behalf of Tarlton Properties for the 985 & 1001 O'Brien Drive 1320 Willow Road project to be built in Menlo Park:

1. Calculations and memo dated Sept 24, 2024, from Erik Dyrr with NRG Engineers
2. Title 24 report dated Sept 11, 2024, from Erik Dyrr
3. October 1 Costing e-mail Memo from Zach Russi with Western Allied

Based upon the calculations provided in the spreadsheet, supported by the other documents, the NPV calculation for the Project shows a negative value, and as such I agree with the design team that the project would qualify for the Natural Gas exemption as outlined in your local ordinance, as non-cost effective and infeasible.

Please contact me if you have any questions on this review.

Regards.

Martyn C. Dodd

Martyn C. Dodd, Principal



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Telephone: (415) 897-6400 • Fax: (415) 897-6422
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ENERGY·SOFT

Energy Efficiency Services • Software Development

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Senior Planner
City Hall - 1st Floor
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Regards.

Martyn C. Dodd

Martyn C. Dodd, Principal



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Website: www.energysoft.com

Western Allied MECHANICAL

ALL ELECTRIC FEASIBILITY STUDY

Tarlton Properties, Inc.

1530 O'Brien Drive, Suite C
Menlo Park, CA 94025

Date: November 15, 2024

Attention: Chris Middlebrooks

Subject: ALL ELECTRIC FEASIBILITY
1320 WILLOW ROAD
LAB/OFFICE WARM UP
MENLO PARK, CA

Dear Chris:

Western Allied Mechanical is pleased to present this report analyzing multiple proposed systems for each building as a feasibility study for future lab/office buildings at the subject project. There are a couple of reasons that we feel that the all-electric option, currently, is not a feasible design for these buildings.

Western Allied Mechanical Background with All-Electric:
Western Allied has been dedicated to providing energy efficient designs for decades. We understand and agree that moving toward carbon neutral buildings and net zero energy buildings is the future of construction.

We have completed and are currently completing several Net Zero buildings including: (Partial list)

- Lucille Packard Foundation in Los Altos – Net zero, all electric design utilizing chilled beam, radiant heating, air source heat pumps and energy recovery
- Fortinet – Ground up all-electric, chilled wall, radiant heating building in Santa Clara
- Millbrae Recreation Center – Ground up, all electric recreation center
- SLAC Science and User Support building - Net zero, all electric design utilizing chilled beam, radiant heating, air source heat pumps and energy recovery in Palo Alto.
- ARE Amenities Center – All Electric, net zero amenities building in South San Francisco
- Skyline College B12 – Ground up, 22,000 SF environmental science building with ground source heat pumps, dual duct VAV coupled with radiant in floor heating and cooling.

Please note that all these buildings are primarily office buildings and do not include life science laboratory space similar to the proposed project. The use of all electric design for office, residential, and other uses is fully feasible with the technologies that have been in place and vetted for years. With the recirculation function of office and the relatively light loads as compared to laboratory buildings coupled with the less “mission critical” issues of the HVAC systems, the use of all-electric design can and should be implemented as much as possible to reduce carbon emissions and increase energy performance of

these type buildings. By contrast, buildings including laboratory space must be designed with tight tolerance of space conditioning to maintain the viability of science functionality taking place within the laboratory setting. Further, laboratory spaces require 100% outside air circulation ("OSA"). The introduction of variable OSA conditions requires tighter control from the mechanical equipment for laboratory environments. Unlike occupant comfort, which is the main design function of office and residential uses, compromise of space conditioning in laboratory settings can lead to failure of occupant science, either experimentation and/or production.

Western Allied has recently finished two all-electric office/lab buildings.

- Building A – 220,000 SF, 12 story, lab/office retrofit completed 6/30/23. This building uses air source heat pump heating plant, exhaust heat recovery and water-cooled chilled water-cooling plant. This building has been commissioned and is partially occupied. With partial occupancy loading (approximately 50%), we have experienced issues with equipment refrigerant leaks and warranty repairs on the heat pumps over the last year. These are issues that we would not normally see a year after the system is installed and conditioned in an office building. They are also issues we would not normally see in a lab building that uses natural gas.

  As this building is of similar size and usage, this building is a relevant comparison to this study

- Building B – 33,000 SF single story lab/office building completed 7/30/24. This building utilizes DX VAV package unit for cooling and air source heat pump plant for heating and supplemental cooling. Although the space is installed and commissioned, there is not sufficient operating data to ensure that the system will be reliable long term.

  As this building is much smaller and not complex, it is not relevant to this study.

The following is the specific analysis of this proposed project.

Scope of work:

1. Perform energy load calculations for both buildings for system and equipment selection and conceptual system design. 1320 Willow Road is an approximately 73,620 SF life science building which is expected to include approximately 60/40 laboratory use to office but must be able to accommodate up to 70% laboratory. Due to the design and scale of each building, similar base and all-electric approaches are warranted for each building. See Appendix B for conceptual design drawings and Appendix C for Energy Analysis Report

   a. **Option 1 - Base design** – 60/40 lab-office (up to 70% lab). 100% OSA for office, recirculating for office with economizer, VAV with hot water reheat; High efficiency gas heating, high efficiency water cooled chilled water plant with cooling towers, chilled/hot water air handlers, exhaust fans

   b. **Option 2 – All-electric design** – 60/40 lab-office (up to 70% lab). 100% OSA for lab, recirculating for office with economizer, VAV with reheat for building; air cooled heat pump plant handling heating and cooling load, chilled/hot water air handlers, exhaust system with heat recovery.

2. Provide mechanical installation cost estimates for each system

3. Provide maintenance and operation cost analysis

4. Provide reliability and feasibility report

Mechanical Cost Summary:

The base system for each building to comply with California Energy Code and LEED is a high efficiency water cooled plant with cooling towers, and high efficiency natural gas boiler plant.

The all-electric options are to provide a combo heating/cooling plant with air source heat pumps staged to handle either heating or cooling load depending on demand. The zone temperature control can be achieved with VAV reheat approach. For equivalent efficiency, heat recovery is required on the exhaust system.

From a cost perspective, the all-electric design is roughly 20% higher at installation than the traditional gas-powered system. This does not take in account the elimination of gas to the buildings or the increase in electrical, structural, and extended roof screen cost as the all-electric systems have more points of connection and a slightly higher kW requirement and takes up more space. The roof screen may be lowered 2-3 feet as cooling towers will not be needed.

From a capital cost perspective, the all-electric design is significantly more expensive and may be cost prohibitive.

The tables below show the cost results. See appendix A for full cost estimate proposal and appendix B for conceptual layout.

1320 Willow:

Item:	Description	Cost:
1.	1320 Willow Rd – Option 1 (Gas Heating, Water cooled)	$4,617,617
2.	1320 Willow Rd – Option 2 (All-electric)	$5,543,540
3.	**Difference**	**$ 925,923**

Structural Impact:

Option 1 – Traditional gas fired system. Total approximate roof weight including all equipment, ductwork, and piping = 108,000 lbs

Option 2 – All Electric system. Total approximate roof weight including all equipment, ductwork, and piping = 120,000 lbs.

Although there are more pieces of equipment associated with the all-electric system, the overall impact of weight to the roof for the 1320 Willow building is similar to the traditional system

Electrical Impact:

Option 1 – Traditional gas fired heating system total connected load requirements: 1,100 Amps

Option 2 – All-Electric system total connected load requirements: 1,500 Amps

Due to the decreased efficiency of the air-cooled air source heat pumps, the all-electric system will require approximately 400 more amps of 406/3/60 power. This will be a significant cost for the additional power and would add increased utility requirements for the 1320 Willow building.

Plumbing Impact:

With the elimination of gas to the building and the elimination of make-up water to the cooling tower, the all-electric option 2 will provide some cost savings for plumbing installation for the 1320 Willow building. The cost savings due to plumbing savings does not offset the increased capital cost for the all-electric option 2.

Ongoing Maintenance:

Option 1 – Traditional gas fired system ongoing estimated maintenance costs: $ 8,000.00 per year
Water treatment required for cooling tower system: $3,000.00 per year
Total ongoing maintenance costs: ~ 11,000.00 per year

Option 2 – All-Electric system ongoing maintenance costs: $ 8,000.00 per year

The ongoing maintenance costs between the systems is negligible for the 1320 Willow building regardless of system chosen. However, reliability of maintenance for Option 2 is a potential feasibility issue as described below. Shortages of reliable service providers and parts would be likely to have multiplier effects on estimated maintenance costs, as well as increased costs related to equipment downtimes, the prediction of which does not have a reliable track record. This is a potential feasibility issue for Option 2 due to the inability to accurately forecast actual maintenance cost.

Feasibility Issue #1 - System Reliability:

Life Science buildings, as opposed to other building uses, require a tight level of temperature control and system reliability. If we cannot maintain consistent building temperature in the lab areas, fluctuation could affect or destroy experimentation, production, and R&D and other aspects that are mission critical for lab facilities.

Option 1 – Traditional water-cooled central systems and gas heating hot water boilers.

The traditional natural gas boiler approach has been proven over the decades to provide adequate temperature control and reliability. Specifically, we have hundreds of projects of the last 25+ years that have utilized high efficiency condensing boilers and have found them to be very reliable. As we service our installations, we have direct feedback from technicians on boiler manufacturer performance and

reliability and there are many certified technicians in the Bay Area to service these types of systems and provide emergency repairs. Replacement parts for natural gas boilers are also readily available as well as local technical support for rapid response to equipment service issues effecting “mission critical” life science applications.

These systems have been installed, operating, and maintained for life science building for decades. The equipment, controls designs, and controls sequences have been vetted to produce very consistent and reliable operation. Associated parts and available qualified service providers familiar with the systems are readily available to keep these systems functional for critical environments.

Equipment utilized for these systems are produced by many reputable national equipment manufacturers and most, if not all, potential equipment trouble points have been identified and solved and there is vast manufacturer support to help work through troubleshooting making the continued operation of the systems reliable.

Option 2 – All-Electric heating and cooling system.

One of the largest causes of concern with these systems is proven reliability. The industry simply does not have a track record of experience in running, maintaining, and servicing these types of systems. This is particularly of concern with a large load operation such as the 1320 Willow project, which will be used by life science tenants that cannot have a climate system failure, even for brief periods, as such fluctuation could lead to catastrophic failure of occupant science. There is currently no data that supports reliable operation under either full load condition or during a power outage using back up power supply.

Air Source Heat Pump chiller/boiler’s (ASHP’s) are relatively new to the United States and very new to critical life science environments. For the current all-electric ASHP, it is a new application. Although the units are similar to air cooled chillers, the heat pump function requires additional technical support, parts, and service that are not readily available. Below is a list of manufacturers with our experience with each.

ASHP Manufacturer’s and Experience:

a. Multistack is an American made product and we can attain parts for repairs with acceptable lead times to decrease down time, however the reliability of this product renders it infeasible for this project. In our experience with the product, we have utilized in a number of installations and have had major issues with equipment functional reliability. Due to its reliability issues, Multistack is infeasible for this project.

b. Aermec – These products are produced outside of the US and air source heat pumps are fabricated in Italy. This product’s application to life science is a recent change, and therefore there is no data on long-term effectiveness. What we have found with this product are major shipping delays, quality control of the delivered product, and lack of qualified and available tech support. Attaining replacement parts is also an issue. With life science, rapid response and repair is required to prevent science failure. Lack of enough local technical support is detrimental to servicing and maintaining life science

buildings. Due to quality control issues, lack of qualified and available tech support and difficulty in attaining replacement parts, Aermec is infeasible for this project.

c. Geoclima – Similar issues the Aermec as Geoclima is an offshoot company of Aermec, therefore Geoclima is infeasible for this project.

d. Trane Ascend, York, Daikin – We are happy to see major US manufacturers have new producst available for ASHP's. These are new to the market, and we aren't aware of any lab facilities using this product in order to confirm current reliability. We are confident that replacement parts will be available for Trane and Daikin and they will have adequate local technical support in the coming years, however reliable supply of replacement parts and adequate local support are not yet in place. Therefore, at the current time, these manufacturers are infeasible because the equipment has not been adequately tested and proven reliable nor are repair and replacement contingencies currently adequate for critical space conditioning applications.

e. LG ASHP – The option 2 All-Electric system is designed around multiple 60-ton LG air source heat pumps. Each heat pump has multiple circuits and multiple compressors. With 6 ASHP's in the design, there is built in redundancy. If one unit (or one circuit in an ASHP) fails, there are multiple units that can handle the heating and/or cooling load which helps the reliability of the system. LG also comes with 10 year compressor warranties with factory certified start-up which is why we selected this equipment as it is the most reliable.

   With that said, these ASHP's are new to North America and do not have a long track record of reliability, specifically in the life science critical building environment. Although parts may be available, there is not a large number of service providers available at this time to troubleshoot and repair the equipment. This reduces the reliability.

Building Management Systems (BMS) Controllability:

The system is designed so that each ASHP can be utilized for cooling or heating depending on demand. This is achieved through BMS controls system with several motorized control valves and complicated staging sequence. This system will need to be thoroughly commissioned prior to turnover to assure that it is functionally reliable.

The increased number of valves, ASHP's, and complicated BMS control strategy does introduce many more modes of failure that could negatively impact the space if multiple failures occur. Due to the number of failure points and increased complication of controls sequencing, there is a potential for decreased reliability.

<u>Reliability Summary</u>

As all-electric heating systems for labs is a new concept to the industry, there is not a long track record of proven reliability. Although, in theory, it should have similar reliability, the increased complexity of the system introduces more modes of failure and the relative unfamiliarity in system operation makes

the system more difficult to troubleshoot. Lack of reliable replacement parts and experienced service support makes system breakdowns longer and more difficult to resolve. Recent experience with Building A has demonstrated that all-electric system reliability issues for laboratory spaces are a real, not just a potential, problem because systems are failing at faster than expected rates. This problem is exacerbated by the unreliability of parts and service. This lack of reliability could have a negative impact, including science failure, for a life science building which are critical facilities.

Feasibility Issue #2 - Back Up Power Analysis:

Another area of concern is the power requirements for emergency back-up power. As a comparison on this building, the two natural gas boilers for this project would need single phase 208/3/60 power at 10 Amps each.

Based on the necessity of a stable indoor environment for laboratory space and the uncertainty of power supply, laboratory tenants would requires their HVAC systems to be backed up fully on emergency generator. We are assuming that 46,500 SF of laboratory space (~50%) will need to be backed up on HVAC and the following is the analysis of the generator size required for Option 1 with gas-fired heating, and Option 2 with all electric heating.

Option 1: Gas Fired heating and water cooled cooling required for emergency power.

1 – 1,500 MBH Boiler requiring 3 kW
1 – 5 HP heating hot pump running at 75% requires 4 kW
1 – AHU at 25,000 CFM requires 7.5 kW
1 – EF at 25,000 CFM requires 4 kW
1 – Water cooled chiller running 40% = 75 kW
1 – Cooling tower running at 40% requires 3 kW
1 – Chilled water pump running at 40% requires 3 kW
1 – Condenser water pump running at 50% requires 5 kW

Total Emergency generator load ~ 110 kW which includes safety factor

Note: This is not the connected load. This assumes that we can utilize load limiting thru the building BMS.

Option 2: All-Electric heating and cooling required for emergency power.

2 – 60-ton Air source heat pumps running at full load for both cooling and heating: 210 kW
2 – 5 HP heating hot water pump running at 50% requires 2 kW each
1 –AHU at 25,000 CFM requires 7.5 kW
1 – EF at 25,000 CFM requires 4 kW
1 – Chilled water pump running at 40% requires 3 kW

Total Emergency generator load ~ 230 kW which includes safety factor

Note: This is not the connected load. This assumes that we can utilize load limiting through the building BMS.

Based on the calculations above, the all-electric system would require the emergency generator to be increased by ~ 120 kW, representing an additional back-up generator of at least an additional 150 Kw Genset for each building, or two to three times the required backup capacity for mechanical. In addition to air quality, noise, and diesel usage associated with the additional generator power, each generator would need an additional 180 square foot footprint beyond what is currently proposed.

This may be prohibitive to the building and jurisdictional requirements with increased generator size.

Feasibility Issue #3 – Case Study – Allogene 7400 Gateway Blvd, Newark

On September 23, 2022, Western Allied conferenced with building energy and systems engineers to review and compare the recently completed Allogene project at 7400 Gateway in Newark with LS District life science projects. Below is a table with some of the comparison between the two projects.

Item	Description	Allogene – 7400 Gateway	1320 Willow
1.	Total building square footage	138,000	73,617
2.	Number of floors	1 story[1]	4 stories
3.	Ratio of lab/office[2]	33% Lab, 67% Office	Up to 70% lab
4.	% Once thru air for lab area	50%	100%
5.	Where is air handling equipment installed?	Mezzanine	Roof
6.	Where is the heating/cooling plant installed?	Yard	Roof
7.	Available area for mechanical equipment[3]	20,000 SF	5,500 SF
8.	Equivalent heating and cooling capacity	720 Tons	360 tons
9.	Solar Availability and back-up power	Full roof[4] and battery backup	Limited roof space/Generator backup

Notes:

1. Data given was essentially a single story for Allogene with 5,000 SF of 2nd floor office and 17,000 SF of mechanical mezzanine
2. Office includes other spaces like warehouse, shipping receiving, etc. that do not have a lab function.
3. For Allogene, the equipment mezzanine is 17,000 SF and we estimated yard mechanical at 3,000 SF from Google Earth

The Allogene building and 1320 Willow project are different in size, and additionally are vastly different in many aspects. 1320 Willow includes a 4-story building with all mechanical airside and plant equipment mounted on the roof with an allotted space of 12,500 SF. Allogene is a single story with yard space and a mezzanine allowing for ~ 20,000 SF for mechanical equipment.

Allogene is 33% lab, whereas 1320 Willow will be up to 70% lab. Additional lab increases load and equipment sizing. Allogene also has about 50% recirculation in the lab spaces whereas 1320 Willow has

0% recirculation. These factors contribute to ~ 25% more capacity required in the heating/cooling plant size.

As mentioned in Feasibility Issue #3, this comparison shows that due to 1320 Willow project having lab and outside air usage increases the size of the plant. With the restrictions in available geography on both the roof and the site, it is not currently feasible to install an all-electric plant with the current building's configuration and usage.

Summary:

Due to system cost, infeasibility of reliability and infeasibility of necessary backup power, all-electric conditioning is infeasible for the project at this time. Science failure is an unacceptable risk for a speculative life science facility and until all-electric systems demonstrate consistent performance without the risk of operational failure, these systems will not be feasible for this type of Project. The Project proposes all-electric cooling, natural gas boilers space heating. Air handling equipment and piping sizing will be designed to accommodate future conversion to all-electric when feasible.

Western Allied MECHANICAL

WAM BUDGET PROPOSAL

Tarlton Properties, Inc.
1530 O'Brien Drive, Suite C
Menlo Park, CA 94025

Date: November 15, 2024

Attention: Yusef Masjedi

Subject: H.V.A.C. PROPOSAL
1005 OBD – 1320 WILLOW
LAB/OFFICE WARM UP
MENLO PARK, CA

Dear Yusef:

Western Allied Mechanical is pleased to present this proposal to design, furnish and install the heating, ventilating and air conditioning systems for the subject project.

The pricing has been based in accordance with the following:

- Update drawings dated 7-13-21 as prepared by DES
- Conceptual Design drawings attached
- Assumed 2024-2025 Construction

Summary:

1320 Willow

Item:	Description	Cost:
1.	1320 Willow Rd – Base (Gas Heating, Water cooled)	$ 4,617,617.00
2.	1320 Willow Rd – (All-electric)	$ 5,543,540.00
3.	**Difference**	**$ 925,923.00**

1320 Willow Rd Warm Up – Base Bid Inclusions:

Item	Qty.	Description
1.	1	360 ton high efficiency water cooled chiller including: • BACNet interface • Vibration Isolation
2.	2	CHW pumps, including: • 440 GPM • Premium-efficiency TEFC inverter duty motors • 7.5 HP variable frequency drives (no bypass) with NEMA-1 enclosure • Untrimmed impeller
3.	1	360 ton Cooling towers including: • 20 HP premium efficiency motor with VFD • Stainless steel hot and cold water basins • Internal service walkway and wier dam • Rails and access ladders • Factory installed sweeper system
4.	1	Centrifugal separator for cooling tower
5.	2	CW pumps, including: • 1100 GPM • Premium-efficiency TEFC inverter duty motors • 15 HP variable frequency drives (no bypass) with NEMA-1 enclosure • Untrimmed impeller
6.	1	AHU including: • 70,000 CFM • 100% OSA • Stainless steel cooling coil with Electrofin UV topcoat • MERV 8 pre-filter section • MERV 14 final filter section • Premium efficiency supply fan with VFD • Internal vibration isolation • Horizontal discharge supply
7.	1	AHU including: • 30,000 CFM • 100% Economizer • Stainless steel heating coil with Electrofin UV topcoat • MERV 8 pre-filter section

Item	Qty.	Description
		• MERV 14 final filter section • Premium efficiency supply fan with VFD • Internal vibration isolation • Airflow monitoring station • Horizontal discharge supply and return ductwork
8.	2	Utility set exhaust fan, including: • 35,000 CFM @ 3'' ESP • 30 HP VFD-rated, premium efficiency inverter duty TEFC motor • Backdraft damper • OSA bypass damper • Fan isolation damper • Vibration Isolation • Discharge nozzle sized at 3000-3500 fpm • Weather hood • Spark "B" Resistance
9.	1	6,000 CFM Restroom Exhaust fan Note: Fan will require a combination motor starter by electrician
10.	2	12,000 CFM Elevator hoistway pressurization fans with VFD's
11.	4	500 CFM electrical room inline exhaust fans with line voltage thermostats
12.	1	500 CFM trash enclosure exhaust fan
13.	1	500 CFM chiller room exhaust fan
14.	1	5-ton split system for 1st Floor Electrical Room with condensing unit mounted in adjacent yard
15.	2	Heating hot water boiler, including: • 1,500 MBH input • 95% efficiency • Natural Gas • Condensing • Indoor-rated Note: 230V/1-phase electrical requirements.
16.	2	HHW pumps, including: • 280 GPM

Item	Qty.	Description
		• Premium-efficiency TEFC inverter duty motors • 5 HP variable frequency drives (no bypass) with NEMA-1 enclosure • Indoor-rated • Untrimmed impeller
17.	**4**	**Lobby Dual duct VAV** **Note: We have only included conditioning for the 1st and 2nd floor main lobbies**
18.	56	Grilles, registers, and diffusers, including: • (12) Non ducted transfer/return grilles • (12) Ducted Return/exhaust diffusers for restrooms • (14) lobby Linear supply diffusers • (14) lobby linear return diffusers • (4) Conference room supply air diffusers
19.	18	Combination fire/smoke dampers **Note: Smoke detector to be provided and located by fire/life safety contractor. Detector to be mounted by Mechanical Contractor.**
20.	Lot	Vibration isolation, including: • New utility set exhaust fans • New inline exhaust fans • New air handlings units • New pumps will be on concrete inertia base
21.	Lot	Seismic anchorage calculations, including: • Air handling unit anchorage calculations • Boiler anchorage calculations • Cooling Tower anchorage calculations • Chiller anchorage calculations • Ductwork and piping, as required by Code
22.	Lot	Ductwork: • All supply ductwork upstream of VAV boxes will be medium pressure round or rectangular galvanized sheetmetal ductwork built in accordance with S.M.A.C.N.A. • All supply ductwork downstream of VAV boxes will be low pressure round or rectangular galvanized sheetmetal ductwork built in accordance with

Item	Qty.	Description
		S.M.A.C.N.A. • All exhaust systems shall be galvanized, round or rectangular, sheetmetal ductwork built in accordance with S.M.A.C.N.A. • Ductwork will be stubbed to floor • **Lobby Supply Mains**
23.	Lot	Piping: • All chilled, condenser, and hot water piping above 3" will be Schedule 40 black steel pipe and fittings. Piping will utilize mechanical grooved couplings. • All chilled, condenser, and hot water piping 2" and below will be Type "L" copper pipe and fittings. Joints will be soldered or pressfit
24.	Lot	Startup, test and balance of mechanical systems by in-house TABB certified technicians.
25.	Lot	DDC Controls system including: • (2) Rooftop air handling units • (1) Chilled water plant • (5) Fans with VFD's • (1) Split system • (2) Boilers • (4) Pumps • (4) Dual duct VAV boxes • Article 63 refrigeration monitoring panel • Centrifugal separator • Engineering • Graphics • 16 hours training • 40 hours commissioning support • 24 hours balance support • Advanced Metering Noted: • We will need 120V to (4) control panels and other locations required by controls. • We are carrying $ 25,000.00 for advanced metering

Item	Qty.	Description
26.	Lot	Insulation: • All new ductwork will be insulated to meet Title 24 requirements. • All new piping systems will be insulated in accordance with Title 24.
27.	Lot	Water treatment including: • Flushing, cleaning and water treatment for closed loop systems. • Water treatment system for evaporative cooled sumps
28.	Lot	Material and Labor Escalation assuming work to be done starting in mid-2024 and completed in mid-2025.
29.	Lot	TABB certified start-up and air balance of units and exhaust
30.	Lot	Project management including attendance of all design coordination meetings, pre-construction meetings, construction meetings, and all job management functions.
31.	Lot	Ductwork and piping stanchion supports including: • (40) Duct Stanchions • (40) piping stanchions • Mechanical room piping supports as required
32.	Lot	Flashings, including: • (10) Ducts through roof • (20) sleeper flashings • (2) unit counter flashing • (1) Platform flashing
33.	Lot	Commissioning support including: • 24 Field hours • 24 PM hours
34.	Lot	All rigging, hoisting and material handling as required to accommodate this scope of work.
35.	Lot	BIM Detailing
36.	Lot	Professionally engineered drawings for city submittal

1320 Willow Rd Warm Up – Base Bid Inclusions:

The total net lump sum price for the H.V.A.C. work as described including all taxes, licenses, and insurance; excluding bond, is: $ 4,617,617.00

1320 Willow Rd Warm Up – All Electric Inclusions:

Item	Qty.	Description
1.	1	AHU including: • 70,000 CFM • 100% OSA • Stainless steel coil with Electrofin UV topcoat • MERV 8 pre-filter section • MERV 14 final filter section • Premium efficiency supply fan with VFD • Internal vibration isolation • Horizontal discharge supply
2.	1	AHU including: • 30,000 CFM • 100% Economizer • Stainless steel heating coil with Electrofin UV topcoat • MERV 8 pre-filter section • MERV 14 final filter section • Premium efficiency supply fan with VFD • Internal vibration isolation • Airflow monitoring station • Horizontal discharge supply and return ductwork
3.	6	Air-source heat pumps to include: • Nominal 60 ton cooling/heating capacity per module • Variable speed compressor
4.	2	Hot water pumps, including: • 300 GPM • Premium-efficiency TEFC inverter duty motors • Outdoor-rated • 5 HP variable frequency drives (no bypass) with NEMA-3 enclosure • Untrimmed impeller
5.	2	Chilled water pumps, including: • 440 GPM • Premium-efficiency TEFC inverter duty motors

Item	Qty.	Description
		• Outdoor-rated • 7.5 HP variable frequency drives (no bypass) with NEMA-3 enclosure • Untrimmed impeller
6.	2	Utility set exhaust fan, including: • 35,000 CFM @ 3'' ESP • 20 HP VFD-rated, premium efficiency inverter duty TEFC motor • Backdraft damper • OSA bypass damper • Fan isolation damper • Vibration Isolation • Discharge nozzle sized at 3000-3500 fpm • Weather hood • Spark "B" Resistance
7.	1	70,000 SF Exhaust heat recovery unit including: • Double wall construction • Coated heat recovery coils • Bypass dampers • Isolation dampers
8.	1	6,000 CFM Restroom Exhaust fan Note: Fan will require a combination motor starter by electrician
9.	2	12,000 CFM Elevator hoistway pressurization fans with VFD's
10.	4	500 CFM electrical room inline exhaust fans with line voltage thermostats
11.	1	500 CFM trash enclosure exhaust fan
12.	1	5-ton split system for 1st Floor Electrical Room with condensing unit mounted in adjacent yard
13.	**4**	**Lobby Dual duct VAV** **Note: We have only included conditioning for the 1st and 2nd floor main lobbies.**
14.	56	Grilles, registers and diffusers, including: • (12) Non ducted transfer/return grilles • (12) Ducted Return/exhaust diffusers for restrooms • **(14) lobby Linear supply diffusers**

Item	Qty.	Description
		• **(14) lobby linear return diffusers** • **(4) Conference room supply air diffusers**
15.	18	Combination fire/smoke dampers **Note: Smoke detector to be provided and located by fire/life safety contractor. Detector to be mounted by Mechanical Contractor.**
16.	Lot	Vibration isolation, including: • New utility set exhaust fans • New inline exhaust fans • New air-source heat pumps • New pumps will be on concrete inertia base
17.	Lot	Seismic anchorage calculations, including: • Air handling unit anchorage calculations • Air-source heat pump anchorage calculations • Ductwork and piping, as required by Code
18.	Lot	Ductwork: • All supply ductwork upstream of VAV boxes will be medium pressure round or rectangular galvanized sheetmetal ductwork built in accordance with S.M.A.C.N.A. • All supply ductwork downstream of VAV boxes will be low pressure round or rectangular galvanized sheetmetal ductwork built in accordance with S.M.A.C.N.A. • All exhaust systems shall be galvanized, round or rectangular, sheetmetal ductwork built in accordance with S.M.A.C.N.A. • Ductwork will be stubbed to each floor • **Lobby Supply Mains**
19.	Lot	Piping: • All chilled, condenser, and hot water piping above 3” will be Schedule 40 black steel pipe and fittings. Piping will utilize mechanical grooved couplings.

Item	Qty.	Description
		• All chilled, condenser, and hot water piping 2" and below will be Type "L" copper pipe and fittings. Joints will be soldered or pressfit
20.	Lot	Startup, test and balance of mechanical systems by in-house TABB certified technicians.
21.	Lot	DDC Controls system including: • (2) Rooftop air handling units • (4) Exhaust fans with VFD's • (1) heat recovery unit • (1) split system • (6) Air-source heat pumps • (4) Pumps • (4) VAV Dual duct boxes • Engineering • Graphics • 16 hours training • 40 hours commissioning support • 24 hours balance support • Advanced Metering Noted: • We will need 120V to (4) control panels and other locations required by controls. • We are carrying $ 25,000.00 for advanced metering
22.	Lot	Insulation: • All new ductwork will be insulated to meet Title 24 requirements. • All new piping systems will be insulated in accordance with Title 24.
23.	Lot	Water treatment including: • Flushing, cleaning, and water treatment for closed loop systems.
24.	Lot	Material and Labor Escalation assuming work to be done starting in mid-2024 and completed in mid-2025
25.	Lot	TABB certified start-up and air balance of units and exhaust
26.	Lot	Project management including attendance of all design coordination meetings, pre-construction meetings, construction meetings, and all job management functions.

Item	Qty.	Description
27.	Lot	Ductwork and piping stanchion supports including: • (40) Duct stanchions • (40) piping stanchions • Mechanical room piping supports as required
28.	Lot	Flashings, including: • (10) Ducts through roof • (20) sleeper flashings • (2) unit counter flashing • (1) Platform flashing
29.	Lot	Commissioning support including: • 24 Field hours • 24 PM hours
30.	Lot	All rigging, hoisting and material handling as required to accommodate this scope of work.
31.	Lot	BIM Detailing
32.	Lot	Professionally engineered drawings for city submittal

1320 Willow Rd Warm Up – Energy Upgrade Price:

The total net lump sum price for the H.V.A.C. work as described including all taxes, licenses, and insurance; excluding bond, is: $ 5,543,540.00

Breakout Pricing:

1. **Pre-Construction Breakout Pricing (Not including BIM)**
    a. **Phase 1 – 1320 Willow: $ $ 40,000.00**

Exclusions:

1. **DDC controls associated with smoke control for high-rise buildings has been excluded from all pricing proposed above.**
2. All electrical work including power and 120 volt wiring, conduit, disconnect switches, motor starters, interlock wiring of smoke/fire dampers, smoke detectors and smoke detector wiring.
3. All plumbing work including gas, make-up water, and condensate piping.
4. All structural engineering and/or support work as required to accommodate mechanical equipment including all steel or wood air conditioning supports.
5. All cutting, caulking, coring, patching, painting, roofing, roof screens, etc.
6. All overtime work.
7. Removal and/or replacement of ceiling tile or grid as required to accommodate mechanical modifications.
8. All architectural sheetmetal and/or louvers.
9. All work associated with hazardous materials (lead, asbestos, etc.).
10. All permits and fees.

Western Allied Mechanical appreciates the opportunity to present this proposal and looks forward to working with you on this project.

Should you have any questions, or if I can be of further assistance, please feel free to call.

Sincerely,

Zachary Russi, P.E. LEED AP
President

Note: This price is valid for 30 days from date of issuance. Should this proposal expire, a revised proposal can be provided upon request.

AIR SOURCE HEAT PUMPS

NO.	MANUFACTURER & MODEL	TYPE	REFRIGERANT			COOLING SYSTEM															HEATING SYSTEM											ELECTRICAL			OP WT (LBS)	ACCESSORIES	REMARKS
			TYPE	CIRCUITS	CHARGE	CAPACITY (TONS)		INPUT POWER (KW)	COOLING TOTAL INPUT CURRENT (A)	AMB (°F)	EER	NPLV	GPM			EWT (F)	LWT (F)	OUTLET WT (F)		WPD	CAPACITY (MBH)		INPUT POWER (KW)	HEATING TOTAL INPUT CURRENT	AMB (°F)	COP	GPM			EWT (F)	LWT (F)	OUTLET WT (F)		WPD	MCA	MOCP	V/Φ/HZ			
						CALC	NOM						DESIGN	MAX	MIN			MAX	MIN		CALC	NOM					DESIGN	MAX	MIN			MAX	MIN							
HP-1	LG KCHH060HDGC	HEAT PUMP	R32				60															-												132	150	460/3/60	3,500		
HP-2	LG ACHH060HBAB	HEAT PUMP	R32				60			92	13.17	21.94	217.5		-	62	42	-	-	3.79		-			33	2.15	167.5			115	135	-	-	2.88	132	150	460/3/60	3,500		(3) POWER CONNECTIONS, (3) DISCONNECTS
HP-3	LG ACHH060HBAB	HEAT PUMP	R32				60																											132	150	460/3/60	3,500		
HP-4	LG ACHH060HBAB	HEAT PUMP	R32				60																											132	150	460/3/60	3,500		
HP-5	LG ACHH060HBAB	HEAT PUMP	R32				60			92	13.17	21.94	217.5		-	62	42	-	-	3.79		-			33	2.15	167.5			115	135	-	-	2.88	132	150	460/3/60	3,500		(3) POWER CONNECTIONS, (3) DISCONNECTS
HP-6	LG ACHH060HBAB	HEAT PUMP	R32				60																											132	150	460/3/60	3,500		

AIR HANDLING UNIT

TAG	MANUFACTURER & MODEL	SERVING	CFM			SUPPLY FAN				RELIEF/RETURN FAN				COILS		FILTER									ELECTRICAL			OP WT (LBS)	ACCESSORIES	REMARKS
			TOTAL	OSA		ESP	RPM	BHP	HP	ESP	RPM	BHP	HP	CHW	HHW	PREFILTER			CARBON			FINAL			MCA	MOCP	V/PH			
				DES	ABS	TSP				TSP						EFF	QTY	SIZE	EFF	QTY	SIZE	EFF	QTY	SIZE						
AHU-1	SCOTT SPRINGFIELD	LABORATORY	70,000						140																		460 / 3	26,000	120V FOR OUTLET AND LIGHTS, 460V SINGLE POINT POWER CONNECTION, RETURN AIR DAMPER	N-1 SUPPLY FAN REDUNDANCY, DUCT SMOKE DETECTOR MOUNTED BY MECHANICAL, PROVDED AND WIRED BY FIRE AND LIFE SAFETY
AHU-2	SCOTT SPRINGFIELD	OFFICE	30,000						60																		460 / 3	12,000	120V FOR OUTLET AND LIGHTS, 460V SINGLE POINT POWER CONNECTION, RETURN AIR DAMPER	N-1 SUPPLY FAN REDUNDANCY, DUCT SMOKE DETECTOR MOUNTED BY MECHANICAL, PROVDED AND WIRED BY FIRE AND LIFE SAFETY
HRU-1	SCOTT SPRINGFIELD	LABORATORY	70,000						N/A																		N/A	20,000	(4) BYPASS DAMPERS, (2) FAN ISOLATION DAMPERS, (1) BYPASS DAMPER	

FANS

TAG	MANUFACTURER & MODEL	SERVES	AREA SERVED	LOCATION	TYPE	DRIVE	DISCHARGE	CFM	TSP	ESP	DESIGN FAN RPM	MAX FAN RPM	MOTOR RPM	V/PH	BHP	HP	SONES	ROOF OPENING	OP WT (LBS)	ACCESSORIES	REMARKS
LEF-1A		LABS	LABS	ROOF	CW	BELT DRIVE	UB	35000	3	3				460/3		30		-	2000	PREMIUM EFF, TEFC, VFD RATED MOTOR WITH SHAFT GROUNDING; BOLTED ACCESS DOOR; DRAIN W/PLUG; WEATHER HOOD; SPARK B RESISTANCE; HI-PRO POLYESTER COATING	ON E-POWER
LEF-1B		LABS	LABS	ROOF	CCW	BELT DRIVE	UB	35000	3	3				460/3		30		-	2000	PREMIUM EFF, TEFC, VFD RATED MOTOR WITH SHAFT GROUNDING; BOLTED ACCESS DOOR; DRAIN W/PLUG; WEATHER HOOD; SPARK B RESISTANCE; HI-PRO POLYESTER COATING	ON E-POWER
EF-1		RESTROOMS	RESTROOMS	ROOF	ROOF	DIRECT DRIVE	DOWNBLAST							115/1		1			100	EC MOTOR; BACKDRAFT DAMPER; 12" ROOF CURB; SPEED CONTROLLER WITH 0-10 VDC LEAD; DISCONNECT SWITCH	
EF-2		ELEVATOR HOISTWAY VENT	ELEVATOR	ROOF	CW	BELT DRIVE	UB							460/3		3			400		
EF-3		ELEVATOR HOISTWAY VENT	ELEVATOR	ROOF	CW	BELT DRIVE	UB							460/3		3			400		

PUMPS

TAG	MANUFACTURER & MODEL	SERVES	AREA SERVED	LOCATION	SHUT OFF TDH	TYPE	GPM	HEAD (FT)	%EFF	NPSH (FT)	INLET (IN)	OUTLET (IN)	RPM	IMPELLER SIZE (IN)	ELECTRICAL			OP WT (LBS)	ACCESSORIES	REMARKS
															BHP	HP	V/PH			
CHWP-1		AHU-1, AHU-2	BUILDING	ROOF		CLOSED-COUPLED END SUCTION	440	40								7.5	460/3	380	VFD-CHWP-1	N+1
CHWP-2		AHU-1, AHU-2	BUILDING	ROOF		CLOSED-COUPLED END SUCTION	440	40								7.5	460/3	380	VFD-CHWP-2	N+1
HHWP-1		AHU-1, AHU-2	BUILDING	ROOF		CLOSED-COUPLED END SUCTION	300	40								5	460/3	240	VFD-HHWP-1	N+1
HHWP-2		AHU-1, AHU-2	BUILDING	ROOF		CLOSED-COUPLED END SUCTION	300	40								5	460/3	240	VFD-HHWP-2	N+1

VARIABLE FREQUENCY DRIVE

TAG	MANUFACTURER & MODEL	SERVING	HP	EFF	TEMP F		LOCATION	V/PH	OP WT (LBS)	ACCESSORIES	REMARKS
					MAX	MIN					
VFD LEF-1A	DANFOSS FC-102	LEF	30	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD LEF-1B	DANFOSS FC-102	LEF	30	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD EF-2	DANFOSS FC-102	EF	3	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD EF-3	DANFOSS FC-102	EF	3	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD CHWP-1	DANFOSS FC-102	CHWP	7.5	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD CHWP-2	DANFOSS FC-102	CHWP	7.5	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD HHWP-1	DANFOSS FC-102	HHWP	5	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD HHWP-2	DANFOSS FC-102	HHWP	5	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD AHU-1	DANFOSS FC-102	AHU-1	70	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD AHU-1	DANFOSS FC-102	AHU-1	70	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD AHU-2	DANFOSS FC-102	AHU-2	30	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD AHU-2	DANFOSS FC-102	AHU-2	30	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	

MISCELLANEOUS EQUIPMENT

TAG	MANUFACTURER & MODEL	SERVING	DESCRIPTION	CAPACITY	DESIGN CONDITIONS	ELECTRICAL		OP WT (LBS)	ACCESSORIES	REMARKS
						PWR	V/PH			
GH-201, 202, 203	GREENHECK FGR	ELEV SHAFTS	SMOKE RELIEF HOOD	N/A	N/A	N/A	N/A	100	NO DAMPER, HOOD ONLY	24X24
ST-1		CHW BUFFER TANK		500 GAL						
ST-2		HHW BUFFER TANK		720 GAL						

ARCHITECT:

Western Allied MECHANICAL

33210 Central Ave, Union City, CA 94587
(650) 326-0750
CA State License No. 826782

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COMMUNICATION OF THIS DESIGN WITHOUT THE CONSENT OF WESTERN ALLIED MECHANICAL, INC. CONSTITUTES A VIOLATION OF THE LAWS OF THIS STATE.

STAMP:

TARLTON PROPERTIES 1320 WILLOW

1320 WILLOW, MENLO PARK

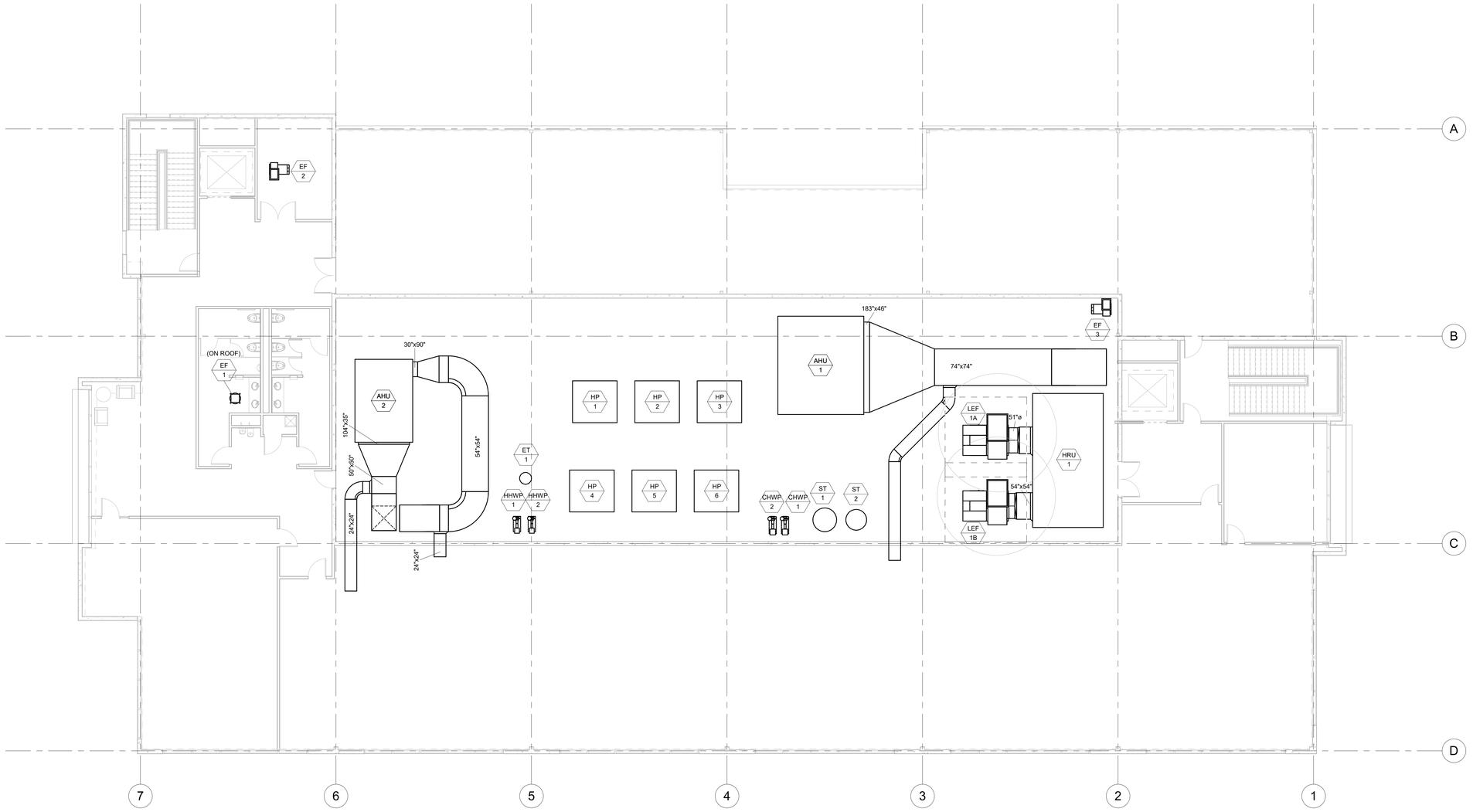
NO.	DESCRIPTION	DATE
1	Revision 1	Date

SCHEDULES - ELECTRIC PLANT

SCALE:	12" = 1'-0"
DRN BY:	Author
CHK BY:	Checker
JOB NO:	PROJECT #
DATE:	Issue Date

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1	Revision 1	Date

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MECHANICAL PLAN LEVEL 4 - ELECTRIC PLANT

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WATER COOLED CHILLER

TAG	MANUFACTURER & MODEL	TYPE	REFRIGERANT			CAPACITY-TONS			KW	KW/ TON	NPLV	EVAPORATOR							CONDENSER								ELECTRICAL			OP WT (LBS)	ACCESSORIES	REMARKS
			TYPE	CIRCUITS	CHARGE (LBS)	CALC	NOM	ACT				INLET (IN)	OUTLET (IN)	EWT	LWT	DES GPM	DES WPD	MIN GPM	MIN WPD	INLET (IN)	OUTLET (IN)	EWT	LWT	DES GPM	DES WPD	MIN GPM	MIN WPD	MCA	MOCP	V/PH			
CH-1	YORK YMC2-S1266BAS	CENTIFUGAL	-	-	-		360		189.6																			311	500	460/3	14000		

COOLING TOWER

TAG	MANUFACTURER & MODEL	SERVICE	AREA SERVED	LOCATION	DESIGN PERFORMANCE				WPD PSI	T-24 PERFORMANCE				WPD PSI	STATIC HEAD	MIN FLOW	FANS			OP WT (LBS)	ACCESSORIES	REMARKS
					GPM	OAWB	EWT	LWT		GPM	OAWB	EWT	LWT				QTY	HP/EA	V/PH			
CT-1	BAC-3000 XES3E-1222-07M	CHILLER	MECH ROOM	MECH WELL												-	1	20	460V/3PH	26000	SWEEPER PIPING, VIBRATION SWITCH, EXTERNAL LADDER AND SERVICE PLATFORM,	

CHILLED WATER AIR HANDLING UNIT

TAG	MANUFACTURER & MODEL	SERVING	CFM			SUPPLY FAN				RELIEF/RETURN FAN				COILS		FILTER									ELECTRICAL			OP WT (LBS)	ACCESSORIES	REMARKS
			TOTAL	OSA		ESP	RPM	BHP	HP	ESP	RPM	BHP	HP	CHW	HHW	PREFILTER			CARBON			FINAL			MCA	MOCP	V/PH			
				DES	ABS	TSP				TSP						EFF	QTY	SIZE	EFF	QTY	SIZE	EFF	QTY	SIZE						
AHU-1	SCOTT SPRINGFIELD	COLD DECK	70,000						140																	460 / 3	26,000	120V FOR OUTLET AND LIGHTS, 460V SINGLE POINT POWER CONNECTION, RETURN AIR DAMPER	N-1 SUPPLY FAN REDUNDANCY, DUCT SMOKE DETECTOR MOUNTED BY MECHANICAL, PROVDED AND WIRED BY FIRE AND LIFE SAFETY
AHU-2	SCOTT SPRINGFIELD	HOT/TEMPERED DECK	30,000						60																	460 / 3	12,000	120V FOR OUTLET AND LIGHTS, 460V SINGLE POINT POWER CONNECTION, RETURN AIR DAMPER	N-1 SUPPLY FAN REDUNDANCY, DUCT SMOKE DETECTOR MOUNTED BY MECHANICAL, PROVDED AND WIRED BY FIRE AND LIFE SAFETY

BOILERS

TAG	MANUFACTURER & MODEL	AREA SERVED	LOCATION	SERVING	TYPE	CAP (MBH)				TEMP		GPM			WATER CONN.	WPD (FT)	GAS			WP MAX	FLUE			ELECTRICAL			OP WT (LBS)	ACCESSORIES	REMARKS
						CALC	IN	OUT	EFF %	EWT (F)	LWT (F)	DESIGN	MAX	MIN			FUEL	CONN (IN)	PRESSURE			CAT	MATERIAL	SIZE	AMPS	MOCP	V/PH			
																			MAX	MIN									
B-1	CLEAVERBROOKS CFC-E2-700-1500-125HW	AHU-1/AHU-2	PENTHOUSE	LABS & OFFICE	CONDENSING		1500												14" WC	7" WC	-	IV	POLY-PROPYLENE	8"	16	20	115/1	2800	BMS GATEWAY; OUTDOOR VENT KIT; CONDENSATE TREATMENT KIT; HIGH LIMIT MANUAL RESET	
B-2	CLEAVERBROOKS CFC-E2-700-1500-125HW	AHU-1/AHU-2	PENTHOUSE	LABS & OFFICE	CONDENSING		1500												14" WC	7" WC	-	IV	POLY-PROPYLENE	8"	16	20	115/1	2800	BMS GATEWAY; OUTDOOR VENT KIT; CONDENSATE TREATMENT KIT; HIGH LIMIT MANUAL RESET	

FANS

TAG	MANUFACTURER & MODEL	SERVES	AREA SERVED	LOCATION	TYPE	DRIVE	DISCHARGE	CFM	TSP	ESP	DESIGN FAN RPM	MAX FAN RPM	MOTOR RPM	V/PH	BHP	HP	SONES	ROOF OPENING	OP WT (LBS)	ACCESSORIES	REMARKS
LEF-1A		LABS	LABS	ROOF	CW	BELT DRIVE	UB	35000	3	3				460/3		30		-	2000	PREMIUM EFF, TEFC, VFD RATED MOTOR WITH SHAFT GROUNDING; BOLTED ACCESS DOOR; DRAIN W/PLUG; WEATHER HOOD; SPARK B RESISTANCE; HI-PRO POLYESTER COATING	ON E-POWER
LEF-1B		LABS	LABS	ROOF	CCW	BELT DRIVE	UB	35000	3	3				460/3		30		-	2000	PREMIUM EFF, TEFC, VFD RATED MOTOR WITH SHAFT GROUNDING; BOLTED ACCESS DOOR; DRAIN W/PLUG; WEATHER HOOD; SPARK B RESISTANCE; HI-PRO POLYESTER COATING	ON E-POWER
EF-1		RESTROOMS	RESTROOMS	ROOF	ROOF	DIRECT DRIVE	DOWNBLAST							115/1		1			100	EC MOTOR; BACKDRAFT DAMPER; 12" ROOF CURB; SPEED CONTROLLER WITH 0-10 VDC LEAD; DISCONNECT SWITCH	
EF-2		ELEVATOR HOISTWAY VENT	ELEVATOR	ROOF	CW	BELT DRIVE	UB							460/3		3			400		
EF-3		ELEVATOR HOISTWAY VENT	ELEVATOR	ROOF	CW	BELT DRIVE	UB							460/3		3			400		
EF-4		CHILLER ROOM	CHILLER ROOM	CHILLER ROOM ROOF	ROOF	DIRECT DRIVE	DOWNBLAST							115/1		1			100	EC MOTOR; BACKDRAFT DAMPER; 12" ROOF CURB; SPEED CONTROLLER WITH 0-10 VDC LEAD; DISCONNECT SWITCH	ON E-POWER, CONNECTED TO REF MONITOR FOR EMERGENCY VENT

PUMPS

TAG	MANUFACTURER & MODEL	SERVES	AREA SERVED	LOCATION	SHUT OFF TDH	TYPE	GPM	HEAD (FT)	%EFF	NPSH (FT)	INLET (IN)	OUTLET (IN)	RPM	IMPELLER SIZE (IN)	ELECTRICAL			OP WT (LBS)	ACCESSORIES	REMARKS
															BHP	HP	V/PH			
CHWP-1		AHU-1, AHU-2	BUILDING	ROOF		CLOSED-COUPLED END SUCTION	440	40								7.5	460/3	380	VFD-CHWP-1	N+1
CHWP-2		AHU-1, AHU-2	BUILDING	ROOF		CLOSED-COUPLED END SUCTION	440	40								7.5	460/3	380	VFD-CHWP-2	N+1
CWP-1		CT-1	BUILDING	ROOF		CLOSED-COUPLED END SUCTION	1100	40								15	460/3	625	VFD-CWP-1	N+1
CWP-2		CT-1	BUILDING	ROOF		CLOSED-COUPLED END SUCTION	1100	40								15	460/3	625	VFD-CWP-2	N+1
HHWP-1		AHU-1, AHU-2	BUILDING	ROOF		CLOSED-COUPLED END SUCTION	280	40								5	460/3	240	VFD-HHWP-1	N+1
HHWP-2		AHU-1, AHU-2	BUILDING	ROOF		CLOSED-COUPLED END SUCTION	280	40								5	460/3	240	VFD-HHWP-2	N+1

MISCELLANEOUS EQUIPMENT

TAG	MANUFACTURER & MODEL	SERVING	DESCRIPTION	CAPACITY	DESIGN CONDITIONS	ELECTRICAL		OP WT (LBS)	ACCESSORIES	REMARKS
						PWR	V/PH			
CS-1	PUROFLUX PF-64-030-AP	CT-1	CENTRIFUGAL SEPARATOR	220 GPM	1 CELL	7.5 HP	460/3	645		
GH-201, 202, 203	GREENHECK FGR	ELEV SHAFTS	SMOKE RELIEF HOOD	N/A	N/A	N/A	N/A	100	NO DAMPER, HOOD ONLY	24X24
ST-1		CHW BUFFER TANK		500 GAL						

VARIABLE FREQUENCY DRIVE

TAG	MANUFACTURER & MODEL	SERVING	HP	EFF	TEMP F		LOCATION	V/PH	OP WT (LBS)	ACCESSORIES	REMARKS
					MAX	MIN					
VFD LEF-1A	DANFOSS FC-102	LEF	30	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD LEF-1B	DANFOSS FC-102	LEF	30	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD EF-2	DANFOSS FC-102	EF	3	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD EF-3	DANFOSS FC-102	EF	3	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD CT-1	DANFOSS FC-102	CT	20	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD CHWP-1	DANFOSS FC-102	CHWP	7.5	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD CHWP-2	DANFOSS FC-102	CHWP	7.5	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD CWP-1	DANFOSS FC-102	CWP	15	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD CWP-2	DANFOSS FC-102	CWP	15	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD HHWP-1	DANFOSS FC-102	HHWP	5	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD HHWP-2	DANFOSS FC-102	HHWP	5	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD AHU-1	DANFOSS FC-102	AHU-1	70	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD AHU-1	DANFOSS FC-102	AHU-1	70	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD AHU-2	DANFOSS FC-102	AHU-2	30	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	
VFD AHU-2	DANFOSS FC-102	AHU-2	30	97%	113	14	ROOF	460/3		FUSED DISCONNECT; BACKPLATE, BACNET; NEMA 3R ENCLOSURE	

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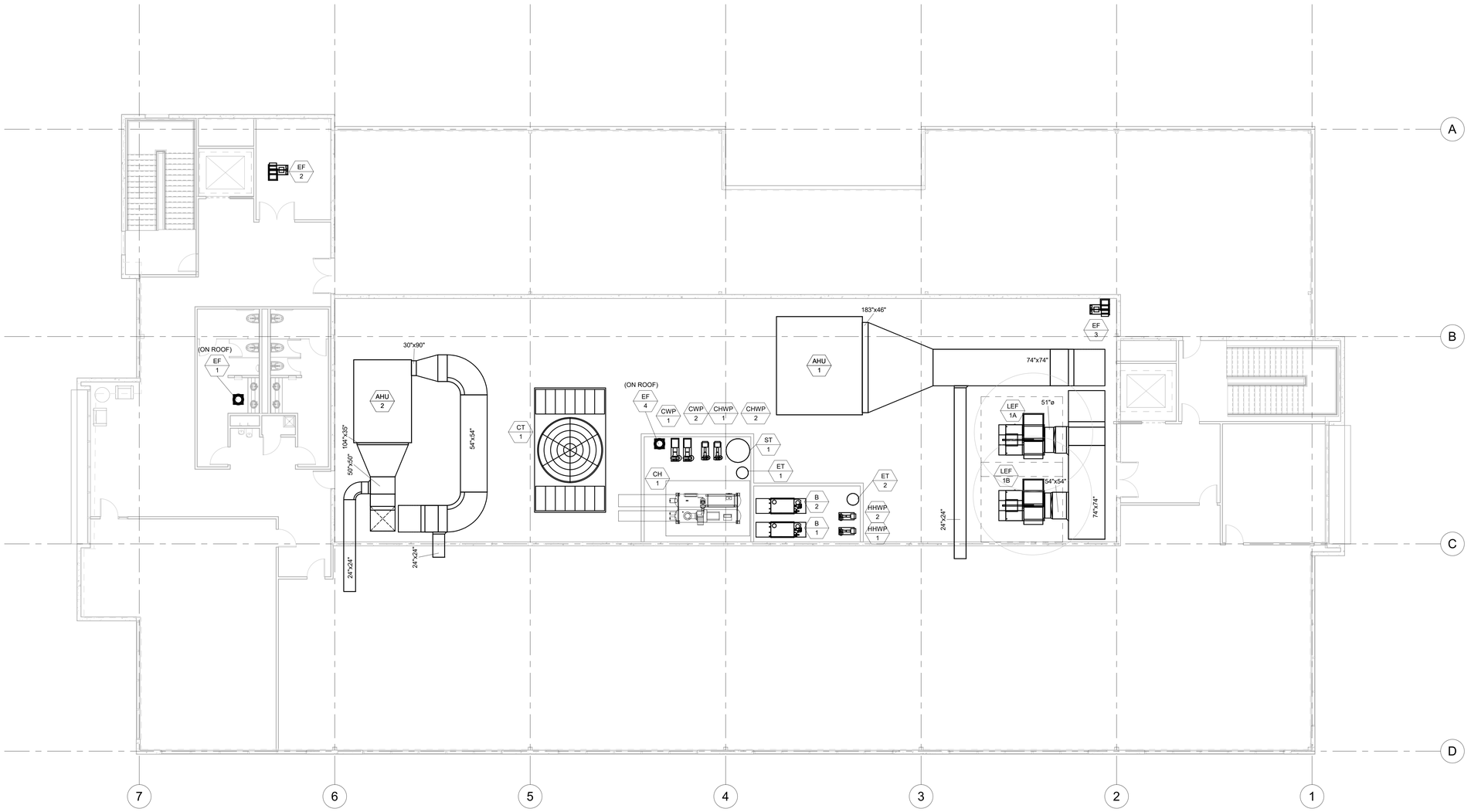
NO.	DESCRIPTION	DATE
1	Revision 1	Date

SCHEDULES -TRADITIONAL PLANT

SCALE:	12" = 1'-0"
DRN BY:	Author
CHK BY:	Checker
JOB NO:	PROJECT #
DATE:	Issue Date

SHEET NO:
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NO.	DESCRIPTION	DATE
1	Revision 1	Date

MECHANICAL PLAN LEVEL 4 - TRADITIONAL PLANT

SCALE:	1/8" = 1'-0"
DRN BY:	Author
CHK BY:	Checker
JOB NO:	PROJECT #
DATE:	Issue Date

SHEET NO:
M2.4
-TRAD

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NRG ENGINEERING
eNeRGy + Building Performance

Tom Hyde
DES Architects + Engineers
399 Bradford St.
Redwood City, CA 94063

September 12, 2024

Subject: 1320 Willow Drive All-Electric Analysis

City of Menlo Park's Cost Effectiveness Calculator

Step 1: Incremental construction costs	($925,923)
Step 2: Incremental operational time dependent valuation (TDV) costs/benefits	($14,459)
Step 3: Cost effectiveness calculations	($940,382)
To demonstrate the cost effectiveness exception, add the incremental construction cost of the electric system (per Step 1) to the on-going TDV impact of the baseline system to the proposed system (per Step 2). This will determine the Net Present Value (NPV) of the electric system. For example, if the incremental cost of the electric system is determined to be $1,000 more than the gas system in Step 1 (and thus a negative number), then the NPV of the electric system would be -$1,000 + $890 = -$110 NPV. If the NPV is positive, then the electric system is cost-effective. If the NPV is negative, the electric system is not cost-effective.	NPV is negative/not cost-effective

City of Menlo Park's NPV Calculation

Design Option	Step 1 TDV	Step 2 Bldg SF	Step 3 TDV kBtu	Step 4 NPV
All Elec design	77.66	73,000	5,669,211	$ 504,560
Gas/Elec design	75.43	73,000	5,506,753	$ 490,101
	TDV Cost of All-Electric Design			**$ (14,459)**

Respectfully,
NRG ENGINEERING

Erik Dyrr

234A W. 3rd St, Suite C, Chico, CA Tel: 415.275.4265 EDyrr@nrg-eng.com

CERTIFICATE OF COMPLIANCE - NONRESIDENTIAL PERFORMANCE COMPLIANCE METHOD				NRCC-PRF-E
Nonresidential Performance Compliance Method				(Page 1 of 26)
Project Name:	1320_Willow	Date Prepared:	2024-09-11	

A. General Information					
1	Project Name	1320_Willow			
2	Run Title	Title 24 Analysis			
3	Project Location	1320 Willow			
4	City	Menlo Park	5	Standards Version	Compliance 2022
6	Zip code	94025	7	Compliance Software (version)	CBECC 2022.3.0 (1302)
8	Climate Zone	3	9	Building Orientation (deg)	0
10	Building Type(s)	• Nonresidential	11	Weather File	OAKLAND-INTL_STYP20.epw
12	Project Scope	• New complete scope	13	Number of Dwelling Units	0
14	Total Conditioned Floor Area in Scope (ft^2)	73066	15	Total # of hotel/motel rooms	0
16	Total Unconditioned Floor Area (ft^2)	561	17	Fuel Type	Natural gas
18	Nonresidential Conditioned Floor Area	73066	19	Total # of Stories (Habitable Above Grade)	4
20	Residential Conditioned Floor Area	0			

B. PROJECT SUMMARY

Table B shows which building components are included in the performance calculation. If indicated as not included, the project must show compliance prescriptively if within the permit application.

Building Components Complying via Performance						**Building Components Complying Prescriptively**	
Envelope (See Table G)	Nonres	Performance	Solar Thermal Water Heating (See Table I3)	☐	Performance	The following building components are ONLY eligible for prescriptive compliance and should be documented on the NRCC form listed if within the scope of the permit application (i.e. compliance will not be shown on the NRCC-PRF-E).	
	MultiFam	Not Included		☒	Not Included		
Mechanical (See Table H)	Nonres	Performance	Covered Process: Commercial Kitchens (see Table J)	☐	Performance	Indoor Lighting (Unconditioned) 140.6 & 170.2(e)	NRCC-LTI-E is required
	MultiFam	Not Included		☒	Not Included	Outdoor Lighting 140.7 & 170.2(e)	NRCC-LTO-E is required
Domestic Hot Water (See Table I)	Nonres	Performance	Covered Process: Laboratory Exhaust (see Table J)	☒	Performance	Sign Lighting 140.8 & 170.2(e)	NRCC-LTS-E is required
	MultiFam	Not Included		☐	Not Included	**Building Components Complying with Mandatory Measures**	
Lighting (Indoor Conditioned, see Table K)	Nonres	Performance	Photovoltaics (see Table F)	☐	Performance	Electrical power systems, commissioning, solar ready, elevator and escalator requirements are mandatory and should be documented on the NRCC form listed if applicable (i.e. compliance will not be shown on the NRCC-PRF-E.)	
	MultiFam	Not Included		☒	Not Included	Electrical Power Distribution 110.11	NRCC-ELC-E is required
			Battery (see Table F)	☐	Performance	Commissioning 120.8	NRCC-CXR-E is required
				☒	Not Included	Solar and Battery 110.10	NRCC-SAB-E is required

C1. COMPLIANCE SUMMARY

COMPLIES[3]

	Time Dependent Valuaton (TDV)		Source Energy Use
	Efficiency[1] (kBtu/ft^2 - yr)	**Total[2] (kBtu/ft^2 - yr)**	**Total[2] (kBtu/ft^2 - yr)**
Standard Design	335.3	335.3	58.37
Proposed Design	291.21	291.21	43.37
Compliance Margins	**44.09**	**44.09**	**15**
	Pass	**Pass**	**Pass**

[1] Efficiency measures include improvements like a better building envelope and more efficient equipment

[2] Compliance Totals include efficiency, photovoltaics and batteries

[3] New Construction, Complete Addition Scope: Building complies when all efficiency and total compliance margins are greater than or equal to zero and unmet load hour limits are not exceeded
Existing, Addition and Alteration Scope: Building complies when efficiency compliance margin is greater than or equal to zero and unmet load hour limits are not exceeded

C2. TDV ENERGY COMPLIANCE RESULTS FOR PERFORMANCE COMPONENTS (Annual TDV Energy Use, kBtu/ft^2 - yr)

COMPLIES[2]

Energy Component	Standard Design (TDV)	Proposed Design (TDV)	Compliance Margin (TDV)[1]
Space Heating	112.99	75.37	37.62
Space Cooling	63.94	40.58	23.36
Indoor Fans	96.9	94.7	2.2
Heat Rejection	0	0.26	-0.26
Pumps & Misc.	0.53	17.96	-17.43
Domestic Hot Water	6.36	7.76	-1.4
Indoor Lighting	54.58	54.58	0
Flexibility	---	---	---
EFFICIENCY COMPLIANCE TOTAL	**335.3**	**291.21**	**44.09 (13.1%)**
Photovoltaics	---	---	---
Batteries	---	---	---
TOTAL COMPLIANCE	**335.3**	**291.21**	**44.09 (13.1%)**

[1] *Notes: This number in parenthesis following the Compliance Margin in column 4, represents the Percent Better than Standard.*

C3. TDV ENERGY RESULTS FOR NON-REGULATED COMPONENTS[1]

Non-Regulated Energy Component	Standard Design (TDV)	Proposed Design (TDV)	Compliance Margin (TDV)[1]
Receptacle	120.43	120.43	---
Process	25.13	25.13	---
Other Ltg	---	---	---
Process Motors	---	---	---
TOTAL (TOTAL COMPLIANCE + NON-REGULATED COMPONENTS)	**480.86**	**436.77**	**44.09 (9.2%)**

[1] *Notes: This table is not used for Energy Code Compliance.*

C4. SOURCE ENERGY COMPLIANCE RESULTS FOR PERFORMANCE COMPONENTS (Annual SOURCE Energy Use, kBtu/ft^2 /yr)

COMPLIES[2]

Energy Component	Standard Design (SOURCE)	Proposed Design (SOURCE)	Compliance Margin (SOURCE)[1]
Space Heating	40.06	26.55	13.51
Space Cooling	2.61	1.43	1.18
Indoor Fans	10.17	9.07	1.1
Heat Rejection	0	0.01	-0.01
Pumps & Misc.	0.07	1.12	-1.05
Domestic Hot Water	0.93	0.66	0.27
Indoor Lighting	4.53	4.53	0
Flexibility	---	---	---
EFFICIENCY COMPLIANCE TOTAL	**58.37**	**43.37**	**15 (25.7%)**
Photovoltaics	---	---	---
Batteries	---	---	---
TOTAL COMPLIANCE	**58.37**	**43.37**	**15 (25.7%)**

[1] *Notes: This number in parenthesis following the Compliance Margin in column 4, represents the Percent Better than Standard.*

C5. SOURCE ENERGY RESULTS FOR NON-REGULATED COMPONENTS[1]

Non-Regulated Energy Component	Standard Design (SOURCE)	Proposed Design (SOURCE)	Compliance Margin (SOURCE)[1]
Receptacle	14.76	14.76	---
Process	2.75	2.75	---
Other Ltg	---	---	---
Process Motors	---	---	---
TOTAL (TOTAL COMPLIANCE + NON-REGULATED COMPONENTS)	**75.88**	**60.88**	**15 (19.8%)**

[1] *Notes: This table is not used for Energy Code Compliance.*

C6. 'ABOVE CODE' QUALIFICATIONS

☐ This project is pursuing CalGreen Tier 1 ☐ This project is pursuing CalGreen Tier 2

C7. ENERGY USE SUMMARY

Energy Component	Standard Design Site (MWh)	Proposed Design Site (MWh)	Margin (MWh)	Standard Design Site (MBtu)	Proposed Design Site (MBtu)	Margin (MBtu)
Space Heating	0.2	---	---	3141.8	2083	1058.8
Space Cooling	115.2	79.6	35.6	---	---	---
Indoor Fans	255.8	245.8	10	---	---	---
Heat Rejection	---	0.3	---	---	---	---
Pumps & Misc.	1.3	43.3	-42	---	---	---
Domestic Hot Water	14.6	21.4	-6.8	41.5	---	---
Indoor Lighting	157.3	157.3	0	---	---	---
Flexibility	---	---	---	---	---	---
EFFICIENCY TOTAL	**544.4**	**547.7**	**-3.3**	**3183.3**	**2083**	**1100.3**
Photovoltaics	---	---	---	---	---	---
Batteries	---	---	---	---	---	---
ENERGY USE SUBTOTAL	**544.4**	**547.7**	**-3.3**	**3183.3**	**2083**	**1100.3**
Receptacle	306.4	306.4	0	518.3	518.3	0
Process	65.3	65.3	0	---	---	---
Other Ltg	---	---	---	---	---	---
Process Motors	---	---	---	---	---	---
ENERGY USE TOTAL	**916.1**	**919.4**	**-3.3**	**3701.6**	**2601.3**	**1100.3**

C8. ENERGY USE INTENSITY (EUI)

	Standard Design (kBtu/ft^2 / yr)	Proposed Design (kBtu/ft^2 / yr)	Margin (kBtu/ft^2 / yr)	Margin Percentage
GROSS EUI[1]	92.73	77.94	14.79	15.95
NET EUI[1]	92.73	77.94	14.79	15.95

[1] Notes: Gross EUI is Energy Use Total (not including PV)/Total Building Area. Net EUI is Energy Use Total (including PV)/Total Building Area.

D1. EXCEPTIONAL CONDITIONS

• The aged solar reflectance and aged thermal emittance must be listed in the Cool Roof Rating Council database of certified products. For projects where initial reflectance is used, the initial reflectance must be listed, and the aged reflectance is calculated by the software program and used in the compliance model.
• The project uses the Simplified Geometry Performance Modeling Approach which is not capable of modeling daylighting controls and assumes the prescriptive Secondary Daylit Control requirements are met. PRESCRIPTIVE COMPLIANCE documentation (form NRCC-LTI-02-E) for the requirements of section 140.6(d) Automatic Daylighting Controls in Secondary Daylit Zones is required.
• Project is claiming Exception 1 to Section 140.10(b): No battery storage system is required if the installed PV system size is less than 15 percent of the size determined by Equation 140.10-A.
• PV/Battery Building Type has been modified from software defaults for one or more spaces. Review project's PV/Battery Building Type(s) with documentation author. Refer to Energy Code section 140.10 for Nonresidential or 170.2(g) for more information.

G1. ENVELOPE GENERAL INFORMATION (conditioned spaces only)

01	02	03	04
Opaque Surfaces & Orientation	**Total Gross Surface Area (ft^2)**	**Total Fenestration Area (ft^2)**	**Window to Wall Ratio (%)**
North-Facing[1]	13838.5	3627	26.21
East-Facing[2]	8177	2748	33.61
South-Facing[3]	14096.5	4103.53	29.11

Notes
[1]North-Facing is oriented to within 45 degrees of true north, including 45 00'00" east of north (NE), but excluding 45 00'00" west of north (NW),
[2]East-Facing is oriented to within 45 degrees of true east, including 45 00'00" south of east (SE), but excluding 45 00'00" north of east (NE),
[3]South-Facing is oriented to within 45 degrees of true south, including 45 00'00" west of south (SW), but excluding 45 00'00" east of south (SE),
[4]West-Facing is oriented to within 45 degrees of true west, including 45 00'00" north of west (NW), but excluding 45 00'00" south of west (SW),

G1. ENVELOPE GENERAL INFORMATION (conditioned spaces only)

01	02	03	04
Opaque Surfaces & Orientation	**Total Gross Surface Area (ft^2)**	**Total Fenestration Area (ft^2)**	**Window to Wall Ratio (%)**
West-Facing[4]	8229	3057	37.15
Total	**44341**	**13535.5**	**30.53**
Roof	21050	0	0

Notes

[1]North-Facing is oriented to within 45 degrees of true north, including 45 00'00" east of north (NE), but excluding 45 00'00" west of north (NW),

[2]East-Facing is oriented to within 45 degrees of true east, including 45 00'00" south of east (SE), but excluding 45 00'00" north of east (NE),

[3]South-Facing is oriented to within 45 degrees of true south, including 45 00'00" west of south (SW), but excluding 45 00'00" east of south (SE),

[4]West-Facing is oriented to within 45 degrees of true west, including 45 00'00" north of west (NW), but excluding 45 00'00" south of west (SW),

G2A. ROOFING PRODUCT SUMMARY (NONRESIDENTIAL)

01	02	03	04	05	06
Assembly Name	**Roof Pitch**	**Roof Rise (x in 12)**	**Aged Solar Reflectance**	**Thermal Emittance**	**SRI**
R-30 Conc Roof	LowSlope	N/A	0.7	0.75	0

G4. NONRESIDENTIAL AIR BARRIER

01	02
Building Story Name	**Air Barrier**
Floor 1	Air barrier - not verified
Floor 2	Air barrier - not verified
Floor 3	Air barrier - not verified
Floor 4	Air barrier - not verified

G5. OPAQUE SURFACE ASSEMBLY SUMMARY

01	02	03	04	05	06		07	08	09	10
Surface Name	**Construction Type**	**Area (ft^2)**	**Framing Type**	**Cavity R-Value**	**Continuous R-Value**		**Units**	**Value**	**Description of Assembly Layers**	**Status[1]**
					Interior	**Exterior**				
Slab On Grade	Underground Floor	20,997	N/A	0	N/A	N/A	F-factor	0.73	Slab Type =Unheated slab on grade Insulation Orientation =None Insulation R-Value =none	N
GFRC Walls	Exterior Wall	45,191	Metal	19	N/A	5	U-factor	0.0857	Stone - 1 in. Vapor permeable felt - 1/8 in. Gypsum Board - 5/8 in. Compliance Insulation R5.00 Wall Metal Framed 2x8 R-19 Gypsum Board - 5/8 in.	N
R-13 Wall Metal Stud	Interior Wall	59,432.6	Metal	13	N/A	N/A	U-factor	0.1802	Gypsum Board - 5/8 in. Wall Metal Framed 2x4 R-13 Gypsum Board - 5/8 in.	N
Uninsulated Raised Slab	Interior Floor	52,630	N/A	0	N/A	N/A	U-factor	0.2375	Concrete - 140 lb/ft3 - 4 in. Carpet - 3/4 in.	N
R-30 Conc Roof	Roof	21,050	N/A	0	N/A	30	U-factor	0.0298	Single Ply Roofing - 1/4 in. Plywood - 1/2 in. Concrete - 80 lb/ft3 - 8 in. Glass fiber batt - 10 in. R30 (CEC Default)	N

[1] Status: N - New, A - Altered, E - Existing

G7A. FENESTRATION ASSEMBLY SUMMARY (NONRESIDENTIAL)

01	02	03	04	05	06	07	08	09
Fenestration Assembly Name	**Fenestration Type/ Product Type / Frame Type**	**Certification Method[1]**	**Assembly Method**	**Area (ft^2)**	**Overall U-factor**	**Overall SHGC**	**Overall VT**	**Status[2]**
Solarban70 on Solar Blue	Vertical fenestration Curtain wall N/A	NFRC	Site built	13,535.5	0.39	0.29	0.56	N

[1] Notes: Newly installed fenestration shall have a certified NFRC Label Certificate or use the CEC default tables found in Table 110.6-A and Table 110.6-B. Center of Glass (COG) values are for the glass-only, determined by the manufacturer, and are shown for ease of verification. Site-built fenestration values are calculated per Nonresidential Appendix NA6 and are used in the analysis.

[2] Status: N - New, A - Altered, E - Existing

H1. DRY SYSTEM EQUIPMENT (FURNACES, AIR HANDLING UNITS, HEAT PUMPS, VRF, ECONOMIZERS ETC.)

01	02	03	04	05	06	07	08	09	10	11	12
			Heating				**Cooling**				
Equipment Name	**Equipment Type**	**Qty**	**Total Heating Output (kBtu/h)**	**Supp Heat Output (kBtu/h)**	**Efficiency Unit**	**Efficiency**	**Total Cooling Output (kBtu/h)**	**Efficiency Unit**	**Efficiency**	**Economizer Type (if present)**	**Status[1]**
AHU1 LAB	Variable Air Volume Air System	1	1910	0	N/A	NA - See Boiler	2000	N/A	NA - See Chiller	No Economizer	N
AHU2 RD	Variable Air Volume Air System	1	1184.75	0	N/A	NA - See Boiler	1000	N/A	NA - See Chiller	Fixed DB	N

[1] Status: N - New, A - Altered, E - Existing

H3. NONRESIDENTIAL / COMMON USE AREA FAN SYSTEMS SUMMARY

01	02	03	04	05	06	07	08	09	10	11	12	13
Name or Item Tag	Qty	Design OA CFM	Supply Fan				Return / Relief Fan					Status[1]
			CFM	Power	Power Units	Control	Fan Type	CFM	Power	Power Units	Control	
AHU1 LAB	1	49301.7	70,000	140	BHP	VSD	N/A	N/A	N/A	N/A	N/A	N
AHU2 RD	1	8436.05	30,000	60	BHP	VSD	N/A	N/A	N/A	N/A	N/A	N

[1] *Status: N - New, A - Altered, E - Existing*

H5. GENERAL EXHAUST FAN SUMMARY

01	02	03	04	05	06	07	08
System ID	Zone Name	Qty	CFM	Power	Power Units	Continuous Operation?	Status[1]
Lab EF	32-01_LabC 33-01_LabCE 34-01_LabCW 35-01_LabSW 36-01_LabSE 37-02_LabCS 38-02_LabE 39-02_LabS 40-03_LabCS 41-03_LabE 42-03_LabS	1	50000	3	InH2O	No	N

[1] *Status: N - New, A - Altered, E - Existing*

H6. WET SYSTEM EQUIPMENT (boilers, chillers, cooling towers, etc.)

01	02	03	04	05	06	07	08	09	10
Name or Item Tag	Equipment Type	Parent Fluid System Name	Qty	Vol (gal)	Rated Capacity	Capacity Unit	Rating	Rating Unit	Status[1]
Boiler 1	Hot Water	HHW Loop	1	N/A	1,500	kBtu/Hr	0.94	TE	N
Boiler 2	Hot Water	HHW Loop	1	N/A	1,500	kBtu/Hr	0.94	TE	N
CH-1	Centrifugal	CHW Loop	1	N/A	4,320	kBtu/Hr	0.53	kWperTon	N
CT-1	Open Tower	CW Loop	1	N/A	5,256	kBtu/Hr	20	HP	N

[1] *Status: N - New, A - Altered, E - Existing*

H7. PUMPS

01	02	03	04	05	06	07	08
Name or Item Tag	Parent Equipment	Qty	Power	Power Units	GPM	VSD	Status[1]
HWP-1	Boiler 1	1	5	BHP	280	☒	N
HWP-2	Boiler 2	1	5	BHP	280	☒	N
CWP-1	CW Loop	1	15	BHP	1100	☐	N
CHWP-1	CH-1	1	7.5	BHP	440	☒	N

[1] *Status: N - New, A - Altered, E - Existing*

H8. SYSTEM SPECIAL FEATURES

01	02	03	04
System Name	Equipment Type	Interlocks per 140.4(n)[1]	Other Special Features and Controls
AHU1 LAB	Variable Air Volume Air System	N/A	DDC Controls Dual Maximum Reheat Controls Warmest Zone Supply Air Temp. Reset

Notes: This table includes controls related to the performance path only. For projects using the prescriptive path, mandatory and prescriptive controls requirements are documented on the NRCC-MCH-E.

[1] *Yes = interlocks are provided, No = interlocks are not provided, NA means no operable openings.*

H8. SYSTEM SPECIAL FEATURES

01	02	03	04
System Name	**Equipment Type**	**Interlocks per 140.4(n)[1]**	**Other Special Features and Controls**
AHU2 RD	Variable Air Volume Air System	N/A	DDC Controls Dual Maximum Reheat Controls Zone(s) With CO2 Sensor Vent. Control Warmest Zone Supply Air Temp. Reset Optimum Start Fixed DB
HHW Loop	Hot Water System	N/A	DDC Controls Fixed Temperature Control
DHW Loop	Service Hot Water	N/A	Fixed Temperature Control
CW Loop	Condenser Water	N/A	DDC Controls Fixed Temperature Control
CHW Loop	Chilled Water System	N/A	DDC Controls Fixed Temperature Control

Notes: This table includes controls related to the performance path only. For projects using the prescriptive path, mandatory and prescriptive controls requirements are documented on the NRCC-MCH-E.

[1] Yes = interlocks are provided, No = interlocks are not provided, NA means no operable openings.

H9. NONRESIDENTIAL / COMMON USE AREA & HOTEL/MOTEL VENTILATION

01	02	03	04	05	06	07
Zone Name	**Mechanical Ventilation**				**Conditioned Area (sf)**	**DCV or Occupant Sensor Controls, or Both**
	Ventilation Function	**# of People**	**Supply OA CFM**	**Exhaust CFM**		
1-01_RDN	Office - Office space	11.91	357.3	0	2382	N/A
3-01_Shipping	Misc - Shipping/receiving	2.28	136.65	0	911	N/A
4-01_Elec	General - Unoccupied	0.47	0	0	314	N/A
5-01_ElevCntl	General - Unoccupied	0.19	0	0	128	N/A
6-01_ConfS	General - Conference/meeting	9.33	140	0	280	DCV

H9. NONRESIDENTIAL / COMMON USE AREA & HOTEL/MOTEL VENTILATION

01	02	03	04	05	06	07
Zone Name	Mechanical Ventilation				Conditioned Area (sf)	DCV or Occupant Sensor Controls, or Both
	Ventilation Function	# of People	Supply OA CFM	Exhaust CFM		
7-01_IDF	General - Unoccupied	0.38	0	0	252	N/A
8-01_RDE	Office - Office space	2.14	64.2	0	428	N/A
9-01_ConfN	General - Conference/meeting	6.07	91	0	182	DCV
10-01_RDC	Office - Office space	20.24	607.2	0	4048	N/A
11-01_Lobby	Office - Main entry lobbies	74.77	1121.5	0	2243	DCV
12-01_Lobby2	Office - Main entry lobbies	47.1	706.5	0	1413	DCV
13-01_Corridor	General - Corridors	4.61	138.3	0	922	N/A
14-02_IDF	General - Unoccupied	0.38	0	0	252	N/A
15-02_ConfN	General - Conference/meeting	6.07	91	0	182	DCV
16-02_RDN	Office - Office space	11.91	357.3	0	2382	N/A
17-02_RDW	Office - Office space	7.7	231	0	1540	N/A
18-02_RDE	Office - Office space	2.14	64.2	0	428	N/A
19-02_Storage	Misc - All others	0	19.2	0	128	N/A
20-02_RDC	Office - Office space	23.8	714.15	0	4761	N/A
21-03_Storage	Misc - All others	0	19.2	0	128	N/A
22-03_RDN	Office - Office space	11.91	357.3	0	2382	N/A
23-03_RDE	Office - Office space	2.14	64.2	0	428	N/A
24-03_ConfN	General - Conference/meeting	6.07	91	0	182	DCV
25-03_RDC	Office - Office space	23.8	714.15	0	4761	N/A
26-03_RDW	Office - Office space	7.7	231	0	1540	N/A
27-03_IDF	General - Unoccupied	0.38	0	0	252	N/A
28-04_Corridor	General - Corridors	7.32	219.45	0	1463	N/A

H9. NONRESIDENTIAL / COMMON USE AREA & HOTEL/MOTEL VENTILATION

01	02	03	04	05	06	07
Zone Name	Mechanical Ventilation				Conditioned Area (sf)	DCV or Occupant Sensor Controls, or Both
	Ventilation Function	# of People	Supply OA CFM	Exhaust CFM		
29-04_ConfW	General - Conference/meeting	37.1	556.5	0	1113	DCV
30-04_RD	Office - Office space	38.38	1151.25	0	7675	N/A
31-04_ConfE	General - Conference/meeting	12.83	192.5	0	385	DCV
32-01_LabC	Misc - General manufacturing (excludes heavy industrial and process using chemicals)	10.23	3410	1364	2046	N/A
33-01_LabCE	Misc - General manufacturing (excludes heavy industrial and process using chemicals)	9.46	3151.67	1260.67	1891	N/A
34-01_LabCW	Misc - General manufacturing (excludes heavy industrial and process using chemicals)	6.58	2191.67	876.67	1315	N/A
35-01_LabSW	Misc - General manufacturing (excludes heavy industrial and process using chemicals)	5.06	1686.67	674.67	1012	N/A
36-01_LabSE	Misc - General manufacturing (excludes heavy industrial and process using chemicals)	3.35	1115	446	669	N/A
37-02_LabCS	Misc - General manufacturing (excludes heavy industrial and process using chemicals)	39.04	13013.3	5205.33	7808	N/A

H9. NONRESIDENTIAL / COMMON USE AREA & HOTEL/MOTEL VENTILATION

01	02	03	04	05	06	07
Zone Name	Mechanical Ventilation				Conditioned Area (sf)	DCV or Occupant Sensor Controls, or Both
	Ventilation Function	# of People	Supply OA CFM	Exhaust CFM		
38-02_LabE	Misc - General manufacturing (excludes heavy industrial and process using chemicals)	3.91	1303.33	521.33	782	N/A
39-02_LabS	Misc - General manufacturing (excludes heavy industrial and process using chemicals)	13.67	4556.67	1822.67	2734	N/A
40-03_LabCS	Misc - General manufacturing (excludes heavy industrial and process using chemicals)	39.04	13013.3	5205.33	7808	N/A
41-03_LabE	Misc - General manufacturing (excludes heavy industrial and process using chemicals)	3.91	1303.33	521.33	782	N/A
42-03_LabS	Misc - General manufacturing (excludes heavy industrial and process using chemicals)	13.67	4556.67	1822.67	2734	N/A

H11. ZONAL SYSTEM AND TERMINAL UNIT SUMMARY

01	02	03	04	05	06	07	08	09	10	11	12
System ID	System Type	Qty	Rated Capacity (kBtuh)		Airflow (cfm)			Fan			VSD
			Heating	Cooling	Design	MIn.	Min. Ratio	Power	Power Units	Cycles	
42-03_LabS-Trm	Variable Air Volume Reheat Box	1	175	N/A	4,556.67	1,822.67	0.4	N/A	N/A	N/A	☐

H11. ZONAL SYSTEM AND TERMINAL UNIT SUMMARY

01	02	03	04	05	06	07	08	09	10	11	12
System ID	System Type	Qty	Rated Capacity (kBtuh)		Airflow (cfm)			Fan			VSD
			Heating	Cooling	Design	MIn.	Min. Ratio	Power	Power Units	Cycles	
41-03_LabE-Trm	Variable Air Volume Reheat Box	1	50	N/A	1,303.33	521.33	0.4	N/A	N/A	N/A	☐
40-03_LabCS-Trm	Variable Air Volume Reheat Box	1	500	N/A	13,013.3	5,205.33	0.4	N/A	N/A	N/A	☐
39-02_LabS-Trm	Variable Air Volume Reheat Box	1	175	N/A	4,556.67	1,822.67	0.4	N/A	N/A	N/A	☐
38-02_LabE-Trm	Variable Air Volume Reheat Box	1	60	N/A	1,303.33	521.33	0.4	N/A	N/A	N/A	☐
37-02_LabCS-Trm	Variable Air Volume Reheat Box	1	500	N/A	13,013.3	5,205.33	0.4	N/A	N/A	N/A	☐
36-01_LabSE-Trm	Variable Air Volume Reheat Box	1	50	N/A	1,115	446	0.4	N/A	N/A	N/A	☐
35-01_LabSW-Trm	Variable Air Volume Reheat Box	1	75	N/A	1,686.67	674.67	0.4	N/A	N/A	N/A	☐
34-01_LabCW-Trm	Variable Air Volume Reheat Box	1	75	N/A	2,191.67	876.67	0.4	N/A	N/A	N/A	☐
33-01_LabCE-Trm	Variable Air Volume Reheat Box	1	125	N/A	3,151.67	1,260.67	0.4	N/A	N/A	N/A	☐
32-01_LabC-Trm	Variable Air Volume Reheat Box	1	125	N/A	3,410	1,364	0.4	N/A	N/A	N/A	☐
31-04_ConfE-Trm	Variable Air Volume Reheat Box	1	30	N/A	1,200	360	0.3	N/A	N/A	N/A	☐
30-04_RD-Trm	Variable Air Volume Reheat Box	1	180	N/A	9,800	2,940	0.3	N/A	N/A	N/A	☐
29-04_ConfW-Trm	Variable Air Volume Reheat Box	1	60	N/A	3,200	960	0.3	N/A	N/A	N/A	☐

H11. ZONAL SYSTEM AND TERMINAL UNIT SUMMARY

01	02	03	04	05	06	07	08	09	10	11	12
System ID	System Type	Qty	Rated Capacity (kBtuh)		Airflow (cfm)			Fan			VSD
			Heating	Cooling	Design	MIn.	Min. Ratio	Power	Power Units	Cycles	
28-04_Corridor-Trm	Variable Air Volume Reheat Box	1	42.75	N/A	2,500	750	0.3	N/A	N/A	N/A	☐
27-03_IDF-Trm	Variable Air Volume Reheat Box	1	2.56	N/A	150	45	0.3	N/A	N/A	N/A	☐
26-03_RDW-Trm	Variable Air Volume Reheat Box	1	75	N/A	3,800	1,140	0.3	N/A	N/A	N/A	☐
25-03_RDC-Trm	Variable Air Volume Reheat Box	1	60	N/A	2,400	720	0.3	N/A	N/A	N/A	☐
24-03_ConfN-Trm	Variable Air Volume Reheat Box	1	12	N/A	400	120	0.3	N/A	N/A	N/A	☐
23-03_RDE-Trm	Variable Air Volume Reheat Box	1	40	N/A	1,400	420	0.3	N/A	N/A	N/A	☐
22-03_RDN-Trm	Variable Air Volume Reheat Box	1	75	N/A	3,200	960	0.3	N/A	N/A	N/A	☐
21-03_Storage-Trm	Variable Air Volume Reheat Box	1	1.71	N/A	100	30	0.3	N/A	N/A	N/A	☐
20-02_RDC-Trm	Variable Air Volume Reheat Box	1	42.75	N/A	2,500	750	0.3	N/A	N/A	N/A	☐
19-02_Storage-Trm	Variable Air Volume Reheat Box	1	1.71	N/A	100	30	0.3	N/A	N/A	N/A	☐
18-02_RDE-Trm	Variable Air Volume Reheat Box	1	40	N/A	1,500	450	0.3	N/A	N/A	N/A	☐
17-02_RDW-Trm	Variable Air Volume Reheat Box	1	75	N/A	3,600	1,080	0.3	N/A	N/A	N/A	☐
16-02_RDN-Trm	Variable Air Volume Reheat Box	1	75	N/A	3,200	960	0.3	N/A	N/A	N/A	☐

H11. ZONAL SYSTEM AND TERMINAL UNIT SUMMARY

01	02	03	04	05	06	07	08	09	10	11	12
System ID	System Type	Qty	Rated Capacity (kBtuh)		Airflow (cfm)			Fan			VSD
			Heating	Cooling	Design	MIn.	Min. Ratio	Power	Power Units	Cycles	
15-02_ConfN-Trm	Variable Air Volume Reheat Box	1	12	N/A	350	105	0.3	N/A	N/A	N/A	☐
14-02_IDF-Trm	Variable Air Volume Reheat Box	1	2.56	N/A	150	45	0.3	N/A	N/A	N/A	☐
13-01_Corridor-Trm	Variable Air Volume Reheat Box	1	8.55	N/A	500	150	0.3	N/A	N/A	N/A	☐
12-01_Lobby2-Trm	Variable Air Volume Reheat Box	1	44.46	N/A	2,600	780	0.3	N/A	N/A	N/A	☐
11-01_Lobby-Trm	Variable Air Volume Reheat Box	1	99.18	N/A	5,800	1,740	0.3	N/A	N/A	N/A	☐
10-01_RDC-Trm	Variable Air Volume Reheat Box	1	37.62	N/A	2,200	660	0.3	N/A	N/A	N/A	☐
9-01_ConfN-Trm	Variable Air Volume Reheat Box	1	5.99	N/A	350	105	0.3	N/A	N/A	N/A	☐
8-01_RDE-Trm	Variable Air Volume Reheat Box	1	40	N/A	1,400	420	0.3	N/A	N/A	N/A	☐
7-01_IDF-Trm	Variable Air Volume Reheat Box	1	2.56	N/A	150	45	0.3	N/A	N/A	N/A	☐
6-01_ConfS-Trm	Variable Air Volume Reheat Box	1	40	N/A	1,400	420	0.3	N/A	N/A	N/A	☐
5-01_ElevCntl-Trm	Variable Air Volume Reheat Box	1	2.05	N/A	120	36	0.3	N/A	N/A	N/A	☐
4-01_Elec-Trm	Variable Air Volume Reheat Box	1	2.74	N/A	160	48	0.3	N/A	N/A	N/A	☐
3-01_Shipping-Trm	Variable Air Volume Reheat Box	1	8.55	N/A	500	150	0.3	N/A	N/A	N/A	☐

H11. ZONAL SYSTEM AND TERMINAL UNIT SUMMARY

01	02	03	04	05	06	07	08	09	10	11	12
System ID	System Type	Qty	Rated Capacity (kBtuh)		Airflow (cfm)			Fan			VSD
			Heating	Cooling	Design	MIn.	Min. Ratio	Power	Power Units	Cycles	
1-01_RDN-Trm	Variable Air Volume Reheat Box	1	65	N/A	3,200	960	0.3	N/A	N/A	N/A	☐

I1. WATER HEATER EQUIPMENT SUMMARY

01	02	03	04	05	06	07	08	09	10	11	12	13	14
Name	Heater Element Type	Tank Type	Qty	Tank Vol (gal)	Rated Input	Rated Input Unit	Efficiency	Efficiency Unit	Tank Insulation R-value Int/Ext	Standby Loss Fraction	1st Hr. Rating or Flow Rate (gal)	Heat Pump Type	Tank Location or Ambient Condition
DHW Tank	Electricity	Storage	1	119	4.5	kW	0.94	UEF	N/A	N/A	99	N/A	N/A

J3. LABORATORY/PROCESS EXHAUST

1	2	3	4	5	6
Space Name	Design Exhaust Flow Rate (cfm)	Minimum Exhaust Flow Rate (cfm)	Total Fume Hood Length (ft)	Exhaust Flow for Fume Hoods with Vertical Sashes (cfm)	Fraction of Fume Hoods with Vertical Sash with automatic control (%)
S-32-01_LabC	3410	1364	0	3,410	1
S-33-01_LabCE	3151.67	1260.67	0	3,152	1
S-34-01_LabCW	2191.67	876.67	0	2,192	1
S-35-01_LabSW	1686.67	674.67	0	1,687	1
S-36-01_LabSE	1115	446	0	1,115	1
S-39-02_LabS	4556.67	1822.67	0	4,557	1
S-38-02_LabE	1303.33	521.33	0	1,303	1
S-37-02_LabCS	13013.3	5205.33	0	13,013	1
S-42-03_LabS	4556.67	1822.67	0	4,557	1

J3. LABORATORY/PROCESS EXHAUST

1	2	3	4	5	6
Space Name	**Design Exhaust Flow Rate (cfm)**	**Minimum Exhaust Flow Rate (cfm)**	**Total Fume Hood Length (ft)**	**Exhaust Flow for Fume Hoods with Vertical Sashes (cfm)**	**Fraction of Fume Hoods with Vertical Sash with automatic control (%)**
S-41-03_LabE	1303.33	521.33	0	1,303	1
S-40-03_LabCS	13013.3	5205.33	0	13,013	1

K1. INDOOR CONDITIONED LIGHTING GENERAL INFO

01	02	03	04	05	06
Occupancy Type[1]	**Conditioned Floor Area[2] (ft^2)**	**Installed Lighting Power (Watts)**	**Lighting Control Credits (Watts)**	**Additional (Custom) Allowance**	
				Area Category Footnotes (Watts)	**Area Category Footnotes (Watts)**
Convention, Conference, Multipurpose and Meeting Center	2324	1743	0	0	0
Corridor	2385	954	0	0	0
Electrical Mechanical Telephone Room	1198	479.2	0	0	0
Laboratory Area, Scientific	29581	26622.9	0	0	0
Main Entry Lobby	3656	2559.2	0	0	0
Commercial Industrial Storage Shipping	911	546.6	0	0	0
Unleased Tenant Area	32755	19653	0	0	0
GeneralStorage	256	102.4	0	0	0
Building Totals:	**73066**	**52660.3**	**0**	**0**	**0**

[1]See Table 140.6-C

[2]See NRCC-LTI--E for unconditioned spaces

[3]Lighting information for existing spaces modeled is not included in this table

K4. INDOOR CONDITIONED LIGHTING MANDATORY LIGHTING CONTROL

See NRCC-LTI-E for mandatory controls

L. DECLARATION OF REQUIRED CERTIFICATES OF INSTALLATION

Selections made by Documentation Author indicate which Certificates of Installation must be submitted for the features to be recognized for compliance. These documents must be retained and provided to the building inspector during construction and can be found online

Building Component	Form/Title
Envelope	NRCI-ENV-01-E - Must be submitted for all buildings
Envelope	NRCI-ENV-E - Envelope (for all buildings)
Mechanical	NRCI-MCH-01-E - Must be submitted for all buildings
Mechanical	NRCI-MCH-E - For all buildings with Mechanical Systems
Plumbing	NRCI-PLB-01-E - Must be submitted for all buildings
Plumbing	NRCI-PLB-E - For all buildings with Plumbing Systems
Indoor Lighting	NRCI-LTI-01-E - Must be submitted for all buildings
Indoor Lighting	NRCI-LTI-E - Indoor Lighting (for all buildings)

M. DECLARATION OF REQUIRED CERTIFICATES OF ACCEPTANCE

Selections made by Documentation Author indicate which Certificates of Acceptance must be submitted for the features to be recognized for compliance. These documents must be provided to the building inspector during construction and must be completed through an Acceptance Test Technician Certification Provider (ATTCP).

Building Component	Form/Title
Envelope	NRCA-ENV-02-F - NRFC label verification for fenestration
Indoor Lighting	NRCA-LTI-02-A - Occupancy Sensors and Automatic Time Switch Controls.
Indoor Lighting	NRCA-LTI-04-A - Demand Responsive Lighting Controls.
Covered Process	NRCA-PRC-12-F Elevator Lighting & Ventilation Controls
Covered Process	NRCA-PRC-13-F Escalators & Moving Walkways Speed Controls
Covered Process	NRCA-PRC-14-F Lab Exhaust Ventilation System
Covered Process	NRCA-PRC-15-F Fume Hood Automatic Sash Closure System
Mechanical	NRCA-MCH-02-A - Outdoor Air must be submitted for all newly installed HVAC units. Note: MCH-02-A can be performed in conjunction with MCH-07-A Supply Fan VFD Acceptance (if applicable) since testing activities overlap

M. DECLARATION OF REQUIRED CERTIFICATES OF ACCEPTANCE

Selections made by Documentation Author indicate which Certificates of Acceptance must be submitted for the features to be recognized for compliance. These documents must be provided to the building inspector during construction and must be completed through an Acceptance Test Technician Certification Provider (ATTCP).

Building Component	Form/Title
Mechanical	NRCA-MCH-05-A - Air Economizer Controls
Mechanical	NRCA-MCH-06-A Demand Control Ventilation Systems must be submitted for all systems required to employ demand controlled ventilation (refer to) can vary outside ventilation flow rates based on maintaining interior carbon dioxide (CO2) concentration setpoints.
Mechanical	NRCA-MCH-07-A Supply Fan Variable Flow Controls
Mechanical	NRCA-MCH-08-A Valve Leakage Test
Mechanical	NRCA-MCH-09-A Supply Water Temperature Reset Controls
Mechanical	NRCA-MCH-10-A Hydronic System Variable Flow Controls
Mechanical	NRCA-MCH-11-A Automatic Demand Shed Controls
Mechanical	NRCA-MCH-13-A Automatic FDD for Air Handling Units and Zone Terminal Units Acceptance
Mechanical	NRCA-MCH-16-A Supply Air Temperature Reset Controls
Mechanical	NRCA-MCH-17-A Condenser Water Temperature Reset Controls
Mechanical	NRCA-MCH-19-A Occupancy Sensor Controls

N. DECLARATION OF REQUIRED CERTIFICATES OF VERIFICATION

Selections made by Documentation Author indicate which Certificates of Verification must be submitted for the features to be recognized for compliance. These documents must be retained and provided to the building inspector during construction and can be found online

Building Component	Form/Title
Mechanical	NRCV-MCH-27 Indoor Air Quality & Mechanical Ventilation
Mechanical	NRCV-MCH-32 Local Mechanical Exhaust

Documentation Author's Declaration Statement

1. I certify that this Certificate of Compliance documentation is accurate and complete.	
Documentation Author Name: Erik Dyrr	Documentation Author Signature:
Company: NRG Engineering	Signature Date:
Address: 234 W. 3rd St, Suite C	CEA/HERS Certification Identification (if applicable):
City/State/Zip: Chico, CA 95928	Phone: 415-275-4265

Responsible Person's Declaration statement

I certify the following under penalty of perjury, under the laws of the State of California:

1. The information provided on this Certificate of Compliance is true and correct.
2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer)
3. The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
5. I understand that a registered copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections, and I will take the necessary steps to accomplish this requirement.
6. I understand that a registered copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy, and I will take the necessary steps to accomplish these requirements.

Responsible Designer Name:	Responsible Designer Signature:	
Company:		
Address:	Date Signed:	
City/State/Zip: ,	License #:	
Phone:	Title:	Scope:

ENERGY·SOFT

Energy Efficiency Services • Software Development

Christopher R. Turner
Senior Planner
City Hall - 1st Floor
701 Laurel St.
Menlo Park, CA 94025

10/3/2024

RE: Phase 2 1320 Willow Rd. Natural Gas Exemption Request

Christopher,

I have reviewed the Phase 2 documents provided on behalf of Tarlton Properties for the 985 & 1001 O'Brien Drive 1320 Willow Road project to be built in Menlo Park:

1. Calculations and memo dated Sept 24, 2024, from Erik Dyrr with NRG Engineers
2. Title 24 report dated Sep 11, 2024, from Erik Dyrr
3. October 1 E-mail Memo from Zach Russi with Western Allied

Based upon the calculations provided in the spreadsheet, supported by the other documents, the NPV calculation for the Project shows a negative value, and as such I agree with the design team that the project would qualify for the Natural Gas exemption as outlined in your local ordinance, as non-cost effective and infeasible.

Please contact me if you have any questions on this review.

Regards.

Martyn C. Dodd

Martyn C. Dodd, Principal



1025 5th Street, Suite A • Novato, CA 94945-2413
Telephone: (415) 897-6400 • Fax: (415) 897-6422
Website: www.energysoft.com

ENERGY·SOFT

Energy Efficiency Services • Software Development

Christopher R. Turner
Senior Planner
City Hall - 1st Floor
701 Laurel St.
Menlo Park, CA 94025

10/3/2024

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Please contact me if you have any questions on this review.

Regards.

Martyn C. Dodd

Martyn C. Dodd, Principal



1025 5th Street, Suite A • Novato, CA 94945-2413
Telephone: (415) 897-6400 • Fax: (415) 897-6422
Website: www.energysoft.com

Appendix J

Construction Health Risk Assessment Parameters

14456 O'Brien Drive and Willow Road

Construction HRA

Project Construction Emissions

	Unmitigated	Mitigated
Year	**DPM tons/year**	**DPM tons/year**
2024	0.0380	0.0039
2025	0.0413	0.0085
2026	0.0375	0.0067
2027	0.0133	0.0033
Total	**0.130**	**0.022**
Total Lbs	**259.951**	**44.707**
Lbs/year	**88.336**	**15.192**
Lbs/hour	**0.04**	**0.0072**

	Start	End	Days
	7/1/2024	6/14/2027	771

Conversions:

Total Days **771**

1 ton = 2,000 lb 2.1123288 years

Construction = 8 hours/day

2096 hours/year

262 days/year

12 months

Project Construction: 771 days

2.94 years

AERMOD Assumptions

Source Name	Description	No. of Vol. Sources	Emission Rate g/s	Release Height m	Plume Height m	Plume Width m
SLINE1	Construction	47	1.00	5.00	10.00	9.00

Receptor Grid

Name	Grid Size	Spacing
UCART1	1 km x 1 km	20 m

Meteorological Data

Station Name	Years	Lat	Long	Elev (m)
San Carlos Airport	2011-2015	37.52	-122.25	1

Source: BAAQMD Public Records Request... OR

Source: https://ww2.arb.ca.gov/resources/documents/harp-aermod-meteorological-files

Population

County	2020 Population
San Mateo County	726,353

Source: https://www.census.gov/quickfacts/sanmateocountycalifornia

Other Model Assumption

Terrain Data	NED 1/3
Lakes Version	11.2.0
AERMOD Version	22112

Unmitigated

Receptor	*RecID - 1050*
Cancer	*15.8400*
Chronic	*0.0091*
PM2.5	*0.0010*

Mitigated

Receptor	*RecID - 1050*
Cancer	*2.7242*
Chronic	*0.0016*
PM2.5	*0.0010*

Appendix K
Noise Calculations

NOISE APPENDIX

Noise Field Data

DUDEK

FIELD NOISE MEASUREMENT DATA

PROJECT 1005 O'BRIEN — PROJECT # 14456
SITE ID ST1
SITE ADDRESS 1323 WILLOW RD. — OBSERVER(S) JVL
START DATE 10/12/23 — END DATE 10/12/23
START TIME 8:49 — END TIME 8:59

METEOROLOGICAL CONDITIONS

TEMP 60 F — HUMIDITY 63 % R.H. — WIND (CALM) (LIGHT) MODERATE
WINDSPD 1 MPH — DIR. (N) NE S SE S SW W NW — VARIABLE STEADY GUSTY
SKY (SUNNY) (CLEAR) OVRCAST PRTLY CLDY FOG RAIN

ACOUSTIC MEASUREMENTS

MEAS. INSTRUMENT Soma dB Picc II — TYPE 1 (2) — SERIAL # 3105
CALIBRATOR REED R9090 — SERIAL # 0321
CALIBRATION CHECK PRE-MEASUREMENT 94.0 dBA SPL — POST-MEASUREMENT 94.0 dBA SPL — WINDSCRN X

SETTINGS (A-WTD) (SLOW) FAST (FRONTAL) RANDOM ANSI OTHER:

REC. #	BEGIN	END	Leq	Lmax	Lmin	L90	L50	L10	OTHER (SPECIFY METRIC
1									
↓									
12									

COMMENTS: REFER TO PICCOLLO 3105 LOGS FOR SOUND LEVEL DATA

SOURCE INFO AND TRAFFIC COUNTS

PRIMARY NOISE SOURCE (TRAFFIC) AIRCRAFT RAIL INDUSTRIAL OTHER:
ROADWAY TYPE: MAJOR ARTERIAL — DIST. TO RDWY C/L OR (EOP): 6'
TRAFFIC COUNT DURATION: 10 MIN — SPEED 45

COUNT 1 (OR RDWY 1) DIRECTION	NB/EB	SB/WB	NB/EB SPEED	SB/WB SPEED
AUTOS	339			
MED TRKS	3			
HVY TRKS	6			
BUSES	12			
MOTRCLS	1			

IF COUNTING BOTH DIRECTIONS AS ONE, CHECK HERE X

COUNT 2 (OR RDWY 2)	NB/EB	SB/WB	NB/EB SPEED	SB/WB SPEED

SPEEDS ESTIMATED BY: RADAR / DRIVING THE PACE
POSTED SPEED LIMIT SIGNS SAY:

OTHER NOISE SOURCES (BACKGROUND): DIST. AIRCRAFT RUSTLING LEAVES DIST. BARKING DOGS BIRDS DIST. INDUSTRIAL
DIST. KIDS PLAYING DIST. CONVRSTNS / YELLING DIST. TRAFFIC (LIST RDWYS BELOW) DISTD GARDENERS/LANDSCAPING NOISE
OTHER:

DESCRIPTION / SKETCH

TERRAIN (HARD) SOFT MIXED (FLAT) OTHER:
PHOTOS ST 1.1, 1.2, 1.3
OTHER COMMENTS / SKETCH

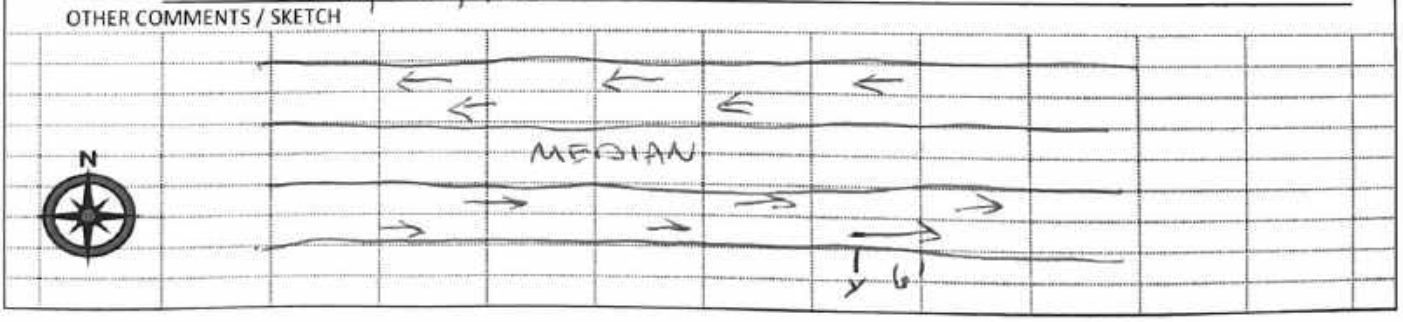




Photo ST1 – 01



Photo ST1 - 02

Field Photos

Location ST1

DUDEK

FIELD NOISE MEASUREMENT DATA

PROJECT 1005 O'BRIEN — PROJECT # 14456
SITE ID ST2
SITE ADDRESS 1215 O'BRIEN (OPEN WIND SCREEN) — OBSERVER(S) JVL
START DATE 10/12/23 — END DATE
START TIME 9:22 — END TIME 9:37

METEOROLOGICAL CONDITIONS

TEMP 60's F — HUMIDITY 63 % R.H. — WIND (CALM) (LIGHT) MODERATE
WINDSPD 1 MPH — DIR. (N) NE S SE S SW W NW — (VARIABLE) STEADY GUSTY
SKY (SUNNY) (CLEAR) OVRCAST PRTLY CLDY FOG RAIN

ACOUSTIC MEASUREMENTS

MEAS. INSTRUMENT SoftdB Piccolo II — TYPE 1 (2) — SERIAL # 3105
CALIBRATOR BRUEL B3090 — SERIAL # 6321
CALIBRATION CHECK PRE-MEASUREMENT 94.0 dBA SPL — POST-MEASUREMENT 94.0 dBA SPL — WINDSCRN X

SETTINGS (A-WTD) (SLOW) FAST (FRONTAL) RANDOM ANSI OTHER:

REC. #	BEGIN	END	Leq	Lmax	Lmin	L90	L50	L10	OTHER (SPECIFY METRIC
13									
↓									
28									

COMMENTS
REFER TO PICCOLO 3105 LOGS FOR SOUND LEVEL DATA.

SOURCE INFO AND TRAFFIC COUNTS

PRIMARY NOISE SOURCE (TRAFFIC) AIRCRAFT RAIL INDUSTRIAL OTHER:
ROADWAY TYPE: 2-LANE ARTERIAL — DIST. TO RDWY C/L OR (EOP): 8 FEET

TRAFFIC COUNT DURATION: 15 MIN — SPEED 25 — ___ MIN — SPEED

COUNT 1 (OR RDWY 1) DIRECTION	NB/EB	SB/WB	NB/EB	SB/WB	IF COUNTING BOTH DIRECTIONS AS ONE, CHECK HERE	COUNT 2 (OR RDWY 2)	NB/EB	SB/WB	NB/EB	SB/WB
AUTOS	101									
MED TRKS	2									
HVY TRKS	1									
BUSES	1									
MOTRCLS	1									

SPEEDS ESTIMATED BY: RADAR (DRIVING THE PACE)
POSTED SPEED LIMIT SIGNS SAY: 25

OTHER NOISE SOURCES (BACKGROUND): DIST. AIRCRAFT RUSTLING LEAVES DIST. BARKING DOGS BIRDS DIST. INDUSTRIAL
DIST. KIDS PLAYING DIST. CONVRSTNS / YELLING DIST. TRAFFIC (LIST RDWYS BELOW) DISTD GARDENERS/LANDSCAPING NOISE
OTHER:

DESCRIPTION / SKETCH

TERRAIN HARD SOFT (MIXED) FLAT OTHER:
PHOTOS ST2.1, 2.2, 2.3
OTHER COMMENTS / SKETCH

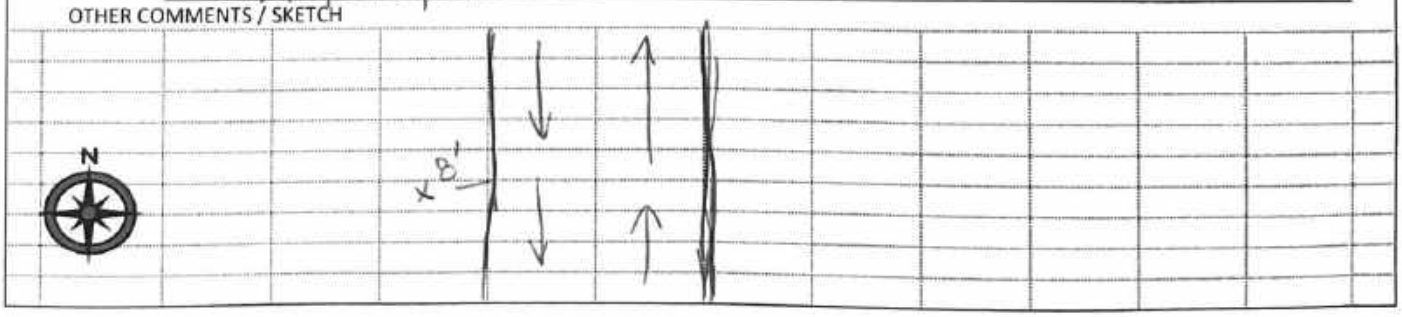




Photo ST2 – 01



Photo ST2 - 02

Field Photos

Location ST2

DUDEK

FIELD NOISE MEASUREMENT DATA

PROJECT 1005 O'BRIEN — PROJECT # 14456
SITE ID ST3
SITE ADDRESS 1423 KAYANAUGH — OBSERVER(S) JVL
START DATE 10/12/23 — END DATE 10/12/23
START TIME 9:48 — END TIME 10:03

METEOROLOGICAL CONDITIONS

TEMP 66 F — HUMIDITY 63 % R.H. — WIND (CALM) (LIGHT) MODERATE
WINDSPD 1 MPH — DIR. (N) NE S SE S SW W NW — VARIABLE STEADY GUSTY
SKY (SUNNY) (CLEAR) OVRCAST PRTLY CLDY FOG RAIN

ACOUSTIC MEASUREMENTS

MEAS. INSTRUMENT SoftdB Picc II — TYPE 1 (2) — SERIAL # 3105
CALIBRATOR REED R8090 — SERIAL # 6321
CALIBRATION CHECK PRE-MEASUREMENT 94.0 dBA SPL — POST-MEASUREMENT 94.0 dBA SPL — WINDSCRN X

SETTINGS (A-WTD) (SLOW) FAST (FRONTAL) RANDOM ANSI OTHER:

REC. #	BEGIN	END	Leq	Lmax	Lmin	L90	L50	L10	OTHER (SPECIFY METRIC

COMMENTS
REFER TO PICCOLO LOGS FOR SOUND LEVEL DATA.

SOURCE INFO AND TRAFFIC COUNTS

PRIMARY NOISE SOURCE (TRAFFIC) AIRCRAFT RAIL INDUSTRIAL OTHER:
ROADWAY TYPE: 2-LANE ARTERIAL — DIST. TO RDWY C/L OR (EOP): 11 FEET
TRAFFIC COUNT DURATION: 15 MIN — SPEED 30

COUNT 1 (OR RDWY 1) DIRECTION	NB/EB	SB/WB	NB/EB	SB/WB
AUTOS	19			
MED TRKS	0			
HVY TRKS	0			
BUSES	0			
MOTRCLS	0			

IF COUNTING BOTH DIRECTIONS AS ONE, CHECK HERE X

COUNT 2 (OR RDWY 2)	MIN NB/EB	MIN SB/WB	SPEED NB/EB	SPEED SB/WB

SPEEDS ESTIMATED BY: RADAR / DRIVING THE PACE
POSTED SPEED LIMIT SIGNS SAY: 30

OTHER NOISE SOURCES (BACKGROUND): (DIST. AIRCRAFT) RUSTLING LEAVES DIST. BARKING DOGS BIRDS DIST. INDUSTRIAL
DIST. KIDS PLAYING DIST. CONVRSTNS / YELLING DIST. TRAFFIC (LIST RDWYS BELOW) (DISTD GARDENERS/LANDSCAPING NOISE)
OTHER:

DESCRIPTION / SKETCH

TERRAIN (HARD) SOFT MIXED (FLAT) OTHER:
PHOTOS ST3.1, 3.2, 3.3
OTHER COMMENTS / SKETCH

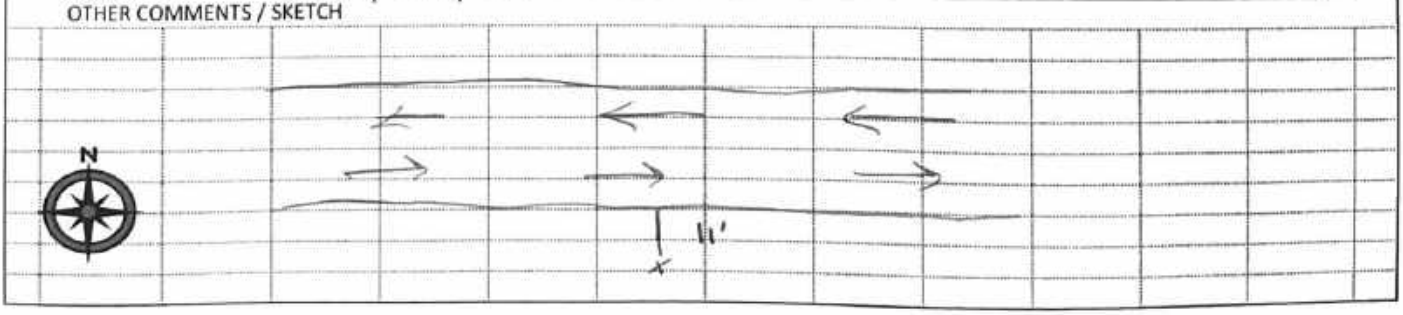




Photo ST3 – 01



Photo ST3 - 02

Field Photos

Location ST3

Number	Start Date	Start Time	End Time	SPL Time Weight	Freq Weight	LAeq	LAmax	LAmin	LApk	L50	L90	L95
Location ST1												
2	10/12/2023	8:50:00 AM	8:51:00 AM	Slow	dBA	65.3	76.2	55.8	90.7	57.8	56.2	56.1
3	10/12/2023	8:51:00 AM	8:52:00 AM	Slow	dBA	74.8	83.9	62.9	98.9	72.9	67.4	64.3
4	10/12/2023	8:52:00 AM	8:53:00 AM	Slow	dBA	67.4	76.1	54.1	91.3	64.3	55.4	54.8
5	10/12/2023	8:53:00 AM	8:54:00 AM	Slow	dBA	74.9	87.8	50.0	102.9	67.4	52.0	50.5
6	10/12/2023	8:54:00 AM	8:55:00 AM	Slow	dBA	70.3	76.6	50.5	90.3	70.3	52.4	51.0
7	10/12/2023	8:55:00 AM	8:56:00 AM	Slow	dBA	69.3	81.3	59.5	104.3	65.5	60.5	60.1
8	10/12/2023	8:56:00 AM	8:57:00 AM	Slow	dBA	68.9	77.5	48.1	92.8	65.8	51.8	49.0
9	10/12/2023	8:57:00 AM	8:58:00 AM	Slow	dBA	71.1	76.9	61.4	90.9	70.5	62.8	62.3
10	10/12/2023	8:58:00 AM	8:59:00 AM	Slow	dBA	62.1	68.8	55.4	81.4	60.9	56.6	56.1
11	10/12/2023	8:59:00 AM	9:00:00 AM	Slow	dBA	66.1	73.6	55.4	88.8	63.1	58.4	56.2
Average Over Total Measurement Duration ST1 (Leq dBA):						**70.6**						

Number	Start Date	Start Time	End Time	SPL Time Weight	Freq Weight	LAeq	LAmax	LAmin	LApk	L50	L90	L95
Location ST2												
13	10/12/2023	9:22:00 AM	9:23:00 AM	Slow	dBA	64.8	70.1	49.2	84.6	63.1	51.6	49.9
14	10/12/2023	9:23:00 AM	9:24:00 AM	Slow	dBA	67.0	77.7	55.1	92.0	63.7	57.7	56.0
15	10/12/2023	9:24:00 AM	9:25:00 AM	Slow	dBA	62.4	69.0	50.1	89.8	59.9	51.5	50.9
16	10/12/2023	9:25:00 AM	9:26:00 AM	Slow	dBA	76.2	88.1	53.4	105.9	66.2	57.9	55.5
17	10/12/2023	9:26:00 AM	9:27:00 AM	Slow	dBA	59.8	68.2	50.0	83.5	53.5	51.4	51.0
18	10/12/2023	9:27:00 AM	9:28:00 AM	Slow	dBA	64.9	71.5	53.2	85.0	62.9	54.1	53.6
19	10/12/2023	9:28:00 AM	9:29:00 AM	Slow	dBA	63.2	71.5	46.1	84.8	57.9	49.8	48.8
20	10/12/2023	9:29:00 AM	9:30:00 AM	Slow	dBA	62.2	68.9	46.9	82.7	59.0	49.7	48.6
21	10/12/2023	9:30:00 AM	9:31:00 AM	Slow	dBA	64.4	73.1	45.3	88.7	60.2	46.5	46.0
22	10/12/2023	9:31:00 AM	9:32:00 AM	Slow	dBA	61.3	69.8	43.1	94.8	57.6	46.1	43.9
23	10/12/2023	9:32:00 AM	9:33:00 AM	Slow	dBA	63.0	72.5	43.4	86.4	50.5	44.5	44.3
24	10/12/2023	9:33:00 AM	9:34:00 AM	Slow	dBA	61.6	71.5	47.7	85.4	57.7	49.6	48.5
25	10/12/2023	9:34:00 AM	9:35:00 AM	Slow	dBA	60.4	66.5	46.9	80.4	56.4	48.0	47.1
26	10/12/2023	9:35:00 AM	9:36:00 AM	Slow	dBA	60.7	68.3	46.5	83.1	54.8	48.2	47.2
27	10/12/2023	9:36:00 AM	9:37:00 AM	Slow	dBA	59.6	67.0	52.6	81.5	54.3	53.0	52.8
Average Over Total Measurement Duration ST2 (Leq dBA):						**66.7**						

Number	Start Date	Start Time	End Time	SPL Time Weight	Freq Weight	LAeq	LAmax	LAmin	LApk	L50	L90	L95
Location ST3												
29	10/12/2023	9:48:00 AM	9:49:00 AM	Slow	dBA	53.9	61.9	47.1	75.5	49.9	47.7	47.3
30	10/12/2023	9:49:00 AM	9:50:00 AM	Slow	dBA	49.3	57.1	46.1	80.2	48.9	46.7	46.5
31	10/12/2023	9:50:00 AM	9:51:00 AM	Slow	dBA	51.1	54.2	48	69.5	50.6	48.9	48.7
32	10/12/2023	9:51:00 AM	9:52:00 AM	Slow	dBA	59.6	69.3	49.8	87	53.3	50.6	50.3
33	10/12/2023	9:52:00 AM	9:53:00 AM	Slow	dBA	54.8	63.5	49	78.4	53.1	50.6	49.7
34	10/12/2023	9:53:00 AM	9:54:00 AM	Slow	dBA	51.6	55.1	49.3	73.9	50.9	49.9	49.7
35	10/12/2023	9:54:00 AM	9:55:00 AM	Slow	dBA	53.6	57.2	48.3	78.3	53.4	49.5	48.7
36	10/12/2023	9:55:00 AM	9:56:00 AM	Slow	dBA	56.2	64.1	42.4	81	53.2	45	43.2
37	10/12/2023	9:56:00 AM	9:57:00 AM	Slow	dBA	50.1	55.4	43.9	68.1	49.4	45.1	44.5
38	10/12/2023	9:57:00 AM	9:58:00 AM	Slow	dBA	51.4	60.9	42.1	75.1	44.3	42.8	42.5
39	10/12/2023	9:58:00 AM	9:59:00 AM	Slow	dBA	55.3	62.9	45.2	76.5	52.7	47.8	46.9
40	10/12/2023	9:59:00 AM	10:00:00 AM	Slow	dBA	58.5	66.5	44.4	88.5	50.9	46	45.6
41	10/12/2023	10:00:00 AM	10:01:00 AM	Slow	dBA	58.8	69.1	44.9	82.3	54	46.4	45.6
42	10/12/2023	10:01:00 AM	10:02:00 AM	Slow	dBA	56.8	66.1	42.6	80.7	47.8	43.6	43.2
43	10/12/2023	10:02:00 AM	10:03:00 AM	Slow	dBA	46.5	60.3	43.6	66.5	45.9	44.4	44.1
Average Over Total Measurement Duration ST3 (Leq dBA):						**55.3**						

NOISE APPENDIX

Construction Noise Modeling Data

Phase 1 Construction

High School Receptor

Minimum Distance: 15 feet to sports field

Averaging Period (in hours): 1

Construction Activity	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Lmax @ 50 ft. for quantify of equipment	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 1-hour Leq
Demolition	dozer	1	40	82	82.0	15	92.4	1	60	88
	excavator	2	40	81	84.0	15	94.4	1	60	90
	concrete saw	1	20	90	90.0	15	100.4	1	60	93
					Total Lmax for phase:		**101.9**	**Total Leq 1hr for phase:**		**96.0**
Site Preparation	dozer	1	40	82	82.0	15	92.4	1	60	88
	front end loader	1	40	79	79.0	15	89.4	1	60	85
	backhoe	1	40	78	78.0	15	88.4	1	60	84
					Total Lmax for phase:		**95.2**	**Total Leq 1hr for phase:**		**91.2**
Grading	excavator	2	40	81	84.0	62	82.0	1	60	78
	grader	1	40	85	85.0	62	83.0	1	60	79
	dozer	1	40	82	82.0	62	80.0	1	60	76
	scraper	1	40	84	84.0	62	82.0	1	60	78
	backhoe	1	40	78	78.0	62	76.0	1	60	72
					Total Lmax for phase:		**88.2**	**Total Leq 1hr for phase:**		**84.2**
Building Erection	crane	1	16	81	81.0	62	79.0	1	60	71
	gradall	1	40	83	83.0	62	81.0	1	60	77
	generator	1	50	72	72.0	62	70.0	1	60	67
	backhoe	2	40	78	81.0	62	79.0	1	60	75
	welder / torch	1	40	73	73.0	62	71.0	1	60	67
					Total Lmax for phase:		**84.9**	**Total Leq 1hr for phase:**		**80.2**
Architectural Coating	compressor (air)	1	40	78	78.0	62	76.0	1	60	72
					Total Lmax for phase:		**76.0**			**72.0**
Paving	Paver	1	50	77	77.0	105	68.3	1	60	65
	Roller	1	20	80	80.0	105	71.3	1	60	64
	Dump Truck	1	40	76	76.0	105	67.3	1	60	63
					Total Lmax for phase:		**74.1**	**Total Leq 1hr for phase:**		**69.2**

Phase 1 Construction

High School Receptor

Minimum Distance: 85 feet to classroom building

Averaging Period (in hours): 1

Construction Activity	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Lmax @ 50 ft. for quantify of equipment	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 1-hour Leq
Demolition	dozer	1	40	82	82.0	85	76.1	1	60	72
	excavator	2	40	81	84.0	85	78.2	1	60	74
	concrete saw	1	20	90	90.0	85	84.1	1	60	77
					Total Lmax for phase:		**85.6**	**Total Leq 1hr for phase:**		**79.8**
Site Preparation	dozer	1	40	82	82.0	85	76.1	1	60	72
	front end loader	1	40	79	79.0	85	73.1	1	60	69
	backhoe	1	40	78	78.0	85	72.1	1	60	68
					Total Lmax for phase:		**78.9**	**Total Leq 1hr for phase:**		**74.9**
Grading	excavator	2	40	81	84.0	110	74.8	1	60	71
	grader	1	40	85	85.0	110	75.8	1	60	72
	dozer	1	40	82	82.0	110	72.8	1	60	69
	scraper	1	40	84	84.0	110	74.8	1	60	71
	backhoe	1	40	78	78.0	110	68.8	1	60	65
					Total Lmax for phase:		**80.9**	**Total Leq 1hr for phase:**		**77.0**
Building Erection	crane	1	16	81	81.0	110	71.8	1	60	64
	gradall	1	40	83	83.0	110	73.8	1	60	70
	generator	1	50	72	72.0	110	62.8	1	60	60
	backhoe	2	40	78	81.0	110	71.8	1	60	68
	welder / torch	1	40	73	73.0	110	63.8	1	60	60
					Total Lmax for phase:		**77.7**	**Total Leq 1hr for phase:**		**73.0**
Architectural Coating	compressor (air)	1	40	78	78.0	110	68.8	1	60	65
					Total Lmax for phase:		**68.8**			**64.8**
Paving	Paver	1	50	77	77.0	135	65.4	1	60	62
	Roller	1	20	80	80.0	135	68.4	1	60	61
	Dump Truck	1	40	76	76.0	135	64.4	1	60	60
					Total Lmax for phase:		**71.1**	**Total Leq 1hr for phase:**		**66.2**

Phase 1 Construction

High School Receptor

Acoustic Center Distance: 206 Feet

Averaging Period (in hours): 1

Construction Activity	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Lmax @ 50 ft. for quantify of equipment	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 1-hour Leq
Demolition	dozer	1	40	82	82.0	206	65.8	1	60	62
	excavator	2	40	81	84.0	206	67.8	1	60	64
	concrete saw	1	20	90	90.0	206	73.8	1	60	67
						Total Lmax for phase:	**75.3**	**Total Leq 1hr for phase:**		**69.4**
Site Preparation	dozer	1	40	82	82.0	206	65.8	1	60	62
	front end loader	1	40	79	79.0	206	62.8	1	60	59
	backhoe	1	40	78	78.0	206	61.8	1	60	58
						Total Lmax for phase:	**68.6**	**Total Leq 1hr for phase:**		**64.6**
Grading	excavator	2	40	81	84.0	206	67.8	1	60	64
	grader	1	40	85	85.0	206	68.8	1	60	65
	dozer	1	40	82	82.0	206	65.8	1	60	62
	scraper	1	40	84	84.0	206	67.8	1	60	64
	backhoe	1	40	78	78.0	206	61.8	1	60	58
						Total Lmax for phase:	**74.0**	**Total Leq 1hr for phase:**		**70.0**
Building Erection	crane	1	16	81	81.0	206	64.8	1	60	57
	gradall	1	40	83	83.0	206	66.8	1	60	63
	generator	1	50	72	72.0	206	55.8	1	60	53
	backhoe	2	40	78	81.0	206	64.8	1	60	61
	welder / torch	1	40	73	73.0	206	56.8	1	60	53
						Total Lmax for phase:	**70.7**	**Total Leq 1hr for phase:**		**66.0**
Architectural Coating	compressor (air)	1	40	78	78.0	206	61.8	1	60	58
						Total Lmax for phase:	**61.8**			**57.8**
Paving	Paver	1	50	77	77.0	206	60.8	1	60	58
	Roller	1	20	80	80.0	206	63.8	1	60	57
	Dump Truck	1	40	76	76.0	206	59.8	1	60	56
						Total Lmax for phase:	**66.6**	**Total Leq 1hr for phase:**		**61.6**

Phase 2 Construction

High School Receptor

Minimum Distance: 62 feet to sports field

Averaging Period (in hours): 1

Construction Activity	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Lmax @ 50 ft. for quantify of equipment	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 1-hour Leq
Demolition	dozer	1	40	82	82.0	62	80.0	1	60	76
	excavator	2	40	81	84.0	62	82.0	1	60	78
	concrete saw	1	20	90	90.0	62	88.0	1	60	81
						Total Lmax for phase:	**89.5**	**Total Leq 1hr for phase:**		**83.6**
Site Preparation	dozer	1	40	82	82.0	62	80.0	1	60	76
	front end loader	1	40	79	79.0	62	77.0	1	60	73
	backhoe	1	40	78	78.0	62	76.0	1	60	72
						Total Lmax for phase:	**82.8**	**Total Leq 1hr for phase:**		**78.8**
Grading	excavator	2	40	81	84.0	62	82.0	1	60	78
	grader	1	40	85	85.0	62	83.0	1	60	79
	dozer	1	40	82	82.0	62	80.0	1	60	76
	scraper	1	40	84	84.0	62	82.0	1	60	78
	backhoe	1	40	78	78.0	62	76.0	1	60	72
						Total Lmax for phase:	**88.2**	**Total Leq 1hr for phase:**		**84.2**
Building Erection	crane	1	16	81	81.0	62	79.0	1	60	71
	gradall	1	40	83	83.0	62	81.0	1	60	77
	generator	1	50	72	72.0	62	70.0	1	60	67
	backhoe	2	40	78	81.0	62	79.0	1	60	75
	welder / torch	1	40	73	73.0	62	71.0	1	60	67
						Total Lmax for phase:	**84.9**	**Total Leq 1hr for phase:**		**80.2**
Architectural Coating	compressor (air)	1	40	78	78.0	62	76.0	1	60	72
						Total Lmax for phase:	**76.0**			**72.0**
Paving	Paver	1	50	77	77.0	105	68.3	1	60	65
	Roller	1	20	80	80.0	105	71.3	1	60	64
	Dump Truck	1	40	76	76.0	105	67.3	1	60	63
						Total Lmax for phase:	**74.1**	**Total Leq 1hr for phase:**		**69.2**

Phase 1 Construction

High School Receptor

Minimum Distance: 85 feet to classroom building

Averaging Period (in hours): 1

Construction Activity	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Lmax @ 50 ft. for quantify of equipment	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 1-hour Leq
Demolition	dozer	1	40	82	82.0	95	74.6	1	60	71
	excavator	2	40	81	84.0	95	76.6	1	60	73
	concrete saw	1	20	90	90.0	95	82.6	1	60	76
						Total Lmax for phase:	**84.1**	**Total Leq 1hr for phase:**		**78.2**
Site Preparation	dozer	1	40	82	82.0	95	74.6	1	60	71
	front end loader	1	40	79	79.0	95	71.6	1	60	68
	backhoe	1	40	78	78.0	95	70.6	1	60	67
						Total Lmax for phase:	**77.4**	**Total Leq 1hr for phase:**		**73.4**
Grading	excavator	2	40	81	84.0	110	74.8	1	60	71
	grader	1	40	85	85.0	110	75.8	1	60	72
	dozer	1	40	82	82.0	110	72.8	1	60	69
	scraper	1	40	84	84.0	110	74.8	1	60	71
	backhoe	1	40	78	78.0	110	68.8	1	60	65
						Total Lmax for phase:	**80.9**	**Total Leq 1hr for phase:**		**77.0**
Building Erection	crane	1	16	81	81.0	110	71.8	1	60	64
	gradall	1	40	83	83.0	110	73.8	1	60	70
	generator	1	50	72	72.0	110	62.8	1	60	60
	backhoe	2	40	78	81.0	110	71.8	1	60	68
	welder / torch	1	40	73	73.0	110	63.8	1	60	60
						Total Lmax for phase:	**77.7**	**Total Leq 1hr for phase:**		**73.0**
Architectural Coating	compressor (air)	1	40	78	78.0	110	68.8	1	60	65
						Total Lmax for phase:	**68.8**			**64.8**
Paving	Paver	1	50	77	77.0	250	58.8	1	60	56
	Roller	1	20	80	80.0	250	61.8	1	60	55
	Dump Truck	1	40	76	76.0	250	57.8	1	60	54
						Total Lmax for phase:	**64.6**	**Total Leq 1hr for phase:**		**59.7**

Phase 2 Construction

High School Receptor

Acoustic Center Distance: 160 Feet

Averaging Period (in hours): 1

Construction Activity	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Lmax @ 50 ft. for quantify of equipment	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 1-hour Leq
Demolition	dozer	1	40	82	82.0	160	68.5	1	60	64
	backhoe	1	40	78	78.0	160	64.5	1	60	60
	concrete saw	1	20	90	90.0	160	76.5	1	60	69
					Total Lmax for phase:		**77.3**	**Total Leq 1hr for phase:**		**71.1**
Site Preparation	dozer	1	40	82	82.0	160	68.5	1	60	64
	backhoe	1	40	78	78.0	160	64.5	1	60	60
					Total Lmax for phase:		**69.9**	**Total Leq 1hr for phase:**		**65.9**
Grading	excavator	1	40	81	81.0	160	67.5	1	60	63
	grader	1	40	85	85.0	160	71.5	1	60	67
	dozer	1	40	82	82.0	160	68.5	1	60	64
	backhoe	1	40	78	78.0	160	64.5	1	60	60
					Total Lmax for phase:		**74.7**	**Total Leq 1hr for phase:**		**70.7**
Building Erection	crane	1	16	81	81.0	160	67.5	1	60	60
	gradall	1	40	83	83.0	160	69.5	1	60	65
	generator	1	50	72	72.0	160	58.5	1	60	55
	backhoe	1	40	78	78.0	160	64.5	1	60	60
	welder / torch	1	40	73	73.0	160	59.5	1	60	55
					Total Lmax for phase:		**72.7**	**Total Leq 1hr for phase:**		**68.0**
Architectural Coating	compressor (air)	1	40	78	78.0	160	64.5	1	60	60
					Total Lmax for phase:		**64.5**			**60.5**
Paving	concrete mixer truck	1	40	79	79.0	160	65.5	1	60	61
	Paver	1	50	77	77.0	160	63.5	1	60	60
	dump truck	1	40	76	76.0	160	62.5	1	60	58
	Roller	1	20	80	80.0	160	66.5	1	60	59
	backhoe	1	40	78	78.0	160	64.5	1	60	60
					Total Lmax for phase:		**71.7**	**Total Leq 1hr for phase:**		**67.2**

Phase 1 Construction

Gateway Riser Receptor

Minimum Distance: 420 Feet

Averaging Period (in hours): 1

Construction Activity	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Lmax @ 50 ft. for quantify of equipment	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 1-hour Leq
Demolition	dozer	1	40	82	82.0	420	58.7	1	60	55
	excavator	2	40	81	84.0	420	60.7	1	60	57
	concrete saw	1	20	90	90.0	420	66.7	1	60	60
						Total Lmax for phase:	**68.2**	**Total Leq 1hr for phase:**		**62.3**
Site Preparation	dozer	1	40	82	82.0	420	58.7	1	60	55
	front end loader	1	40	79	79.0	420	55.7	1	60	52
	backhoe	1	40	78	78.0	420	54.7	1	60	51
						Total Lmax for phase:	**61.5**	**Total Leq 1hr for phase:**		**57.5**
Grading	excavator	2	40	81	84.0	420	60.7	1	60	57
	grader	1	40	85	85.0	420	61.7	1	60	58
	dozer	1	40	82	82.0	420	58.7	1	60	55
	scraper	1	40	84	84.0	420	60.7	1	60	57
	backhoe	1	40	78	78.0	420	54.7	1	60	51
						Total Lmax for phase:	**66.9**	**Total Leq 1hr for phase:**		**62.9**
Building Erection	crane	1	16	81	81.0	420	57.7	1	60	50
	gradall	1	40	83	83.0	420	59.7	1	60	56
	generator	1	50	72	72.0	420	48.7	1	60	46
	backhoe	2	40	78	81.0	420	57.7	1	60	54
	welder / torch	1	40	73	73.0	420	49.7	1	60	46
						Total Lmax for phase:	**63.6**	**Total Leq 1hr for phase:**		**58.9**
Architectural Coating	compressor (air)	1	40	78	78.0	420	54.7	1	60	51
						Total Lmax for phase:	**54.7**			**50.8**
Paving	Paver	1	50	77	77.0	420	53.7	1	60	51
	Roller	1	20	80	80.0	420	56.7	1	60	50
	Dump Truck	1	40	76	76.0	420	52.7	1	60	49
						Total Lmax for phase:	**59.5**	**Total Leq 1hr for phase:**		**54.6**

Phase 1 Construction

Gateway Riser Receptor

Acoustic Center Distance: 474 Feet

Averaging Period (in hours): 1

Construction Activity	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Lmax @ 50 ft. for quantify of equipment	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 1-hour Leq
Demolition	dozer	1	40	82	82.0	474	57.6	1	60	54
	excavator	2	40	81	84.0	474	59.6	1	60	56
	concrete saw	1	20	90	90.0	474	65.6	1	60	59
						Total Lmax for phase:	**67.1**	**Total Leq 1hr for phase:**		**61.2**
Site Preparation	dozer	1	40	82	82.0	474	57.6	1	60	54
	front end loader	1	40	79	79.0	474	54.6	1	60	51
	backhoe	1	40	78	78.0	474	53.6	1	60	50
						Total Lmax for phase:	**60.4**	**Total Leq 1hr for phase:**		**56.4**
Grading	excavator	2	40	81	84.0	474	59.6	1	60	56
	grader	1	40	85	85.0	474	60.6	1	60	57
	dozer	1	40	82	82.0	474	57.6	1	60	54
	scraper	1	40	84	84.0	474	59.6	1	60	56
	backhoe	1	40	78	78.0	474	53.6	1	60	50
						Total Lmax for phase:	**65.7**	**Total Leq 1hr for phase:**		**61.8**
Building Erection	crane	1	16	81	81.0	474	56.6	1	60	49
	gradall	1	40	83	83.0	474	58.6	1	60	55
	generator	1	50	72	72.0	474	47.6	1	60	45
	backhoe	2	40	78	81.0	474	56.6	1	60	53
	welder / torch	1	40	73	73.0	474	48.6	1	60	45
						Total Lmax for phase:	**62.4**	**Total Leq 1hr for phase:**		**57.8**
Architectural Coating	compressor (air)	1	40	78	78.0	474	53.6	1	60	50
						Total Lmax for phase:	**53.6**			**49.6**
Paving	Paver	1	50	77	77.0	474	52.6	1	60	50
	Roller	1	20	80	80.0	474	55.6	1	60	49
	Dump Truck	1	40	76	76.0	474	51.6	1	60	48
						Total Lmax for phase:	**58.4**	**Total Leq 1hr for phase:**		**53.4**

Phase 2 Construction

Gateway Riser Receptor

Minimum Distance: 305 Feet

Averaging Period (in hours): 1

Construction Activity	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Lmax @ 50 ft. for quantify of equipment	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 1-hour Leq
Demolition	dozer	1	40	82	82.0	474	57.6	1	60	54
	backhoe	1	40	78	78.0	474	53.6	1	60	50
	concrete saw	1	20	90	90.0	474	65.6	1	60	59
					Total Lmax for phase:		**66.4**	**Total Leq 1hr for phase:**		**60.2**
Site Preparation	dozer	1	40	82	82.0	474	57.6	1	60	54
	backhoe	1	40	78	78.0	474	53.6	1	60	50
					Total Lmax for phase:		**59.0**	**Total Leq 1hr for phase:**		**55.0**
Grading	excavator	1	40	81	81.0	474	56.6	1	60	53
	grader	1	40	85	85.0	474	60.6	1	60	57
	dozer	1	40	82	82.0	474	57.6	1	60	54
	backhoe	1	40	78	78.0	474	53.6	1	60	50
					Total Lmax for phase:		**63.8**	**Total Leq 1hr for phase:**		**59.8**
Building Erection	crane	1	16	81	81.0	474	56.6	1	60	49
	gradall	1	40	83	83.0	474	58.6	1	60	55
	generator	1	50	72	72.0	474	47.6	1	60	45
	backhoe	1	40	78	78.0	474	53.6	1	60	50
	welder / torch	1	40	73	73.0	474	48.6	1	60	45
					Total Lmax for phase:		**61.8**	**Total Leq 1hr for phase:**		**57.1**
Architectural Coating	compressor (air)	1	40	78	78.0	474	53.6	1	60	50
					Total Lmax for phase:		**53.6**			**49.6**
Paving	concrete mixer truck	1	40	79	79.0	474	54.6	1	60	51
	Paver	1	50	77	77.0	474	52.6	1	60	50
	dump truck	1	40	76	76.0	474	51.6	1	60	48
	Roller	1	20	80	80.0	474	55.6	1	60	49
	backhoe	1	40	78	78.0	474	53.6	1	60	50
					Total Lmax for phase:		**60.8**	**Total Leq 1hr for phase:**		**56.3**

Phase 2 Construction

Gateway Riser Receptor

Acoustic Center Distance: 465 Feet

Averaging Period (in hours): 1

Construction Activity	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Lmax @ 50 ft. for quantify of equipment	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 1-hour Leq
Demolition	dozer	1	40	82	82.0	465	57.8	1	60	54
	backhoe	1	40	78	78.0	465	53.8	1	60	50
	concrete saw	1	20	90	90.0	465	65.8	1	60	59
					Total Lmax for phase:		**66.6**	**Total Leq 1hr for phase:**		**60.4**
Site Preparation	dozer	1	40	82	82.0	465	57.8	1	60	54
	backhoe	1	40	78	78.0	465	53.8	1	60	50
					Total Lmax for phase:		**59.2**	**Total Leq 1hr for phase:**		**55.2**
Grading	excavator	1	40	81	81.0	465	56.8	1	60	53
	grader	1	40	85	85.0	465	60.8	1	60	57
	dozer	1	40	82	82.0	465	57.8	1	60	54
	backhoe	1	40	78	78.0	465	53.8	1	60	50
					Total Lmax for phase:		**64.0**	**Total Leq 1hr for phase:**		**60.0**
Building Erection	crane	1	16	81	81.0	465	56.8	1	60	49
	gradall	1	40	83	83.0	465	58.8	1	60	55
	generator	1	50	72	72.0	465	47.8	1	60	45
	backhoe	1	40	78	78.0	465	53.8	1	60	50
	welder / torch	1	40	73	73.0	465	48.8	1	60	45
					Total Lmax for phase:		**62.0**	**Total Leq 1hr for phase:**		**57.2**
Architectural Coating	compressor (air)	1	40	78	78.0	465	53.8	1	60	50
					Total Lmax for phase:		**53.8**			**49.8**
Paving	concrete mixer truck	1	40	79	79.0	465	54.8	1	60	51
	Paver	1	50	77	77.0	465	52.8	1	60	50
	dump truck	1	40	76	76.0	465	51.8	1	60	48
	Roller	1	20	80	80.0	465	55.8	1	60	49
	backhoe	1	40	78	78.0	465	53.8	1	60	50
					Total Lmax for phase:		**61.0**	**Total Leq 1hr for phase:**		**56.5**

Phase 1 Construction

Sequoia Belle Haven Receptor

Minimum Distance: 445 Feet

Averaging Period (in hours): 1

Construction Activity	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Lmax @ 50 ft. for quantify of equipment	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 1-hour Leq
Demolition	dozer	1	40	82	82.0	445	58.2	1	60	54
	excavator	2	40	81	84.0	445	60.2	1	60	56
	concrete saw	1	20	90	90.0	445	66.2	1	60	59
					Total Lmax for phase:		**67.7**	**Total Leq 1hr for phase:**		**61.8**
Site Preparation	dozer	1	40	82	82.0	445	58.2	1	60	54
	front end loader	1	40	79	79.0	445	55.2	1	60	51
	backhoe	1	40	78	78.0	445	54.2	1	60	50
					Total Lmax for phase:		**61.0**	**Total Leq 1hr for phase:**		**57.0**
Grading	excavator	2	40	81	84.0	445	60.2	1	60	56
	grader	1	40	85	85.0	445	61.2	1	60	57
	dozer	1	40	82	82.0	445	58.2	1	60	54
	scraper	1	40	84	84.0	445	60.2	1	60	56
	backhoe	1	40	78	78.0	445	54.2	1	60	50
					Total Lmax for phase:		**66.4**	**Total Leq 1hr for phase:**		**62.4**
Building Erection	crane	1	16	81	81.0	445	57.2	1	60	49
	gradall	1	40	83	83.0	445	59.2	1	60	55
	generator	1	50	72	72.0	445	48.2	1	60	45
	backhoe	2	40	78	81.0	445	57.2	1	60	53
	welder / torch	1	40	73	73.0	445	49.2	1	60	45
					Total Lmax for phase:		**63.1**	**Total Leq 1hr for phase:**		**58.4**
Architectural Coating	compressor (air)	1	40	78	78.0	445	54.2	1	60	50
					Total Lmax for phase:		**54.2**			**50.2**
Paving	Paver	1	50	77	77.0	445	53.2	1	60	50
	Roller	1	20	80	80.0	445	56.2	1	60	49
	Dump Truck	1	40	76	76.0	445	52.2	1	60	48
					Total Lmax for phase:		**59.0**	**Total Leq 1hr for phase:**		**54.0**

Phase 1 Construction

Sequoia Belle Haven Receptor

Acoustic Center Distance: 645 Feet

Averaging Period (in hours): 1

Construction Activity	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Lmax @ 50 ft. for quantify of equipment	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 1-hour Leq
Demolition	dozer	1	40	82	82.0	645	54.6	1	60	51
	excavator	2	40	81	84.0	645	56.6	1	60	53
	concrete saw	1	20	90	90.0	645	62.6	1	60	56
						Total Lmax for phase:	**64.1**	**Total Leq 1hr for phase:**		**58.2**
Site Preparation	dozer	1	40	82	82.0	645	54.6	1	60	51
	front end loader	1	40	79	79.0	645	51.6	1	60	48
	backhoe	1	40	78	78.0	645	50.6	1	60	47
						Total Lmax for phase:	**57.4**	**Total Leq 1hr for phase:**		**53.4**
Grading	excavator	2	40	81	84.0	645	56.6	1	60	53
	grader	1	40	85	85.0	645	57.6	1	60	54
	dozer	1	40	82	82.0	645	54.6	1	60	51
	scraper	1	40	84	84.0	645	56.6	1	60	53
	backhoe	1	40	78	78.0	645	50.6	1	60	47
						Total Lmax for phase:	**62.8**	**Total Leq 1hr for phase:**		**58.8**
Building Erection	crane	1	16	81	81.0	645	53.6	1	60	46
	gradall	1	40	83	83.0	645	55.6	1	60	52
	generator	1	50	72	72.0	645	44.6	1	60	42
	backhoe	2	40	78	81.0	645	53.6	1	60	50
	welder / torch	1	40	73	73.0	645	45.6	1	60	42
						Total Lmax for phase:	**59.5**	**Total Leq 1hr for phase:**		**54.8**
Architectural Coating	compressor (air)	1	40	78	78.0	645	50.6	1	60	47
						Total Lmax for phase:	**50.6**			**46.6**
Paving	Paver	1	50	77	77.0	645	49.6	1	60	47
	Roller	1	20	80	80.0	645	52.6	1	60	46
	Dump Truck	1	40	76	76.0	645	48.6	1	60	45
						Total Lmax for phase:	**55.4**	**Total Leq 1hr for phase:**		**50.4**

Phase 2 Construction

Sequoia Belle Haven Receptor

Minimum Distance: 345 Feet

Averaging Period (in hours): 1

Construction Activity	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Lmax @ 50 ft. for quantify of equipment	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 1-hour Leq
Demolition	dozer	1	40	82	82.0	345	60.6	1	60	57
	backhoe	1	40	78	78.0	345	56.6	1	60	53
	concrete saw	1	20	90	90.0	345	68.6	1	60	62
					Total Lmax for phase:		**69.5**	**Total Leq 1hr for phase:**		**63.3**
Site Preparation	dozer	1	40	82	82.0	345	60.6	1	60	57
	backhoe	1	40	78	78.0	345	56.6	1	60	53
					Total Lmax for phase:		**62.1**	**Total Leq 1hr for phase:**		**58.1**
Grading	excavator	1	40	81	81.0	345	59.6	1	60	56
	grader	1	40	85	85.0	345	63.6	1	60	60
	dozer	1	40	82	82.0	345	60.6	1	60	57
	backhoe	1	40	78	78.0	345	56.6	1	60	53
					Total Lmax for phase:		**66.9**	**Total Leq 1hr for phase:**		**62.9**
Building Erection	crane	1	16	81	81.0	345	59.6	1	60	52
	gradall	1	40	83	83.0	345	61.6	1	60	58
	generator	1	50	72	72.0	345	50.6	1	60	48
	backhoe	1	40	78	78.0	345	56.6	1	60	53
	welder / torch	1	40	73	73.0	345	51.6	1	60	48
					Total Lmax for phase:		**64.9**	**Total Leq 1hr for phase:**		**60.1**
Architectural Coating	compressor (air)	1	40	78	78.0	345	56.6	1	60	53
					Total Lmax for phase:		**56.6**			**52.7**
Paving	concrete mixer truck	1	40	79	79.0	345	57.6	1	60	54
	Paver	1	50	77	77.0	345	55.6	1	60	53
	dump truck	1	40	76	76.0	345	54.6	1	60	51
	Roller	1	20	80	80.0	345	58.6	1	60	52
	backhoe	1	40	78	78.0	345	56.6	1	60	53
					Total Lmax for phase:		**63.9**	**Total Leq 1hr for phase:**		**59.4**

Phase 1 Construction

Sequoia Belle Haven Receptor

Acoustic Center Distance: 547 Feet

Averaging Period (in hours): 1

Construction Activity	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Lmax @ 50 ft. for quantify of equipment	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 1-hour Leq
Demolition	dozer	1	40	82	82.0	547	56.2	1	60	52
	backhoe	1	40	78	78.0	547	52.2	1	60	48
	concrete saw	1	20	90	90.0	547	64.2	1	60	57
					Total Lmax for phase:		**65.1**	**Total Leq 1hr for phase:**		**58.8**
Site Preparation	dozer	1	40	82	82.0	547	56.2	1	60	52
	backhoe	1	40	78	78.0	547	52.2	1	60	48
					Total Lmax for phase:		**57.6**	**Total Leq 1hr for phase:**		**53.7**
Grading	excavator	1	40	81	81.0	547	55.2	1	60	51
	grader	1	40	85	85.0	547	59.2	1	60	55
	dozer	1	40	82	82.0	547	56.2	1	60	52
	backhoe	1	40	78	78.0	547	52.2	1	60	48
					Total Lmax for phase:		**62.4**	**Total Leq 1hr for phase:**		**58.4**
Building Erection	crane	1	16	81	81.0	547	55.2	1	60	47
	gradall	1	40	83	83.0	547	57.2	1	60	53
	generator	1	50	72	72.0	547	46.2	1	60	43
	backhoe	1	40	78	78.0	547	52.2	1	60	48
	welder / torch	1	40	73	73.0	547	47.2	1	60	43
					Total Lmax for phase:		**60.5**	**Total Leq 1hr for phase:**		**55.7**
Architectural Coating	compressor (air)	1	40	78	78.0	547	52.2	1	60	48
					Total Lmax for phase:		**52.2**			**48.2**
Paving	concrete mixer truck	1	40	79	79.0	547	53.2	1	60	49
	Paver	1	50	77	77.0	547	51.2	1	60	48
	dump truck	1	40	76	76.0	547	50.2	1	60	46
	Roller	1	20	80	80.0	547	54.2	1	60	47
	backhoe	1	40	78	78.0	547	52.2	1	60	48
					Total Lmax for phase:		**59.4**	**Total Leq 1hr for phase:**		**54.9**

Phase 1 Construction

Alberni Street Residence Receptor

Minimum Distance: 345 Feet

Averaging Period (in hours): 1

Construction Activity	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Lmax @ 50 ft. for quantify of equipment	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 1-hour Leq
Demolition	dozer	1	40	82	82.0	345	60.6	1	60	57
	excavator	2	40	81	84.0	345	62.7	1	60	59
	concrete saw	1	20	90	90.0	345	68.6	1	60	62
						Total Lmax for phase:	**70.1**	**Total Leq 1hr for phase:**		**64.3**
Site Preparation	dozer	1	40	82	82.0	345	60.6	1	60	57
	front end loader	1	40	79	79.0	345	57.6	1	60	54
	backhoe	1	40	78	78.0	345	56.6	1	60	53
						Total Lmax for phase:	**63.4**	**Total Leq 1hr for phase:**		**59.5**
Grading	excavator	2	40	81	84.0	345	62.7	1	60	59
	grader	1	40	85	85.0	345	63.6	1	60	60
	dozer	1	40	82	82.0	345	60.6	1	60	57
	scraper	1	40	84	84.0	345	62.6	1	60	59
	backhoe	1	40	78	78.0	345	56.6	1	60	53
						Total Lmax for phase:	**68.8**	**Total Leq 1hr for phase:**		**64.8**
Building Erection	crane	1	16	81	81.0	345	59.6	1	60	52
	gradall	1	40	83	83.0	345	61.6	1	60	58
	generator	1	50	72	72.0	345	50.6	1	60	48
	backhoe	2	40	78	81.0	345	59.7	1	60	56
	welder / torch	1	40	73	73.0	345	51.6	1	60	48
						Total Lmax for phase:	**65.5**	**Total Leq 1hr for phase:**		**60.9**
Architectural Coating	compressor (air)	1	40	78	78.0	345	56.6	1	60	53
						Total Lmax for phase:	**56.6**			**52.7**
Paving	Paver	1	50	77	77.0	345	55.6	1	60	53
	Roller	1	20	80	80.0	345	58.6	1	60	52
	Dump Truck	1	40	76	76.0	345	54.6	1	60	51
						Total Lmax for phase:	**61.4**	**Total Leq 1hr for phase:**		**56.5**

Phase 1 Construction

Alberni Street Residence Receptor

Acoustic Center Distance: 490 Feet

Averaging Period (in hours): 1

Construction Activity	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Lmax @ 50 ft. for quantify of equipment	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 1-hour Leq
Demolition	dozer	1	40	82	82.0	490	57.2	1	60	53
	excavator	2	40	81	84.0	490	59.3	1	60	55
	concrete saw	1	20	90	90.0	490	65.2	1	60	58
					Total Lmax for phase:		**66.7**	**Total Leq 1hr for phase:**		**60.9**
Site Preparation	dozer	1	40	82	82.0	490	57.2	1	60	53
	front end loader	1	40	79	79.0	490	54.2	1	60	50
	backhoe	1	40	78	78.0	490	53.2	1	60	49
					Total Lmax for phase:		**60.0**	**Total Leq 1hr for phase:**		**56.1**
Grading	excavator	2	40	81	84.0	490	59.3	1	60	55
	grader	1	40	85	85.0	490	60.2	1	60	56
	dozer	1	40	82	82.0	490	57.2	1	60	53
	scraper	1	40	84	84.0	490	59.2	1	60	55
	backhoe	1	40	78	78.0	490	53.2	1	60	49
					Total Lmax for phase:		**65.4**	**Total Leq 1hr for phase:**		**61.4**
Building Erection	crane	1	16	81	81.0	490	56.2	1	60	48
	gradall	1	40	83	83.0	490	58.2	1	60	54
	generator	1	50	72	72.0	490	47.2	1	60	44
	backhoe	2	40	78	81.0	490	56.3	1	60	52
	welder / torch	1	40	73	73.0	490	48.2	1	60	44
					Total Lmax for phase:		**62.1**	**Total Leq 1hr for phase:**		**57.5**
Architectural Coating	compressor (air)	1	40	78	78.0	490	53.2	1	60	49
					Total Lmax for phase:		**53.2**			**49.3**
Paving	Paver	1	50	77	77.0	490	52.2	1	60	49
	Roller	1	20	80	80.0	490	55.2	1	60	48
	Dump Truck	1	40	76	76.0	490	51.2	1	60	47
					Total Lmax for phase:		**58.0**	**Total Leq 1hr for phase:**		**53.1**

Phase 2 Construction

Alberni Street Residence Receptor

Minimum Distance: 425 Feet

Averaging Period (in hours): 1

Construction Activity	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Lmax @ 50 ft. for quantify of equipment	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 1-hour Leq
Demolition	dozer	1	40	82	82.0	425	58.6	1	60	55
	excavator	2	40	81	84.0	425	60.6	1	60	57
	concrete saw	1	20	90	90.0	425	66.6	1	60	60
						Total Lmax for phase:	**68.1**	**Total Leq 1hr for phase:**		**62.2**
Site Preparation	dozer	1	40	82	82.0	425	58.6	1	60	55
	front end loader	1	40	79	79.0	425	55.6	1	60	52
	backhoe	1	40	78	78.0	425	54.6	1	60	51
						Total Lmax for phase:	**61.4**	**Total Leq 1hr for phase:**		**57.4**
Grading	excavator	2	40	81	84.0	425	60.6	1	60	57
	grader	1	40	85	85.0	425	61.6	1	60	58
	dozer	1	40	82	82.0	425	58.6	1	60	55
	scraper	1	40	84	84.0	425	60.6	1	60	57
	backhoe	1	40	78	78.0	425	54.6	1	60	51
						Total Lmax for phase:	**66.8**	**Total Leq 1hr for phase:**		**62.8**
Building Erection	crane	1	16	81	81.0	425	57.6	1	60	50
	gradall	1	40	83	83.0	425	59.6	1	60	56
	generator	1	50	72	72.0	425	48.6	1	60	46
	backhoe	2	40	78	81.0	425	57.6	1	60	54
	welder / torch	1	40	73	73.0	425	49.6	1	60	46
						Total Lmax for phase:	**63.5**	**Total Leq 1hr for phase:**		**58.8**
Architectural Coating	compressor (air)	1	40	78	78.0	425	54.6	1	60	51
						Total Lmax for phase:	**54.6**			**50.6**
Paving	Paver	1	50	77	77.0	425	53.6	1	60	51
	Roller	1	20	80	80.0	425	56.6	1	60	50
	Dump Truck	1	40	76	76.0	425	52.6	1	60	49
						Total Lmax for phase:	**59.4**	**Total Leq 1hr for phase:**		**54.5**

Phase 2 Construction

Alberni Street Residence Receptor

Acoustic Center Distance: 575 Feet

Averaging Period (in hours): 1

Construction Activity	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Lmax @ 50 ft. for quantify of equipment	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 1-hour Leq
Demolition	dozer	1	40	82	82.0	575	55.7	1	60	52
	backhoe	1	40	78	78.0	575	51.7	1	60	48
	concrete saw	1	20	90	90.0	575	63.7	1	60	57
					Total Lmax for phase:		**64.6**	**Total Leq 1hr for phase:**		**58.3**
Site Preparation	dozer	1	40	82	82.0	575	55.7	1	60	52
	backhoe	1	40	78	78.0	575	51.7	1	60	48
					Total Lmax for phase:		**57.2**	**Total Leq 1hr for phase:**		**53.2**
Grading	excavator	1	40	81	81.0	575	54.7	1	60	51
	grader	1	40	85	85.0	575	58.7	1	60	55
	dozer	1	40	82	82.0	575	55.7	1	60	52
	backhoe	1	40	78	78.0	575	51.7	1	60	48
					Total Lmax for phase:		**61.9**	**Total Leq 1hr for phase:**		**57.9**
Building Erection	crane	1	16	81	81.0	575	54.7	1	60	47
	gradall	1	40	83	83.0	575	56.7	1	60	53
	generator	1	50	72	72.0	575	45.7	1	60	43
	backhoe	1	40	78	78.0	575	51.7	1	60	48
	welder / torch	1	40	73	73.0	575	46.7	1	60	43
					Total Lmax for phase:		**60.0**	**Total Leq 1hr for phase:**		**55.2**
Architectural Coating	compressor (air)	1	40	78	78.0	575	51.7	1	60	48
					Total Lmax for phase:		**51.7**			**47.7**
Paving	concrete mixer truck	1	40	79	79.0	575	52.7	1	60	49
	Paver	1	50	77	77.0	575	50.7	1	60	48
	dump truck	1	40	76	76.0	575	49.7	1	60	46
	Roller	1	20	80	80.0	575	53.7	1	60	47
	backhoe	1	40	78	78.0	575	51.7	1	60	48
					Total Lmax for phase:		**58.9**	**Total Leq 1hr for phase:**		**54.4**

Equipment Description	Impact Device?	Acoustical Use Factor (%)	Lesser of or available Lmax	Spec. 721 Lmax	Measured L_{max} @50ft (dBA, slow)
All Other Equipment > 5 HP	No	50	85	85	-- N/A --
Auger Drill Rig	No	20	84	85	84
Backhoe	No	40	78	80	78
Bar Bender	No	20	80	80	-- N/A --
Blasting	Yes	-- N/A --	94	94	-- N/A --
Boring Jack Power Unit	No	50	80	80	83
Chain Saw	No	20	84	85	84
Clam Shovel (dropping)	Yes	20	87	93	87
Compactor (ground)	No	20	80	80	83
Compressor (air)	No	40	78	80	78
Concrete Batch Plant	No	15	83	83	-- N/A --
Concrete Mixer Truck	No	40	79	85	79
Concrete Pump Truck	No	20	81	82	81
Concrete Saw	No	20	90	90	90
Crane	No	16	81	85	81
Dozer	No	40	82	85	82
Drill Rig Truck	No	20	79	84	79
Drum Mixer	No	50	80	80	80
Dump Truck	No	40	76	84	76
Excavator	No	40	81	85	81
Flat Bed Truck	No	40	74	84	74
Front End Loader	No	40	79	80	79
Generator	No	50	72	72	81
Generator (<25KVA, VMS signs)	No	50	70	70	73
Gradall	No	40	83	85	83
Grader	No	40	85	85	-- N/A --
Grapple (on backhoe)	No	40	85	85	87
Horizontal Boring Hydr. Jack	No	25	80	80	82
Hydra Break Ram	Yes	10	90	90	-- N/A --
Impact Pile Driver	Yes	20	95	95	101
Jackhammer	Yes	20	85	85	89
Man Lift	No	20	75	85	75
Mounted Impact Hammer (hoe ram)	Yes	20	90	90	90
Pavement Scarafier	No	20	85	85	90
Paver	No	50	77	85	77
Pickup Truck	No	40	55	55	75
Pneumatic Tools	No	50	85	85	85
Pumps	No	50	77	77	81
Refrigerator Unit	No	100	73	82	73
Rivit Buster/chipping gun	Yes	20	79	85	79
Rock Drill	No	20	81	85	81
Roller	No	20	80	85	80
Sand Blasting (Single Nozzle)	No	20	85	85	96
Scraper	No	40	84	85	84
Shears (on backhoe)	No	40	85	85	96
Slurry Plant	No	100	78	78	78
Slurry Trenching Machine	No	50	80	82	80
Soil Mix Drill Rig	No	50	80	80	-- N/A --
Tractor	No	40	84	84	-- N/A --
Vacuum Excavator (Vac-truck)	No	40	85	85	85
Vacuum Street Sweeper	No	10	80	80	82
Ventilation Fan	No	100	79	85	79
Vibrating Hopper	No	50	85	85	87
Vibratory Concrete Mixer	No	20	80	80	80
Vibratory Pile Driver	No	20	95	95	101
Warning Horn	No	5	83	85	83
Welder / Torch	No	40	73	73	74

NOISE APPENDIX

Traffic Noise Modeling Worksheets

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT:	1005 O'Brien	JN:	14456
ROADWAY:	Willow Road - Hamilton to Ivy	DATE:	1/24/24
Scenario:	**Year 2027**	BY:	J. Leech

ADT	7,016			PK HR VOL	1,754
SPEED	40				
PK HR %	25				
DIST CTL	85				
DIST N/F	76	(M=76,P=52,S=36,C=12)	AUTO SLE DISTANCE		76.2
DIST WALL	0		MED TRUCK SLE DIST		76.1
DIST W/OB	85		HVY TRUCK SLE DIST		76.1
HTH WALL	0.0	********			
HTH OBS	5.0				
AMBIENT	45.0				
ROADWAY VIEW:					
LF ANGLE	-90				
RT ANGLE	90				
DF ANGLE	180				

SITE CONDITIONS:		(15=HARD SITE, 10=SOFT SITE)			
AUTOM	15.0				
MED TR	15.0				
HVY TR	15.0				
BARRIER	0	(0=WALL,1=BERM)			
ELEVATIONS:					
PAD	0.0	AUTOMOBILES =	0.00		
ROAD	0.0	MEDIUM TRUCKS=	2.30		
		HEAVY TRUCKS =	8.01		
GRADE:	0.0 %	GRADE ADJUSTM=	0.0	(TO HEAVY TRUCKS)	

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.770	0.134	0.096	0.9200
MEDIUM TRUCKS	0.872	0.053	0.075	0.0200
HEAVY TRUCKS	0.889	0.030	0.081	0.0100

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	63.2	57.3	55.7	49.5	58.8
MEDIUM TRUCKS	57.8	52.4	46.3	43.0	52.6
HEAVY TRUCKS	60.1	54.8	46.1	45.6	54.8
VEHICULAR NOISE	65.7	60.1	56.6	51.6	**60.9**

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT:	1005 O'Brien	JN:	14456
ROADWAY:	Willow Road - Hamilton to Ivy	DATE:	1/24/24
Scenario:	**Year 2027 + Project**	BY:	J. Leech

ADT	7,200			PK HR VOL	1,800
SPEED	40				
PK HR %	25				
DIST CTL	85				
DIST N/F	76	(M=76,P=52,S=36,C=12)	AUTO SLE DISTANCE		76.2
DIST WALL	0		MED TRUCK SLE DIST		76.1
DIST W/OB	85		HVY TRUCK SLE DIST		76.1
HTH WALL	0.0	********			
HTH OBS	5.0				
AMBIENT	45.0				
ROADWAY VIEW:					
LF ANGLE	-90				
RT ANGLE	90				
DF ANGLE	180				

SITE CONDITIONS:		(15=HARD SITE, 10=SOFT SITE)			
AUTOM	15.0				
MED TR	15.0				
HVY TR	15.0				
BARRIER	0	(0=WALL,1=BERM)			
ELEVATIONS:					
PAD	0.0	AUTOMOBILES =	0.00		
ROAD	0.0	MEDIUM TRUCKS=	2.30		
		HEAVY TRUCKS =	8.01		
GRADE:	0.0 %	GRADE ADJUSTM=	0.0	(TO HEAVY TRUCKS)	

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.770	0.134	0.096	0.9200
MEDIUM TRUCKS	0.872	0.053	0.075	0.0200
HEAVY TRUCKS	0.889	0.030	0.081	0.0100

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	63.3	57.4	55.8	49.6	58.9
MEDIUM TRUCKS	57.9	52.5	46.4	43.2	52.7
HEAVY TRUCKS	60.2	54.9	46.2	45.7	54.9
VEHICULAR NOISE	65.8	60.2	56.7	51.8	**61.0**

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT:	1005 O'Brien	JN:	14456
ROADWAY:	Willow Road - Hamilton to Ivy	DATE:	1/24/24
Scenario:	**Year 2040**	BY:	J. Leech

ADT	7,108			PK HR VOL	1,777
SPEED	40				
PK HR %	25				
DIST CTL	85				
DIST N/F	76	(M=76,P=52,S=36,C=12)	AUTO SLE DISTANCE		76.2
DIST WALL	0		MED TRUCK SLE DIST		76.1
DIST W/OB	85		HVY TRUCK SLE DIST		76.1
HTH WALL	0.0	********			
HTH OBS	5.0				
AMBIENT	45.0				
ROADWAY VIEW:					
LF ANGLE	-90				
RT ANGLE	90				
DF ANGLE	180				

SITE CONDITIONS:		(15=HARD SITE, 10=SOFT SITE)			
AUTOM	15.0				
MED TR	15.0				
HVY TR	15.0				
BARRIER	0	(0=WALL,1=BERM)			
ELEVATIONS:					
PAD	0.0	AUTOMOBILES =	0.00		
ROAD	0.0	MEDIUM TRUCKS=	2.30		
		HEAVY TRUCKS =	8.01		
GRADE:	0.0 %	GRADE ADJUSTM=	0.0	(TO HEAVY TRUCKS)	

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.770	0.134	0.096	0.9200
MEDIUM TRUCKS	0.872	0.053	0.075	0.0200
HEAVY TRUCKS	0.889	0.030	0.081	0.0100

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	63.3	57.4	55.8	49.6	58.8
MEDIUM TRUCKS	57.9	52.5	46.4	43.1	52.6
HEAVY TRUCKS	60.1	54.8	46.1	45.7	54.9
VEHICULAR NOISE	65.8	60.1	56.7	51.7	**61.0**

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT:	1005 O'Brien	JN:	14456
ROADWAY:	Willow Road - Hamilton to Ivy	DATE:	1/24/24
Scenario:	**Year 2040 + Project**	BY:	J. Leech

ADT	7,268			PK HR VOL	1,817
SPEED	40				
PK HR %	25				
DIST CTL	85				
DIST N/F	76	(M=76,P=52,S=36,C=12)	AUTO SLE DISTANCE		76.2
DIST WALL	0		MED TRUCK SLE DIST		76.1
DIST W/OB	85		HVY TRUCK SLE DIST		76.1
HTH WALL	0.0	********			
HTH OBS	5.0				
AMBIENT	45.0				
ROADWAY VIEW:					
LF ANGLE	-90				
RT ANGLE	90				
DF ANGLE	180				

SITE CONDITIONS:		(15=HARD SITE, 10=SOFT SITE)			
AUTOM	15.0				
MED TR	15.0				
HVY TR	15.0				
BARRIER	0	(0=WALL,1=BERM)			
ELEVATIONS:					
PAD	0.0	AUTOMOBILES =	0.00		
ROAD	0.0	MEDIUM TRUCKS=	2.30		
		HEAVY TRUCKS =	8.01		
GRADE:	0.0 %	GRADE ADJUSTM=	0.0	(TO HEAVY TRUCKS)	

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.770	0.134	0.096	0.9200
MEDIUM TRUCKS	0.872	0.053	0.075	0.0200
HEAVY TRUCKS	0.889	0.030	0.081	0.0100

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	63.4	57.5	55.9	49.7	58.9
MEDIUM TRUCKS	58.0	52.6	46.4	43.2	52.7
HEAVY TRUCKS	60.2	54.9	46.2	45.8	55.0
VEHICULAR NOISE	65.9	60.2	56.8	51.8	**61.1**

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT:	1005 O'Brien	JN:	14456
ROADWAY:	Willow Road - Ivy to O'Brien	DATE:	1/24/24
Scenario:	**Year 2027**	BY:	J. Leech

ADT	6,808			PK HR VOL	1,702
SPEED	40				
PK HR %	25				
DIST CTL	85				
DIST N/F	76	(M=76,P=52,S=36,C=12)	AUTO SLE DISTANCE		76.2
DIST WALL	0		MED TRUCK SLE DIST		76.1
DIST W/OB	85		HVY TRUCK SLE DIST		76.1
HTH WALL	0.0	********			
HTH OBS	5.0				
AMBIENT	45.0				
ROADWAY VIEW:					
LF ANGLE	-90				
RT ANGLE	90				
DF ANGLE	180				

SITE CONDITIONS:		(15=HARD SITE, 10=SOFT SITE)			
AUTOM	15.0				
MED TR	15.0				
HVY TR	15.0				
BARRIER	0	(0=WALL,1=BERM)			
ELEVATIONS:					
PAD	0.0	AUTOMOBILES =	0.00		
ROAD	0.0	MEDIUM TRUCKS=	2.30		
		HEAVY TRUCKS =	8.01		
GRADE:	0.0 %	GRADE ADJUSTM=	0.0	(TO HEAVY TRUCKS)	

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.770	0.134	0.096	0.9200
MEDIUM TRUCKS	0.872	0.053	0.075	0.0200
HEAVY TRUCKS	0.889	0.030	0.081	0.0100

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	63.1	57.2	55.6	49.4	58.6
MEDIUM TRUCKS	57.7	52.3	46.2	42.9	52.4
HEAVY TRUCKS	59.9	54.7	46.0	45.5	54.7
VEHICULAR NOISE	65.6	59.9	56.5	51.5	**60.8**

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT:	1005 O'Brien	JN:	14456
ROADWAY:	Willow Road - Ivy to O'Brien	DATE:	1/24/24
Scenario:	**Year 2027 + Project**	BY:	J. Leech

ADT	6,972			PK HR VOL	1,743
SPEED	40				
PK HR %	25				
DIST CTL	85				
DIST N/F	76	(M=76,P=52,S=36,C=12)	AUTO SLE DISTANCE		76.2
DIST WALL	0		MED TRUCK SLE DIST		76.1
DIST W/OB	85		HVY TRUCK SLE DIST		76.1
HTH WALL	0.0	********			
HTH OBS	5.0				
AMBIENT	45.0				
ROADWAY VIEW:					
LF ANGLE	-90				
RT ANGLE	90				
DF ANGLE	180				

SITE CONDITIONS:		(15=HARD SITE, 10=SOFT SITE)			
AUTOM	15.0				
MED TR	15.0				
HVY TR	15.0				
BARRIER	0	(0=WALL,1=BERM)			
ELEVATIONS:					
PAD	0.0	AUTOMOBILES =	0.00		
ROAD	0.0	MEDIUM TRUCKS=	2.30		
		HEAVY TRUCKS =	8.01		
GRADE:	0.0 %	GRADE ADJUSTM=	0.0	(TO HEAVY TRUCKS)	

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.770	0.134	0.096	0.9200
MEDIUM TRUCKS	0.872	0.053	0.075	0.0200
HEAVY TRUCKS	0.889	0.030	0.081	0.0100

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	63.2	57.3	55.7	49.5	58.7
MEDIUM TRUCKS	57.8	52.4	46.3	43.0	52.5
HEAVY TRUCKS	60.0	54.8	46.1	45.6	54.8
VEHICULAR NOISE	65.7	60.0	56.6	51.6	**60.9**

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT:	1005 O'Brien	JN:	14456
ROADWAY:	Willow Road - Ivy to O'Brien	DATE:	1/24/24
Scenario:	**Year 2040**	BY:	J. Leech

ADT	7,204			PK HR VOL	1,801
SPEED	40				
PK HR %	25				
DIST CTL	85				
DIST N/F	76	(M=76,P=52,S=36,C=12)	AUTO SLE DISTANCE		76.2
DIST WALL	0		MED TRUCK SLE DIST		76.1
DIST W/OB	85		HVY TRUCK SLE DIST		76.1
HTH WALL	0.0	********			
HTH OBS	5.0				
AMBIENT	45.0				
ROADWAY VIEW:					
LF ANGLE	-90				
RT ANGLE	90				
DF ANGLE	180				

SITE CONDITIONS:		(15=HARD SITE, 10=SOFT SITE)			
AUTOM	15.0				
MED TR	15.0				
HVY TR	15.0				
BARRIER	0	(0=WALL,1=BERM)			
ELEVATIONS:					
PAD	0.0	AUTOMOBILES =	0.00		
ROAD	0.0	MEDIUM TRUCKS=	2.30		
		HEAVY TRUCKS =	8.01		
GRADE:	0.0 %	GRADE ADJUSTM=	0.0	(TO HEAVY TRUCKS)	

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.770	0.134	0.096	0.9200
MEDIUM TRUCKS	0.872	0.053	0.075	0.0200
HEAVY TRUCKS	0.889	0.030	0.081	0.0100

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	63.3	57.4	55.9	49.6	58.9
MEDIUM TRUCKS	57.9	52.6	46.4	43.2	52.7
HEAVY TRUCKS	60.2	54.9	46.2	45.7	54.9
VEHICULAR NOISE	65.8	60.2	56.7	51.8	**61.0**

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT:	1005 O'Brien	JN:	14456
ROADWAY:	Willow Road - Ivy to O'Brien	DATE:	1/24/24
Scenario:	**Year 2040 + Project**	BY:	J. Leech

ADT	7,352			PK HR VOL	1,838
SPEED	40				
PK HR %	25				
DIST CTL	85				
DIST N/F	76	(M=76,P=52,S=36,C=12)	AUTO SLE DISTANCE		76.2
DIST WALL	0		MED TRUCK SLE DIST		76.1
DIST W/OB	85		HVY TRUCK SLE DIST		76.1
HTH WALL	0.0	********			
HTH OBS	5.0				
AMBIENT	45.0				
ROADWAY VIEW:					
LF ANGLE	-90				
RT ANGLE	90				
DF ANGLE	180				

SITE CONDITIONS:		(15=HARD SITE, 10=SOFT SITE)			
AUTOM	15.0				
MED TR	15.0				
HVY TR	15.0				
BARRIER	0	(0=WALL,1=BERM)			
ELEVATIONS:					
PAD	0.0	AUTOMOBILES =	0.00		
ROAD	0.0	MEDIUM TRUCKS=	2.30		
		HEAVY TRUCKS =	8.01		
GRADE:	0.0 %	GRADE ADJUSTM=	0.0	(TO HEAVY TRUCKS)	

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.770	0.134	0.096	0.9200
MEDIUM TRUCKS	0.872	0.053	0.075	0.0200
HEAVY TRUCKS	0.889	0.030	0.081	0.0100

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	63.4	57.5	55.9	49.7	59.0
MEDIUM TRUCKS	58.0	52.6	46.5	43.2	52.8
HEAVY TRUCKS	60.3	55.0	46.3	45.8	55.0
VEHICULAR NOISE	65.9	60.3	56.8	51.8	**61.1**

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT:	1005 O'Brien	JN:	14456
ROADWAY:	Willow Road - O'Brien to Newbridge	DATE:	1/24/24
Scenario:	**Year 2027**	BY:	J. Leech

ADT	11,100			PK HR VOL	2,775
SPEED	40				
PK HR %	25				
DIST CTL	85				
DIST N/F	76	(M=76,P=52,S=36,C=12)	AUTO SLE DISTANCE		76.2
DIST WALL	0		MED TRUCK SLE DIST		76.1
DIST W/OB	85		HVY TRUCK SLE DIST		76.1
HTH WALL	0.0	********			
HTH OBS	5.0				
AMBIENT	45.0				
ROADWAY VIEW:					
LF ANGLE	-90				
RT ANGLE	90				
DF ANGLE	180				

SITE CONDITIONS:		(15=HARD SITE, 10=SOFT SITE)			
AUTOM	15.0				
MED TR	15.0				
HVY TR	15.0				
BARRIER	0	(0=WALL,1=BERM)			
ELEVATIONS:					
PAD	0.0	AUTOMOBILES =	0.00		
ROAD	0.0	MEDIUM TRUCKS=	2.30		
		HEAVY TRUCKS =	8.01		
GRADE:	0.0 %	GRADE ADJUSTM=	0.0	(TO HEAVY TRUCKS)	

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.770	0.134	0.096	0.9200
MEDIUM TRUCKS	0.872	0.053	0.075	0.0200
HEAVY TRUCKS	0.889	0.030	0.081	0.0100

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	65.2	59.3	57.7	51.5	60.8
MEDIUM TRUCKS	59.8	54.4	48.3	45.0	54.5
HEAVY TRUCKS	62.1	56.8	48.1	47.6	56.8
VEHICULAR NOISE	67.7	62.1	58.6	53.6	**62.9**

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT:	1005 O'Brien			JN:	14456
ROADWAY:	Willow Road - O'Brien to Newbridge			DATE:	1/24/24
Scenario:	**Year 2027 + Project**			BY:	J. Leech
ADT	11,320			PK HR VOL	2,830
SPEED	40				
PK HR %	25				
DIST CTL	85				
DIST N/F	76	(M=76,P=52,S=36,C=12)	AUTO SLE DISTANCE		76.2
DIST WALL	0		MED TRUCK SLE DIST		76.1
DIST W/OB	85		HVY TRUCK SLE DIST		76.1
HTH WALL	0.0	********			
HTH OBS	5.0				
AMBIENT	45.0				
ROADWAY VIEW:					
LF ANGLE	-90				
RT ANGLE	90				
DF ANGLE	180				
			11320		
SITE CONDITIONS:		(15=HARD SITE, 10=SOFT SITE)			
AUTOM	15.0				
MED TR	15.0				
HVY TR	15.0				
BARRIER	0	(0=WALL,1=BERM)			
ELEVATIONS:					
PAD	0.0	AUTOMOBILES =	0.00		
ROAD	0.0	MEDIUM TRUCKS=	2.30		
		HEAVY TRUCKS =	8.01		
GRADE:	0.0 %	GRADE ADJUSTM=	0.0	(TO HEAVY TRUCKS)	

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.770	0.134	0.096	0.9200
MEDIUM TRUCKS	0.872	0.053	0.075	0.0200
HEAVY TRUCKS	0.889	0.030	0.081	0.0100

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	65.3	59.4	57.8	51.6	60.8
MEDIUM TRUCKS	59.9	54.5	48.4	45.1	54.6
HEAVY TRUCKS	62.1	56.9	48.2	47.7	56.9
VEHICULAR NOISE	67.8	62.1	58.7	53.7	**63.0**

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT:	1005 O'Brien	JN:	14456
ROADWAY:	Willow Road - O'Brien to Newbridge	DATE:	1/24/24
Scenario:	**Year 2040**	BY:	J. Leech

ADT	11,460			PK HR VOL	2,865
SPEED	40				
PK HR %	25				
DIST CTL	85				
DIST N/F	76	(M=76,P=52,S=36,C=12)	AUTO SLE DISTANCE		76.2
DIST WALL	0		MED TRUCK SLE DIST		76.1
DIST W/OB	85		HVY TRUCK SLE DIST		76.1
HTH WALL	0.0	********			
HTH OBS	5.0				
AMBIENT	45.0				
ROADWAY VIEW:					
LF ANGLE	-90				
RT ANGLE	90				
DF ANGLE	180				

SITE CONDITIONS:		(15=HARD SITE, 10=SOFT SITE)			
AUTOM	15.0				
MED TR	15.0				
HVY TR	15.0				
BARRIER	0	(0=WALL,1=BERM)			
ELEVATIONS:					
PAD	0.0	AUTOMOBILES =	0.00		
ROAD	0.0	MEDIUM TRUCKS=	2.30		
		HEAVY TRUCKS =	8.01		
GRADE:	0.0 %	GRADE ADJUSTM=	0.0	(TO HEAVY TRUCKS)	

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.770	0.134	0.096	0.9200
MEDIUM TRUCKS	0.872	0.053	0.075	0.0200
HEAVY TRUCKS	0.889	0.030	0.081	0.0100

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	65.3	59.4	57.9	51.6	60.9
MEDIUM TRUCKS	59.9	54.6	48.4	45.2	54.7
HEAVY TRUCKS	62.2	56.9	48.2	47.7	56.9
VEHICULAR NOISE	67.8	62.2	58.7	53.8	**63.1**

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT:	1005 O'Brien	JN:	14456
ROADWAY:	Willow Road - O'Brien to Newbridge	DATE:	1/24/24
Scenario:	**Year 2040 + Project**	BY:	J. Leech

ADT	11,668			PK HR VOL	2,917
SPEED	40				
PK HR %	25				
DIST CTL	85				
DIST N/F	76	(M=76,P=52,S=36,C=12)	AUTO SLE DISTANCE		76.2
DIST WALL	0		MED TRUCK SLE DIST		76.1
DIST W/OB	85		HVY TRUCK SLE DIST		76.1
HTH WALL	0.0	********			
HTH OBS	5.0				
AMBIENT	45.0				
ROADWAY VIEW:					
LF ANGLE	-90				
RT ANGLE	90				
DF ANGLE	180				

SITE CONDITIONS:		(15=HARD SITE, 10=SOFT SITE)			
AUTOM	15.0				
MED TR	15.0				
HVY TR	15.0				
BARRIER	0	(0=WALL,1=BERM)			
ELEVATIONS:					
PAD	0.0	AUTOMOBILES =	0.00		
ROAD	0.0	MEDIUM TRUCKS=	2.30		
		HEAVY TRUCKS =	8.01		
GRADE:	0.0 %	GRADE ADJUSTM=	0.0	(TO HEAVY TRUCKS)	

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.770	0.134	0.096	0.9200
MEDIUM TRUCKS	0.872	0.053	0.075	0.0200
HEAVY TRUCKS	0.889	0.030	0.081	0.0100

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	65.4	59.5	57.9	51.7	61.0
MEDIUM TRUCKS	60.0	54.6	48.5	45.3	54.8
HEAVY TRUCKS	62.3	57.0	48.3	47.8	57.0
VEHICULAR NOISE	67.9	62.3	58.8	53.9	**63.1**

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT:	1005 O'Brien	JN:	14456
ROADWAY:	Willow Road - Newbridge to US101	DATE:	1/24/24
Scenario:	**Year 2027**	BY:	J. Leech

ADT	14,256			PK HR VOL	3,564
SPEED	40				
PK HR %	25				
DIST CTL	85				
DIST N/F	76	(M=76,P=52,S=36,C=12)	AUTO SLE DISTANCE		76.2
DIST WALL	0		MED TRUCK SLE DIST		76.1
DIST W/OB	85		HVY TRUCK SLE DIST		76.1
HTH WALL	0.0	********			
HTH OBS	5.0				
AMBIENT	45.0				
ROADWAY VIEW:					
LF ANGLE	-90				
RT ANGLE	90				
DF ANGLE	180				

SITE CONDITIONS:		(15=HARD SITE, 10=SOFT SITE)			
AUTOM	15.0				
MED TR	15.0				
HVY TR	15.0				
BARRIER	0	(0=WALL,1=BERM)			
ELEVATIONS:					
PAD	0.0	AUTOMOBILES =	0.00		
ROAD	0.0	MEDIUM TRUCKS=	2.30		
		HEAVY TRUCKS =	8.01		
GRADE:	0.0 %	GRADE ADJUSTM=	0.0	(TO HEAVY TRUCKS)	

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.770	0.134	0.096	0.9200
MEDIUM TRUCKS	0.872	0.053	0.075	0.0200
HEAVY TRUCKS	0.889	0.030	0.081	0.0100

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	66.3	60.4	58.8	52.6	61.8
MEDIUM TRUCKS	60.9	55.5	49.4	46.1	55.6
HEAVY TRUCKS	63.1	57.9	49.2	48.7	57.9
VEHICULAR NOISE	68.8	63.1	59.7	54.7	**64.0**

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT:	1005 O'Brien	JN:	14456
ROADWAY:	Willow Road - Newbridge to US101	DATE:	1/24/24
Scenario:	**Year 2027 + Project**	BY:	J. Leech

ADT	14,468			PK HR VOL	3,617
SPEED	40				
PK HR %	25				
DIST CTL	85				
DIST N/F	76	(M=76,P=52,S=36,C=12)	AUTO SLE DISTANCE		76.2
DIST WALL	0		MED TRUCK SLE DIST		76.1
DIST W/OB	85		HVY TRUCK SLE DIST		76.1
HTH WALL	0.0	********			
HTH OBS	5.0				
AMBIENT	45.0				
ROADWAY VIEW:					
LF ANGLE	-90				
RT ANGLE	90				
DF ANGLE	180				

SITE CONDITIONS:		(15=HARD SITE, 10=SOFT SITE)			
AUTOM	15.0				
MED TR	15.0				
HVY TR	15.0				
BARRIER	0	(0=WALL,1=BERM)			
ELEVATIONS:					
PAD	0.0	AUTOMOBILES =	0.00		
ROAD	0.0	MEDIUM TRUCKS=	2.30		
		HEAVY TRUCKS =	8.01		
GRADE:	0.0 %	GRADE ADJUSTM=	0.0	(TO HEAVY TRUCKS)	

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.770	0.134	0.096	0.9200
MEDIUM TRUCKS	0.872	0.053	0.075	0.0200
HEAVY TRUCKS	0.889	0.030	0.081	0.0100

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	66.4	60.5	58.9	52.7	61.9
MEDIUM TRUCKS	60.9	55.6	49.4	46.2	55.7
HEAVY TRUCKS	63.2	57.9	49.2	48.8	58.0
VEHICULAR NOISE	68.8	63.2	59.8	54.8	**64.1**

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT:	1005 O'Brien	JN:	14456
ROADWAY:	Willow Road - Newbridge to US101	DATE:	1/24/24
Scenario:	**Year 2040**	BY:	J. Leech

ADT	15,816			PK HR VOL	3,954
SPEED	40				
PK HR %	25				
DIST CTL	85				
DIST N/F	76	(M=76,P=52,S=36,C=12)	AUTO SLE DISTANCE		76.2
DIST WALL	0		MED TRUCK SLE DIST		76.1
DIST W/OB	85		HVY TRUCK SLE DIST		76.1
HTH WALL	0.0	********			
HTH OBS	5.0				
AMBIENT	45.0				
ROADWAY VIEW:					
LF ANGLE	-90				
RT ANGLE	90				
DF ANGLE	180				

SITE CONDITIONS:		(15=HARD SITE, 10=SOFT SITE)			
AUTOM	15.0				
MED TR	15.0				
HVY TR	15.0				
BARRIER	0	(0=WALL,1=BERM)			
ELEVATIONS:					
PAD	0.0	AUTOMOBILES =	0.00		
ROAD	0.0	MEDIUM TRUCKS=	2.30		
		HEAVY TRUCKS =	8.01		
GRADE:	0.0 %	GRADE ADJUSTM=	0.0	(TO HEAVY TRUCKS)	

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.770	0.134	0.096	0.9200
MEDIUM TRUCKS	0.872	0.053	0.075	0.0200
HEAVY TRUCKS	0.889	0.030	0.081	0.0100

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	66.7	60.8	59.3	53.0	62.3
MEDIUM TRUCKS	61.3	56.0	49.8	46.6	56.1
HEAVY TRUCKS	63.6	58.3	49.6	49.1	58.3
VEHICULAR NOISE	69.2	63.6	60.1	55.2	**64.4**

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT:	1005 O'Brien	JN:	14456
ROADWAY:	Willow Road - Newbridge to US101	DATE:	1/24/24
Scenario:	**Year 2040 + Project**	BY:	J. Leech

ADT	16,016			PK HR VOL	4,004
SPEED	40				
PK HR %	25				
DIST CTL	85				
DIST N/F	76	(M=76,P=52,S=36,C=12)	AUTO SLE DISTANCE		76.2
DIST WALL	0		MED TRUCK SLE DIST		76.1
DIST W/OB	85		HVY TRUCK SLE DIST		76.1
HTH WALL	0.0	********			
HTH OBS	5.0				
AMBIENT	45.0				
ROADWAY VIEW:					
LF ANGLE	-90				
RT ANGLE	90				
DF ANGLE	180				

SITE CONDITIONS:		(15=HARD SITE, 10=SOFT SITE)			
AUTOM	15.0				
MED TR	15.0				
HVY TR	15.0				
BARRIER	0	(0=WALL,1=BERM)			
ELEVATIONS:					
PAD	0.0	AUTOMOBILES =	0.00		
ROAD	0.0	MEDIUM TRUCKS=	2.30		
		HEAVY TRUCKS =	8.01		
GRADE:	0.0 %	GRADE ADJUSTM=	0.0	(TO HEAVY TRUCKS)	

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.770	0.134	0.096	0.9200
MEDIUM TRUCKS	0.872	0.053	0.075	0.0200
HEAVY TRUCKS	0.889	0.030	0.081	0.0100

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	66.8	60.9	59.3	53.1	62.4
MEDIUM TRUCKS	61.4	56.0	49.9	46.6	56.1
HEAVY TRUCKS	63.7	58.4	49.7	49.2	58.4
VEHICULAR NOISE	69.3	63.6	60.2	55.2	**64.5**

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT:	1005 O'Brien	JN:	14456
ROADWAY:	O'Brien Road - Willow Rd to Kavanaugh St	DATE:	1/24/24
Scenario:	**Year 2027**	BY:	J. Leech

ADT	8,680			PK HR VOL	2,170
SPEED	30				
PK HR %	25				
DIST CTL	70				
DIST N/F	52	(M=76,P=52,S=36,C=12)	AUTO SLE DISTANCE		65.2
DIST WALL	0		MED TRUCK SLE DIST		65.0
DIST W/OB	70		HVY TRUCK SLE DIST		65.1
HTH WALL	0.0	********			
HTH OBS	5.0				
AMBIENT	45.0				
ROADWAY VIEW:					
LF ANGLE	-90				
RT ANGLE	90				
DF ANGLE	180				

SITE CONDITIONS:		(15=HARD SITE, 10=SOFT SITE)			
AUTOM	15.0				
MED TR	15.0				
HVY TR	15.0				
BARRIER	0	(0=WALL,1=BERM)			
ELEVATIONS:					
PAD	0.0	AUTOMOBILES =	0.00		
ROAD	0.0	MEDIUM TRUCKS=	2.30		
		HEAVY TRUCKS =	8.01		
GRADE:	0.0 %	GRADE ADJUSTM=	0.0	(TO HEAVY TRUCKS)	

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.770	0.134	0.096	0.9200
MEDIUM TRUCKS	0.872	0.053	0.075	0.0200
HEAVY TRUCKS	0.889	0.030	0.081	0.0100

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	61.6	55.7	54.2	47.9	57.2
MEDIUM TRUCKS	56.8	51.4	45.3	42.0	51.5
HEAVY TRUCKS	60.2	54.9	46.2	45.7	54.9
VEHICULAR NOISE	64.7	59.2	55.3	50.6	**59.9**

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT:	1005 O'Brien	JN:	14456
ROADWAY:	O'Brien Road - Willow Rd to Kavanaugh St	DATE:	1/24/24
Scenario:	**Year 2027 + Project**	BY:	J. Leech

ADT	8,688			PK HR VOL	2,172
SPEED	30				
PK HR %	25				
DIST CTL	70				
DIST N/F	52	(M=76,P=52,S=36,C=12)	AUTO SLE DISTANCE		65.2
DIST WALL	0		MED TRUCK SLE DIST		65.0
DIST W/OB	70		HVY TRUCK SLE DIST		65.1
HTH WALL	0.0	********			
HTH OBS	5.0				
AMBIENT	45.0				
ROADWAY VIEW:					
LF ANGLE	-90				
RT ANGLE	90				
DF ANGLE	180				

SITE CONDITIONS:		(15=HARD SITE, 10=SOFT SITE)			
AUTOM	15.0				
MED TR	15.0				
HVY TR	15.0				
BARRIER	0	(0=WALL,1=BERM)			
ELEVATIONS:					
PAD	0.0	AUTOMOBILES =	0.00		
ROAD	0.0	MEDIUM TRUCKS=	2.30		
		HEAVY TRUCKS =	8.01		
GRADE:	0.0 %	GRADE ADJUSTM=	0.0	(TO HEAVY TRUCKS)	

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.770	0.134	0.096	0.9200
MEDIUM TRUCKS	0.872	0.053	0.075	0.0200
HEAVY TRUCKS	0.889	0.030	0.081	0.0100

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	61.7	55.7	54.2	48.0	57.2
MEDIUM TRUCKS	56.8	51.4	45.3	42.0	51.5
HEAVY TRUCKS	60.2	54.9	46.2	45.7	54.9
VEHICULAR NOISE	64.7	59.2	55.3	50.6	**59.9**

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT:	1005 O'Brien	JN:	14456
ROADWAY:	O'Brien Road - Willow Rd to Kavanaugh St	DATE:	1/24/24
Scenario:	**Year 2040**	BY:	J. Leech

ADT	10,344			PK HR VOL	2,586
SPEED	30				
PK HR %	25				
DIST CTL	70				
DIST N/F	52	(M=76,P=52,S=36,C=12)	AUTO SLE DISTANCE		65.2
DIST WALL	0		MED TRUCK SLE DIST		65.0
DIST W/OB	70		HVY TRUCK SLE DIST		65.1
HTH WALL	0.0	********			
HTH OBS	5.0				
AMBIENT	45.0				
ROADWAY VIEW:					
LF ANGLE	-90				
RT ANGLE	90				
DF ANGLE	180				

SITE CONDITIONS:		(15=HARD SITE, 10=SOFT SITE)			
AUTOM	15.0				
MED TR	15.0				
HVY TR	15.0				
BARRIER	0	(0=WALL,1=BERM)			
ELEVATIONS:					
PAD	0.0	AUTOMOBILES =	0.00		
ROAD	0.0	MEDIUM TRUCKS=	2.30		
		HEAVY TRUCKS =	8.01		
GRADE:	0.0 %	GRADE ADJUSTM=	0.0	(TO HEAVY TRUCKS)	

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.770	0.134	0.096	0.9200
MEDIUM TRUCKS	0.872	0.053	0.075	0.0200
HEAVY TRUCKS	0.889	0.030	0.081	0.0100

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	62.4	56.5	54.9	48.7	58.0
MEDIUM TRUCKS	57.5	52.2	46.0	42.8	52.3
HEAVY TRUCKS	61.0	55.7	47.0	46.5	55.7
VEHICULAR NOISE	65.5	59.9	56.0	51.4	**60.7**

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT:	1005 O'Brien	JN:	14456
ROADWAY:	O'Brien Road - Willow Rd to Kavanaugh St	DATE:	1/24/24
Scenario:	**Year 2040 + Project**	BY:	J. Leech

ADT	10,356			PK HR VOL	2,589
SPEED	30				
PK HR %	25				
DIST CTL	70				
DIST N/F	52	(M=76,P=52,S=36,C=12)	AUTO SLE DISTANCE		65.2
DIST WALL	0		MED TRUCK SLE DIST		65.0
DIST W/OB	70		HVY TRUCK SLE DIST		65.1
HTH WALL	0.0	********			
HTH OBS	5.0				
AMBIENT	45.0				
ROADWAY VIEW:					
LF ANGLE	-90				
RT ANGLE	90				
DF ANGLE	180				

SITE CONDITIONS:		(15=HARD SITE, 10=SOFT SITE)			
AUTOM	15.0				
MED TR	15.0				
HVY TR	15.0				
BARRIER	0	(0=WALL,1=BERM)			
ELEVATIONS:					
PAD	0.0	AUTOMOBILES =	0.00		
ROAD	0.0	MEDIUM TRUCKS=	2.30		
		HEAVY TRUCKS =	8.01		
GRADE:	0.0 %	GRADE ADJUSTM=	0.0	(TO HEAVY TRUCKS)	

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.770	0.134	0.096	0.9200
MEDIUM TRUCKS	0.872	0.053	0.075	0.0200
HEAVY TRUCKS	0.889	0.030	0.081	0.0100

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	62.4	56.5	54.9	48.7	58.0
MEDIUM TRUCKS	57.5	52.2	46.0	42.8	52.3
HEAVY TRUCKS	61.0	55.7	47.0	46.5	55.7
VEHICULAR NOISE	65.5	59.9	56.0	51.4	**60.7**

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT:	1005 O'Brien	JN:	14456
ROADWAY:	University Ave - O'Brien Rd to Kavanaugh St	DATE:	1/24/24
Scenario:	**Year 2027**	BY:	J. Leech

ADT	4,936			PK HR VOL	1,234
SPEED	35				
PK HR %	25				
DIST CTL	50				
DIST N/F	52	(M=76,P=52,S=36,C=12)	AUTO SLE DISTANCE		43.0
DIST WALL	0		MED TRUCK SLE DIST		42.8
DIST W/OB	50		HVY TRUCK SLE DIST		42.8
HTH WALL	0.0	********			
HTH OBS	5.0				
AMBIENT	45.0				
ROADWAY VIEW:					
LF ANGLE	-90				
RT ANGLE	90				
DF ANGLE	180				

SITE CONDITIONS:		(15=HARD SITE, 10=SOFT SITE)			
AUTOM	15.0				
MED TR	15.0				
HVY TR	15.0				
BARRIER	0	(0=WALL,1=BERM)			
ELEVATIONS:					
PAD	0.0	AUTOMOBILES =	0.00		
ROAD	0.0	MEDIUM TRUCKS=	2.30		
		HEAVY TRUCKS =	8.01		
GRADE:	0.0 %	GRADE ADJUSTM=	0.0	(TO HEAVY TRUCKS)	

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.770	0.134	0.096	0.9200
MEDIUM TRUCKS	0.872	0.053	0.075	0.0200
HEAVY TRUCKS	0.889	0.030	0.081	0.0100

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	63.8	57.9	56.3	50.1	59.3
MEDIUM TRUCKS	58.6	53.3	47.1	43.9	53.4
HEAVY TRUCKS	61.4	56.2	47.5	47.0	56.2
VEHICULAR NOISE	66.5	60.9	57.3	52.5	**61.7**

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT:	1005 O'Brien	JN:	14456
ROADWAY:	University Ave - O'Brien Rd to Kavanaugh St	DATE:	1/24/24
Scenario:	**Year 2027 + Project**	BY:	J. Leech

ADT	5,008			PK HR VOL	1,252
SPEED	35				
PK HR %	25				
DIST CTL	50				
DIST N/F	52	(M=76,P=52,S=36,C=12)	AUTO SLE DISTANCE		43.0
DIST WALL	0		MED TRUCK SLE DIST		42.8
DIST W/OB	50		HVY TRUCK SLE DIST		42.8
HTH WALL	0.0	********			
HTH OBS	5.0				
AMBIENT	45.0				
ROADWAY VIEW:					
LF ANGLE	-90				
RT ANGLE	90				
DF ANGLE	180				

SITE CONDITIONS:		(15=HARD SITE, 10=SOFT SITE)			
AUTOM	15.0				
MED TR	15.0				
HVY TR	15.0				
BARRIER	0	(0=WALL,1=BERM)			
ELEVATIONS:					
PAD	0.0	AUTOMOBILES =	0.00		
ROAD	0.0	MEDIUM TRUCKS=	2.30		
		HEAVY TRUCKS =	8.01		
GRADE:	0.0 %	GRADE ADJUSTM=	0.0	(TO HEAVY TRUCKS)	

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.770	0.134	0.096	0.9200
MEDIUM TRUCKS	0.872	0.053	0.075	0.0200
HEAVY TRUCKS	0.889	0.030	0.081	0.0100

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	63.8	57.9	56.4	50.1	59.4
MEDIUM TRUCKS	58.7	53.3	47.2	43.9	53.5
HEAVY TRUCKS	61.5	56.2	47.5	47.0	56.3
VEHICULAR NOISE	66.6	61.0	57.3	52.5	**61.8**

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT:	1005 O'Brien	JN:	14456
ROADWAY:	University Ave - O'Brien Rd to Kavanaugh St	DATE:	1/24/24
Scenario:	**Year 2040**	BY:	J. Leech

ADT	6,824			PK HR VOL	1,706
SPEED	35				
PK HR %	25				
DIST CTL	50				
DIST N/F	52	(M=76,P=52,S=36,C=12)	AUTO SLE DISTANCE		43.0
DIST WALL	0		MED TRUCK SLE DIST		42.8
DIST W/OB	50		HVY TRUCK SLE DIST		42.8
HTH WALL	0.0	********			
HTH OBS	5.0				
AMBIENT	45.0				
ROADWAY VIEW:					
LF ANGLE	-90				
RT ANGLE	90				
DF ANGLE	180				

SITE CONDITIONS:		(15=HARD SITE, 10=SOFT SITE)			
AUTOM	15.0				
MED TR	15.0				
HVY TR	15.0				
BARRIER	0	(0=WALL,1=BERM)			
ELEVATIONS:					
PAD	0.0	AUTOMOBILES =	0.00		
ROAD	0.0	MEDIUM TRUCKS=	2.30		
		HEAVY TRUCKS =	8.01		
GRADE:	0.0 %	GRADE ADJUSTM=	0.0	(TO HEAVY TRUCKS)	

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.770	0.134	0.096	0.9200
MEDIUM TRUCKS	0.872	0.053	0.075	0.0200
HEAVY TRUCKS	0.889	0.030	0.081	0.0100

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	65.2	59.3	57.7	51.5	60.7
MEDIUM TRUCKS	60.0	54.7	48.5	45.3	54.8
HEAVY TRUCKS	62.8	57.6	48.9	48.4	57.6
VEHICULAR NOISE	68.0	62.3	58.7	53.9	**63.1**

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT:	1005 O'Brien	JN:	14456
ROADWAY:	University Ave - O'Brien Rd to Kavanaugh St	DATE:	1/24/24
Scenario:	**Year 2040 + Project**	BY:	J. Leech

ADT	6,908			PK HR VOL	1,727
SPEED	35				
PK HR %	25				
DIST CTL	50				
DIST N/F	52	(M=76,P=52,S=36,C=12)	AUTO SLE DISTANCE		43.0
DIST WALL	0		MED TRUCK SLE DIST		42.8
DIST W/OB	50		HVY TRUCK SLE DIST		42.8
HTH WALL	0.0	********			
HTH OBS	5.0				
AMBIENT	45.0				
ROADWAY VIEW:					
LF ANGLE	-90				
RT ANGLE	90				
DF ANGLE	180				

SITE CONDITIONS:		(15=HARD SITE, 10=SOFT SITE)			
AUTOM	15.0				
MED TR	15.0				
HVY TR	15.0				
BARRIER	0	(0=WALL,1=BERM)			
ELEVATIONS:					
PAD	0.0	AUTOMOBILES =	0.00		
ROAD	0.0	MEDIUM TRUCKS=	2.30		
		HEAVY TRUCKS =	8.01		
GRADE:	0.0 %	GRADE ADJUSTM=	0.0	(TO HEAVY TRUCKS)	

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.770	0.134	0.096	0.9200
MEDIUM TRUCKS	0.872	0.053	0.075	0.0200
HEAVY TRUCKS	0.889	0.030	0.081	0.0100

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	65.2	59.3	57.8	51.5	60.8
MEDIUM TRUCKS	60.1	54.7	48.6	45.3	54.8
HEAVY TRUCKS	62.9	57.6	48.9	48.4	57.6
VEHICULAR NOISE	68.0	62.4	58.7	53.9	**63.2**

NOISE APPENDIX

Generator Noise Worksheet

GENERATOR NOISE LEVEL CALCULATIONS **1005 O'Brien Drive, Menlo Park**

Generator Make & Model:	Generac SD1500	
Sound Pressure Level (SPL) - No Enclosure	98.3	dBA
SPL Distance:	23	Ft
SPL - Level 2 Acoustic Enclosure	78.8	dBA
SPL Distance:	23	Ft

915 Alberni Street
Generator Noise Levels (No Enclosure)

Distance to 1005 O'Brien Generator	440	Ft
Generator Noise Level at this Distance:	72.7	dBA
Distance to 1320 Willow Generator	485	Ft
Generator Noise Level at this Distance:	71.8	dBA
Combined Generator Noise Levels:	**75.3**	dBA

915 Alberni Street
Generator Noise Levels (Level 2 Acoustic Enclosure)

Distance to 1005 O'Brien Generator	440	Ft
Generator Noise Level at this Distance:	53.2	dBA
Distance to 1320 Willow Generator	485	Ft
Generator Noise Level at this Distance:	52.3	dBA
Combined Generator Noise Levels:	**55.8**	dBA

1271 Willow Road
Generator Noise Levels (No Enclosure)

Distance to 1005 O'Brien Generator	410	Ft
Generator Noise Level at this Distance:	73.3	dBA
Distance to 1320 Willow Generator	480	Ft
Generator Noise Level at this Distance:	71.9	dBA
Combined Generator Noise Levels:	**75.6**	dBA

1271 Willow Road
Generator Noise Levels (Level 2 Acoustic Enclosure)

Distance to 1005 O'Brien Generator	410	Ft
Generator Noise Level at this Distance:	53.8	dBA
Distance to 1320 Willow Generator	480	Ft
Generator Noise Level at this Distance:	52.4	dBA
Combined Generator Noise Levels:	**56.1**	dBA

Appendix L
Housing Needs Assessment

bae urban economics

Housing Needs Assessment for 1005 O'Brien Drive and 1320 Willow Road Research & Development Project

Prepared for the City of Menlo Park

July 30, 2024



July 30, 2024

Katherine Waugh
Senior Project Manager
Dudek
Via email

Dear Katherine:

BAE is pleased to submit this Housing Needs Assessment for the proposed 1005 O'Brien Drive and 1320 Willow Road Research & Development Project.

Sincerely,



Raymond Kennedy
Director of Research, BAE Urban Economics

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EXECUTIVE SUMMARY

BAE Urban Economics, Inc. (BAE) has been retained to prepare a housing needs assessment for the proposed 1005 O'Brien Drive and 1320 Willow Road Research & Development Project (the "Proposed Project"), which is currently slated to include a new five-story research and development (R&D) building of 154,581 square feet, a new four-story R&D building of 73,617 square feet, and a six-level parking structure with 505 parking spaces. The existing single-story warehouse/R&D structures that currently occupy the site would be demolished. Overall, the proposal will result in 227,750 square feet of R&D space and 504 parking spaces in the garage and 23 surface parking spaces.

The analysis here is provided to satisfy the terms of the 2017 settlement agreement between the City of Menlo Park and the City of East Palo Alto, which states:

> *"When the preparation of an EIR is required pursuant to this Agreement, concurrent with the preparation of the EIR, Menlo Park or East Palo Alto, whichever is the lead agency for the Development Project, will conduct a Housing Needs Assessment ("HNA"). The scope of the HNA will, to the extent possible, include an analysis of the multiplier effect for indirect and induced employment by that Development Project and its relationship to the regional housing market and displacement."*

To accomplish this, the analysis includes background analysis of the local and regional housing market context; identification of the proposed project's net impact on housing supply and demand across income levels; estimation of the impacts felt within Menlo Park and East Palo Alto; and an evaluation of the broader impacts on the balance of supply and demand within the regional housing market. The latter includes a qualitative assessment of the potential for displacement of lower-income residents within the local area.

Background Conditions

Menlo Park is currently home to approximately 33,000 residents and 13,000 households (as of 2022, most recent data available at the time of analysis).[1] This represents an increase since 2010 of 3.1 percent in population and 3.5 percent in households. The Two-County Region, which consists of San Mateo and Santa Clara Counties, has seen a higher rate of growth since 2010s, with a 2022 population slightly greater than 2.3 million, in 934,000 households. This growth indicates continued demand for housing in Menlo Park and the region, as also shown by long-term trends of rising rents and home prices.

[1] Sources for the information summarized here can be found in the full Background Conditions section of this report.

Menlo Park's household incomes are relatively high, showing affluence even above what is a high-income region. Nevertheless, there are numerous households in both the city and the region that cannot find affordable housing due to lower income levels.

Owners outnumber renters in Menlo Park, accounting for 58 percent of all city households. There are also approximately 4,900 renter-occupied housing units in the city, indicating a substantial local market for both owner and renter-occupied homes.

Slightly more than half of Menlo Park's housing units are single-family detached homes. However, almost all of the residential growth in the city and the region since 2010 has been in multifamily units in buildings of five or more units, indicating an increase in housing density in both Menlo Park and the Two-County Region.

Slightly less than 35 percent of Menlo Park households report housing cost burdens exceeding 30 percent of income; households with housing cost burdens above this threshold are considered to have excessive housing costs. The regional distribution is very similar, indicating that over 300,000 households in the region face excessive housing costs; this demonstrates the ongoing need for additional affordable housing in the region.

Menlo Park has seen significant job growth in recent years as the tech economy boomed, far exceeding population growth. The rate of growth exceeds the two-county region over the same period. The local and regional growth have created substantial pressure on housing markets in Menlo Park and surrounding communities.

Menlo Park has far more jobs than employed residents; with 2.57 jobs in the city for every working resident. This is in contrast to the two-county region, which has only 1.12 jobs for every working resident. It is also higher than other nearby cities; Palo Alto has 2.44 jobs per employed resident, Mountain View has 1.90 jobs per employed resident, Redwood City has 1.28 jobs per employed resident, and East Palo Alto has only 0.40 jobs per working resident. As a result, Menlo Park has relatively high net in-commuting; the other cities and the region import a smaller share of their workers. While the Proposed Project would increase those imbalances, the net new jobs onsite, as estimated later in this report, would only represent an increase of 1.2 percent in Menlo Park jobs and 0.03 percent for the region.

Plan Bay Area, released by the Metropolitan Transportation Commission and the Association of Bay Area Governments, projects that South San Mateo County, which includes Menlo Park, will gain 26,000 additional households and 44,000 additional jobs between 2015 and 2050. The Two-County Region is projected to see an increase of 581,000 households and 625,000 jobs over the same period. As a result, there may be continued demand for new workspaces and housing over the next few decades both locally in Menlo Park and regionally. It should be noted that these projections use a baseline that is pre-2020 Census and pre-pandemic, so

recent changes, including the trend toward tele-commuting, are not accounted for in the estimates and therefore this study provides a conservative analysis.

While the Project itself is non-residential, understanding housing trends is key to completing this housing needs assessment. Most of the recent residential construction activity in the city has been in larger multifamily structures. From 2018 through 2022 building permits were issued for 1,454 multifamily units in buildings of five or more units, with the remainder being for single-family units. In addition, as of December 2022 there were 3,645 additional planned and proposed housing units in Menlo Park, as reported in the Housing Element. Over 90 percent of these planned and proposed units are in large multifamily projects of 100 or more units. Seventeen percent of the units are designated as below market rate, with four percent being very low income, eight percent low income, and five percent moderate income.

CoStar, a real estate data vendor tracking rental residential and other property types, shows six multifamily rental projects in Menlo Park built in 2016 or thereafter. Vacancies are currently high in these projects at 17.8 percent as of the fourth quarter of 2022. This may reflect the initial lease-up of newly constructed units; rates are considerably lower and in the range of a stabilized market in Redwood City, at only 5.7 percent. However, the region also shows a high vacancy rate of 12.5 percent, indicating a potentially soft rental market regionally for recently constructed apartments.

Despite the high vacancy rates, CoStar reports that average asking apartment rents across all apartment sizes have increased slightly year-over-year in Menlo Park and the region to $3,948 and $3,626, respectively, at the end of 2022, and have remained stable in Redwood City at $3,670, a negligible drop from end-of-year 2021. These rent trends point to a continuing strong rental housing market for new units in Menlo Park and nearby communities.

For a period from January 2020 through January 2023, the overall median sale price for condominium and townhome sales was $1.45 million, with medians ranging from $770,000 for one-bedroom units to $2.05 million for four-bedroom units. These housing prices indicate strong demand for ownership housing in Menlo Park and nearby communities.

Net Impact on Housing Supply and Demand by Income Level

To serve as the basis for the impact assessment, this section estimates the net impacts of the Proposed Project on housing supply and demand, by income level. This estimate steps through estimations of the following components:

- Change in housing supply by income level
- Net direct change in worker housing demand
- Indirect and induced job impacts and related regional worker housing demand
- Net effect on housing demand/supply

The Proposed Project provides jobs at a variety of income levels and will thus generate housing demand at a variety of income levels and household sizes. These households will then spend money locally and regionally, creating additional demand for workers in various industries at various earnings levels, which will in turn create additional demand for housing across a range of costs. In addition, the project occupants will purchase goods and services from other local and regional businesses, who will in turn purchase other local goods and services. The workers for these secondary industries will also generate additional impacts through their household expenditures. In economic terminology, the impacts generated by the purchases of goods and services by the project's businesses are *indirect* impacts. The additional jobs generated by expenditures by the project's worker households, as well as by the households of workers in the indirect industries are *induced* impacts.

Since no existing housing is being removed and no new housing is being constructed as part of the Proposed Project, the Project itself would not result in a change to the local or regional housing supply. The Proposed Project will create a number of new jobs, focused on life sciences. However, there will be a reduction in jobs due to removal of the existing commercial and industrial buildings onsite.

Based on the Initial Study for the Project's environmental review,

> At full buildout, it is anticipated that approximately 570 employees would occupy the Project site, assuming one employee for each 400 square feet of building space.

Currently, several of the spaces in the existing buildings are vacant due to the Proposed Project. For the purposes of this analysis, the vacant spaces are assumed to be occupied at standard employment densities for the R&D and mini-warehouse uses which they were previously used for and would return to in the absence of the Project. There were two remaining tenants still in place at the time of analysis. For the purposes of this housing needs assessment and based on information provided by tenants and otherwise using standard employment density factors, the existing space on the project site is assumed to have a total of 81 workers. As a result, the net change in employment due to the Project is estimated at 489 jobs.

To estimate the income distribution of the existing and new workers, BAE developed a matrix of worker household income ranges by industry using data from the Public Use Microdata Sample (PUMS) data from the American Community Survey (ACS), based on the Two-County Region (San Mateo and Santa Clara County) to estimate the distribution of household incomes of existing workers. The 81 direct onsite jobs lost are estimated to result in a decline of 44 households. Of those 44, 16 would be extremely low to moderate income households. The loss of existing direct jobs at the Project site could also lead to *indirect* job losses in the supply chain for the impacted businesses, and to *induced* job losses due to the decline in spending in the region by the direct workers no longer employed in the area. Overall, the offsite indirect

and induced job losses in the two-county region resulting from removal of the existing businesses from the project site are estimated at 41 total jobs. Twenty-three households can be attributed to the estimated 41 indirect and induced jobs lost due to the redevelopment of the Proposed Project site. Of the 23 households, 13 would be households with extremely low to moderate incomes.

While the removal of existing businesses from the Proposed Project will result in the loss of some jobs as the businesses currently onsite are displaced, the completed Project will provide employment resulting in a net gain in employment. As noted above, the site is projected to hold approximately 570 jobs at life science-related businesses responsible for 528 new households. Over two-thirds of these 570 workers and their households are estimated to have above-moderate incomes – likely due to many of these workers being well-educated and highly trained in their occupations. Approximately one-fifth of the worker households are estimated to be extremely low, very low, and low income per HCD/HUD criteria.

The job impacts of the Proposed Project will result in an estimated net demand for approximately 461 additional housing units for the households of 849 workers; the Proposed Project itself provides no addition to the housing inventory. Approximately sixty percent the demand will be for units for households with above moderate incomes; six percent from extremely low income households; eight percent from very low income households; 16 percent from low income households; and ten percent from households of moderate incomes.

Table 1: Net Housing Demand

	Estimated Household Income as a Percent of AMI					
Change in Number of Households	**Extremely Low**	**Very Low**	**Low**	**Moderate**	**Above Moderate**	**Total**
Due to Closure of Existing Businesses	-6	-7	-10	-6	-39	-67
New Employment	33	44	84	50	317	528
Net New Housing Demand	27	38	74	44	278	461
as % of Net New Demand	6%	8%	16%	10%	60%	100%

Source: BAE, based on sources as cited in tables below.

It should be noted that this is a measure of regional demand. None of these worker households would necessarily live in the city or East Palo Alto, and with the exception of those directly employed at the Project location, these workers would not necessarily be employed in Menlo Park or East Palo Alto.

Menlo Park and East Palo Alto Share of Housing Impacts

One of the goals of the Housing Needs Analysis is to estimate the direct, indirect, and induced housing needs from the Project in order to satisfy the requirements of the settlement agreement between the Cities of Menlo Park and East Palo Alto.

This section provides an estimate of the share of new direct, indirect, and induced housing demand related to the Proposed Project that would occur in Menlo Park and East Palo Alto based in large part on existing commute patterns.

Data from the American Community Survey indicate that 14.2 percent of persons working in Menlo Park also live in Menlo Park. Similar data directly from ACS are not available for East Palo Alto residents working in Menlo Park; however, 2012-2016 ACS data processed for the Census Transportation Planning Package[2] (CTPP) estimate that 3.0 percent of Menlo Park workers live in East Palo Alto.

The indirect and induced jobs under consideration could be at workplaces anywhere in the two-county region. Based on existing regional commute patterns, approximately 1.0 percent of these workers would live in Menlo Park and 0.9 percent in East Palo Alto.

The analysis here provides two scenarios, based on existing commute patterns as described above, estimating overall housing demand generated by the Proposed Project within each city. There are two variations of the "baseline" scenario. In both variations, workers at the Proposed Project are assumed to choose housing in Menlo Park and East Palo Alto based on recent commute patterns where 14.2 percent of the worker households would live in Menlo Park and 3.0 percent would live in East Palo Alto. The low estimate version of the baseline assumes that the workers in the indirect and induced jobs, which could be located anywhere in the two-county region, would choose to live in one or the other of the two cities based on recent commute patters, with 1.0 percent of these indirect and induced worker households living in Menlo Park and 0.9 percent living in East Palo Alto. The high estimate version of the baseline assumes that the indirect and induced worker households would live in Menlo Park and East Palo Alto at the same rate as the worker households at the Proposed Project itself (14.2 percent and 3.0 percent, respectively).

Assuming a baseline scenario based on recent commute patterns for Menlo Park and East Palo Alto, approximately 45 of the net new households of workers at the Proposed Project site would reside in Menlo Park and East Palo Alto. In the low estimate, four of the indirect and induced worker households would also live in Menlo Park or East Palo Alto, for a total of 49 households residing in the two cities. In the high estimate, 34 of the indirect and induced

[2] U.S. Census Bureau, American Community Survey 2012-2016 five-year estimates. Special Tabulation: Census Transportation Planning. This is the most recent data available.

worker households would live in the two cities, for a total of 79 worker households residing in the two cities. For both the low and the high estimates, most of these worker households would be located in Menlo Park itself.

An additional scenario is analyzed in this study, assuming 20 percent additional worker households above the baseline assumptions would choose to live in Menlo Park or East Palo Alto; 54 of the net new households of the Project's onsite workers would live in Menlo Park or East Palo Alto. Under the low estimate for this scenario, five of the indirect and induced households would live in the two cities, for a total of 58 worker households residing in Menlo Park or East Palo Alto. Under the high estimate for this scenario, 41 of the indirect and induced worker households would live in the two cities, with most of them residing in Menlo Park.

Based on the analysis above, the Proposed Project is estimated to general overall demand to house approximately 139 lower-income households. Approximately half of those units are for low income households, those in the 80 percent AMI income bracket. For the low baseline estimate, only 15 of the lower-income units would be attributed to Menlo Park and East Palo Alto. For the high baseline estimate, that increases to 25 units. Assuming a 20 percent increase in the capture rate yields demand for 29 lower-income units. Finally, using a more extreme and unlikely assumption that half of the housing demand from the Project were attributed to Menlo Park and East Palo Alto, the total lower income household demand for the two cities would be approximately 69 housing units.

Analysis of Impacts on Local and Regional Housing Markets

This analysis builds off of the information considered above to evaluate the potential impacts that the Project could have on the local and regional housing supply, jobs-housing balance, and displacement pressures. The Project, assuming its estimated net impact of approximately 490 direct jobs, results in a minimal impact on overall employment in Menlo Park and regionally. The net change in onsite jobs would only represent an increase of 1.2 percent in Menlo Park jobs and 0.03 percent for the region. Inclusive of the indirect and induced jobs, which could occur anywhere in the Two-County Region, the regional change in employment would be an increase of only 0.06 percent. Given these small numbers relative to the total jobs in the city and the region, the Project is likely to have a negligible impact on the regional housing market, jobs-housing balance, and displacement pressures.

The project's construction results in no change in the city or regional housing supply, as the site contains no housing units currently or as planned. Based on Menlo Park's Housing Element, there are 3,645 housing units in the planning pipeline in the city. While it is likely that many of the new indirect and induced jobs associated with the project would actually be elsewhere in the two-county region, the assumed expansion of the housing supply just in Menlo Park, while critical to addressing regional housing challenges, could absorb demand

from workers attributable to the Proposed Project, especially those seeking housing in Menlo Park, even without accounting for units made available through turnover of existing units.

Most of the households associated with the Proposed Project would be above moderate income households. Depending on the scenario considered (baseline, 20 percent higher, or 50 percent higher), the Project-generated demand would absorb from five percent and 24 percent of Menlo Park's planned very low income supply and from three percent to 13 percent of the planned low income supply.

In addition to proposed projects currently in the development pipeline, Menlo Park's current Housing Element Update has designated numerous opportunity sites for housing development to meet or exceed the city's Regional Housing Needs Allocation (RHNA) across all income levels. In addition to the housing units in the pipeline, the sites inventory provides locations for 1,514 additional very low and low-income units, and 571 moderate-income units. This is a surplus of 809 very low and low-income units and 298 moderate income units over and above the city's RHNA goals. The number of above moderate income units currently in the pipeline far exceeds the RHNA number.

The Proposed Project overall is assumed to generate housing demand in Menlo Park and East Palo Alto as some workers seek housing locally. The project by itself would minimally increase the imbalance between jobs and housing in Menlo Park but would still be consistent with the expectation and scope of what was anticipated in Plan Bay Area and the ConnectMenlo General Plan. However, for above moderate income households, the city has far more units in the pipeline than the number of households associated with the Project seeking housing locally, as even the total regional demand from the project is for only 278 above moderate income units. For households at lower income levels, the local demand for housing units from the Project is less than the number of lower income units in the pipeline. Overall, the net increase of 489 direct on-site jobs represents an increase of approximately one percent over the current city employment base, only 0.25 percent of the projected 2050 employment in South San Mateo County and only 0.02 percent of the projected 2050 employment in the two-county region, so the net change in the jobs housing balance directly attributable to the Project is negligible. Additionally, the Proposed Project will provide funds to Menlo Park's Below-Market Rate (BMR) Housing Program to be used in developing additional deed-restricted affordable housing.

Displacement and gentrification are key issues locally and throughout the region and addressing the cumulative impact of the Project and other projects that generate new housing demand will be essential to addressing cumulative housing needs and mitigating displacement pressures over the long term. However, given the limited potential impacts of the Project on the local and regional housing supply and jobs-housing balance, and consistency with regional and local planning documents, the Project is not likely to have a perceptible impact on local and regional displacement pressures. Furthermore, the Proposed

Project itself would not displace any existing housing serving any household income level and is in a non-residential area largely consisting of industrial uses. Due to the regional nature of the housing market, the Project is unlikely to have any measurable impact on displacement pressures in Menlo Park and East Palo Alto.

INTRODUCTION

BAE Urban Economics, Inc. (BAE) has been retained to prepare a housing needs assessment for the proposed 1005 O'Brien Drive and 1320 Willow Road Research & Development Project (the "Proposed Project"), which is currently slated to include a new five-story research and development (R&D) building of 154,581 square feet, a new four-story R&D building of 73,617 square feet, and a seven-level garage with 6.5 floors of parking providing 504 parking spaces. In addition, the Project would include approximately 59,344 square feet of open space of which approximately 31,535 square feet would be available and accessible to the public, and the Project would pay the City's community amenity in-lieu fee to allow the Project to attain the bonus level height and increased floor area ratio allowed by the Municipal Code. The existing single-story warehouse/R&D structures that currently occupy the site would be demolished. The project would be completed in two phases; the first phase would remove the existing structures at 985 and 1005 O'Brien Drive as well as a portion of the 1320 Willow Road structure, to be replaced by the five-story R&D building fronting on O'Brien and the first four floors of the parking structure to the rear. The second phase would remove the remainder of the 1320 Willow Road structure to be replaced by the four-story R&D building and an additional two levels in the parking structure. Although Phase 2 is expected to begin upon completion of Phase 1, there is a potential for it to be delayed up to 15 years. The Project is evaluated in this housing needs assessment at full buildout. Overall, the proposal will result in 228,198 square feet of R&D space, and 504 parking spaces in the garage and 23 surface parking spaces.

The analysis here is provided to satisfy the terms of the 2017 settlement agreement between the City of Menlo Park and the City of East Palo Alto, which states:

> *"When the preparation of an EIR is required pursuant to this Agreement, concurrent with the preparation of the EIR, Menlo Park or East Palo Alto, whichever is the lead agency for the Development Project, will conduct a Housing Needs Assessment ("HNA"). The scope of the HNA will, to the extent possible, include an analysis of the multiplier effect for indirect and induced employment by that Development Project and its relationship to the regional housing market and displacement."*

To accomplish this, the analysis includes background analysis of the local and regional housing market context; identification of the proposed project's net impact on housing supply and demand across income levels; estimation of the impacts felt within Menlo Park and East Palo Alto; and an evaluation of the broader impacts on the balance of supply and demand within the regional housing market. The latter includes a qualitative assessment of the potential for displacement of lower-income residents within the local area.

BACKGROUND CONDITIONS

To set the stage for the impact analysis, BAE has collected and analyzed background data on demographic and housing market characteristics in Menlo Park and the wider region. The analysis covers both Menlo Park and the San Mateo County/Santa Clara County region of the Bay Area, and includes information on basic population and household trends, household income levels, housing cost burden, overcrowding, renter and owner occupancy rates, residential rents and sale prices, typical residential turnover rates, recent residential construction activity, recent employment growth, projected household growth, and projected employment growth, as well as on the number and type of units in the residential development pipeline in Menlo Park.

Demographic and Economic Trends

The following analysis looks at Menlo Park in the context of a larger region which provides workers and potential residents for Menlo Park at its location in the core of the Bay Area's high-tech economy. Since the city sits at the boundary of two counties, the larger region is defined as consisting of both San Mateo County and Santa Clara County, i.e., the "Two-County Region."

Data sources used in this analysis include the California Department of Finance, the U.S. Census Bureau, American Community Survey, and *Plan Bay Area 2050* from the Association of Bay Area Governments & Metropolitan Transportation Commission.

Population and Households

Menlo Park is currently home to approximately 33,000 residents and 13,000 households (as of 2022, most recent data available at the time of analysis). This represents an increase since 2010 of 3.1 percent in population and 3.5 percent in households (see Table 2). The average household size in the city remained at 2.53 persons in 2022. The Two-County Region has seen a higher rate of growth since 2010s, with a 2022 population slightly greater than 2.3 million, in 934,000 households. Household size has decreased slightly in the region from 2.85 persons in 2010 to 2.78 persons in 2022.

Table 2: Population and Housing Trends, 2010-2022

Population	2010	2022	% Change 2000-2022
Menlo Park	32,026	33,034	3.1%
San Mateo & Santa Clara Counties	2,500,093	2,639,445	5.6%

Households	2010	2022	% Change 2000-2022
Menlo Park	12,347	12,777	3.5%
San Mateo & Santa Clara Counties	862,041	933,989	8.3%

Average Household Size	2010	2022
Menlo Park	2.53	2.53
San Mateo & Santa Clara Counties	2.85	2.78

Sources: California Department of Finance, 2022 E-5 Report; BAE, 2023.

This growth indicates continued demand for housing in Menlo Park and the region, as also shown by long-term trends of rising rents and home prices as discussed below.

Household Income

As illustrated in Table 3, Menlo Park's household incomes are relatively high, showing affluence even relative to what is a high-income region, with a median annual household income of over almost $180,000 compared to $140,000 for the region - by comparison the statewide median household income for the same period is only $84,097. Nevertheless, there are numerous households in both the city and the region with incomes where the cost of market-rate housing would result in high housing cost burdens.

Table 3: Household Income Distribution and Median Annual Household Income

	City of Menlo Park		San Mateo and Santa Clara Counties	
Household Income	Number	Percent	Number	Percent
Less than $14,999	505	4.3%	43,528	4.8%
$15,000 to $24,999	311	2.7%	32,572	3.6%
$25,000 to $34,999	422	3.6%	33,690	3.7%
$35,000 to $49,999	407	3.5%	50,378	5.5%
$50,000 to $74,999	995	8.5%	88,208	9.7%
$75,000 to $99,999	794	6.8%	84,188	9.2%
$100,000 to $149,999	1,629	13.9%	152,233	16.7%
$150,000 and above	6,662	56.8%	426,942	46.8%
Total Households	**11,725**	**100.0%**	**911,739**	**100.0%**
Median Household Income	**$179,913**		**$140,174**	

Note:
Incomes are in 2021 dollars.

Source: U.S. Census Bureau, American Community Survey 5-Year Data (2017-2021), Tables B19001 and S1903; BAE 2023.

Tenure

Owners outnumber renters in Menlo Park, accounting for 58 percent of all households, as illustrated in Table 4 below. This distribution is extremely similar to that of the two-county region. Nevertheless, there are approximately 4,900 renter-occupied housing units in the city, indicating a substantial local market for both owner and renter-occupied homes.

Table 4: Distribution of Homeowners by Tenure Type

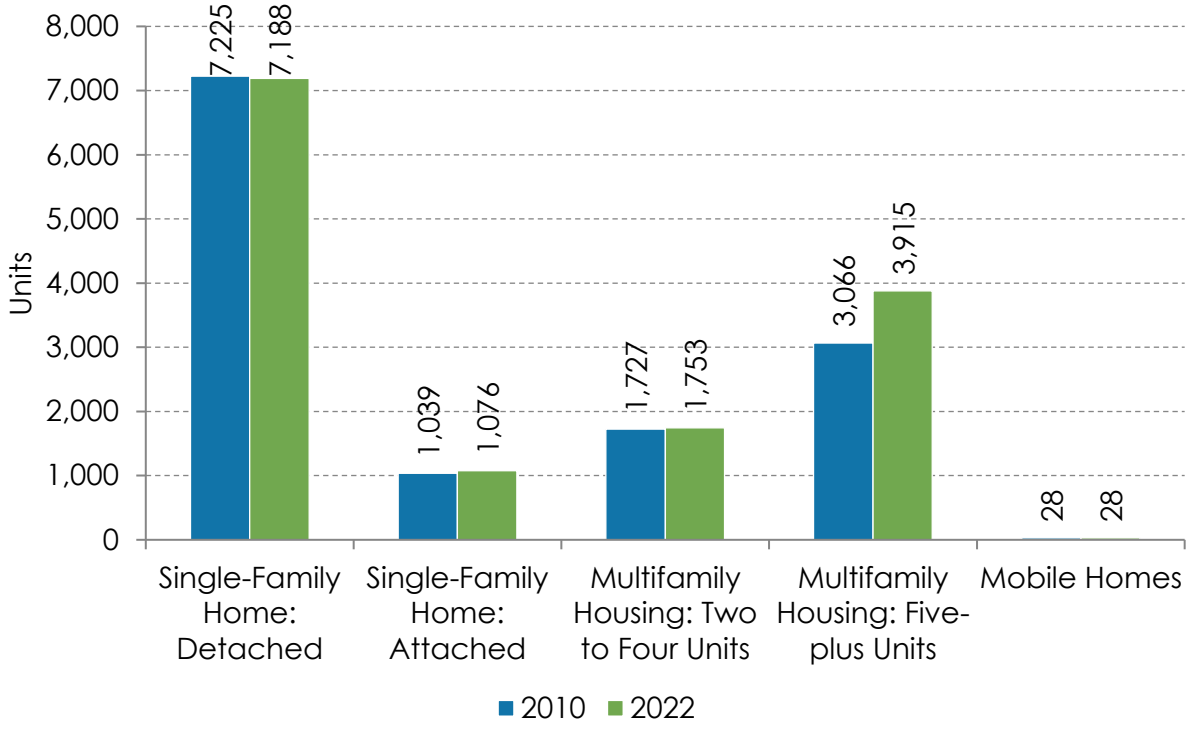
	City of Menlo Park		San Mateo and Santa Clara Counties	
Tenure Type	**Number**	**Percent**	**Number**	**Percent**
Owner	6,806	58.0%	521,385	57.2%
Renter	4,919	42.0%	390,354	42.8%
Total Occupied Households	**11,725**	**100.0%**	**911,739**	**100.0%**

Source: U.S. Census Bureau, American Community Survey 5-Year Data (2017-2021), Table B25003.

Housing Trends by Unit Type

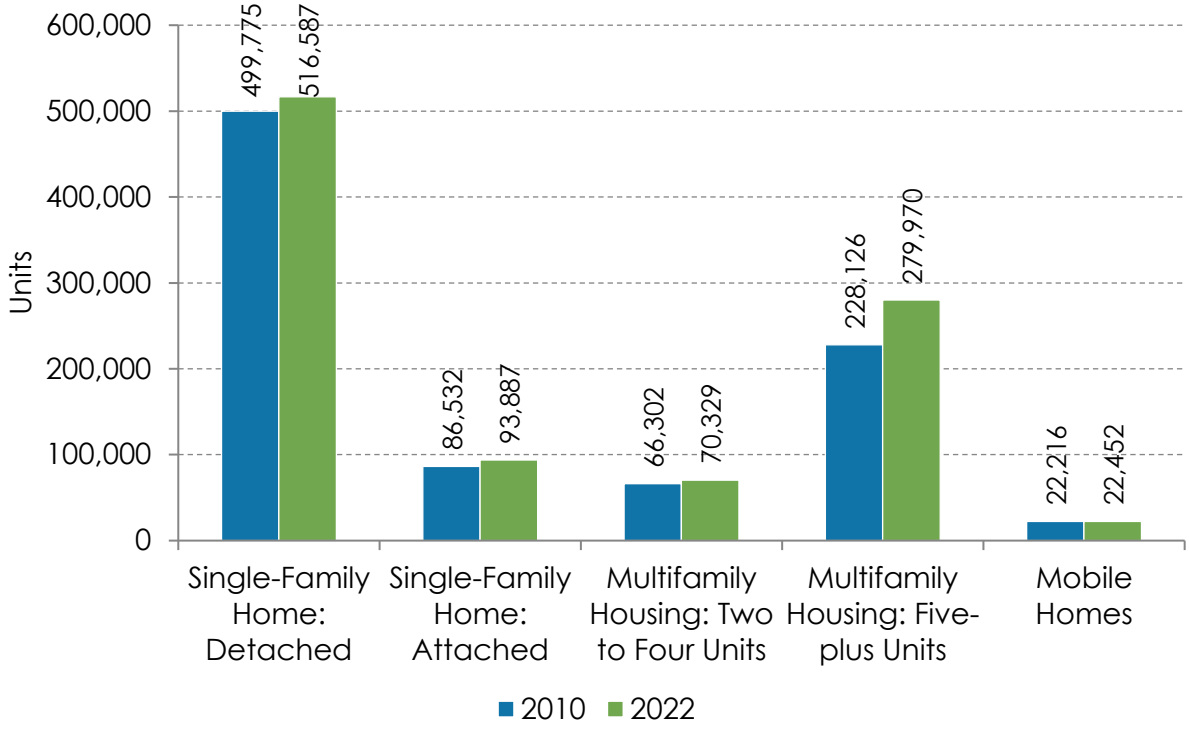
Slightly more than half of Menlo Park's housing units are single-family detached homes. However, almost all of the residential growth in the city and the region since 2010 has been in multifamily units in buildings of five or more units (see Figure 1 and Figure 2). This indicates an increase in housing density in both Menlo Park and the Region.

Figure 1: Menlo Park Housing Units, 2010 and 2022



Source: California Department of Finance E-5 Report, 2022.

Figure 2: San Mateo and Santa Clara Counties Housing Units, 2010 and 2022



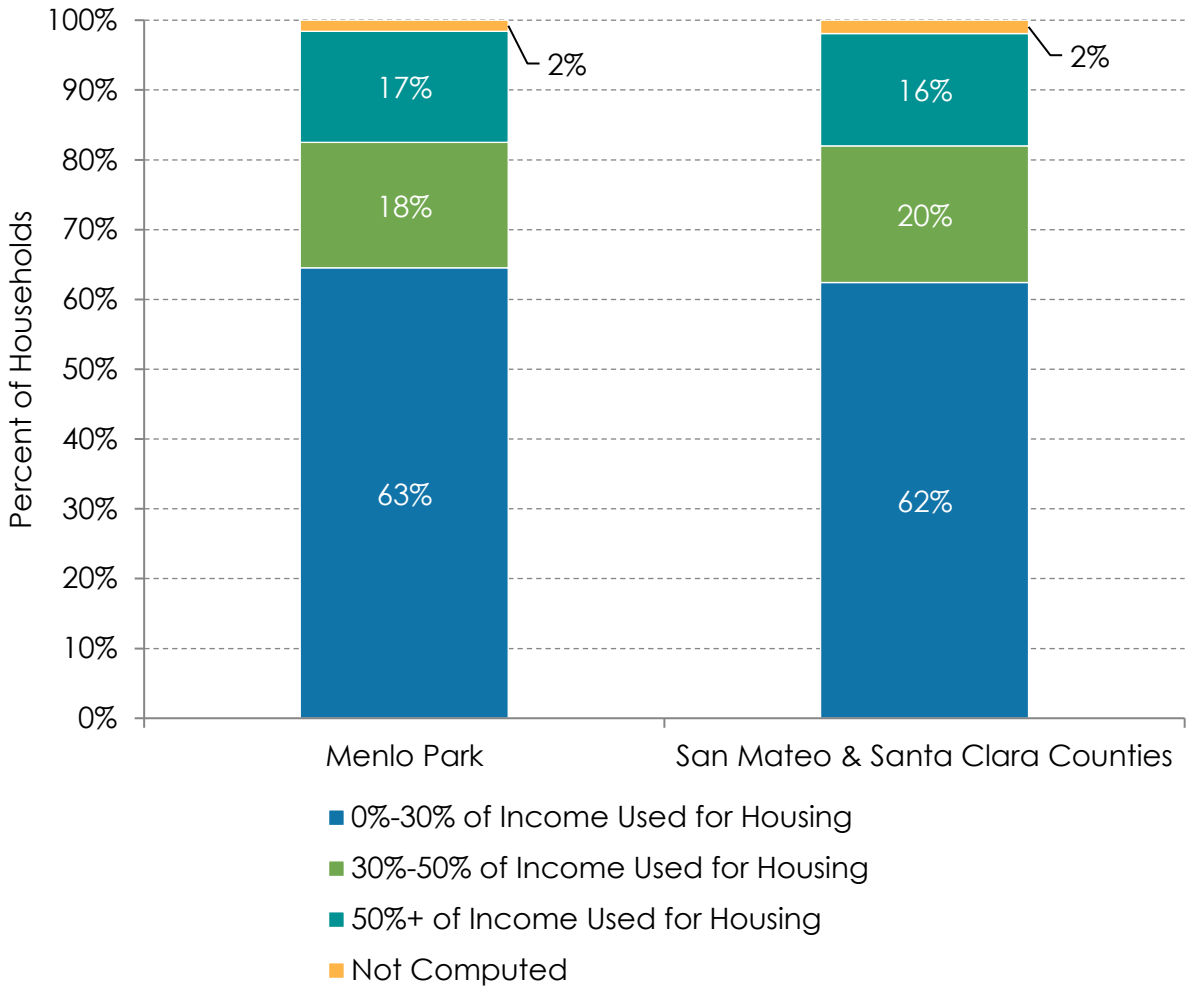
Source: California Department of Finance E-5 Report, 2022.

Cost Burden

Housing cost burden is the ratio of housing costs to household income; for renters, housing cost is gross rent (contract rent plus utilities), and for owners, housing cost is "select monthly owner costs," which includes mortgage payment, utilities, association fees, insurance, and real estate taxes. Moderately cost-burdened households are typically defined as those whose housing costs exceed 30 percent of their income, while severely cost-burdened households are those whose housing costs are more than half of their income.

Based on 2017 to 2021 Census data, slightly less than 35 percent of Menlo Park households (4,037) report cost burdens exceeding 30 percent of income, with 17 percent (1,892) reporting severe cost burdens (see Figure 3). The region shows very similar proportions of moderate and severely cost-burdened households, indicating that over 300,000 households face excessive housing costs; this demonstrates the ongoing need for additional affordable housing in the region.

Figure 3: Housing Costs as a Percent of Household Income, Menlo Park and the Two-County Region



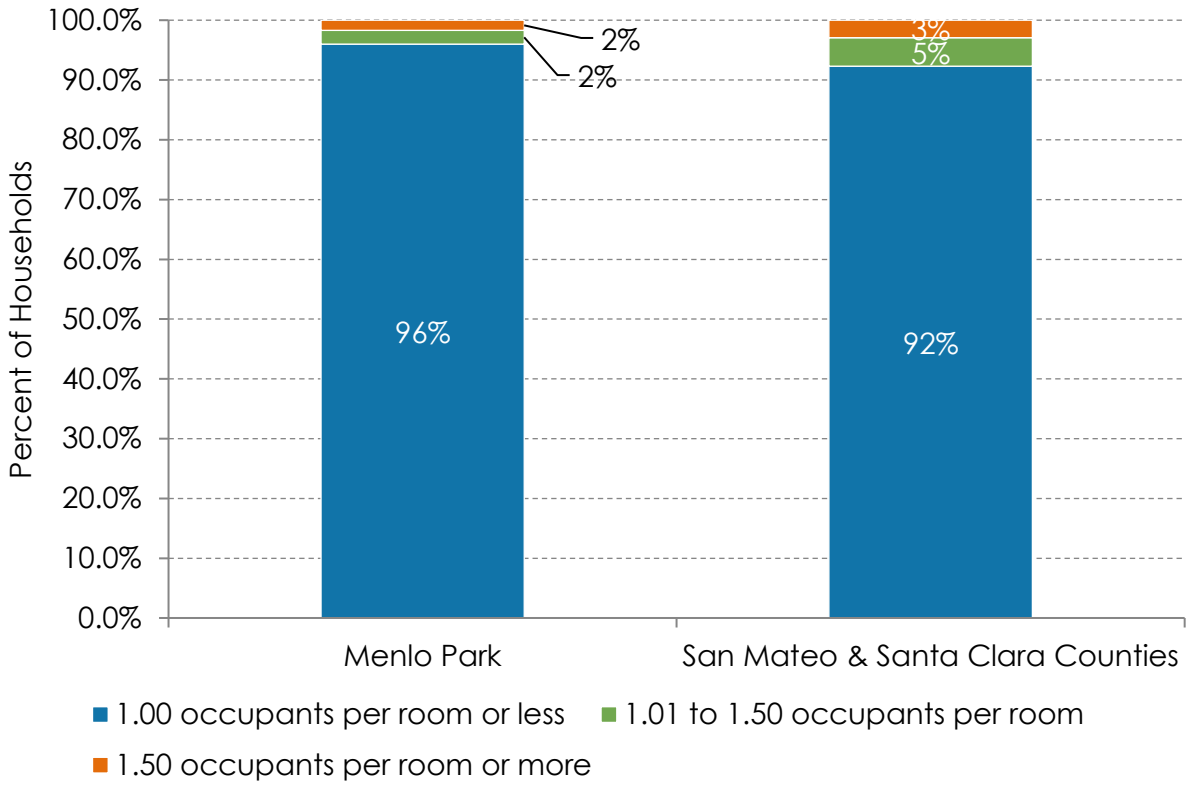
Source: U.S. Census Bureau, American Community Survey 5-Year Data (2017-2021), Table B25070, B25091.

Overcrowding

Households having difficulty finding suitable housing at affordable prices can lead to "doubling up" or other types of overcrowding as households rent or buy smaller less expensive units. The Census Bureau defines an overcrowded unit as one occupied by more than one person per room (excluding bathrooms and kitchens), and units with more than 1.5 persons per room are considered severely overcrowded.

As illustrated in Figure 4, Menlo Park has few households living with overcrowded conditions. Only four percent of households have more than one person per room, and only two percent of households are severely overcrowded. Regionally, overcrowding is more of an issue, with eight percent of households at more than one person per room, and three percent severely overcrowded.

Figure 4: Persons per Room, Menlo Park and the Two-County Region



Source: U.S. Census Bureau, American Community Survey 5-Year Data (2017-2021), Table B25014.

Recent Employment Growth

Menlo Park has seen significant job growth in recent years, far exceeding population growth. Between the 2007 2011 period and the 2017-2021 period, employment in the city grew by over 40 percent, from approximately 29,900 to 42,100, as the tech economy boomed. The rate of growth exceeds the two-county region, even as the region showed an increase of 19 percent, or 246,000 jobs, over the same period. The local and regional growth have created substantial pressure on housing markets in Menlo Park and surrounding communities.

Table 5: Employment Growth, 2011-2021

Year	Menlo Park	Two-County Region
2007-2011	29,929	1,282,712
2017-2021	42,173	1,528,217
Percent Change, 2011-2021	41%	19%

Sources: U.S. Census Bureau, American Community Survey, 2017-2021 five-year sample data, Table B08604; BAE, 2023.

Jobs Housing Balance

Menlo Park has far more jobs than employed residents; based on American Community Survey data, there are 2.57 jobs in the city for every working resident (see Table 6). This is higher than the nearby cities of Palo Alto (2.44 jobs per working resident), Mountain View (1.90 jobs per working resident), Redwood City (1.28 jobs per working resident), or especially East Palo Alto (0.40 jobs per working resident). The two-county region is relatively balanced but still imports workers, with 1.12 jobs per working resident. As a result, Menlo Park has high net in-commuting, and the region and some nearby cities also import workers. While the Proposed Project could increase those imbalances, the net new jobs onsite, as estimated later in this report, would only represent an increase of 1.2 percent in Menlo Park jobs and 0.03 percent for the region.

Table 6: Jobs to Working Residents, 2017-2021

	Menlo Park	Palo Alto	Mountain View	Redwood City	East Palo Alto	Two-County Region
Total Persons Working in City	42,173	81,204	89,500	58,457	6,302	1,528,217
Working Residents	16,401	33,343	47,106	45,564	15,708	1,358,968
Ratio, Jobs to Working Residents	2.57	2.44	1.90	1.28	0.40	1.12

Note: Estimates may vary from the prior table due to different sources and data collection methods.

Sources: U.S. Census Bureau, American Community Survey, 2017-2021 five-year sample data, Tables B08008 and B08604; BAE, 2023.

Household and Employment Projections

The Metropolitan Transportation (MTC) and Association of Bay Area Governments (ABAG) released Plan Bay Area 2050 in October 2021. This study includes the most recent household and employment estimates for 2050, from a 2015 baseline. The projections are only available for counties and "superdistricts," which are subareas of the nine counties in the ABAG region, with no estimates specific to Menlo Park.

Plan Bay Area projects that South San Mateo County, which includes Menlo Park, will gain 26,000 additional households and 44,000 additional jobs between 2015 and 2050. The Two-County Region is projected to see an increase of 581,000 households and 625,000 jobs over the same period. As a result, there may be continued demand for new workspaces and housing over the next few decades both locally in Menlo Park and regionally. It should be noted that these projections use a baseline that is pre-2020 Census and pre-pandemic, so recent changes are not accounted for in the estimates.

Table 7: Household and Employment Projections, 2050

South San Mateo County (a)	2015	2050	Annual Growth
Household	80,000	106,000	0.8%
Employment	152,000	196,000	0.7%
San Mateo and Santa Clara Counties	**2015**	**2050**	**Annual Growth**
Household	888,000	1,469,000	1.4%
Employment	1,492,000	2,117,000	1.0%

(a) Atherton, Menlo Park, Redwood City, Woodside, East Palo Alto, Portola Valley, San Carlos are the primary jurisdictions in the South San Mateo Superdistrict.

Source: "Plan Bay Area 2050: Forecasting and Modeling Report," Association of Bay Area Governments & Metropolitan Transportation Commission, October 2021.

Real Estate Market Conditions

This section provides information on housing market conditions in Menlo Park. This includes discussion of recent and proposed residential projects, current rent and vacancy trends, and prices for condominiums and townhomes. While the Project itself is non-residential, understanding housing trends is key to completing this housing needs assessment.

Recent and Planned Residential Construction in Menlo Park

Most of the recent residential construction activity in the city has been in larger multifamily structures. As shown in Table 8, from 2018 through 2022 building permits were issued for 1,454 multifamily units in buildings of five or more units, with the remaining 195 being for single-family units It should be noted that Issuance of a permit usually leads to actual construction, but not always. Note that the data does not include demolitions. For instance, a single-family permit could represent the teardown and replacement of an existing home so the actual increase in units could be less than the numbers shown here. Over half of the total permits were issued in 2022, for 776 multifamily units.

Table 8: Residential Construction Activity, City of Menlo Park, 2018-2022

Building Permits by	2018		2019		2020		2021		2022	
Type of Structure	**#**	**%**	**#**	**%**	**#**	**%**	**#**	**%**	**#**	**%**
Single-Family Units	56	27.6%	49	20.0%	12	100.0%	33	19.1%	45	5.5%
Multifamily 2 units	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Multifamily 3-4 units	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Multifamily 5+ units	147	72.4%	196	80.0%	0	0.0%	140	80.9%	776	94.5%
Total Permitted Units	**203**	**100.0%**	**245**	**100.0%**	**12**	**100.0%**	**173**	**100.0%**	**821**	**100.0%**

Note: 2022 results are preliminary.

Sources: U.S. Department of Housing and Urban Development State of the Cities Data System (SCODS); BAE, 2023.

In addition, as of December 2022 there were 3,645 additional planned and proposed housing units in Menlo Park, as reported in the Housing Element and shown in Table 9. Over 90

percent of these planned and proposed units are in large multifamily projects of 100 or more units. Seventeen percent of the units are designated as below market rate, with four percent being very low income, eight percent low income, and five percent moderate income.

Table 9: Housing Units in Pipeline Projects as of December 2022

	# of Units	% of Units
Total Below Market Rate	**607**	**17%**
Very Low Income	133	4%
Low Income	277	8%
Moderate Income	197	5%
Market Rate	**3,038**	**83%**
Total Net New	**3,645**	**100%**

Source: Menlo Park 6th Cycle Housing Element: 2023-2031, adopted January 31, 2023, Table 7-5.

Multifamily Market Overview

CoStar, a real estate data vendor tracking rental residential and other property types, shows six multifamily rental projects in Menlo Park built in 2016 or thereafter (see Table 10), containing a total of 962 units. Vacancies are currently high in these projects at 17.8 percent as of the fourth quarter of 2022. This may reflect the initial lease-up of newly constructed units; rates are considerably lower and in the range of a stabilized market in Redwood City, at only 5.7 percent. However, the region also shows a high vacancy rate of 12.5 percent, indicating a potentially soft rental market regionally for recently constructed apartments.

Despite the high vacancy rates, average asking rents have increased slightly year-over-year in Menlo Park and the region to $3,948 and $3,626, respectively, at the end of 2022, and have remained stable in Redwood City at $3,670, a negligible drop from end-of-year 2021. These rent trends point to a continuing strong rental housing market for new units in Menlo Park and nearby communities.

Table 10: Multifamily Rental Summary for Recently Built Projects, 3rd Quarter 2021

Multifamily Summary, Market-Rate (a)	City of Menlo Park	City of Redwood City	Two-County Region
Inventory, Q4 2022 (bldgs) (b)	**6**	**9**	**145**
Inventory, Q4 2022 (units) (b)	**962**	**1,948**	**28,498**
Occupied Units	791	1,673	24,785
Vacant Units	171	100	3,538
Vacancy Rate	17.8%	5.7%	12.5%
Average Inventory Size, Q4 2022 (sf)	**910**	**886**	**914**
Average Asking Rents			
Average Asking Rent, Q4 2021	$3,795	$3,684	$3,564
Average Asking Rent, Q4 2022	$3,948	$3,670	$3,626
% Change Q4 2021 - Q4 2022	4.0%	-0.4%	1.7%
Average Asking Rents psf			
Average Asking Rent psf, Q4 2021	$4.17	$4.18	$3.95
Average Asking Rent psf, Q4 2022	$4.34	$4.16	$4.02
% Change Q4 2021 - Q4 2022	4.1%	-0.5%	1.8%

Notes:
(a) Market-rate units represent those that are in market-rate and market-rate/affordable-mix properties. Affordable units in 100 percent affordable-rent properties were excluded.
(b) Inventory reflects properties built in 2016 or later.

Sources: CoStar Group, 2023; BAE, 2023.

Home Sales Prices

To complete the overview of housing market conditions in Menlo Park, the following analysis discusses for sale townhome units. Table 11 below provides information on condominium and townhome sales in the local market. A period back to January 2020 is considered in order to provide a sufficient sampling of units for each size (by number of bedrooms). The overall median sale price for these two unit types over the period was $1.45 million, with medians ranging from $770,000 for one-bedroom units to $2.05 million for four-bedroom units.[3] These housing prices indicate strong demand for ownership housing in Menlo Park and nearby communities.

[3] Note the number of qualifying units of some sizes is very limited.

Table 11: Home Sale Prices for Condominiums and Townhomes in Menlo Park and Redwood City, January 2020 to January 2023

Sale Price Range	1 BR	2 BR	3 BR	4+ BR	Total	Percent of Total
Less than $1,250,000	13	55	3	0	71	**31.7%**
$1,250,000-$1,499,999	0	27	17	0	44	**19.6%**
$1,500,000-$1,749,999	0	18	15	2	35	**15.6%**
$1,750,000 or more	0	23	44	7	74	**33.0%**
Total Units Sold	**13**	**123**	**79**	**9**	**224**	**100.0%**
Percent of Total						
Median Sale Price	**$770,000**	**$1,299,000**	**$1,800,000**	**$2,050,000**	**$1,450,500**	
Average Sale Price	**$786,615**	**$1,356,554**	**$1,818,367**	**$2,100,222**	**$1,515,479**	
Average Unit Size (SF)	**775**	**1,370**	**1,808**	**2,024**	**1,516**	
Median Price per SF	**$981**	**$971**	**$985**	**$985**	**$977**	
Average Price per SF	**$1,022**	**$997**	**$1,018**	**$1,037**	**$1,007**	

Notes:
Records include condominiums and townhomes built since 2010.

Sources: Redfin, 2023; BAE, 2023.

NET IMPACT ON HOUSING SUPPLY AND DEMAND BY INCOME LEVEL

To serve as the basis for the impact assessment, this section estimates the net impacts of the Proposed Project on housing supply and demand, by income level. This estimate steps through estimations of the following components:

- Change in housing supply by income level
- Net direct change in worker housing demand
- Indirect and induced job impacts and related regional worker housing demand
- Net effect on housing demand/supply

Since the Proposed Project provides jobs at a variety of income levels, the project will generate housing demand at a variety of income levels and household sizes. These households will then spend money locally and regionally, creating additional demand for workers in various industries at various earnings levels, which will in turn create additional demand for housing across a range of costs. In addition, the project businesses will purchase goods and services from other local and regional businesses, who will in turn purchase other local goods and services. The workers for these secondary industries will also generate additional impacts through their household expenditures.

In economic terminology, the impacts generated by the purchases of goods and services by the project's occupants are *indirect* impacts. The additional jobs generated by the project's worker households, as well as the households of workers in the indirect industries are *induced* impacts. To estimate these impacts, the analysis here uses the IMPLAN input-output model, which provides estimates of the number of new jobs created in the Two-County Region to serve the new project-and its related households. IMPLAN is a widely recognized and utilized model and is described in detail in Appendix A.

Change in Housing Supply due to Proposed Project

The Introduction above provides a description of the Proposed Project. Since no existing housing is being removed and no new housing is being constructed as part of the Proposed Project, the project itself would not result in a change to the local or regional housing supply.

Net Direct Change in Housing Demand from Workers on Proposed Project Site

The Proposed Project will create a number of new jobs, focused on life sciences. However, there will be a reduction in jobs due to removal of the existing commercial and industrial buildings onsite.

Based on the Initial Study for the Project's environmental review,

> At full buildout, it is anticipated that approximately 570 employees would occupy the Project site, assuming one employee for each 400 square feet of building space.

Currently, several of the spaces in the existing building appear to be vacant. Based on site visits by the consultant team, there are two remaining tenants in place, as shown in Table 12. These businesses are estimated to have approximately 54 workers, based on standard employment density factors or self-reporting by the tenant. For the purposes of this analysis, the vacant spaces are also assumed to be occupied at standard employment densities for R&D and mini-warehouse space, for an assumed total of 81 workers in the existing space at the project site. As a result, the net change in employment due to the Project is estimated at 489 jobs.

Table 12: Existing Employment at Project Site

Existing Buildings		Square Feet	Workers	Tenant	Comments
Building 1	985 O'Brien	10,022	1	Mini-Warehouse	Assumed use at full occupancy
	985 O'Brien	10,022	25	R&D	Assumed use at full occupancy; assumes 400 square feet per worker (R&D)
Building 2	1001 O'Brien	20,542	51	Cyngn	Autonomous vehicles for indstrustrial uses; assume 400 square feet per worker (R&D)
Building 3	1320 Willow Rd. A	26,013	3	WineBank	Wine storage facility with sales and tasting room; employment self-reported
	1320 Willow Rd. B	24,032	1	Mini-Warehouse	Assumed use at full occupancy
Total Workers			**81**		

Sources; Dudek; WineBank; City of Menlo Park; BAE, 2024.

Existing Jobs and Related Worker Households

Based on various sources, Table 13 shows these existing jobs allocated by type of business and household income, as well as showing an estimate of the number of households by income level associated with those jobs.

These workers are assumed to be in a range of earning and household income categories, thus likely to be occupying a range of housing types of varying values. To estimate the income distribution of the existing and new workers, BAE developed a matrix of worker household income ranges by industry using the most recent Public Use Microdata Sample (PUMS) data from the American Community Survey (ACS). This data set allows for detailed cross-tabulations not available through the published ACS data, using the standard income limits by household size as published by the California Department of Housing and Community

Development. The analysis here uses PUMS data for the Two-County Region (San Mateo and Santa Clara County) to estimate the distribution of household incomes of existing workers by industry and the estimated income distribution by percentage is shown in Table 13. The estimated number of direct jobs lost by income category and the resulting estimated decline of 44 households is also shown. Of those 44, 16 would be extremely low to moderate income households.

Table 13: Project-Only (Direct) Existing Employment Loss by Income Level

			Estimated Household Income as a Percent of AMI				
Census NAICS Code	**Industry**	**Number of Workers**	**Extremely Low**	**Very Low**	**Low**	**Moderate**	**Above Moderate**
336M	Motor vehicles and motor vehicle equipment manufacturing	51	6.6%	6.2%	9.6%	8.5%	69.1%
4453	Beer, wine, and liquor stores	3	10.9%	30.3%	18.1%	9.4%	31.3%
Multiple	Research and Development (R&D)	25	1.9%	4.2%	13.1%	9.5%	71.2%
493	Warehousing and Storage	2	8.3%	19.3%	33.8%	11.4%	27.2%
	Total Existing Jobs	**81**					

			Estimated Jobs by Percent of AMI (a)				
NAICS Code (b)	**Industry**	**Total Jobs**	**Extremely Low**	**Very Low**	**Low**	**Moderate**	**Above Moderate**
336M	Motor vehicles and motor vehicle equipment manufacturing	51	3.3	3.2	4.9	4.3	35.3
4453	Beer, wine, and liquor stores	3	0.3	0.9	0.5	0.3	0.9
Multiple	Research and Development (R&D)	25	0.5	1.1	3.3	2.4	17.8
493	Warehousing and Storage	2	0.2	0.4	0.7	0.2	0.5
	Total Existing Jobs	**81**	**4**	**6**	**9**	**7**	**55**
	Workers per Household (b)	1.84	1.36	1.63	1.84	1.87	1.91
	Number of Households	**44**	**3**	**3**	**5**	**4**	**29**

Notes:
Based on a cross tabulation of Public Use Microdata Samples (PUMS) from the 2017-2021 American Community Survey. These incomes were compared to household income limits published by the State of CA Department of Housing and Community Development (HCD) to determine the percentage of households falling into each income category. The analysis controlled for household size, to address the varying HCD income limits for each household size.
(a) Based on 2021 HCD Income Limits in order to match PUMS data vintage.
(b) Code as used by Census PUMS. May vary from standard NAICS codes.
(c) Average number of workers per worker household by income category calculated based on American Community Survey PUMS Analysis, 2017-2021.

Sources: American Community Survey, 2017-2021, including the Public Use Microdata Sample; CA Department of Housing and Community Development (HCD); BAE, 2024.

The loss of existing direct jobs at the Project site could also lead to *indirect* job losses in the supply chain for the impacted businesses, and to *induced* job losses due to the decline in spending in the region by the direct workers no longer employed in the area. IMPLAN has been used to estimate these losses of change in employment. Overall, the offsite indirect and

induced job losses in the two-county region resulting from removal of the existing businesses from the project site total 41 jobs (see Table 14).

Table 14: Indirect & Induced Employment Loss from Proposed Project by Income Level

NAICS Code	Industry	Total Jobs (b)	Estimated Jobs by Percent of AMI (a) Extremely Low	Very Low	Low	Moderate	Above Moderate
11, 21	Agriculture & Natural Resources	-0.05	-0.01	-0.01	-0.01	0.00	-0.01
23	Construction	-0.26	-0.03	-0.05	-0.07	-0.03	-0.08
31-33	Manufacturing	-1.16	-0.04	-0.07	-0.16	-0.12	-0.76
42	Wholesale Trade	-6.14	-0.32	-0.72	-1.41	-0.63	-3.06
44-45	Retail Trade	-4.94	-0.45	-0.74	-1.22	-0.52	-2.00
48-49, 22	Transportation, Warehousing, & Utilities	-2.88	-0.26	-0.50	-0.75	-0.32	-1.04
51	Information	-0.94	-0.02	-0.03	-0.08	-0.06	-0.75
52-53	Finance, Insurance, & Real Estate	-4.37	-0.18	-0.30	-0.70	-0.38	-2.81
54-55	Professional, Scientific, & Technical Services, & Mgmt of Companies	-4.77	-0.11	-0.15	-0.48	-0.40	-3.63
56	Admin, Support, & Waste Mgmt Srvcs	-3.93	-0.60	-0.81	-0.99	-0.42	-1.10
61	Educational Services	-1.04	-0.07	-0.11	-0.20	-0.13	-0.54
62	Health Care & Social Assistance	-4.50	-0.31	-0.48	-0.89	-0.51	-2.30
71-72	Leisure & Hospitality	-3.55	-0.57	-0.67	-0.93	-0.39	-0.99
81	Other Services Except Public Admin	-2.49	-0.41	-0.49	-0.62	-0.24	-0.74
Public Sector		-0.17	-0.01	-0.02	-0.04	-0.02	-0.08
	Total Jobs	**-41**	**-3**	**-5**	**-9**	**-4**	**-20**
	Workers per Households (c)	1.79	1.36	1.63	1.84	1.87	1.91
	Number of Households	**-23**	**-3**	**-3**	**-5**	**-2**	**-10**

Notes:
(a) Based on 2021 HCD Income Limits in order to match PUMS data vintage.
(b) Job estimates are the output of the IMPLAN model. Columns to right may not sum to Total Jobs due to independent rounding.
(c) Average number of workers per worker household by income category calculated based on American Community Survey PUMS Analysis, 2017-2021.

Sources: American Community Survey, 2017-2021, including the Public User Microdata Sample; CA Department of Housing and Community Development (HCD); IMPLAN; BAE, 2024.

Table 14 also shows the estimated household income distribution of these workers based on the ACS PUMS data and relies on the matrix of incomes by industry shown in Appendix B, applying that distribution to the induced and indirect jobs results in the distribution shown. The table applies the average number of workers by household income category to estimate the total number of households associated with these indirect and induced jobs. Twenty-three households can be attributed to the estimated 41 indirect and induced jobs lost due to the redevelopment of the Proposed Project site. Of the 23 households, 13 would be households with extremely low to moderate incomes.

New Jobs and Household Creation Resulting from Proposed Project

While the removal of existing businesses from the Proposed Project will result in the loss of some jobs as the businesses currently onsite are displaced, the completed Project will provide

employment resulting in a net gain in employment. As noted above, the site is projected to hold approximately 570 jobs at life science-related businesses. Based on various studies of the life sciences industry cluster, these jobs are assumed to be in the following industries, with the distribution in the Project matching the overall distribution in these sectors in the region. The Census data indicates that there are approximately 93,000 workers in the selected industries in the Two-County Region.

Table 15: Distribution by Industry of Life Science Workers in the Region

Industry	Census NAICS Code	IMPLAN Sector	Sector Description	Existing Workers (a) Number	Existing Workers (a) Percent
Agricultural chemical manufacturing	3253	170	Pesticide and other agricultural chemical manufacturing	220	0.24%
Pharmaceutical and medicine manufacturing	3254	172	Pharmaceutical preparation manufacturing	14,628	15.81%
Industrial and miscellaneous chemicals	325M	185	Other miscellaneous chemical product manufacturing	1,107	1.20%
Navigational, measuring, electromedical, and control instruments manufacturing	3345	317	Analytical laboratory instrument manufacturing	8,011	8.66%
Medical equipment and supplies manufacturing	3391	376	Surgical and medical instrument manufacturing	20,122	21.75%
Drugs, sundries, and chemical and allied products merchant wholesalers	424M	397	Wholesale - Drugs and druggists' sundries	1,743	1.88%
Architectural, engineering, and related services	5413	457	Architectural, engineering, and related services	16,997	18.37%
Scientific research and development services	5417	464	Scientific research and development services	29,691	32.09%
Total				**92,519**	**100%**

Note:
(a) Distribution of existing workers in the two-county region in the life science industries, as indicated by an analysis of the American Community Survey PUMS data from 2017-2021.

Sources: Biocom California Life Science Impact Report, 2022; California Life Sciences Sector Report, 2021; American Community Survey, 2017-2021 Public User Microdata Sample; IMPLAN; BAE, 2023.

Table 16 shows the new workers by estimated HCD income category, applying the regional distribution across the designated life science industries to the 570 workers in the Project. Over two-thirds of the workers and their households are estimated to have above-moderate incomes – likely due to many of these workers being well-educated and highly trained in their occupations. Approximately one-fifth of the worker households are estimated to be extremely low, very low, and low income per HCD/HUD criteria.

Table 16: Distribution of New Life Sciences Jobs and Households by Income Category

	Estimated Household Income as a Percent of AMI				
	Extremely Low	Very Low	Low	Moderate	Above Moderate
P:ercent of Workers by Household Income	1.9%	4.2%	13.1%	9.5%	71.3%
Number of Workers by Households Income	11	24	75	54	406
Workers per Household (a)	1.36	1.63	1.84	1.87	1.91
Worker Households by Worker Income	8	15	41	29	212
Percent Distribution of Workier Households	2.6%	4.9%	13.3%	9.5%	69.7%

Notes:
(a) Average number of workers per worker household by income category calculated based on American Community Survey PUMS Analysis, 2017-2021.

Sources: American Community Survey, 2017-2021 Public User Microdata Sample; CA Department of Housing and Community Development (HCD); BAE, 2024.

These workers would in turn support indirect jobs at suppliers to their employers, and induced jobs related to their household expenditures. Table 17 below provides an estimate of the distribution by industry and household income of the workers in the two-county region supported through the indirect and induced impacts.

Table 17: Indirect and Induced Jobs Generated by Direct Employment at Project

NAICS Code	Industry	Total Jobs (b)	Estimated Jobs by Percent of AMI (a) Extremely Low	Very Low	Low	Moderate	Above Moderate
11, 21	Agriculture & Natural Resources	0.67	0.15	0.12	0.17	0.06	0.18
23	Construction	2.80	0.33	0.53	0.72	0.32	0.90
31-33	Manufacturing	5.53	0.19	0.34	0.78	0.59	3.63
42	Wholesale Trade	30.46	1.61	3.57	6.98	3.14	15.16
44-45	Retail Trade	35.29	3.24	5.31	8.71	3.72	14.30
48-49, 22	Transportation, Warehousing, & Utilities	21.90	2.01	3.81	5.70	2.45	7.92
51	Information	11.26	0.23	0.36	0.93	0.74	9.00
52-53	Finance, Insurance, & Real Estate	48.15	2.02	3.29	7.70	4.17	30.97
54-55	Professional, Scientific, & Technical Services, & Mgmt of Companies	68.41	1.59	2.12	6.95	5.72	52.02
56	Admin, Support, & Waste Mgmt Srvcs	41.46	6.34	8.59	10.44	4.46	11.63
61	Educational Services	11.72	0.80	1.21	2.20	1.44	6.06
62	Health Care & Social Assistance	52.31	3.61	5.58	10.40	5.98	26.75
71-72	Leisure & Hospitality	41.85	6.76	7.86	10.92	4.61	11.70
81	Other Services Except Public Admin	27.59	4.53	5.37	6.84	2.67	8.18
Public Sector		1.97	0.11	0.20	0.44	0.25	0.98
	Total Jobs	**401**	**34**	**48**	**80**	**40**	**199**
	Workers per Households	1.80	1.36	1.63	1.84	1.87	1.91
	Number of Households	**223**	**25**	**30**	**43**	**22**	**104**

Notes:
(a) Based on 2021 HCD Income Limits in order to match PUMS data vintage.
(b) Job estimates are the output of the IMPLAN model. Columns to right may not sum to Total Jobs due to independent rounding.
(c) Average number of workers per worker household by income category calculated based on American Community Survey PUMS Analysis, 2017-2021.

Sources: American Community Survey, 2017-2021, including the Public User Microdata Sample; CA Department of Housing and Community Development (HCD); IMPLAN; BAE, 2024.

Net Change in Number of Workers and Households

Table 18 rolls up the estimates in the prior tables to present the total net change in workers and households by industry and income level for the Project, distributed by AMI income category.

Table 18: Net Direct, Indirect, & Induced Employment & Households

NAICS Code	Industry	Total Jobs (b)	Estimated Jobs by Percent of AMI (a) Extremely Low	Very Low	Low	Moderate	Above Moderate
11, 21	Agriculture & Natural Resources	0.6	0.1	0.1	0.2	0.1	0.2
23	Construction	2.5	0.3	0.5	0.7	0.3	0.8
31-33	Manufacturing	211.7	1.5	10.0	32.7	22.8	144.7
42	Wholesale Trade	34.4	1.4	3.3	8.4	3.0	18.4
44-45	Retail Trade	27.3	2.5	3.7	6.9	2.9	11.4
48-49, 22	Transportation, Warehousing, & Utilities	17.0	1.6	2.9	4.3	1.9	6.3
51	Information	10.3	0.2	0.3	0.9	0.7	8.2
52-53	Finance, Insurance, & Real Estate	43.8	1.8	3.0	7.0	3.8	28.2
54-55	Professional, Scientific, & Technical Services, & Mgmt of Companies	330.5	6.4	11.4	36.5	28.9	247.4
56	Admin, Support, & Waste Mgmt Srvcs	37.5	5.7	7.8	9.5	4.0	10.5
61	Educational Services	10.7	0.7	1.1	2.0	1.3	5.5
62	Health Care & Social Assistance	47.8	3.3	5.1	9.5	5.5	24.4
71-72	Leisure & Hospitality	38.3	6.2	7.2	10.0	4.2	10.7
81	Other Services Except Public Admin	25.1	4.1	4.9	6.2	2.4	7.4
Public Sector		11.6	0.7	0.6	2.3	1.1	6.8
	Total Jobs	**849**	**37**	**62**	**137**	**83**	**531**
	Workers per Households	1.84	1.36	1.63	1.84	1.87	1.91
	Number of Households	**461**	**27**	**38**	**74**	**44**	**278**

Notes: See previous tables.

Sources: As cited in prior tables; BAE 2024.

Net Housing Demand

As summarized in Table 19, the job impacts of the Proposed Project will result in an estimated net demand for approximately 461 additional housing units; the Proposed Project itself provides no addition to the housing inventory. Approximately sixty percent the demand will be for units for households with above moderate incomes; six percent from extremely low income households; eight percent from very low income households; 16 percent from low income households; and ten percent from households of moderate incomes.

It should be noted that this is a measure of regional demand. None of these worker households would necessarily live in the city or East Palo Alto, and with the exception of those directly employed at the Project location, these workers would not necessarily be employed in Menlo Park or East Palo Alto. The following section will consider the proportion of the demand to be allocated to Menlo Park and East Palo Alto.

Table 19: Net Housing Demand

	Estimated Household Income as a Percent of AMI					
Change in Number of Households	**Extremely Low**	**Very Low**	**Low**	**Moderate**	**Above Moderate**	**Total**
Due to Closure of Existing Businesses	-6	-7	-10	-6	-39	-67
New Employment	33	44	84	50	317	528
Net New Housing Demand	27	38	74	44	278	461
as % of Net New Demand	6%	8%	16%	10%	60%	100%

Source: BAE, based on sources as cited in previous tables.

MENLO PARK AND EAST PALO ALTO SHARE OF HOUSING IMPACTS

One of the goals of the Housing Needs Analysis is to estimate the direct, indirect, and induced housing needs from the Project in order to satisfy the requirements of the settlement agreement between the Cities of Menlo Park and East Palo Alto.

This section provides an estimate of the share of new direct, indirect, and induced housing demand related to the Proposed Project that would occur in Menlo Park and East Palo Alto based in large part on existing commute patterns.

As shown in Table 20, data from the American Community Survey indicate that 14.2 percent of persons working in Menlo Park also live in Menlo Park. Similar data directly from ACS are not available for East Palo Alto residents working in Menlo Park; however, 2012-2016 ACS data processed for the Census Transportation Planning Package[4] (CTPP) estimate that 3.0 percent of Menlo Park workers live in East Palo Alto.

The indirect and induced jobs under consideration could be at workplaces anywhere in the two-county region. Based on existing regional commute patterns as shown by the CTPP, approximately 1.0 percent of these workers would live in Menlo Park and 0.9 percent in East Palo Alto.

Table 20: Key Factors in Worker/Resident Distributions

Total Persons Working in Menlo Park, 2017-2021	42,173
Persons Living and Working in Menlo Park	5,993
Percent of Persons Living and Working in Menlo Park	14.2%
Menlo Park Workers Living in East Palo Alto, 2012-2016	1,100
Percent of Menlo Park Workers Living in East Palo Alto, 2012-2016	3.0%
Total Jobs/Persons Working in Two-County Region,, 2012-2016	1,430,991
Persons Working in Two-County Region and Living in Menlo Park	14,735
Percent of Persons Working in Two-County Region and Living in Menlo Park	1.0%
Persons Working in Two-County Region and Living in East Palo Alto, 2012-2016	13,130
Percent of Persons Working in Two-County Region and Living in East Palo Alto	0.9%

Sources: U.S. Bureau of the Census American Community Survey, 2017-2021 5-Year sample data, Tables B08604 and B08008; Census Transportation Planning Package 2021.2016, Table A302100; BAE, 2023.

[4] U.S. Census Bureau, American Community Survey 2012-2016 five-year estimates. Special Tabulation: Census Transportation Planning. This is the most recent data available.

The analysis below shown in Table 21 provides two scenarios, based on existing commute patterns as described above, estimating overall housing demand generated by the Proposed Project within each city. There are two variations of the "baseline" scenario. In both variations, workers at the Proposed Project are assumed to choose housing in Menlo Park and East Palo Alto based on recent commute patterns where 14.2 percent of the worker households would live in Menlo Park and 3.0 percent would live in East Palo Alto. The low estimate version of the baseline assumes that the workers in the indirect and induced jobs, which could be located anywhere in the two-county region, would choose to live in one or the other of the two cities based on recent commute patters, with 1.0 percent of these indirect and induced worker households living in Menlo Park and 0.9 percent living in East Palo Alto. The high estimate version of the baseline assumes that the indirect and induced worker households would live in Menlo Park and East Palo Alto at the same rate as the worker households at the Proposed Project itself (14.2 percent and 3.0 percent, respectively).

As shown in Table 21, assuming a baseline scenario based on recent commute patterns for Menlo Park and East Palo Alto, approximately 45 of the net new households of workers at the Proposed Project site would reside in Menlo Park and East Palo Alto. In the low estimate, four of the indirect and induced worker households would also live in Menlo Park or East Palo Alto, for a total of 49 households residing in the two cities. In the high estimate, 34 of the indirect and induced worker households would live in the two cities, for a total of 79 worker households residing in the two cities. (Parts may not sum exactly to this total due to independent rounding.) For both the low and the high estimates, most of these worker households would be located in Menlo Park itself.

An additional scenario set is shown in the table, where 20 percent more of the worker households would choose to live in Menlo Park or East Palo Alto; 54 of the net new households of the Project's onsite workers would live in Menlo Park or East Palo Alto. Under the low estimate for this scenario, five of the indirect and induced households would live in the two cities, for a total of 58 worker households residing in Menlo Park or East Palo Alto. Under the high estimate for this scenario, 41 of the indirect and induced worker households would live in the two cities, with most of them residing in Menlo Park.

Table 21: Residence of Households with Jobs Linked to Project

New Worker Households by Place of Residence, Using Current Distributions of Workers (Baseline)

DIRECT WORKERS (a)	**Low and High Estimates**	
Place of Residence	**Number**	**Percent**
Menlo Park	37	14.2%
East Palo Alto	8	3.0%
All Other Places	216	82.8%
Total	**261**	**100.0%**

INDIRECT & INDUCED WORKERS	**Low Estimate** (b)		**High Estimate** (c)	
Place of Residence	**Number**	**Percent**	**Number**	**Percent**
Menlo Park	2	1.0%	28	14.2%
East Palo Alto	2	0.9%	6	3.0%
All Other Places	197	98.1%	166	82.8%
Total	**201**	**100.0%**	**201**	**100.0%**

TOTAL WORKERS	**Low Estimate** (b)		**High Estimate** (c)	
Place of Residence	**Number**	**Percent**	**Number**	**Percent**
Menlo Park	39	8.5%	66	14.2%
East Palo Alto	10	2.1%	14	3.0%
All Other Places	412	89.4%	382	82.8%
Total	**461**	**100.0%**	**461**	**100.0%**

New Worker Households by Place of Residence, Assuming 20 Percent More Workers Living in East Palo Alto and Menlo Park

DIRECT WORKERS (a)	**Low and High Estimates**	
Place of Residence	**Number**	**Percent**
Menlo Park	44	17.1%
East Palo Alto	9	3.6%
All Other Places	**207**	**79.4%**
Total	**261**	**100.0%**

INDIRECT & INDUCED WORKERS	**Low Estimate** (b)		**High Estimate** (c)	
Place of Residence	**Number**	**Percent**	**Number**	**Percent**
Menlo Park	2	1.2%	34	17.1%
East Palo Alto	2	1.1%	7	3.6%
All Other Places	196	97.7%	159	79.4%
Total	**201**	**100.0%**	**201**	**100.0%**

TOTAL WORKERS	**Low Estimate** (b)		**High Estimate** (c)	
Place of Residence	**Number**	**Percent**	**Number**	**Percent**
Menlo Park	47	10.2%	79	17.1%
East Palo Alto	12	2.5%	17	3.6%
All Other Places	403	87.3%	366	79.4%
Total	**461**	**100.0%**	**461**	**100.0%**

Notes:
Baseline assumes those jobs associated with the Project are likely to be distributed geographically by residence in patterns similar to current workers, with the low estimate based on indirect and induced workers distributed residentially as for the two counties overall, and the high estimate with those workers distributed as for Menlo Park. Parts may not sum to totals due to independent rounding.
(a) Since the direct jobs are all in Menlo Park, both low and high estimates use the distribution of current workers in Menlo Park by place of residence.
(b) For the indirect and induced jobs, the low estimate estimates the geographic distribution of new workers using the distribution of workers in the two counties by place of residence. Indirect and induced jobs might be anywhere in the two counties.
(c) For the indirect and induced jobs, the high estimate estimates the geographic distribution of new workers using the distribution of Menlo Park workers by place of residence, as with the direct jobs. While indirect and induced jobs might be anywhere in the two counties, they may tend to be closer to Menlo Park. For example, workers are likely to make daytime expenditures that generate retail jobs near their place of work in Menlo Park. The businesses in the Project might also be likely to contract for services and supplies with nearby establishments.

Sources: U.S. Census Bureau, American Community Survey, 2017-2021, including the Public User Microdata Sample; 2012-2026 Census Transportation Planning Package; IMPLAN; BAE, 2024.

Table 22 shows the estimated net lower-income housing demand attributable to Menlo Park and East Palo Alto based on scenarios described in the previous table, as well as in a scenario where half of the housing demand generated by the Project is attributed to the two cities.[5]

The Project is estimated to general overall demand to house approximately 139 lower-income households. Approximately half of those units are for low income households, those in the 80 percent AMI income bracket. For the low baseline estimate, only 15 of the lower-income units would be attributed to Menlo Park and East Palo Alto. For the high baseline estimate, that increases to 25 units. Assuming a 20 percent increase in the capture rate yields demand for 29 lower-income units. Finally, using a more extreme and unlikely assumption that half of the housing demand from the Project were attributed to Menlo Park and East Palo Alto, the total lower income household demand for the two cities would be approximately 69 housing units.

Table 22: Sensitivity Analysis of Housing Needs in Menlo Park and East Palo Alto

	Household Income Category			
Number of New Project-Related Households	**Extremely Low**	**Very Low**	**Low**	**Total Lower Income**
Estimated Total New Housing Demand from Project	27	38	74	**139**
Demand in Menlo Park and East Palo Alto				
Low Baseline Estimate	10.6%			
Capture in Menlo Park and East Palo Alto (a)	3	4	8	**15**
High Baseline Estimate	17%			
Capture in Menlo Park and East Palo Alto (a)	5	7	13	**25**
Estimate with 20% Higher Capture in Menlo Park & East Palo Alto	21%			
Capture in Menlo Park and East Palo Alto (a)	6	8	15	**29**
Estimate Based on 50% Capture	50%			
Capture in Menlo Park and East Palo Alto (a)	13	19	37	**69**

Notes:
(a) Rounded to nearest whole number.

Source: BAE, based on sources as cited in previous tables.

[5] "Lower income" here is defined as households in the extremely low, very low, and low income AMI categories as calculated by the California Department of Housing and Community Development.

ANALYSIS OF IMPACTS ON LOCAL AND REGIONAL HOUSING MARKETS

This chapter uses the information provided in the previous chapters to evaluate the potential impacts that the Project could have on the local and regional housing supply, jobs-housing balance, and displacement pressures. The Project, assuming its estimated net impact of approximately 490 direct jobs, results in a minimal impact on overall employment in Menlo Park and regionally. The net change in onsite jobs would only represent an increase of 1.2 percent in Menlo Park jobs and 0.03 percent for the region. Inclusive of the indirect and induced jobs, which could occur anywhere in the Two-County Region, the regional change in employment would be an increase of only 0.06 percent. Given these small numbers relative to the total jobs in the city and the region, the Project is likely to have a negligible impact on the regional housing market, jobs-housing balance, and displacement pressures.

Potential Impacts on Housing Supply

The project's construction results in no change in the city or regional housing supply, as the site contains no housing units currently or as planned. Based on Menlo Park's Housing Element and as discussed above in the Background Conditions section of this report, there are 3,645 housing units in the planning pipeline in the city. While it is likely that many of the new indirect and induced jobs associated with the project would actually be elsewhere in the two-county region, the assumed expansion of the housing supply just in Menlo Park, while critical to addressing regional housing challenges, could absorb demand from workers attributable to the Proposed Project, especially those seeking housing in Menlo Park, even without accounting for units made available through turnover of existing units.

Table 9 above provides an estimate of the number of planned and proposed units in Menlo Park by affordability level. Most of the households associated with the project would be above moderate income households. Table 23 compares that affordable supply to the Project-generated demand for both Menlo Park and East Palo Alto. Depending on the scenario considered, this demand would absorb from five percent and 24 percent of Menlo Park's planned very low income supply[6] and from three percent to 13 percent of the planned low income supply.

[6] Because of the way the supply is presented in the Housing Element, the extremely low and very low income demand have been combined in this table.

Table 23: Comparison of Affordable Housing Supply and Demand

	Very Low Income	Low Income
Planned and Proposed Supply	133	277
Estimated Menlo Park and East Palo Alto Demand		
Low Baseline	7	8
as % of Supply	5%	3%
Hjigh Baseline	12	13
as % of Supply	9%	5%
20% Higher than Baseline	14	15
as % of Supply	11%	5%
50% Higher than Baseline	32	37
as % of Supply	24%	13%

Source: BAE, based on sources as cited in previous tables.

In addition to proposed projects currently in the development pipeline, Menlo Park's current Housing Element Update has designated numerous opportunity sites for housing development to meet or exceed the city's Regional Housing Needs Allocation (RHNA) across all income levels. In addition to the housing units in the pipeline, the sites inventory provides locations for 1,514 additional very low and low-income units, and 571 moderate-income units. This is a surplus of 809 very low and low-income units and 298 moderate income units over and above the city's RHNA goals. The number of above moderate income units currently in the pipeline far exceeds the RHNA number.

Table 24: RHNA Inventory Summary

	Very Low	Low	Moderate	Above Moderate	Total
RHNA	740	426	496	1,284	2,946
Pipeline Projects	133	277	197	3,038	3,645
ADUs	26	25	26	8	85
Total Sites Inventory	1,514 (a)		571	-	2,085
Shortfall/Surplus	809 (a)		298	1,762	3,168

Source: Menlo Park Housing Element.

Potential Impacts on Jobs-Housing Balance

The Proposed Project overall is estimated to generate housing demand in Menlo Park and East Palo Alto. The project by itself would minimally increase the imbalance between jobs and housing in Menlo Park. However, for above moderate income households, the city has far more units in the pipeline (3,038) than the number of households associated with the Project seeking housing locally, as even the total regional demand from the project is for only 278

units. For households at lower income levels, the local demand for housing units from the Project (see Table 23) is less than the number of lower income units in the pipeline. Overall, the net increase of 489 direct on-site jobs represents an increase of approximately only one percent over the current city employment base, only 0.25 percent of the projected 2050 employment in South San Mateo County and only 0.02 percent of the projected 2050 employment in the two-county region (see Table 7), so the net change in the jobs housing balance directly attributable to the Project is negligible.

Potential Displacement Impact Findings

Displacement and gentrification are a key issue locally and throughout the region and addressing the cumulative impact of the Project and other projects that generate new housing demand will be essential to addressing cumulative housing needs and mitigating displacement pressures over the long term. However, given the limited potential impacts of the Project on the local and regional housing supply and jobs-housing balance, the Project is not likely to have a perceptible impact on local and regional displacement pressures. Furthermore, the Proposed Project itself does not displace any existing housing serving any household income level and is in a non-residential area largely in industrial uses. Due to the regional nature of the housing market, the Project is unlikely to have any measurable impact on displacement pressures in Menlo Park and East Palo Alto.

LIMITING CONDITIONS

This study presents an assessment of current and potential future housing needs in Menlo Park, based on the identified data sources. It has been prepared to inform the decisions of the City regarding the Proposed Project and is not intended to be used to support any decision regarding the feasibility of the project or any other proposed development. Because of the limitations of the scope of this study, available data including any errors by data providers, and the methodologies used, along with the uncertainty inherent in long-term projections, actual future conditions may vary considerably from what is presented here. Market conditions are dynamic, and the analysis and findings presented in this study are subject to change at any time after the publication of this study, based on changes due to macroeconomic conditions at the global, national, and regional level; changes in legislation, regulations, and public policy actions; and decisions by developers, investors, firms, lenders, and other parties that may impact local market conditions and development potential.

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APPENDIX A: OVERVIEW OF IMPLAN

This appendix provides additional clarification of the workings of the IMPLAN input-output model. It provides a step-by-step account of how IMPLAN estimates economic impacts, using new residential development as an illustrative example. This section begins with an overview of the data that IMPLAN uses internally and moves forward through the process of how the model estimates the impacts of new commercial and housing projects.

What is IMPLAN?

IMPLAN is an input-output model that estimates the total economic implications of new economic activity within a specified geography. The model uses national industry data and county-level economic data to generate a series of multipliers, which in turn estimate the total economic implications of economic activity.

At the heart of the model is a national input-output dollar flow table called the Social Accounting Matrix (SAM). Unlike other static input-output models, which just measure the purchasing relationships between industry and household sectors, SAM also measures the economic relationships between government, industry, and household sectors, allowing IMPLAN to model transfer payments such as unemployment insurance. Thus, for the specified region, the input-output table accounts for all the dollar flows between the different sectors within the economy.

National Industry Data. The model uses national production functions for 546 sectors to determine how an industry spends its operating receipts to produce its commodities. The model also uses a national matrix to determine the *byproducts*[7] that each industry generates. To analyze the impacts of household spending, the model treats households as an "industry" to determine their expenditure patterns. IMPLAN couples the national production functions with a variety of county-level economic data to determine the impacts for our example.

County-Level Economic Data. In order to estimate the county-level impacts, IMPLAN combines national industry production functions with county-level economic data. IMPLAN collects data from a variety of economic data sources to generate average output, employment, and productivity for each of the industries in a given county. It also collects data on average prices for all of the goods sold in the local economy. In this analysis, IMPLAN uses economic data for a two-county region consisting of Santa Clara and San Mateo Counties. IMPLAN gathers data on the types and amount of output that each industry generates within the region. In addition, the IMPLAN model uses county-level data on the prices of goods and household expenditures

[7] The byproducts refer to any secondary commodities that the industry creates.

to determine the consumption functions of regional households and local government, considering the availability of each commodity within the specified geography.

Multipliers. IMPLAN combines these data to generate a series of SAM-type multipliers for the local economy. The multiplier measures the amount of total economic activity that results from an industry (or household) spending an additional dollar in the local economy. Based on these multipliers, IMPLAN generates a series of tables to show the economic event's *direct*, *indirect*, and *induced* impacts to gross receipts (output) and employment, within each of the model's 546 sectors. These outputs have been described above, and also are described here:

- Direct Impacts. Direct impacts refer to the dollar value of economic activity available to circulate through the economy and the jobs associated with that economic activity. In the case of new residential development, the direct impacts are equal to the new households' discretionary spending. The direct impacts do not include household savings and payments to federal, state, and local taxes, as these payments do not circulate through the economy.

  It should be noted that impacts from retail expenditures differ significantly between the total economic value of retail and the amount available to circulate through the local economy. The nature of retail expenditures accounts for this difference. The model assumes that only the retail markup impacts the local economy, particularly for industries heavily populated with national firms such as gas stations and grocery stores. Since local stores buy goods from wholesalers and manufacturers outside of the area, and corporate profits also leave the local economy, only the retail markup will be available for distribution within the local economy. To the extent that retailers' headquarters are located within the county or region, the model allocates their portions of the impacts to the local economy.

- Indirect Impacts. The indirect impacts refer to the impact of local industries buying goods and services from other local industries, and to the jobs supported by those purchases. The cycle of spending works its way backward through the supply chain until all money leaks from the local economy, either through imports or by payments to income and taxes. For capital projects this would include payments for construction inputs such as wood, steel, office supplies, and any other non-labor payments that a construction firm would purchase in the building process.

- Induced Impacts. The induced impacts refer to the dollar and employment impacts of household spending by the employees generated by the direct and indirect impacts. In other words, induced impacts result from the household spending of employees of business establishments that the new households patronize (direct) and their suppliers (indirect). The model accounts for local commute patterns in the geography. For example, if 20 percent of construction workers who work in the region live outside

of the region, the model will allocate 80 percent of labor's disposable income into the model to generate induced impacts. The model excludes payments to federal and state taxes and savings based on the geography's average local tax and savings rates. Thus, only the disposable incomes from local workers are included in the model.

Specifying the "Event" and Running the Model

Once the model is built for the specified geographies, it is time to specify the "event" that the model will analyze and run the model.

Specifying the "Event." The "event" refers to the total economic value of industry output that the analyst is considering. In the case of the ongoing economic impacts of a new institutional development such as a school, the "event" would be the operations of a school, including the resulting new jobs and the worker compensation.

Running the Model. Once the event is specified, IMPLAN runs the event through the model to generate the results. By default, IMPLAN applies the local data on average output per worker and compensation per worker to determine the direct impacts. For the analysis here, worker compensation was derived from earnings as shown in the PUMS analysis of a hypothetical mix of workers and their occupations. The model then applies the value of the event to the national production functions and runs a number of iterations of this value through the production functions for the local economy to determine the indirect and induced impacts. For each iteration, the model removes expenditures to government, savings, and for goods bought outside of the local economy so that the results only include those dollars that impact the local economy.

Summarizing the Impacts

Once the model is run, IMPLAN generates a series of output tables to show the direct, indirect, and induced impacts within each of the model's 546 sectors. IMPLAN generates these tables for three types of impacts: employment, output, and value added. The IMPLAN analysis of this study is focused on the employment impacts.

- *Employment* shows the number of employees needed to support the economic activity in the local economy. It should be noted that for annual impacts of ongoing operations, the employment figure shown represents the amount of employment needed to support that activity for a year. Furthermore, IMPLAN reports the number of jobs based on average output per employee for a given industry within the geography. This is not necessarily the same as the number of full-time positions.
- *Output* refers to the total economic value of the project in the local economy.
- *Value Added* shows the total income that the event generates in the local economy. This income includes:
    - *Employee Compensation* – total payroll costs, including benefits

- *Proprietary Income* – payments received by self-employed individuals as income
- *Other Property Type Income* – payments for rents, royalties, and dividends
- *Indirect Business Taxes* – excise taxes, property taxes, fees, and sales taxes paid by businesses. These taxes occur during the normal operation of businesses, but do not include taxes on profits or income.

APPENDIX B: WORKER HOUSEHOLD INCOME LEVEL BY INDUSTRY AND HOUSEHOLD INCOME LIMITS

		Estimated Household Income as a Percent of AMI					
NAICS Code	Industry	Extremely Low	Very Low	Low	Moderate	Above Moderate	Total
Private Sector							
11, 21	Agriculture & Natural Resources	22.4%	18.4%	25.1%	8.2%	26.0%	100.0%
23	Construction	11.7%	18.7%	25.8%	11.5%	32.2%	100.0%
31-33	Manufacturing	3.5%	6.2%	14.0%	10.6%	65.7%	100.0%
42	Wholesale Trade	5.3%	11.7%	22.9%	10.3%	49.8%	100.0%
44-45	Retail Trade	9.2%	15.1%	24.7%	10.5%	40.5%	100.0%
48-49, 22	Transportation, Warehousing, & Utilities	9.2%	17.4%	26.0%	11.2%	36.2%	100.0%
51	Information	2.0%	3.2%	8.3%	6.6%	79.9%	100.0%
52-53	Finance, Insurance, & Real Estate	4.2%	6.8%	16.0%	8.7%	64.3%	100.0%
54-55	Professional, Scientific, & Technical Services, & Mgmt of Companies	2.3%	3.1%	10.2%	8.4%	76.0%	100.0%
56	Admin, Support, & Waste Mgmt Srvcs	15.3%	20.7%	25.2%	10.8%	28.0%	100.0%
61	Educational Services	6.8%	10.3%	18.8%	12.3%	51.7%	100.0%
62	Health Care & Social Assistance	6.9%	10.7%	19.9%	11.4%	51.1%	100.0%
71-72	Leisure & Hospitality	16.2%	18.8%	26.1%	11.0%	28.0%	100.0%
81	Other Services Except Public Admin	16.4%	19.5%	24.8%	9.7%	29.6%	100.0%
Public Sector		5.7%	10.0%	22.1%	12.8%	49.5%	100.0%

Notes:
Based on a cross tabulation of Public Use Microdata Samples (PUMS) from the 2017-2021 American Community Survey. These
incomes were compared to household income limits published by the State of CA Department of Housing and Community Development (HCD) to determine the percentage of households falling into
each income category. The analysis controlled for household size, to address the varying HCD income limits for each household size.

Sources: Census, American Community Survey Public-Use Microdata Sample (PUMS) 2017-2021; HCD; BAE, 2023.

Appendix M
Transportation Analysis

M1 Transportation Impact Analysis
M2 Transportation Demand Management Memorandum

Appendix M
Transportation

Appendix M1 Transportation Impact Analysis

Transportation Impact Analysis

1005 O'Brien and 1320 Willow Road Life Sciences Project

NOVEMBER 2025

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Executive Summary

Dudek has prepared this Transportation Impact Analysis (TIA) to identify traffic impacts associated with the proposed 1005 O'Brien Drive and 1320 Willow Road Life Science project (proposed project or project), a research and development office in the City of Menlo Park (City), in San Mateo County (County). This TIA has been prepared per the City of Menlo Park Transportation Impact Analysis (TIA) Guidelines (2020, last updated in 2022) and its scope of analysis has been approved by the City's Transportation Division. In addition, this TIA complies with the City of Menlo Park General Plan Circulation Element requirements, and with the 2025 San Mateo County Congestion Management Program (CMP) for the City/County Association of Governments of San Mateo County (C/CAG).

The project would include demolition of three existing single-story buildings, and the construction of two new multi-story research and development buildings, and a parking garage. Based on trip rates contained in the Institute of Transportation Engineers (ITE) Trip Generation, 11th Edition (2021), after the application of the 35% trip reduction as required by the Transportation Demand Management (TDM) Plan, the proposed project would generate approximately 1,643 daily trips, 152 AM peak hour trips (125 inbound and 27 outbound), and 145 PM peak hour trips (23 inbound and 122 outbound). After subtracting for the existing land uses, the proposed project's net trip generation would be 1,217 daily trips, 115 AM peak hour trips (96 inbound and 19 outbound), and 105 PM peak hour trips (13 inbound and 92 outbound). Without any TDM measures, the employee trips generated by the project may cause substantial additional VMT. The TDM plan would need to achieve a minimum 28.4% reduction in VMT to reduce the proposed project's impacts to less-than-significant levels, which is not within the 20% reduction required by Section 16.44.090 of the Menlo Park Municipal Code. However, up to a 36% reduction in VMT is possible using the C/CAG TDM Mitigation score sheet for large, transit proximate, non-residential uses such as the project. However, to provide a conservative analysis, a 35% reduction is utilized throughout the analysis. Therefore, with the implementation of the required TDM Plan (consisting of at least a 35% reduction in VMT), the project's VMT impact would be less than significant.

The project would provide driveways within each of the two proposed building lots, and would provide access from Willow Road and O'Brien Drive, with the parking garage entrance along internal roads. Based on the vehicular queuing analysis for project driveways, vehicle storage lengths would be accommodated within all available storage lanes. Emergency access would be provided and maintained through project driveways and access through several emergency vehicle only easements. All existing pedestrian and bicycle facilities would not be impacted by the project.

The project would include a total of 520 vehicle parking spaces for employees and visitors. Four of the surface-level parking spaces and 21 the garage parking spaces would be accessible per the Americans with Disabilities Act (ADA). At the time of construction completion, 15% of the total parking spaces would be equipped with an electric vehicle (EV) charging station (78 spaces) and 30% of the total parking spaces would be "EV Ready," meaning that conduits would be installed to facilitate adding a charging station in the future (157 spaces). Therefore, the project would meet the City's parking requirements.

This TIA includes the assessment of study intersections within the study area of the proposed project. These facilities were analyzed under the Existing, Near-Term (2027), Near-Term (2027) plus Project, Cumulative (2040), and Cumulative (2040) plus Project conditions.

Per the City's TIA Guidelines and analysis criteria, the roadway and intersection improvements were recommended to achieve satisfactory levels of service and/or reduce delay increases to pre-project conditions or better (see below). Improvements at some locations may not be feasible due to right-of-way constraints.

Level of Service Analysis

Existing Conditions

As discussed in Chapter 5.1, all of the study area intersections are currently operating at satisfactory levels of service (LOS D or better) under existing conditions per City standards, with the exception of the following intersections:

- #1 Willow Road/Bayfront Expressway – LOS F in AM and PM peak hours (signalized)
- #2 Willow Road/Hamilton Avenue – LOS E in PM peak hour (signalized)
- #4 Willow Road/O'Brien Drive – LOS F in PM peak hour (signalized)
- #5 Willow Road/Newbridge Street – LOS F in AM and PM peak hours (signalized)
- #9 University Avenue/Bayfront Expressway – LOS E in PM peak hour (signalized)
- #10 University Avenue/Adams Drive – LOS F in AM peak hour; LOS E in PM peak hour (unsignalized)

Near-Term (2027) plus Project Conditions

Under Near-Term (2027) plus Project conditions, the following intersections would exceed the thresholds identified in the City's TIA guidelines and increase the average critical movement delay by 0.8 seconds or more during AM and/or PM peak hours:

- #1 Willow Road/Bayfront Expressway – LOS F in AM peak hour (signalized)
- #2 Willow Road/Hamilton Avenue – LOS F in AM peak hour (signalized)
- #3 Willow Road/Ivy Drive – LOS F in PM peak hour (signalized)
- #4 Willow Road/O'Brien Drive – LOS F in AM and PM peak hours (signalized)
- #5 Willow Road/Newbridge Street – LOS F in AM and PM peak hours (signalized)
- #8 O'Brien Drive/Kavanaugh Drive – LOS F in AM peak hour (unsignalized)
- #9 University Avenue/Bayfront Expressway – LOS E in PM peak hour (signalized)

For Willow Road intersections between Bayfront Expressway and US-101 ramps, the overall delay is reported as OVERSAT (LOS E or F) for oversaturated conditions based on previous simulation models that the increased volumes will cause queuing that extends past multiple intersections and results in oversaturated conditions. The Manual on Uniform Traffic Control Devices (MUTCD) peak hour signal warrant was performed at the unsignalized intersections (#8 and #10) and is provided in Appendix C. The warrant is met for intersection #8 (O'Brien Drive/Kavanaugh Drive) in both peak hours for both baseline and plus project conditions. The warrant is not met in either peak hour for all other remaining unsignalized intersections.

Recommendations

A summary of recommended improvements at the intersections identified above is provided in Table 10 and summarized below:

- #1 Willow Road/Bayfront Expressway

  - No feasible physical improvements are possible (The TIF Nexus Study include adaptive traffic signal coordination along both the Bayfront Expressway corridor and Willow Road corridor which is likely to reduce delay but the intersection would still not be compliant with the City's LOS policy).
- #2 Willow Road/Hamilton Avenue
  - Reconfigure northbound approach to one northbound through-right turn lane and one northbound left-turn lane. These physical improvements would not be feasible due to potential impacts to bicyclists and bicycle travel.
- #3 Willow Road/Ivy Drive
  - Install right-turn overlap on southbound Ivy Drive and restrict eastbound Willow Road U-turns (included in TIF Nexus Study).
- #4 Willow Road/O'Brien Drive
  - Reconfigure northbound approach to two northbound left-turn lanes and one northbound right-turn lane. Additional improvements in the TIF Nexus Study include adaptive traffic signal coordination along the Willow Road corridor which is likely to improve LOS operations. These physical improvements would not be feasible due to potential impacts to bicyclists and bicycle travel.
- #5 Willow Road/Newbridge Street
  - There are no feasible physical improvements possible (The City plans to implement adaptive traffic signal coordination along the Willow Road corridor which is likely to reduce delay but the intersection would still not be compliant with the City's LOS policy).
- #8 O'Brien Drive/Kavanaugh Drive
  - Install a westbound left-turn lane. These physical improvements would not be feasible due to potential impacts to bicyclists and bicycle travel.
- #9 University Avenue/Bayfront Expressway
- There are no feasible physical improvements possible (The TIF Nexus Study includes adaptive traffic signal coordination along the Bayfront Expressway corridor which is likely to reduce delay but the intersection would still not be compliant with the City's LOS policy).

Cumulative (2040) plus Project Conditions

Under Cumulative (2040) plus Project conditions, the following intersections would exceed the thresholds identified in the City's TIA guidelines and increase the average critical movement delay by 0.8 seconds or more during AM and/or PM peak hours:

- #1 Willow Road/Bayfront Expressway – LOS F in AM and PM peak hours (signalized)
- #2 Willow Road/Hamilton Avenue - LOS F in AM peak hour (signalized)
- #3 Willow Road/Ivy Drive - LOS E in PM peak hour (signalized)
- #4 Willow Road/O'Brien Drive - LOS E in AM peak hour; LOS F in PM peak hour (signalized)
- #5 Willow Road/Newbridge Street – LOS F in AM and PM peak hours (signalized)
- #7 Willow Road/US 101 SB Off-ramps – LOS F in AM peak hour (signalized)
- #8 O'Brien Drive/Kavanaugh Drive – LOS F in AM and PM peak hours (unsignalized)
- #9 University Avenue/Bayfront Expressway – LOS F in PM peak hour (signalized)
- #11 University Avenue/O'Brien Drive - LOS F in AM peak hour (signalized)

For Willow Road intersections between Bayfront Expressway and US-101 ramps, the overall delay is reported as OVERSAT (LOS E or F) for oversaturated conditions based on previous simulation models that the increased volumes will cause queuing that extends past multiple intersections and results in oversaturated conditions. The MUTCD peak hour signal warrant was performed at the unsignalized intersections (#8 and #10) and is provided in Appendix C. The warrant is met for intersection #8 (O'Brien Drive/Kavanaugh Drive) in both peak hours for both baseline and plus project conditions. The warrant is not met in either peak hour for all other remaining unsignalized intersections.

Recommendations

The same improvement measures noted under Near-Term (2027) plus Project conditions are recommended for incompliant intersections noted above, where overlap occurs. A summary of any additional improvements warranted under Cumulative (2040) plus Project conditions is provided in Table 10 and summarized below:

- #7 Willow Road/US 101 SB Off-ramps
  - Install an additional southbound left-turn lane. These physical improvements would not be feasible.
- #11 University Avenue/O'Brien Drive
  - There are no feasible physical improvements possible (improvements in the TIF Nexus Study include signalization of #10 (University Avenue/Adams Drive) which may further improve LOS along the University Avenue corridor.

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1 Introduction

1.1 Purpose and Scope

The purpose of this TIA is to identify traffic impacts associated with the proposed 1005 O'Brien and 1320 Willow Road life science research and development project (proposed project or project) in the City of Menlo Park (City) This TIA has been prepared per the City's Transportation Impact Analysis (TIA) Guidelines (2020, last updated in 2022) and its scope of analysis has been approved by the City's Transportation Division. In addition, this TIA complies with the City of Menlo Park General Plan Circulation Element requirements, and with the 2025 San Mateo County Congestion Management Program (CMP) for the City/County Association of Governments of San Mateo County (C/CAG).

The objectives of this TIA are to:

- Document existing roadway, pedestrian, bicycle, transit, and traffic conditions, including intersection levels of service (LOS) in the study area;
- Estimate trip generation, distribution, and assignment characteristics for the proposed project;
- Provide a Vehicle Miles Traveled (VMT) analysis per SB 743, the updated California Environmental Quality Act (CEQA) Guidelines, and the City of Menlo Park TIA Guidelines;
- Incorporate the transportation demand management (TDM) plan as required per City Ordinance to reduce at least 20% of net new vehicular trips;
- Determine LOS for study area intersections under: 1) Existing; 2) Near-Term (2027); 3) Near-Term (2027) plus Project; 4) Cumulative (2040); and 5) Cumulative (2040) plus Project conditions;
- Identify operational improvements needed to meet LOS standards;
- Identify CEQA-required mitigation measures for significant transportation impacts and/or other improvements needed to meet LOS standards (if any); and,
- Provide findings and recommendations based on the traffic analysis of the proposed project.

1.2 Project Description and Location

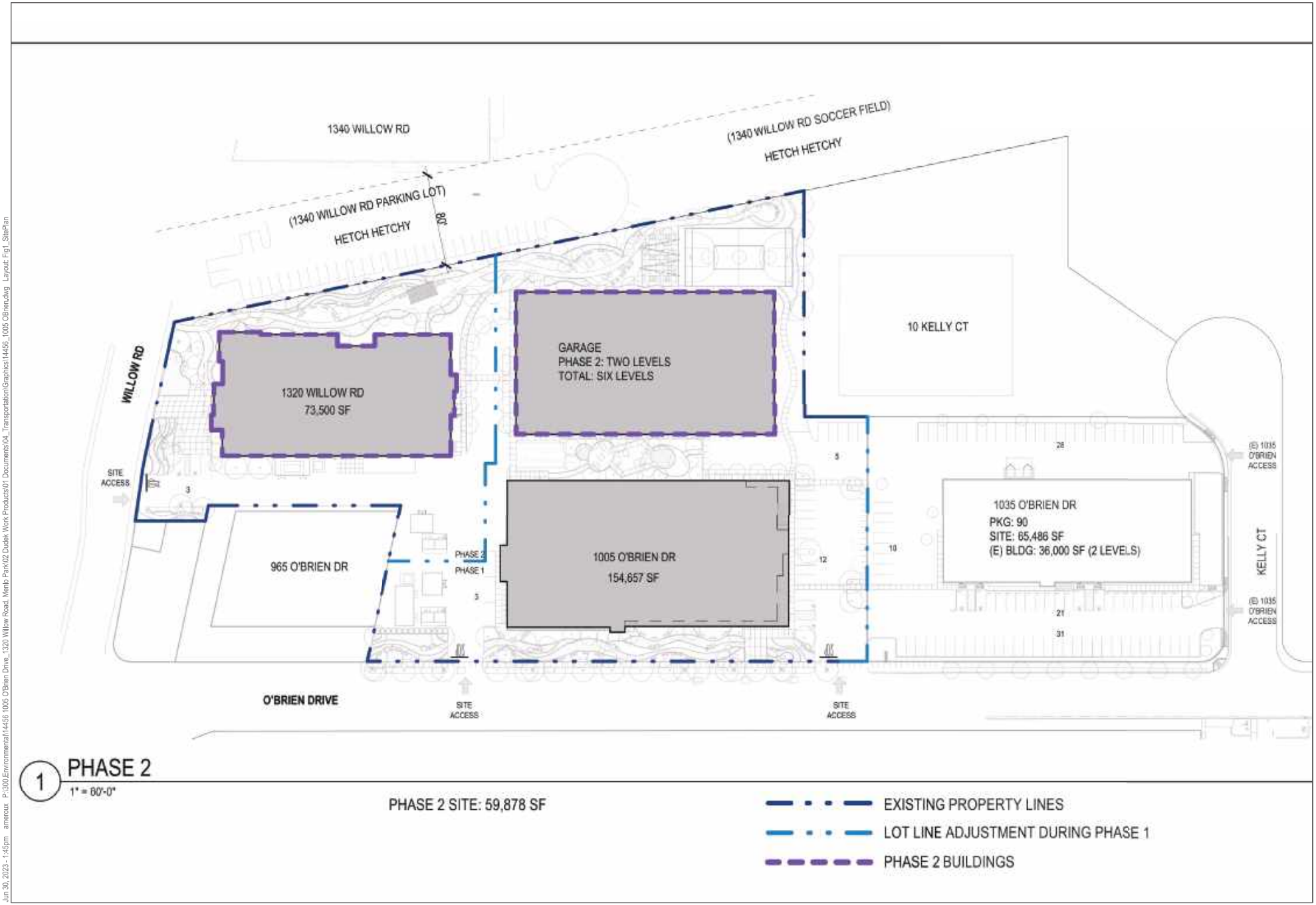
The proposed project would include demolition of three existing office and light warehouse storage buildings (a total of approximately 90,631 square feet (SF) of building space, inclusive of surface parking) and the construction of two research and development buildings, a parking garage, and open space/pedestrian area, as shown on Figure 1, Proposed Site Plan. Regional access to the proposed project is provided to the north via State Route 84 (SR-84) – Bayfront Expressway and its interchanges with State Route 114 (SR-114) - Willow Road and State Route 109 (SR-109) - University Avenue, and to the south via U.S. Route 101 (US-101 or Highway 101) and its interchange with SR-114 - Willow Road.

Approximately 59,344 SF of open space would be created within the northern and western portions of the Project site, of which approximately 31,535 SF would be publicly accessible. This open space would include walking/pedestrian pathways, public gathering spaces, a public plaza, active space such as sports courts, public seating areas, bike racks, and a main entry plaza to the 1320 Willow Road Building along Willow Road. The public

plaza is envisioned to function as a central gathering space site within the open space area and would consist of a concrete pad with a trellis and backdrop screening and flexible seating, suitable for picnics and similar activities.

Parking for employees and visitors would be provided via a parking structure located in the northeastern portion of the site, and surface-level parking spaces near each building entrance. The parking structure will be 172,800 square feet, inclusive of enclosed bicycle parking, trash enclosures, fans, and other mechanical space. A total of 520 parking spaces, inclusive of standard, electric vehicle (EV), ADA, and carpool/vanpool spaces will be provided on site. There is limited pedestrian infrastructure in the project area. To the immediate west of the project site, sidewalks are missing on both the western and eastern portions of O'Brien Drive, and to the north of the project site, sidewalks are present along both portions of Willow Road.

The proposed project would provide for vehicular circulation within each of the two proposed building lots and the parking garage. The 1320 Willow Road lot would be accessed from both Willow Road and O'Brien Drive. Internal streets within the 1320 Willow Road lot would not be connected with the adjacent 1005 O'Brien lot, except for through the parking structure. The 1005 O'Brien lot would be accessed from O'Brien Drive and is connected to the neighboring parcel via internal streets and Kelly Court to the south. Emergency vehicles would have access to the project site from Willow Road and O'Brien Drive into the site, as well as through the neighboring lot via Kelly Court. Internal streets that would provide emergency vehicle access would be 26 feet wide while other internal streets and driveways would be 20 feet wide.



SOURCE: TARLTON, DES Architects/Engineers 2022

DUDEK N NOT TO SCALE

Figure 1

Proposed Site Plan

1005 O'Brien Drive and 1320 Willow Road Life Sciences Project

Jun 30, 2023 - 1:45pm ameroux P:\300.Environmental\14456 1005 O'Brien Drive_1320 Willow Road, Menlo Park\02 Dudek Work Products\01 Documents\04_Transportation\Graphics\14456_1005 OBrien.dwg Layout: Fig1_SitePlan

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1.3 Analysis Methodology

1.3.1 Vehicle Miles Traveled Analysis for CEQA

On September 27, 2013, Senate Bill (SB) 743 was signed into law, which creates a process to change the way that transportation impacts are analyzed under California Environmental Quality Act (CEQA). SB 743 required the Governor's Office of Planning and Research (OPR) to amend the CEQA Guidelines to provide an alternative to level of service (LOS) for evaluating transportation impacts. Under the new transportation guidelines, LOS, or vehicle delay, will no longer be considered an environmental impact under CEQA. OPR recommended Vehicle Miles Traveled (VMT) as the most appropriate measure of project transportation impacts for land use projects and land use plans. The updates to the CEQA Guidelines required under SB 743 were approved on December 28, 2018.

Under these guidelines, VMT has been adopted as the most appropriate measure of transportation impacts under CEQA. The OPR's regulatory text indicates that a public agency may immediately commence implementation of the new transportation impact guidelines, and that the guidelines must be implemented statewide by July 1, 2020. The Updated CEQA Guidelines state that "*…generally, vehicle miles traveled (VMT) is the most appropriate measure of transportation impacts…*" and define VMT as "*…the amount and distance of automobile travel attributable to a project….*" It should be noted that "automobile" refers to on-road passenger vehicles, specifically cars and light trucks. Heavy-duty truck VMT could be included for modeling convenience and ease of calculation (for example, where models or data provide combined auto and heavy truck VMT). Other relevant considerations may include the effects of the project on transit and non-motorized travel.

The City of Menlo Park City Council approved the VMT thresholds and incorporated them the City's TIA Guidelines on January 11, 2022; therefore, this analysis follows these guidelines for SB 743 compliance. Per the City's guidelines, projects shall analyze VMT metrics when exemption criteria are not met. The details of applicable screening and VMT analysis methodology is provided in Section 4 of this TIA.

1.3.2 Level of Service Analysis for General Plan Consistency

In addition to a VMT analysis required under CEQA, a local agency may require a TIA to include an LOS analysis to identify infrastructure improvements required to provide acceptable operations, consistent with the acceptable LOS in the local agency's General Plan. Although the City of Menlo Park adopted VMT thresholds into their TIA Guidelines, the City continues to require LOS analysis for conformance with their General Plan. LOS is commonly used as a quantitative description of intersection operations and roadway segments and is based on the design capacity of the intersection configuration and roadway facility, compared to the volume of traffic using the facility.

Transportation conditions are analyzed in this TIA for the following scenarios:

Existing Conditions

The TIA includes a description of existing traffic conditions in the site vicinity, including existing intersection weekday AM and PM peak hour traffic volumes, and traffic operations. The existing condition is representative of the year 2023. Much of the signal timing information and some existing traffic volumes were obtained and approved from City staff. Counts were all collected in 2023 by either the City or by Dudek and provided in 2023.

Near Term (2027) Conditions

This scenario includes a description of traffic conditions and operations within a short-term horizon period (less than 5 years) where the proposed project is constructed and fully occupied. Near Term 2027 traffic volumes were also provided by the City's traffic modeler (Hexagon Transportation Consultants, Inc.) and includes a calculation of near-term traffic volumes using the City's Travel Demand Model.

Near Term (2027) plus Project Conditions

This scenario includes analysis of traffic operations under the Near Term 2027 condition (described above) with project-related traffic added to the AM and PM peak hour traffic volumes. The traffic impacts specific to the project under this condition were used as the basis for determining the project's contribution to short-term impacts.

Cumulative (2040) Conditions

This scenario includes a description of traffic conditions and operations within a long-term horizon period to account for transportation network changes throughout the region, as well as population growth, developed of approved or pending development projects, and buildout of the land uses designated in the City's General Plan. Traffic volumes were provided by the City's traffic modeler (Hexagon) and utilized the City's Travel Demand Model for the year 2040.

Cumulative (2040) plus Project Conditions

This condition includes analysis of traffic operations under the Cumulative (2040) Condition (described above) with project-related traffic added to the AM and PM peak hour traffic volumes. The traffic impacts specific to the project under this condition were used as the basis for determining the project's contribution to cumulative impacts.

1.3.2.1 Intersections

The Highway Capacity Manual, 7th Edition (HCM 7) methodology (Transportation Research Board 2022) was used to assess level of service for intersections within the study area per requirement of the respective jurisdiction.

The HCM intersection analysis methodology was used to analyze the operation of signalized and unsignalized study intersections. The HCM analysis methodology describes the operation of an intersection using a range of LOS from LOS A (free-flow conditions) to LOS F (severely congested conditions), based on the corresponding control delay experienced per vehicle for unsignalized intersections. The PTV Vistro software was used to determine intersection LOS. PTV Vistro is consistent with the HCM 7 methodology. Table 1 shows the LOS values by delay ranges for unsignalized and signalized intersections under the HCM methodology.

Table 1. Levels of Service for Intersections using HCM Methodology

Level of Service	Unsignalized Intersections Control Delay (in seconds per vehicle)	Signalized Intersections Control Delay (in seconds per vehicle)
A	< 10.0	< 10.0
B	> 10.0 to < 15.0	> 10.0 to < 20.0
C	> 15.0 to < 25.0	> 20.0 to < 35.0
D	> 25.0 to < 35.0	> 35.0 to < 55.0

Table 1. Levels of Service for Intersections using HCM Methodology

Level of Service	Unsignalized Intersections Control Delay (in seconds per vehicle)	Signalized Intersections Control Delay (in seconds per vehicle)
E	> 35.0 to < 50.0	> 55.0 to < 80.0
F	> 50.0	> 80.0

Source: HCM 7 (Transportation Research Board 2022).

Study Intersections

Based on the City of Menlo Park TIA Guidelines, the TIA study area was determined to include the intersections listed below. Figure 2 shows the project location and intersections within the study area, and their respective jurisdictions.

Intersections

1. Willow Road/Bayfront Expressway (Menlo Park)
2. Willow Road/Hamilton Avenue (Menlo Park)
3. Willow Road/Ivy Drive (Menlo Park)
4. Willow Road/O'Brien Drive (Menlo Park)
5. Willow Road/Newbridge Street (Menlo Park)
6. Willow Road/US 101 Northbound Ramp (Menlo Park)
7. Willow Road/US 101 Southbound Ramp (Menlo Park)
8. O'Brien/Kavanaugh Drive (Menlo Park)
9. University Avenue/Bayfront Expressway (Menlo Park)
10. University Avenue/Adams Drive (East Palo Alto)
11. University Avenue/O'Brien Drive (East Palo Alto)
12. University Avenue/Kavanaugh Drive (East Palo Alto)

The existing roadway network is not laid out consistent with cardinal directions. For this report, roadways parallel to US 101 are considered to run in a north-south direction. Therefore, Willow Road, University Avenue, and Kavanaugh Drive are assumed to run in an east-west direction. However, all figures and appendix items retain the consistent cardinal directions.

1.3.2.2 San Mateo County Congestion Management Program

Per the 2025 San Mateo CMP and C/CAG, new developments that add trips to the CMP network must be evaluated for transportation impacts. C/CAG recognizes that SB 743 requires VMT as the primary metric for traffic impacts under CEQA and indicates that future CMP legislation will be amended. However, as updated legislation is not currently available, C/CAG continues to require use of a delay-based metric (LOS) to measure roadway performance. Since the proposed project would generate fewer than 100 peak hour trips along regional CMP freeway facilities (i.e., US-101), no CMP segment analysis is required. All projects subject to the C/CAG TDM Policy are required to implement a set of TDM measures identified within a TDM Checklist. The proposed project qualifies as a large

(generates 500+ ADT), transit proximate (approximately 0.5 to 3 miles from high quality transit service), project and therefore requires a trip reduction of 35%.

1.3.2.3 General Plan Consistency Requirements

Transportation-related policies are included in the Circulation Element of the Menlo Park General Plan. This section was added to the General Plan to provide framework for transportation planning within the city and was most recently updated in 2016 when the City updated its Land Use and Circulation Elements (commonly referred to as ConnectMenlo). The framework is based on existing practices and future considerations in land use, population, and regional transportation. The General Plan Circulation Element establishes a vision for the city with goals related to sustainability, reliability, and safety for all modes of transportation. The transportation goals for Menlo Park that relate to the proposed project include:

City of Menlo Park General Plan Circulation Element

The City of Menlo Park General Plan Circulation Element contains the following policies and programs related to transportation compliance and LOS requirements:

GOAL CIRC-3: Increase mobility options to reduce traffic congestion, greenhouse gas emissions, and commute travel time.

Policy CIRC-3.4: Level of Service. Strive to maintain LOS D at all City-controlled signalized intersections during peak hours, except at the intersection of Ravenswood Avenue and Middlefield Road and at intersections along Willow Road from Middlefield Road to Highway 101. The City shall work with Caltrans to ensure that the average stopped delay on local approaches to State-controlled signalized intersections does not exceed LOS E.

Program CIRC-3.A: Transportation Impact Metrics. Supplement VMT and greenhouse gas emissions per service population (or other efficiency metric) metrics with LOS in the transportation impact review process, and utilize LOS for identification of potential operational improvements, such as traffic signal upgrades and coordination, as part of the Transportation Master Plan.

City of Menlo Park Transportation Impact Analysis Guidelines

Per the City of Menlo Park TIA guidelines:

- A project is considered potentially noncompliant with local policies if the addition of project traffic causes an intersection on a collector street operating at LOS "A" through "C" to operate at an unacceptable level (LOS "D," "E" or "F") or have an increase of 23 seconds or greater in average vehicle delay, whichever comes first.
- Potential non-compliance shall also include a project that causes an intersection on arterial streets or local approaches to State-controlled signalized intersections operating at LOS "A" through "D" to operate at an unacceptable level (LOS "E" or "F") or have an increase of 23 seconds or greater in average vehicle delay, whichever comes first.

- A project is also considered potentially non-compliant if the addition of project traffic causes an increase of more than 0.8 seconds of average delay to vehicles on all critical movements for intersections operating at a near-term LOS "D" through "F" for collector streets and at a near-term LOS "E" or "F" for arterial streets.
- For local approaches to State-controlled signalized intersections, a project is considered to be potentially non-compliant if the addition of project traffic causes an increase of more than 0.8 seconds of delay to vehicles on the most critical movements for intersections operating at a near-term LOS "E" or "F.

City of East Palo Alto General Plan Circulation Element

The City of East Palo Alto General Plan Circulation Element contains the following policies and programs related to transportation compliance and LOS requirements:

Goal T-7: Adopt transportation performance measures.

Policy T-7.1: Automobile Level of Service Standards. Improve the East Palo Alto circulation system roadways in concert with land development to maintain adequate levels of service for automobile travel. Automobile Level of Service (LOS) performance can be measured using a volume-to-capacity (V/C) ratio. V/C ratios are calculated based on existing or future average daily traffic (ADT) volumes and daily capacity values for various types of roadways. A level of service scale is used to evaluate roadway performance based on V/C ratios. These levels range from "A" to "F," with LOS A representing free flow conditions and LOS F representing severe traffic congestion. Descriptions of traffic flow for the different levels of service are provided in Table 6-4 Standards for Roadway Levels of Service. The performance criteria for evaluating volumes and capacities of the East Palo Alto roadway system is LOS D. At a signalized intersection, an impact is considered significant if it causes operations to degrade from LOS D or better to LOS E or F; or exacerbates LOS E or F conditions by increasing critical delay by >4 seconds and increasing volume to capacity ratio (V/C ratio) by 0.01; or increases the V/C ratio by > 0.01 at an intersection that exhibits unacceptable operations, even if the calculated LOS is acceptable. At an unsignalized intersection, an impact is considered significant if it causes operations to degrade from LOS D or better to LOS E or F; or exacerbates LOS E or F conditions by increasing control delay; or causes volumes under project conditions to exceed the Caltrans Peak Hour Volume Warrant Criteria. Where the City determines that proposed development projects will cause LOS standards to be exceeded, appropriate mitigation will be required to improve roadways to meet LOS standards.

Policy T-7.3: Multimodal transportation impact fee. Adopt a transportation impact fee for new development that raises funds for improving all modes of transportation.

City of East Palo Alto Transportation Impact Analysis Guidelines

Per the City of East Palo Alto's TIA Guidelines:

- At a signalized intersection, the project is considered to have an adverse effect if it:
  - Causes operations to degrade from LOS D (or better) to LOS E or F; or
  - Exacerbates LOS E or F conditions by both critical movement delay by four or more seconds and increasing volume-to-capacity ratio (V/C ratio) by 0.01 at an intersection; or

- Exacerbates LOS E or F conditions by increasing the average intersection delay by four or more seconds at an intersection; or
- Increases the V/C ratio by > 0.01 at an intersection that exhibits unacceptable operations, even if the calculated LOS is acceptable; or
- Causes planned future intersections to operate at LOS E or F.

- At an unsignalized intersection, the project is considered to have an adverse effect if it:
  - Causes operations to degrade from LOS D (or better) to LOS E or F; or
  - Exacerbates LOS E or F conditions by increasing control delay by five or more seconds; and
  - Causes volumes under project conditions to exceed the Caltrans Peak-Hour Volume Warrant Criteria.

1.3.3 General Plan and Transportation Master Plan Consistency (non-LOS criteria)

Goals, plans, and policies included in the City of Menlo Park Transportation Master Plan (2020) are included below to evaluate the project's potential impacts to non-LOS related criteria, including impacts to pedestrians, bicyclists, and transit users.

Goal CIRC-1: Provide and maintain a safe, efficient, attractive, user-friendly circulation system that promotes a healthy, safe, and active community and quality of life throughout Menlo Park.

Policy CIRC-1.7: Bicycle Safety. Support and improve bicyclist safety through roadway maintenance and design efforts.

Policy CIRC-1.8: Pedestrian Safety. Maintain and create a connected network of safe sidewalks and walkways within the public right of way ensuring that appropriate facilities, traffic control, and street lighting are provided for pedestrian safety and convenience, including for sensitive populations.

Goal CIRC-2: Increase accessibility for and use of streets by pedestrians, bicyclists, and transit riders.

Policy CIRC-2.1: Accommodating All Modes. Plan, design, and construct transportation projects to safely accommodate the needs of pedestrians, bicyclists, transit riders, motorists, people with mobility challenges, and persons of all ages and abilities.

Policy CIRC-2.2: Livable Streets. Ensure that transportation projects preserve and improve the aesthetics of the city.

Policy CIRC-2.3: Street Classification. Utilize measurements of safety and efficiency for all travel modes to guide the classification and design of the circulation system, with an emphasis on providing "complete streets" sensitive to neighborhood context.

Policy CIRC-2.4: Equity. Identify low-income and transit-dependent districts that require pedestrian and bicycle access to, from, and within their neighborhoods.

Policy CIRC-2.6: Local Streets as Alternative Routes. Work with appropriate agencies to discourage use of city streets as alternatives to, or connectors of, State and federal highways; to encourage

improvement of the operation of US 101; and to explore improvements to Bayfront Expressway (State Route 84) and Marsh Road (and its connection to US 101), with environmental protection for adjacent marsh and wetland areas, to reduce regional traffic on Willow Road (State Route 114).

Policy CIRC-2.7: Walking and Biking. Provide for the safe, efficient, and equitable use of streets by pedestrians and bicyclists through appropriate roadway design and maintenance, effective traffic law enforcement, and implementation of the City's Comprehensive Bicycle Development Plan and the El Camino Real/Downtown Specific Plan.

Policy CIRC-2.8: Pedestrian Access at Intersections. Support full pedestrian access across all legs of signalized intersections.

Policy CIRC-2.9: Bikeway System Expansion. Expand the citywide bikeway system through appropriate roadway design, maintenance, effective traffic law enforcement, and implementation of the City's Comprehensive Bicycle Development Plan, and the El Camino Real/Downtown Specific Plan.

Policy CIRC-2.10: Green Infrastructure. Maximize the potential to implement green infrastructure by: a) Reducing or removing administrative, physical, and funding barriers; b)Setting implementation priorities based on stormwater management needs, as well as the effectiveness of improvements and the ability to identify funding; and c) Taking advantage of opportunities such as grant funding, routine repaving or similar maintenance projects, funding associated with Priority Development Areas, public private partnerships, and other funding opportunities.

Policy CIRC-2.11: Design of New Development. Require new development to incorporate design that prioritizes safe pedestrian and bicycle travel and accommodates senior citizens, people with mobility challenges, and children.

Policy CIRC-2.14: Impacts of New Development. Require new development to mitigate its impacts on the safety (e.g., collision rates) and efficiency (e.g., VMT per capita) of the circulation system. New development should minimize cut-through and high-speed vehicle traffic on residential streets; minimize the number of vehicle trips; provide appropriate bicycle, pedestrian, and transit connections, amenities, and improvements in proportion with the scale of proposed projects; and facilitate appropriate or adequate response times and access for emergency vehicles.

Goal CIRC-3: Increase mobility options to reduce traffic congestion, greenhouse gas emissions, and commute travel time.

Policy CIRC-3.1: Vehicle Miles Traveled. Support development and transportation improvements that help reduce per capita vehicle miles traveled.

Policy CIRC-3.2: Greenhouse Gas Emissions. Support development, transportation improvements, and emerging vehicle technology that help reduce per capita greenhouse gas emissions.

Policy CIRC-3.4: Level of Service. Strive to maintain level of service (LOS) D at all City-controlled signalized intersections during peak hours, except at the intersection of Ravenswood Avenue and Middlefield Road and at intersections along Willow Road from Middlefield Road to US 101. The City shall work

with Caltrans to ensure that average stopped delay on local approaches to State-controlled signalized intersections does not exceed LOS E.

Policy CIRC-3.A: Transportation Impact Metric. Supplement Vehicle Miles Traveled (VMT) and greenhouse gas emissions per service population (or other efficiency metric) metrics with Level of Service (LOS) in the transportation impact review process, and utilize LOS for identification of potential operational improvements, such as traffic signal upgrades and coordination, as part of the Transportation Master Plan.

Goal CIRC-4: Improve Menlo Park's overall health, wellness, and quality of life through transportation enhancements.

Policy CIRC-4.1: Global Greenhouse Gas Emissions. Encourage the safer and more widespread use of nearly zero-emission modes, such as walking and biking, and lower emission modes like transit, to reduce greenhouse gas emissions.

Policy CIRC-4.2: Local Air Pollution. Promote non-motorized transportation to reduce exposure to local air pollution, thereby reducing risks of respiratory diseases, other chronic illnesses, and premature death.

Policy CIRC-4.3: Active Transportation. Promote active lifestyles and active transportation, focusing on the role of walking and bicycling, to improve public health and lower obesity.

Policy CIRC-4.4: Safety. Improve traffic safety by reducing speeds and making drivers more aware of other roadway users.

Goal CIRC-5: Support local and regional transit that is efficient, frequent, convenient, and safe.

Policy CIRC-5.7: New Development. Ensure that new nonresidential, mixed-use, and multiple-dwelling residential development provides associated needed transit service, improvements, and amenities in proportion with demand attributable to the type and scale of the proposed development.

Goal CIRC-6: Provide a range of transportation choices for the Menlo Park community.

Policy CIRC-6.1: Transportation Demand Management. Coordinate Menlo Park's transportation demand management efforts with other agencies providing similar services within San Mateo and Santa Clara Counties.

Policy CIRC-6.4: Employers and Schools. Encourage employers and schools to promote walking, bicycling, carpooling, shuttles, and transit use.

Goal CIRC-7: Utilize innovative strategies to provide efficient and adequate vehicle parking.

Policy CIRC-7.1: Parking and New Development. Ensure new development provides appropriate parking ratios, including application of appropriate minimum and/or maximum ratios, unbundling, shared parking, electric car charging, car sharing, and Green Trip Certified strategies to accommodate residents, employees, customers, and visitors.

Policy CIRC-7.2: Off-Street Parking. Ensure both new and existing off-street parking is properly designed and used efficiently through shared parking agreements and, if appropriate, parking in-lieu fees.

Policy CIRC-7.3: Park Once. Support the establishment of shared public parking, particularly in mixed-use and retail areas, and of Park-Once strategies that allow motorists to park once and complete multiple daily tasks on foot before returning to their vehicle, helping to reduce vehicle trips and parking demand.

Menlo Park Municipal Code

The proposed project is located in the Life Sciences – Bonus (LS-B) zoning district. The Zoning Ordinance requires development and implementation of a Transportation Demand Management (TDM) plan:

Section 16.44.090 Transportation Demand Management. As stated in Section 16.44.090 of the City's Zoning Ordinance, all new construction, regardless of size, and building additions of 10,000 or more square feet of gross floor area, or a change of use of 10,000 or more square feet of gross floor area shall develop a TDM plan to reduce associated vehicle trips to at least 20% below standard generation rates for uses on the individual project site. Each individual applicant is required to prepare its own TDM plan and provide an analysis to the satisfaction of the City's Transportation Manager of the impact of that TDM program.

The TDM Program Guidelines (July 2015) provide options for project applicants to mitigate the traffic impacts of new developments. The guidelines include an extensive list of TDM measures accompanied with the number of trips credited to each measure and the rationale for each measure. The list of recommended measures and the associated trip credit is maintained by City/County Association of Governments of San Mateo County (C/CAG) as part of the San Mateo County CMP and are as follows:

Eligible TDM measures may include but are not limited to:

- Participation in a local Transportation Management Association (TMA) that provides documented, ongoing support for alternative commute programs;
- Appropriately located transit shelter(s);
- Subsidized transit tickets/passes for employees;
- Subsidized pedestrian/bicyclists commutes (such as credits to go towards shoes or bike repairs);
- Safe, well-lit, accessible, and direct route to the nearest transit or shuttle stop or dedicated, fully accessible bicycle and pedestrian trail;
- Preferred parking for carpools or vanpools;
- Designated parking for car-share vehicles;
- Requiring drivers to pay directly for using parking facilities;
- Public and/or private bike share program;
- Secure bicycle storage;
- Secure shower and changing rooms;
- Provision or subsidy of carpool, vanpool, shuttle, or bus service, including transit passes for site occupants;
- Required alternative work schedules and/or telecommuting for non-residential uses;
- Passenger loading zones for carpools and vanpools at main building entrance;

- Car share membership for employees or residents;
- Emergency Ride Home programs;
- Green Trip Certification.
- Measures receiving TDM credit shall be:
  - Documented in a TDM plan developed specifically for each project and noted on project site plans, if and as appropriate;
  - Guaranteed to achieve the intended reduction over the life of the development, as evidenced by annual reporting provided to the satisfaction of City's Transportation Manager;
  - Required to be replaced by appropriate substitute measures if unable to achieve intended trip reduction in any reporting year;
  - Administered by a representative whose updated contact information is provided to the Transportation Manager.

City of Menlo Park Complete Streets Policy

The Complete Streets Policy was adopted by the City in 2013. The policy confirms the City's commitment to provide safe and convenient travel along and across streets for all users. It also requires Complete Streets infrastructure to be considered for incorporation into all significant planning, funding, design, approval, and implementation processes for new, maintenance, and retrofit construction.

City of Menlo Park Neighborhood Traffic Management Plan

The Neighborhood Traffic Management Plan (November 2004) was developed to mitigate the adverse effects of increased vehicle speeds and vehicle volumes on neighborhood streets. The primary goal of this plan is to correct unsafe conditions at prioritized locations with higher incidences of collisions and higher speeds. The plan recommends two levels of measures, Level I "Express" and Level II. Level I "Express" measures include education and enforcement initiatives. Level II measures are traffic management features that can be implemented to divert/slow traffic (i.e. speed humps) traffic and to restrict access to certain properties. The traffic management measures are recommended by City staff at the request of the community.

City of Menlo Park Transportation Master Plan

The City adopted the finalized TMP in November 2020 to serve as an update of the City's Bicycle and Sidewalk Plans and advance goals and policies set forth in the General Plan Circulation Element. The TMP provides the ability to identify appropriate projects to enhance the transportation network, conduct community engagement to ensure such projects meet the communities' goals and values, and prioritize projects based on need for implementation. The following recommended TMP projects (that are also included in the TIF) proposed within the vicinity of the project site and are identified below for informational purposes only in Table 2.

Table 2. City of Menlo Park Recommended TMP Projects

TMP Project No.	Location	Project	Project Details
8.	Bayfront Expressway and Willow Road	Bayfront Expressway Multimodal Corridor Project	Install bike signals, high-visibility crosswalks, and cross-bike markings. Reconstruct eastbound Willow Road right-turn channelizing island to improve pedestrian access. Remove southbound Bayfront Expressway channelizing island to provide space for shoulder-running bus lane and implement a right-turn overlap phase. Modify traffic signal to accommodate channelized right turn modifications. Install Transit Signal Priority (TSP) for queue jumps by shoulder-running buses.
9.	Bayfront Expressway	Bayfront Expressway Multimodal Corridor Project	Install shoulder-running peak hour bus lane on Bayfront Expressway. Install Transit Signal Priority (TSP) at signalized intersections.
11.	Bayfront Expressway	Dumbarton Corridor Project	Implement Dumbarton Transportation Corridor Study alternative with improved mixed flow and managed lane connections, including grade separations with revised access to University Avenue, Willow Road, Chilco Street, Marsh Road, and Chrysler Drive, to include City and Neighborhood involvement in the project development (not included in TIF).
13.	Dumbarton Rail Corridor Trail from Marsh Road to University Avenue	Dumbarton Corridor Project	Construct Class I Multi-Use Path.
25.	Ivy Drive from Willow Road to Market Place	Belle Haven Bicycle Network Improvement Project	Designate Class III Bicycle Route
27.	Ivy Drive from Willow Road to Chilco Street	Ivy Drive Pedestrian Network Improvement	Widen sidewalks on both sides of Ivy Drive and narrow existing median (requires coordination with SFPUC).
30.	Adams Drive from O'Brien Drive to University Avenue	Adams Drive Pedestrian and Bicycle Network Improvement	Install sidewalk on both sides of the roadway, to be completed in phases, as the properties are redeveloped. Establish Class II Bicycle Lanes.
31.	University Avenue and Adams Drive	University Avenue and Adams Drive	Install traffic signal (requires coordination with City of East Palo Alto and Caltrans).

Table 2. City of Menlo Park Recommended TMP Projects

TMP Project No.	Location	Project	Project Details
		Intersection Improvements	
32.	O'Brien Drive from Willow Road to University Avenue	O'Brien Drive Pedestrian Network Improvement	Install sidewalk on both sides of the roadway, to be complete in phases, as the properties are redeveloped. Establish Class II Bicycle Lanes.
36.	Willow Road between Bayfront Expressway and US-101	Willow Road Corridor Improvement Project	Buses allowed to use existing right turn lane at O'Brien location for queue jump with TSP. Implement peak hour left-turn restrictions.
37.	Willow Road from Dumbarton Rail Corridor to Newbridge Road	Willow Road Corridor Improvement Project – Alternative C	Install eastbound Willow Road one-way Class IV separated bikeway between Hamilton Avenue and US 101 Willow Road Interchange. Install westbound Willow Road one-way Class IV separated bikeway between Dumbarton Rail Corridor and US 101 Willow Road interchange.
38.	Willow Road and Hamilton Avenue	Willow Road Corridor Improvement Project	Modify southbound Hamilton Avenue to shared left-through lane and time-of-day limited right turn lane. Implement evening peak period parking restriction on the west side of southbound Hamilton Avenue. Modify northbound and southbound Hamilton Avenue to split phase.
39.	Willow Road and Ivy Drive	Willow Road Corridor Improvement Project	Install right-turn overlap on southbound Ivy Drive and restrict eastbound Willow Road U-turns. Widen pedestrian refuge island to match crosswalk width on east Willow Road leg. Convert existing crosswalks to high-visibility crosswalks. Extend pedestrian crossing times.
40.	Willow Road and O'Brien Drive	Willow Road Corridor Improvement Project	Install curb ramps at all corners of the intersection. Install high-visibility crosswalks on all legs and add pedestrian signals (including new crosswalks crossing Willow Road). Install bulb-outs into O'Brien Drive on northeast and southeast corners.
41.	Willow Road and Newbridge Street	Willow Road Corridor Improvement Project	Convert existing crosswalks to high-visibility crosswalks. Modify signal timing to lead-lag operation on Newbridge Street with the leading left-turn phase on the southbound

Table 2. City of Menlo Park Recommended TMP Projects

TMP Project No.	Location	Project	Project Details
			Newbridge Street approach and lagging left-turn phase on the northbound Newbridge Street approach.
50.	Willow Road between Bayfront and Newbridge Street	Willow Road Corridor Improvement Project	Work with Caltrans to modify signal timing at Caltrans intersections to include All-Red clearance time.
157	Citywide	Enhanced Bicycle and Pedestrian Detection	Install bicycle and pedestrian detection at intersections to efficiently serve residents and visitors traveling via alternative modes.
158	Citywide	Adaptive Traffic Control System Operations and Maintenance	Adaptive Traffic Control System O&M to better serve residents and guests traveling throughout the city. Adaptive signaling utilizes real-time data at signalized intersections rather than conventional pre-programmed, daily signal timing schedules.
159	Citywide	Automated Traffic Signal Performance Measurement	Automated Traffic Signal Performance Measurement (ATSPM), provides way to collect data for use in evaluating performance measures. Data from the ATSPM software is used to provide more efficient signal timing plans, targeted repairs and maintenance resulting in increased safety and improved traffic operations.
176	Citywide	Willow Road Relinquishment	Evaluate relinquishment of Willow Road by Caltrans from Bayfront Expressway to Bay Road.
196	Citywide	Update Crosswalk Policy	Update crosswalk policy to identify potential RRFB locations and priority.

1.4 Improvements for Transportation Impacts

When deficiencies from a TIA are identified, improvements should be incorporated into projects as conditions of approval. Applicants will also be required to pay all applicable local and regional transportation impact fees. To the extent a project is conditioned to construct a project that is included within the local or regional fee program, a reimbursement agreement may be sought for a portion of the improvement project costs beyond the project's fair share. All project deficiencies should be addressed consistent with the policies of the General Plan. Under these circumstances, the applicant should meet with City staff to identify transportation improvements that address the deficiencies.

City of Menlo Park Transportation Impact Fee

The City of Menlo Park has a Transportation Impact Fee (TIF) codified in Municipal Code Chapter 13.26 to help fund transportation improvements as new development occurs in the City. New development and redevelopment

projects are subject to the TIF to contribute to the cost of new transportation infrastructure associated with the development. The types of developments that are subject to the TIF are:

- All new development in all land use categories identified in the City's zoning ordinance
- Any construction adding additional floor area to a lot with an existing building
- New single-family and multi-family dwelling units
- Changes of use from one land use category to a different land use category that requires Planning Commission approval.

The TIF provides a mechanism to modernize the City's fee program to collect funds towards construction of the improvements expected to be identified and prioritized in the Transportation Master Plan (as noted above).



SOURCE: Bing Maps

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Figure 2

Project Location and Study Area

1005 O'Brien Drive and 1320 Willow Road Life Sciences Project

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2 Existing Conditions

This section describes existing conditions within the study area. Characteristics are provided for the existing roadway, transit, bicycle, and pedestrian facilities.

2.1 Roadway System

Characteristics of the existing street system within the study area are described below.

U.S. Highway 101 (US-101 or Highway 101) is a north-south, 8-lane, divided highway located south of the project site. The highway serves as a regional transportation corridor on the peninsula for the project, with access provided via the Willow Road interchange. US-101 is designated as a Freeway/Expressway by the City of Menlo Park General Plan. The posted speed limit is 65 miles per hour (MPH) within the study area.

Bayfront Expressway (State Route 84 or SR-84) is a north-south, six-lane, divided roadway with a raised median and left-turn pockets throughout the study area. The expressway connects the project site to major corridors and communities, including Interstate 880 (I-880) via the Dumbarton Bridge and communities in the East Bay. Bayfront Expressway is designated as a Freeway/Expressway by the City of Menlo Park General Plan. The posted speed limit is 50 MPH within the vicinity of the project site. Sidewalk, curb, and gutters are not provided along the majority of Bayfront Expressway within the study area; however, pedestrian crosswalks and bicycle lanes are provided at major intersections connecting bicycle and pedestrian facilities along adjacent streets to the Class I Bike Path that runs parallel to westbound traffic on the expressway.

O'Brien Drive is a north-south undivided, two-lane roadway located along the project site's southern boundary and is designated as a Mixed Use Collector by the City of Menlo Park General Plan. O'Brien Drive serves as the primary roadway to and from the project site. There are no specific bicycle facilities, and pedestrian facilities are present along the northside of the roadway. The posted speed limit is 25 MPH.

Willow Road is an east-west, four-lane divided roadway directly north of the project site and provides direct access to the site. Willow Road serves as a connection between major corridors, including Highway 101 and Bayfront Expressway, and is designated as a Boulevard from Bayfront Expressway to Bay Road, an Avenue – Mixed Use from Bay Road to Middlefield Road, and a Neighborhood Collector from Middlefield Road to Alma Road, per the City of Menlo Park General Plan. Bicycle and pedestrian facilities and bus stops for Dumbarton Express (DB and DB1) buses, and M1 shuttle are provided along the roadway. Buffered Class II bicycle lanes are located along Willow Road. Parking is generally not permitted along the roadway, except for some portions in residential areas. The posted speed limit ranges from 25 to 40 MPH within the study area.

University Avenue is an east-west, four-lane divided roadway located approximately to the southeast of the project site. University Avenue is designated as a Boulevard according to the City of Menlo Park General Plan. Similar to Willow Road, University Avenue connects major corridors, including Highway 101 and Bayfront Expressway. Bicycle and pedestrian facilities are provided along the roadway, within the project vicinity. Bicycle facilities along University Avenue are classified as Class I Bike Paths. On-street parking is generally not permitted, and there is no availability within the project vicinity. The posted speed limit is 25 MPH within the study area.

Adams Drive is a north-south, undivided, two-lane roadway located southeast of the project site that connects the project site to major corridors, such as University Avenue. There are no specific bicycle or pedestrian facilities located throughout the roadway. No posted speed limit is present.

Hamilton Avenue is a north-south, undivided, two-lane roadway located northeast of the project site. Hamilton Avenue is designated as a Neighborhood Collector by the City of Menlo Park General Plan. There are grade separated pedestrian facilities and bus stops for Route 81 located along the roadway. The posted speed limit is 25 MPH.

Ivy Drive is a north-south, two-lane, divided roadway located north of the project site. Ivy Drive is considered a local access roadway by the City of Menlo Park General Plan. A vegetative divider between lanes is present but is fragmented to provide access for four-way intersections. Pedestrian facilities and bus stops for the City of Menlo Park M1-Crosstown Shuttle (M1 shuttle) are located throughout the roadway. The posted speed limit is 25 mph.

Kavanaugh Drive is a north-south, two-lane, undivided roadway located to the south of the project site. Kavanaugh Drive is designated as a Local Access Road by the City of Menlo Park General Plan. There is on-street parking and pedestrian facilities are present. Bus stops for Route 81 are present along the roadway. The posted speed limit is 25 mph.

Newbridge Street is a north-south, divided, two-lane roadway located southwest of the project site. Newbridge Street is designated as a neighborhood collector roadway by the City of Menlo Park General Plan. The roadway is a multi-use pathway and features a green-striped Class II bike lane on the westbound lane, as well as pedestrian facilities on both east and westbound sides. Bus stops for SamTrans Route 281, 296, 2960, and 397 buses are located along the road. The posted speed limit is 25 MPH.

2.2 Transit System

Figures 3-A and 3-B show the existing transit facilities within the study area. The project site is served by passenger rail and bus services. The Caltrain commuter rail system serves the Menlo Park Station, located at 1120 Merrill Street, and the Palo Alto Station, located at 95 University Avenue, both are approximately 3 miles southwest of the project site. The study area is also served by the Menlo Park Shuttle Service, the SamTrans bus service, and the Dumbarton Express, all of which collectively provide local and regional public transit within the project area.

Caltrain

Caltrain is a commuter railroad operating between San Francisco and San Jose, with limited service to Gilroy. As of 2023, Caltrain's fleet consists of 29 locomotives, 134 passenger cars, and 37 bike cars that service 31 stations over a 77-mile corridor. Caltrain is owned and operated by the Peninsula Corridor Joint Powers Board, which is made up of representatives from the City and County of San Francisco, the San Mateo County Transit District, and the Santa Clara Valley Transportation Authority (Caltrain 2023).

As noted above, the proposed project would be served by Caltrain's Menlo Park and Palo Alto stations, both of which are located approximately 3.0 miles south of the project. Weekday headways for northbound and southbound trains at either station average around 30 to 45 minutes, however during peak hours can be as low as 10 to 15 minutes.

Menlo Park Shuttle Service

The City of Menlo Park offers a free shuttle service for local community destinations and commuters working in business parks. All shuttles are wheelchair-accessible and have a rack that accommodates two bicycles. The project site is served by the M1 Crosstown and M4 Willow Road shuttles. The M4 Willow Road shuttle provides service from the Menlo Park Caltrain station to O'Brien Drive along Willow Road. The M1 Crosstown shuttle provides service across the City, from Del Norte Avenue to Monte Rosa Drive. The nearest M4 shuttle stop is located at the intersection of Willow Road and O'Brien Drive, immediately southwest of the project site. The nearest M1 shuttle stop is located at the intersection of Willow Road and Ivy Street, approximately 0.15 miles northwest of the project. The M1 shuttle is a community shuttle that provides all day service with 90-minute headways, and the M4 shuttle provides morning and afternoon commuter service with an average of 60-minute peak service headways to synchronize with Caltrain's peak period schedule (City of Menlo Park 2023).

San Mateo County Transit District (SamTrans)

SamTrans bus services are part of the regional public transit and transportation effort conducted by the County of San Mateo to provide bus service throughout San Mateo County and into parts of San Francisco and Palo Alto. In total, SamTrans operates 76 bus routes throughout its service area (SamTrans 2023). There are five routes that serve the project site: routes 81, 281, 296, 296 Owl, and 397 Owl.

Route 81 serves the Menlo-Atherton High School, primarily operating along roads adjacent to neighborhood communities. This route operates on weekdays only, from 7:30am to 8:30am with 10-minute headways, and from 2:30pm to 5:00pm with 30-minute headways. The nearest stop to the project is located at Carlton Avenue and Ivy Drive, approximately 0.15 miles from the project site.

Route 281 serves the Stanford Shopping Center and the Menlo Park Senior Center, primarily operating along University Avenue and Newbridge Street. This route operates weekdays from 6:00am to 10:30pm, with 30-minute headways, and on the weekends from 8:00am to 7:30pm, with 30-minute headways. The nearest stop to the project is located at Willow Road and Newbridge Street, approximately 0.30 miles from the project site.

Route 296 serves the Redwood City Transit Center, primarily operating along Middlefield Road and Willow Road. This route operates weekdays from 5:15am to 10:45pm, with 20-minute headways, and on weekends from 7:45am to 8:00pm, with 60-minute headways. The nearest stop to the project is located at Willow Road and Newbridge Street, approximately 0.30 miles from the project site.

Route 296 Owl is a night service route that serves the Palo Alto Transit Center and the Menlo Park Transit Center, primarily operating along Middlefield Road, Willow Road, and University Avenue. This route operates on weekdays from 3:40am to 5:20am and 10:45pm to 12:25am with 60-minute headways, and on weekends from 3:45am to 8:25am and 7:45pm to 12:25am with 60-minute headways. The nearest stop to the project is located at Willow Road and Newbridge Street, approximately 0.30 miles from the project site.

Route 397 Owl is a night service route that serves communities along the western side of the peninsula from San Francisco to Palo Alto. This route operates daily from 1:00am to 7:00am, with 60-minute headways. The nearest stop to the project is located at Willow Road and Newbridge Street, approximately 0.30 miles from the project site.

Ride Plus is a new, on-demand, shared-ride service by SamTrans that offers affordable transportation for residents throughout East Palo Alto and the Belle Haven neighborhood of Menlo Park. Ride Plus operates daily from 6:00am to 10:00pm within the local service area.

Dumbarton Express

The Dumbarton Express is an all-day, limited stop bus service that provides a connection for riders between the East Bay and the Peninsula via the Dumbarton Bridge. The Dumbarton Express operates two bus routes: DB and DB1, both of which operate Monday through Friday except holidays. The DB route operates between the Union City BART (Bay Area Rapid Transit) station and the Stanford Oval from 5:25am to 11:45am and from 1:30pm to 7:05pm with 30-minute headways. The DB1 route operates between the Union City BART station and the Deer Creek Road business park in Palo Alto from 5:10am to 11:59am and 12:43pm to 6:45pm with 30-minute headways. The nearest bus stop for both routes is located at Willow Road and Ivy Drive, approximately 0.15 miles from the project site.

2.3 Pedestrian and Bicycle Facilities

The City's TMP indicates that, while the City's sidewalk network is largely complete, there are still a number of challenges that can make walking difficult for many residents. These issues include difficulty crossing multi-lane, high-traffic volume streets, lack of buffers between sidewalks from traffic, and obstruction of sidewalks by municipal and utility infrastructure (e.g., utility poles) (City of Menlo Park 2020).

Land uses around the project site are predominately comprised of general offices, which serve as areas with active transportation users. Sidewalks are present along the eastern portions of O'Brien Drive, and on both north and south sides of Willow Road. However, there are missing sidewalk segments on both eastern and western portions of O'Brien Drive including directly along the project site boundary, and along Adams Drive. These roadways are outfitted with storm drain outlets that either flow into the municipal storm drain system or directly into vegetated swales. Designated crosswalks are also present along most of the intersections near the project site.

Figure 4 illustrates the existing and future bicycle facilities in the study area. The City's TMP also includes specific class designations for bicycle facilities within the City. The following designations are used to classify bicycle facilities with the City:

- Class I Shared Use Path allows for two-way, off-street bicycle use and also may be used by pedestrians, skaters, wheelchair users, joggers, and other non-motorized users. These facilities are frequently found in parks, along rivers, beaches, and in greenbelt or utility corridors where there are few conflicts with motorized vehicles. Path facilities can also include amenities such as lighting, signage, and fencing.
- Class II On-Street Bicycle Lanes is designated exclusively for bicycle travel. On-street bicycle lanes are separated from vehicle lanes by striping and can include pavement stencils and other treatments. On-street bicycle lanes are most appropriate on collector streets with single-lane of traffic in each direction where moderate traffic volumes and speeds are too high for shared-roadway use.
- Class III: Shared Roadways allows for bicyclists and motor vehicles to use the same roadway space. These facilities are typically used on roads with low speeds and traffic volumes; however, they can be used on higher volume roads with wide outside lanes or shoulders. A motor vehicle driver will usually have to cross over into the adjacent lane to pass a bicyclist unless a wide outside lane or shoulder is provided.

- **Class IV: Separated Bikeways** is an exclusive bike facility that combines the user experience of a separated path with the on-street infrastructure of an on-street bike lane. A separated bikeway is physically separated from motor traffic by a vertical element and distinct from the sidewalk. In situations where on-street parking is allowed, separated bikeways are located between the parking and the sidewalk.
- **Multi-use Pathways** provides priority access to pedestrians and bicycles only, per Caltrans pathway minimum standards. Multi-use pathways feature high-quality crossings where they traverse major roadways.

The closest designated bicycle facilities are a Class III Bike Route along O'Brien Drive, located immediately west of the project site, and a buffered Class II bicycle lane along Willow Road, immediately north of the project site. In addition, an existing Class I Bike Path is provided along Bayfront Expressway and a Class II Bike Lanes are present on Newbridge Street and University Avenue. As indicated in the TMP, proposed bicycle facilities in the vicinity of the project site include an extension of the Class II Bike Lane along O'Brien Drive and a Class II Bike Lane along Marsh Road, from Bayfront Expressway to Bay Road. In addition, the TMP identified future Class IV bikeways for Willow Road.

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SOURCE: Bing Imagery 2021, San Mateo County 2015

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FIGURE 3-A

Existing Transit Facilities - San Mateo County Transit District

1005 O'Brien Drive and 1320 Willow Road Life Sciences Project

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SOURCE: Bing Imagery 2021, Dumbarton Express (Accessed 2023) , City of Menlo Park (Accessed 2023)

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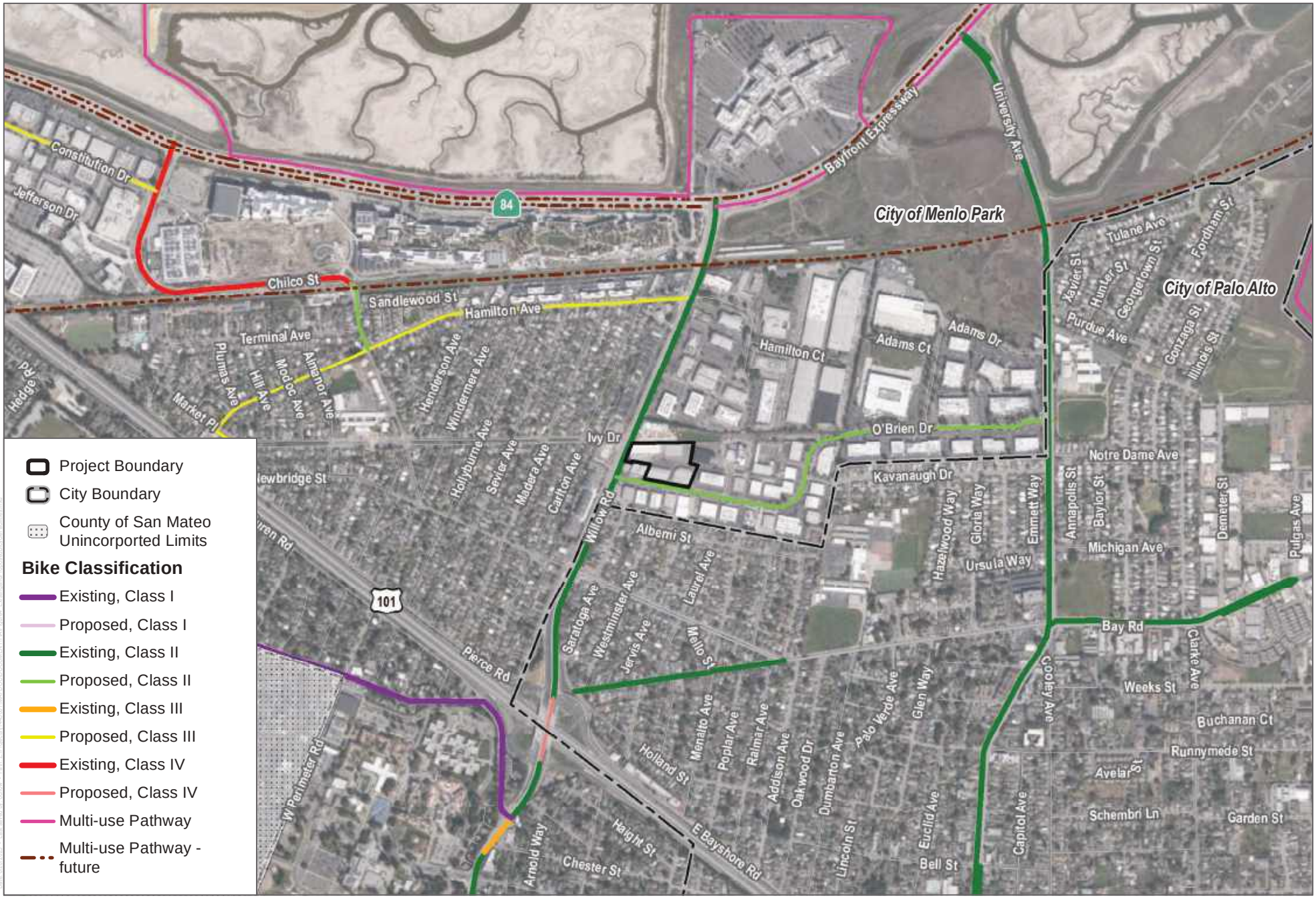
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FIGURE 3-B

Existing Transit Facilities - Dumbarton Express and Menlo Park Shuttle Service

1005 O'Brien Drive and 1320 Willow Road Life Sciences Project

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SOURCE: Bing Imagery 2021, City of Menlo Park (Accessed 2023)

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FIGURE 4

Existing and Proposed Bicycle Facilities

1005 O'Brien Drive and 1320 Willow Road Life Sciences Project

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3 Project Traffic

This section documents the trip generation, distribution, and assignment of project traffic in the study area.

3.1 Trip Generation

The project would include demolition of two existing office and mini-warehouse buildings, and the construction of two research and development office buildings and an accompanying parking garage.

Trip generation estimates for the proposed project are based on daily and AM and PM peak hour trip generation rates obtained from the ITE Trip Generation Handbook, 11th Edition (2021). In order to accurately represent the proposed project's trip generation, trips generated from the existing land uses that the project would replace were calculated and subtracted resulting in the net project trip generation. Consistent with the City of Menlo Park City Zoning Ordinance, and C/CAG requirements, a reduction was applied to account for the proposed TDM plan that the project would be required to provide. The TDM plan would be expected to achieve at least a 35% reduction of daily and peak hour vehicle trips. Table 3 displays the proposed project trip generation estimates.

Table 3. Project Trip Generation

Land Use	ITE Code	Size/Unit	Daily	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
Trip Rates[1]									
Mini-Warehouse	151	per TSF	1.45	0.05	0.04	0.09	0.07	0.08	0.15
Research and Development Center	760	per TSF	11.08	0.84	0.19	1.03	0.16	0.82	0.98
Trip Generation of Existing Uses									
985 O'Brien Drive – Mini-Warehouse	151	10.022 TSF	14	1	0	1	1	1	2
985 O'Brien Drive – R&D	760	10.022 TSF	111	8	2	10	2	8	10
1001 O'Brien Drive – R&D	760	20.542 TSF	228	17	4	21	3	17	20
1320 Willow Road – Mini-Warehouse	151	50.045 TSF	73	3	2	5	4	4	8
Existing Uses Subtotal[2]			426	29	8	37	10	30	40
Trip Generation of Proposed Project									
1005 O'Brien Drive – R&D	760	154.581 TSF	1,713	131	28	159	24	127	151
1320 Willow Road – R&D	760	73.500 TSF	814	62	13	75	11	61	72
Proposed Project Subtotal			2,527	193	41	234	35	188	223
TDM Plan: 35% Reduction[3]			-884	-68	-14	-82	-12	-66	-78
Proposed Project Total			1,643	125	27	152	23	122	145
Total Net Project Trip Generation (Proposed – Existing)			**1,217**	**96**	**19**	**115**	**13**	**92**	**105**

Source: ITE 2021

Notes: TSF = thousand square feet
Some of the totals may not match exactly due to rounding.

1 Trip rates from Trip Generation, 11th Edition, Institute of Transportation Engineers, 2021.

2 A portion of the existing uses may be currently vacant, however, for the purposes of this analysis, all uses were assumed to be fully operational.

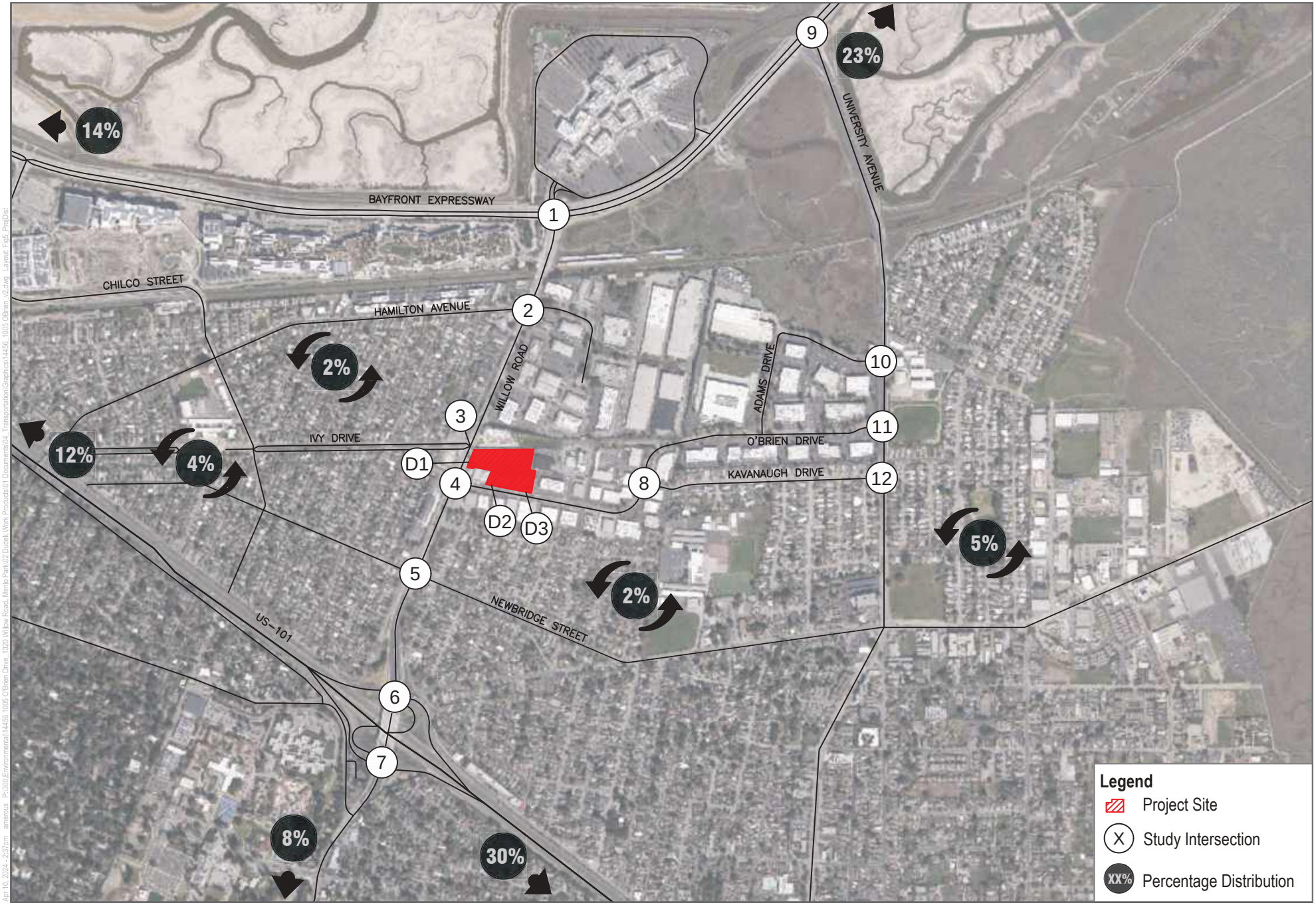
3 Consistent with the City of Menlo Park City Zoning Ordinance, and C/CAG requirements, a reduction was applied to account for the proposed TDM plan that the project would be required to provide. The TDM plan specifies that a 36% reduction in VMT is possible using the C/CAG TDM Mitigation score sheet for large, transit proximate, non-residential uses such as the project. However, to provide a conservative analysis, a 35% reduction is utilized throughout the analysis, therefore, the TDM plan would be expected to achieve at least a 35% reduction of daily and peak hour vehicle trips.

As shown in Table 4, the proposed project, after the application of the 35% reduction as required by the TDM plan, would generate 1,643 daily trips, 152 AM peak hour trips (125 inbound and 27 outbound), and 145 PM peak hour trips (23 inbound and 122 outbound). After subtracting for the existing land uses, the proposed project's net trip generation would be 1,217 daily trips, 115 AM peak hour trips (96 inbound and 19 outbound), and 105 PM peak hour trips (13 inbound and 92 outbound).

3.2 Trip Distribution and Assignment

Project trip distribution percentages are based on logical travel paths to and from the project site and consideration of established traffic distribution patterns in the area. Project vehicles were distributed to and from each driveway. The project's trip distribution percentages were approved by the City's Public Works Department prior to the completion of the transportation analysis and the TIA.

The existing land uses within the project site that would be replaced by the project were calculated and subtracted from the roadway network. Figure 5 illustrates the project trip distribution and Figure 6 illustrates the existing land uses trip assignment. The proposed project trip assignment (without any subtracting of existing land uses) is provided in Figure 7. Finally, once the existing land uses were removed from the roadway network, the net project trip assignment could be calculated. Figure 8 displays the net project trip assignment.



SOURCE: Bing Maps

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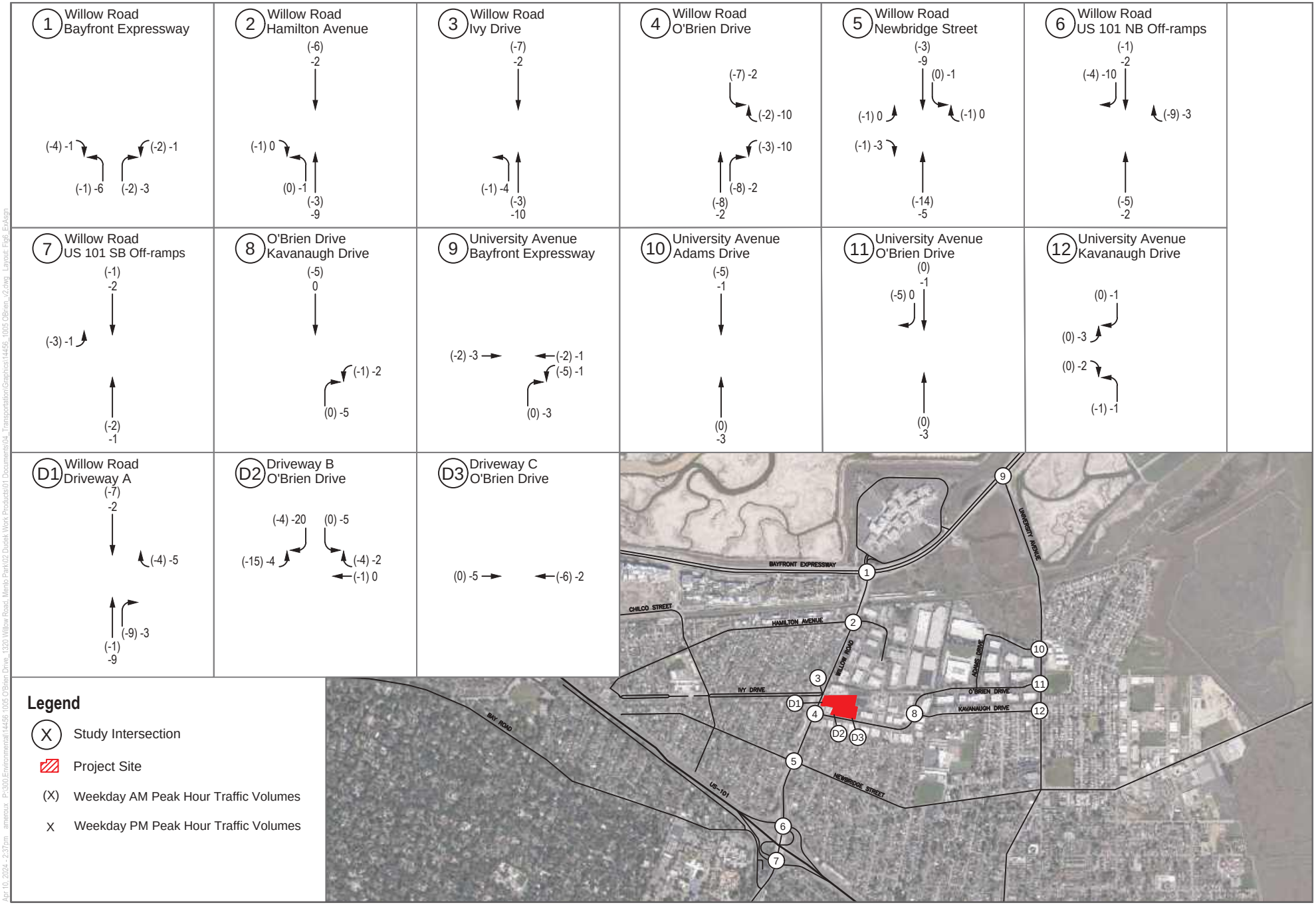
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Figure 5

Project Trip Distribution

1005 O'Brien Drive and 1320 Willow Road Life Sciences Project

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SOURCE: Bing Maps

Figure 6

Existing Land Uses Trip Assignment (Trips to be Removed)

1005 O'Brien Drive and 1320 Willow Road Life Sciences Project

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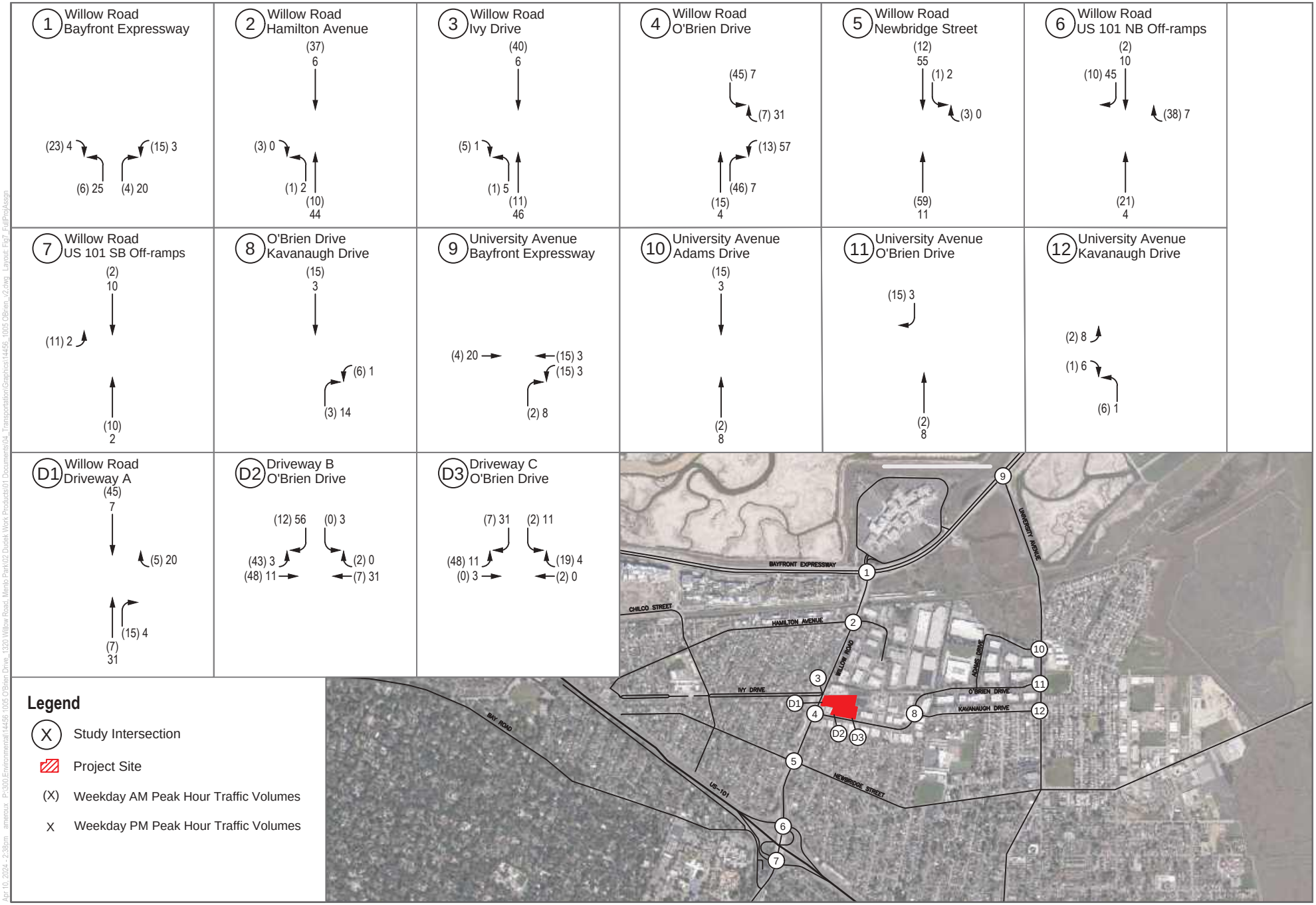
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SOURCE: Bing Maps

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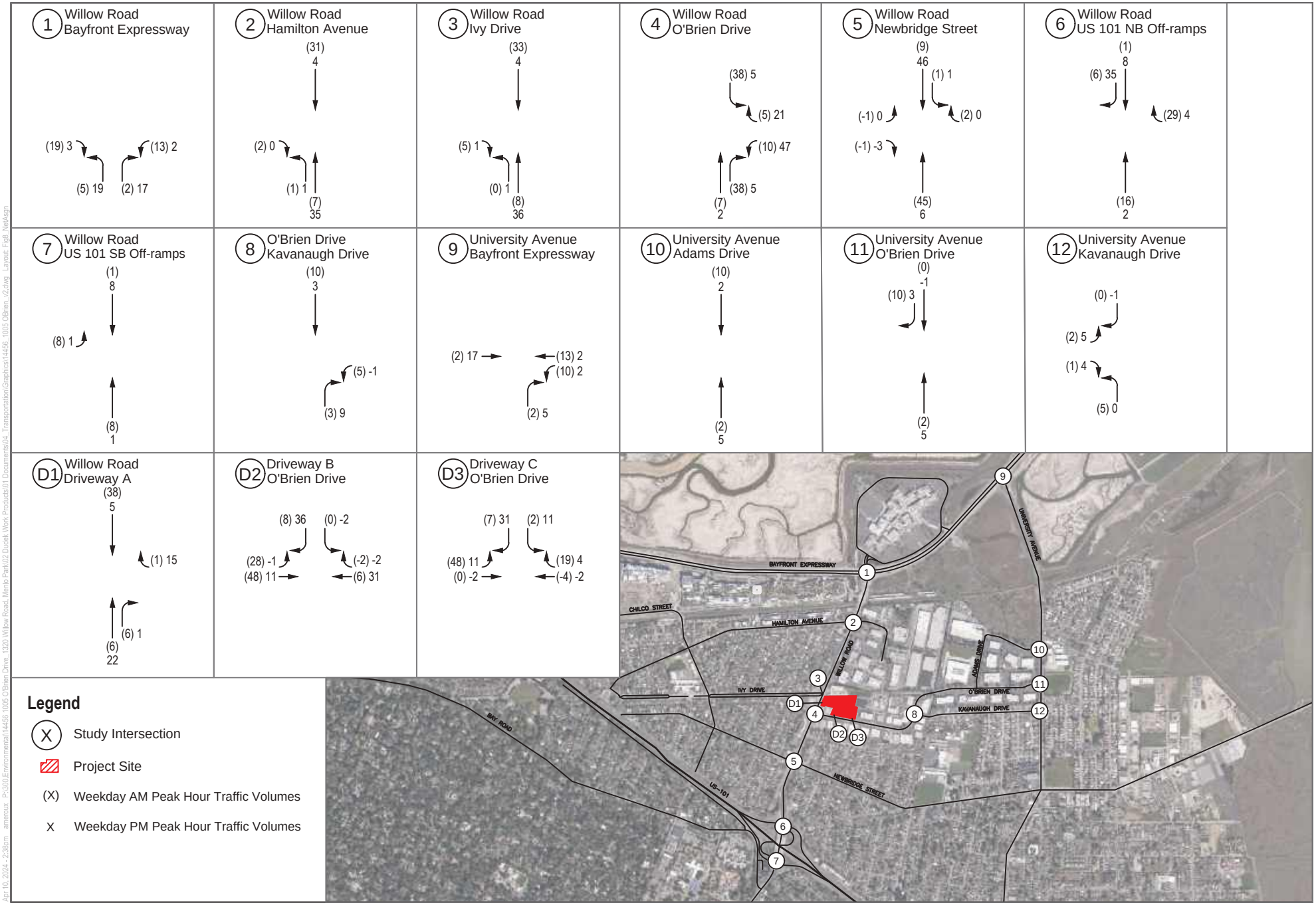
Figure 7

Proposed Project Trip Assignment

1005 O'Brien Drive and 1320 Willow Road Life Sciences Project

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SOURCE: Bing Maps

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Figure 8

Net Project Trip Assignment

1005 O'Brien Drive and 1320 Willow Road Life Sciences Project

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4 Vehicle Miles Traveled Analysis

This section describes the vehicle miles traveled (VMT) analysis of the proposed project.

4.1 Significance Threshold

According to City TIA guidelines, the evaluation of non-residential land use is based on a daily VMT per employee metric. Using the City's Travel Demand Model that has been customized for City's transportation analysis and as described in detail under VMT Analysis, this metric is calculated only for home-based work/employee trips, per OPR's technical advisory. Based on the latest citywide travel demand model, regional average employee VMT is 15.9 per employee. Therefore, the City's employee VMT impact threshold, at 15% below regional average, would be 13.6 daily VMT per capita.

4.2 VMT Analysis and Impact Determination

To determine the appropriate VMT analysis tool (e.g., C/CAG VMT sketch model or City's travel demand model). Based on discussion with the City, the Menlo Park travel demand forecast model was used. The model is a mathematical representation of travel within the nine Bay Area counties, as well as Santa Cruz, San Benito, Monterey, and San Joaquin counties. The base model structure was developed by Metropolitan Transportation Commission (MTC) and further refined by the C/CAG and Santa Clara Valley Transportation Authority for use within San Mateo County and Santa Clara County. The City further refined this model for application with Menlo Park to add more detail to the zone structure and transportation network.

There are four main components of the model: 1) trip generation, 2) trip distribution, 3) mode choice, and 4) trip assignment. The model uses socioeconomic inputs (i.e., population, income, employment) aggregated into geographic areas, called transportation analysis zones (TAZ) to estimate travel within the model area. There are 81 TAZs within the model to represent the City of Menlo Park. The model was used to estimate the proposed project's effect on VMT in accordance with the City's VMT guidelines. The proposed project is located in TAZ 332, and Figure 9 displays the VMT thresholds and TAZs within the area.

The model has a base year of year 2019. It has a near-term range of year 2027 for cumulative projects traffic forecast to include the pending developments in the City of Menlo Park, City of East Palo Alto and City of Palo Alto (as of December 2023). The long-range forecast year of the model is 2040 which assumes buildout of the City of Menlo Park General Plan and any pending General Plan Amendments, the RHNA 6th cycle Housing Element Update, and the pending General Plan Amendment for 123 Independence Drive, the Willow Village project and the Parkline project, as well as the buildout of and regional growth projected by the Association of Bay Area Governments (ABAG), modified by VTA/C/CAG for model land use inputs.

Therefore, the project's VMT analysis was conducted under year-2040 conditions. The project's VMT summary is provided in Table 4.

Table 4. Vehicle Miles Traveled Summary

Land use / VMT Metric	Regional Average	VMT Threshold (15% below Regional Average)	Project VMT	VMT Impact	VMT Reduction needed
R&D/per employee	15.9	13.6	19.0	Yes	28.4%

Source: Hexagon, 2023.

Because the project is proposing offices/research and development space, the efficiency metric of VMT per employee was used. A project-specific model run was conducted and the project's employee VMT was extracted from the TAZ. The project's VMT was estimated to be 19.0 VMT per employee. The regional average VMT per employee is 15.9 and the threshold is 13.6 VMT per employee for the City. Therefore, the project VMT exceeds the VMT significance threshold by 28.4%.

The estimated project VMT does not account for the project's proposed Transportation Demand Management (TDM) Plan. Without any TDM measures, the project's employee use may cause substantial additional VMT. However, as shown below, with the implementation of a TDM Plan, the Project's VMT impact would be less than significant.

4.3 Transportation Demand Management (TDM) Plan

The TDM plan would need to achieve a minimum 28.4% reduction in VMT to reduce the proposed project's impacts to less-than-significant levels, which is not within the 20% reduction in vehicle trips required by Section 16.44.090 of the Menlo Park Municipal Code. However, up to a 36% reduction in VMT is possible using the C/CAG TDM Mitigation score sheet for large, transit proximate, non-residential uses such as the project. However, to provide a conservative analysis, a 35% reduction is utilized throughout the analysis per the C/CAG minimum requirements.[1] The TDM measures to be implemented by the project include. programs that would be created and implemented by the Proposed Project's Property Manager or designated Transportation Coordinator. The project's recommended TDM measures are provided in Table 5.

[1] As noted above, after this analysis was performed the Applicant submitted an updated TDM plan dated January 31, 2024 which describes that the Project TDM can achieve an additional 1% reduction (36% overall reduction) under the C/CAG methodology described in *Transportation Demand Management Policy Update Approach*. Therefore, the analysis in this chapter based on 35% is more conservative than expected reductions. In addition, the January 2024 update also includes analysis using methodology prescribed by the California Air Pollution Control Officers Association (CAPCOA) in *Quantifying Greenhouse Gas Mitigation Measures,* which estimates that the project will achieve a 39.1% reduction using that methodology. This chapter relies on the more conservative C/CAG methodology. Both the C/CAG and CAPCOA documents describe a methodology for calculating trip reductions, VMT reductions, and emissions reductions provided by TDM measures based on various relevant data sources, reports, and studies around the world. These documents are incorporated by reference and can be found at https://www.aqmd.gov/docs/default-source/ceqa/handbook/capcoa-quantifying-greenhouse-gas-mitigation-measures.pdf (CAPCOA) and https://ccag.ca.gov/wp-content/uploads/2021/06/Final-Draft-CCAG_TDM-Policy-Update-Approach-Document-6-10-2021.pdf (C/CAG).

Table 5. Proposed TDM Measure Summary

TDM Measure		Description	C/CAG	
			Estimated Trip Reduction	Required Measure
1	Free/Preferential Parking for Carpools	Provide free or preferential parking, including reserved spaces or spaces near an entrance or in another desirable location, to incentivize ridesharing.	1.0%	Yes
2	TDM Coordinator	In addition to, or in place of a building-wide Commute Assistance Center, a TDM Coordinator can be appointed by each building tenant. This representative is responsible for implementing the TDM Plan within its organization, with responsibilities that may include distributing transit and commute alternative information, conducting an annual commuter survey, and preparing an annual report summarizing the TDM Plan activities and performance.	0.5%	Yes
3	Actively Participate in Commute.org, or Transportation Management Association (TMA) Equivalent	Sites shall register with Commute.org or else join or create a Transportation Management Association (TMA) with equivalent TDM service, whose role is to coordinate transportation-related programs and services in specific geographic areas. Notably, for Large Non-Residential (Office, Industrial, Institutional, as well as Medical and Lodging) projects categorized as Transit Proximate there are five components an applicant must fulfill to satisfactorily implement this measure: 1. Obtain certification of participation with Commute.org, or equivalent program. 2. Provide commute assistance or ride-matching program. 3. Provide (or fund) a dedicated shuttle program/consortium or equivalent transit service. 4. Provide Guaranteed Ride Home 5. Supply orientation, education, and promotional programs and/or materials for tenants	16.5%	Yes
3a	Certified participation in Commute.org, or equivalent program such as TMA	See above	4.0%	Yes
3b	Commute assistance and ride-matching	Establish a commute assistance program to provide individualized trip planning services. These services can help employees and residents understand the range of transportation options available to them based on their commute patterns. Ride-matching services aim to find carpools or vanpools for employees or residents with similar commute patterns. Dynamic ridesharing apps are increasing in popularity and allow for ride-matching on a day-by-day basis.	1.0%	Yes

Table 5. Proposed TDM Measure Summary

TDM Measure		Description	C/CAG	
			Estimated Trip Reduction	Required Measure
3c	Shuttle Program/Shuttle Consortium/Fund Transit Service	Establish a shuttle service to regional transit hubs, commercial centers, or residential areas. Shuttle service should be provided free of charge to residents, employees, and guests. Alternatively, a project site may buy into a shuttle consortium with neighboring developments to pool resources and run shuttle services to multiple nearby sites. Developers may also fund enhanced transit service to/from their project site in collaboration with SamTrans.	10.0%	Yes
3d	Guaranteed Ride Home	Offer employees a Guaranteed Ride Home (GRH) program to provide an occasional subsidized ride to commuters who use alternative modes, for example, if a bus rider must return home in an emergency, or a car pooler must stay at work later than expected. This addresses a common objection to the use of alternative modes. In San Mateo County, a countywide GRH program is managed by Commute.org. This program is open to all persons with a workplace in San Mateo County or students who commute to a participating college in San Mateo County	0.5%	Yes
3e	Orientation, Education, Promotional Programs and/or Materials	Offer new employees or residents an orientation or education program or materials. This should explain the importance of trip reduction methods and provide information on alternative transport mode options available at the site, including transit schedules, maps, and trip planning. These orientation or education programs and materials can also highlight transportation-focused benefits or amenities available to employees or residents, such as pre-tax benefits, car share, bike share, or shuttle services.	1.0%	Yes
4	Carpool or Vanpool Program	Carpool and vanpooling are types of ridesharing that seek to allow vehicles to carry additional passengers when making a trip, with minimal additional mileage. Carpooling generally uses participants' own automobiles. Vanpooling generally uses leased vans (often supplied by employers, non-profit organizations, or government agencies). Carpool and vanpool programs may receive financial incentives from property managers or employers, as well as ride-matching services to help facilitate these shared trips.	2.0%	Yes
5	Transit or Ridesharing Passes/ Subsidies	Offer public transit passes or subsidies; or carpool/vanpool subsidies to tenants' equivalent to 30% of the value of their monthly fare or $50 monthly, to incentivize transit use and ridesharing and comply with regional environmental sustainability goals. NOTE: Funding contributions towards and/or	10.0%	Yes

Table 5. Proposed TDM Measure Summary

TDM Measure		Description	C/CAG	
			Estimated Trip Reduction	Required Measure
		participation in Commute.org shuttle program does not count for this measure. Passes/subsides provided must be valid for public transportation options, including but not limited to BART, Caltrain, SamTrans, and ridesharing platforms and vanpool subscription (or costs)		
6	Pre-Tax Transportation Benefits	Allow employees to participate in a pre-tax transit and parking benefits program to save money and encourage the use of sustainable transportation modes. In the Bay Area, the Bay Area Air Quality Management District (BAAQMD) requires that employers with 50+ employees within the air district provide commuter benefits.	1.0%	Yes
7	Secure Bicycle Storage	Provide safe and convenient long-term (Class I) bicycle parking. Long-term bicycle parking should offer protection from weather and convenient access to and from the street, without the need to use stairs and with doorways and corridors that are sufficiently wide to navigate with a bicycle. Short term (Class II) bicycle parking should be near pedestrian entries and may be in the public right-of-way. Short term bicycle parking may be used for visitors, couriers, or customers, typically for less than two hours.	1.0%	Yes
8	Showers, Lockers, and Changing Rooms for Cyclists	These amenities serve as end of trip facilities for employees arriving by bike or other active transportation forms. Commuters who bicycle or walk often arrive wet, muddy, or sweaty. Providing employees with a place to shower, change and store clothes can encourage bicycle commuting. Such facilities also benefit employees who exercise during breaks or may occasionally need to wash and change clothes for other reasons.	2.0%	Yes
9	Design Streets to Encourage Bike/Ped Access	Design street or roadways that provide travel choices and give people the option to avoid traffic congestion, increasing the overall capacity of the transportation network. Street designs should enable safe access for all users of all ages and abilities. Improving pedestrian and cyclist safety and comfort can increase the use of active transportation for residents or employees of a project site.	1.0%	Yes
10	Bike/Scooter Share On-Site	Provide on-site bike share or bicycle fleets. Availability of bikeshare bikes or bicycle fleets reduces the need for individual vehicle ownership and use, which, reduced the number of VMT by individuals. Bike share systems allow for bikes to be rented at one location and returned to another. Bike share systems can play	1.0%	No

Table 5. Proposed TDM Measure Summary

TDM Measure		Description	C/CAG	
			Estimated Trip Reduction	Required Measure
		a role in the first or last mile of a commute. Subsidizing or offering complementary bike share memberships, can encourage greater use of the bike share systems and may reduce the barrier for individuals to try bike share. Similarly, on-site fleet bicycles at employer sites allow employees who either drive or a commuter alternative to run errands during the day, using a non-motorized form of transport.		
		Total	**36%**	

Source: TDM Memorandum for 985-1005 O'Brien Drive, January 31, 2024, Prepared by Kimley Horn & Associates

The measures shown in Table 5 have been calculated by using the C/CAG TDM Score Sheet that assists with calculating VMT reductions due to TDM measures from the Transportation Demand Management Policy Update Approach, Updated September 1, 2021, for the City/County Association of Governments of San Mateo County. Based on the C/CAG TDM Tool, with the implementation of the proposed TDM measures, the project would be able to achieve a reduction of up to 36% of the VMT generated by the proposed large non-residential development as shown in Table 6 above.

The project would be required to implement a TDM Plan achieving at least a 35% reduction from gross ITE trip generation rates (as shown in Table 3, Project Trip Generation, the reduction required equals 884 daily trips). As noted in the CAPCOA Handbook when estimating VMT or GHG reductions in the Transportation sub-sector, the adjustment factor from vehicle trips to VMT is 1. This assumes that all vehicle trips will average out to typical trip length ("assumes all trip lengths are equal"). Thus, it can be assumed that a percentage reduction in vehicle trips will equal the same percentage reduction in VMT. Additionally, daily trips generated by projects is a metric that can be measured and periodically reviewed using the TDM plan. The Transportation Coordinator, shall prepare, Implement, monitor, and report a TDM Plan for the project to the satisfaction of the City's Transportation Manager and per the Menlo Park Municipal Code requirements. The TDM Plan reporting shall include annual commute surveys, annual driveway counts and annual reporting to demonstrate that the 35% daily trip reduction requirement has been achieved. If the reduction has not been achieved in the reporting period, the report shall provide additional measures that will be implemented in the coming year in order to achieve the City's requirement.

Table 6. Trip Generation Summary – Net New Trips

Existing or Proposed	ITE Land Use Code	Land Use	Vehicle Trips		
			Daily	AM Peak	PM Peak
Existing	151	10.022 ksf Mini-Warehouse	14	1	2
	151	50.045 ksf Mini-Warehouse	73	5	8
	760	10.022 ksf R&D	111	10	10
	760	20.542 ksf R&D	228	21	20
		Existing Total Trips	**426**	**37**	**40**
Proposed	760	228.08 ksf R&D	2,527	234	223

Table 6. Trip Generation Summary – Net New Trips

Existing or Proposed	ITE Land Use Code	Land Use	Vehicle Trips		
			Daily	AM Peak	PM Peak
		Proposed Total Trips	2,527	234	223
		Net Trips Generated (Proposed – Existing)	+2,101	+197	+183
		TDM Reduction (35%)	-884	-82	-78
		Net Proposed Trips	+1,217	+115	+105

Source: TDM Memorandum for 985-1005 O'Brien Drive, January 31, 2024, Prepared by Kimley Horn & Associates

The required non-residential TDM Plan will include annual monitoring and reporting requirements on the effectiveness of the TDM program. The project applicant submitted a draft TDM Plan (Appendix A), which contains specific measures that would meet this trip reduction requirement. The draft TDM Plan is subject to City review and approval. If the annual monitoring finds that the TDM reduction is not met, the TDM coordinator will be required to work with City staff to detail next steps to achieve the TDM reduction. Based on the City's transportation engineer, if needed, there are additional measures that could be added to the TDM that would ensure the required reduction is met. Additional measures include recommended measures within above mentioned categories such as employee programs, parking management, TDM management and administration, transit, shuttle and ridesharing, and site design initiatives. With the implementation of the required TDM Plan, the project's VMT impact would be less than significant.

4.4 Cumulative Impact

Consistent with OPR's Technical Advisory on Evaluating Transportation Impacts in CEQA a project's cumulative impacts are based on an assessment of whether the "incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects." A project that falls below an efficiency-based threshold that is aligned with long-term environmental goals and relevant plans would have no cumulative impact distinct from the project impact. An efficiency-based threshold applies only to the proposed project without regard to the VMT generated by the previously existing land use.

The project would be consistent with the development assumptions included in ConnectMenlo. Implementation of the land use and transportation changes described in ConnectMenlo would create a built environment that supports a live/work/play environment with increased density and diversity of uses and a street network that supports safe and sustainable travel and is expected to reduce VMT per employee by providing more jobs in an area where the Project Site is located. Consistent with the findings of the ConnectMenlo EIR, the project, in combination with cumulative projects and as assessed for year 2040 which includes buildout of the City of Menlo Park General Plan, would have a less-than-significant cumulative impact with mitigation with respect to VMT. There would be no significant cumulative VMT impact to which the project could contribute, and the project would not combine with past, present, and foreseeable future projects to create such impact; therefore, this impact would remain less than significant.

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SOURCE: Hexagon 2023; City of Menlo Park Travel Demand Model

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Figure 9

VMT Thresholds and Traffic Analysis Zones

1005 O'Brien Drive and 1320 Willow Road Life Sciences Project

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5 Level of Service Analysis

5.1 Existing Traffic Operations

This section details the existing intersection and roadway segment operations within the study area. Figure 10 displays the existing traffic control and roadway geometrics. Existing weekday AM and PM peak hour are summarized in Figure 11.

An intersection LOS analysis was prepared for the existing conditions using HCM 7 methodology via the PTV Vistro LOS software as discussed in Chapter 1.3. Table 7 shows the results of the existing conditions analysis. LOS worksheets are provided in Appendix B.

Table 7. Existing Peak Hour Intersection Level of Service

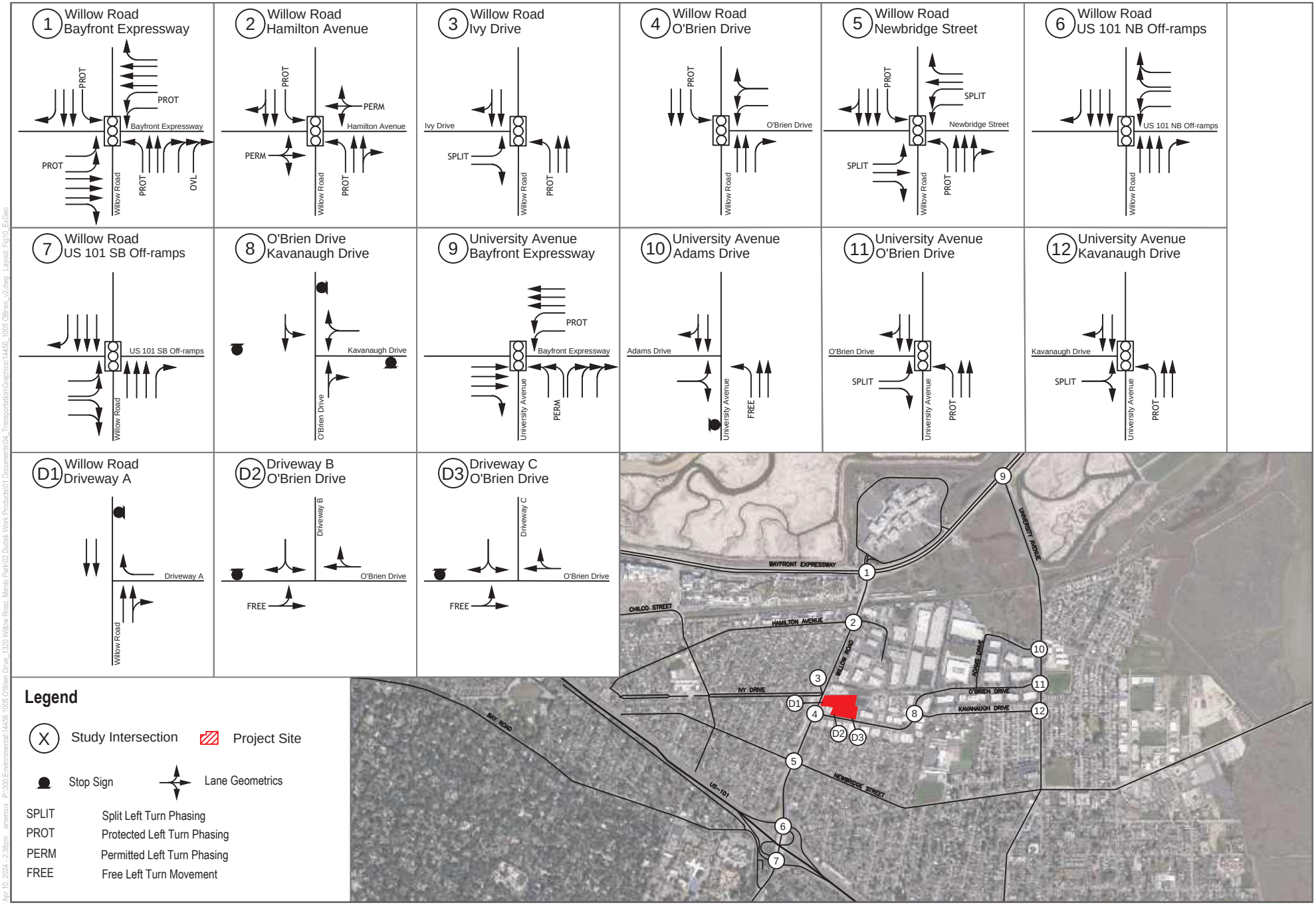
No.	Intersection	Jurisdiction	LOS Method	Existing			
				AM Peak		PM Peak	
				Avg. Delay[1]	LOS[2]	Avg. Delay[1]	LOS[2]
1	Willow Road/Bayfront Expressway	Menlo Park/ State	HCM Signal	54.8	D	407.3	**F**
2	Willow Road/Hamilton Avenue	Menlo Park/ State	HCM Signal	25.5	C	69.7	**E**
3	Willow Road/Ivy Drive	Menlo Park/ State	HCM Signal	18.6	B	43.2	D
4	Willow Road/O'Brien Drive	Menlo Park/ State	HCM Signal	28.4	C	157.0	**F**
5	Willow Road/Newbridge Street	Menlo Park/ State	HCM Signal	156.4	**F**	124.3	**F**
6	Willow Road/US 101 NB Off-ramps	Menlo Park/ State	HCM Signal	9.5	A	10.2	B
7	Willow Road/US 101 SB Off-ramps	Menlo Park/ State	HCM Signal	7.8	A	26.6	C
8	O'Brien Drive/Kavanaugh Drive	Menlo Park	HCM AWSC	13.6	B	7.9	A
9	University Avenue/Bayfront Expressway	Menlo Park/ State	HCM Signal	23.6	C	60.5	**E**
10	University Avenue/Adams Drive	Menlo Park/ East Palo Alto/State	HCM TWSC	72.1	**F**	37.6	**E**
11	University Avenue/O'Brien Drive	Menlo Park/ East Palo Alto/State	HCM Signal	7.3	A	7.9	A
12	University Avenue/Kavanaugh Drive	East Palo Alto/State	HCM Signal	21.3	C	16.2	B

Notes:
Bold – Exceeds LOS threshold
HCM = Highway Capacity Manual; TWSC = Two-Way Stop-Controlled; AWSC = All-Way Stop-Controlled

1 Delay in seconds per vehicle
2 Level of Service (LOS)

As shown in the table, all the study area intersections are currently operating at satisfactory levels of service (LOS D or better) under existing conditions per City standards, with the exception of the following intersections:

- #1 Willow Road/Bayfront Expressway – LOS F in AM and PM peak hours (signalized)
- #2 Willow Road/Hamilton Avenue – LOS E in PM peak hour (signalized)
- #4 Willow Road/O'Brien Drive – LOS F in PM peak hour (signalized)
- #5 Willow Road/Newbridge Street – LOS F in AM and PM peak hours (signalized)
- #9 University Avenue/Bayfront Expressway – LOS E in PM peak hour (signalized)
- #10 University Avenue/Adams Drive – LOS F in AM peak hour; LOS E in PM peak hour (unsignalized)



SOURCE: Bing Maps

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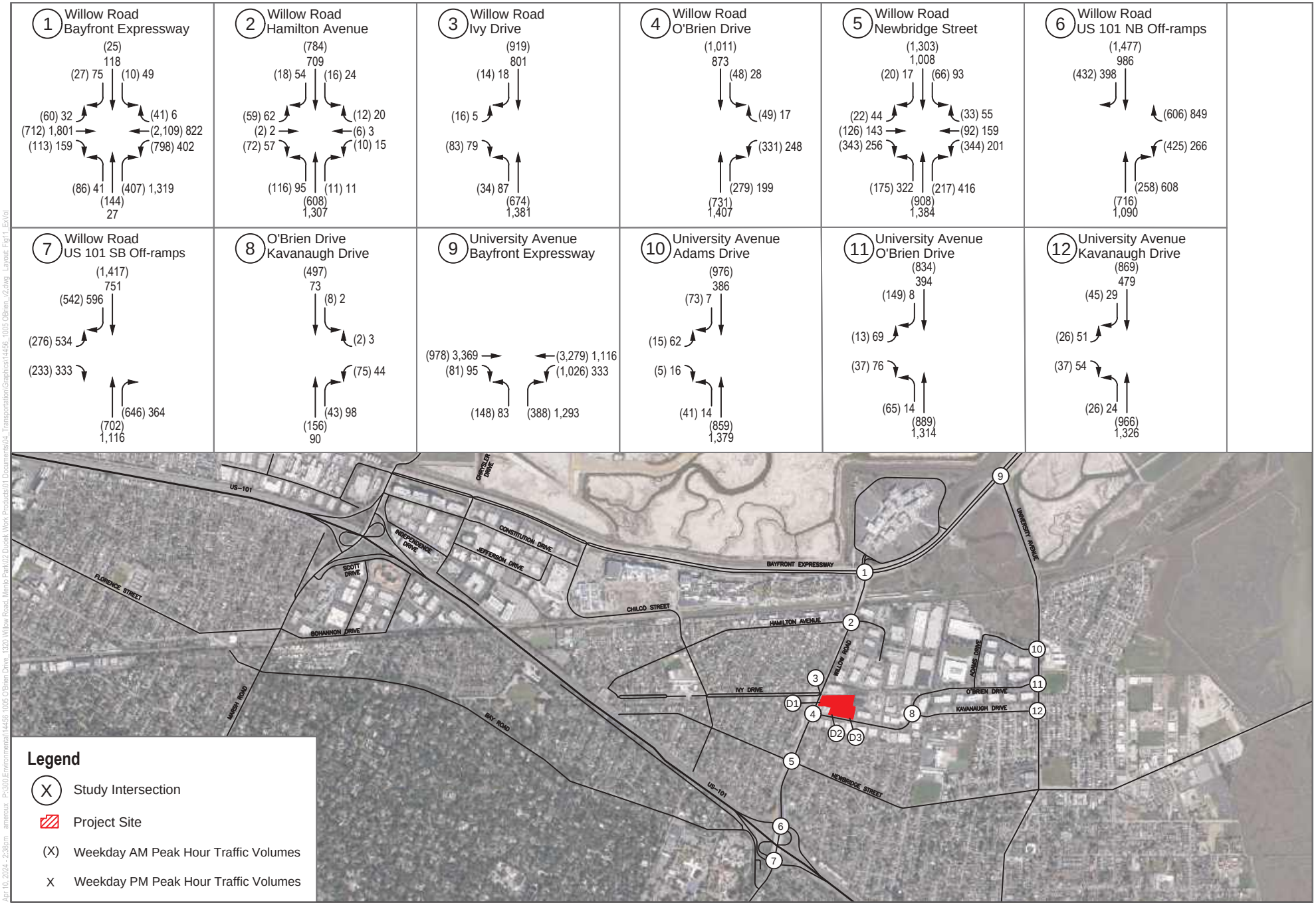
Figure 10

Existing Intersection Controls and Geometrics

1005 O'Brien Drive and 1320 Willow Road Life Sciences Project

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SOURCE: Bing Maps

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Figure 11

Existing Peak Hour Traffic Volumes

1005 O'Brien Drive and 1320 Willow Road Life Sciences Project

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5.2 Near-Term (2027) and Near-Term (2027) plus Project Traffic Operations

This section details the Near-Term (2027) intersection and roadway segment operations within the study area with and without the addition of project traffic. Near-Term (2027) weekday AM and PM peak hour traffic volumes are summarized in Figure 12, and Near-Term (2027) plus Project AM and PM peak hour traffic volumes are summarized in Figure 13.

Near-Term (2027) conditions are representative of a cumulative conditions analysis for a short-term horizon year (2027) assuming the proposed project is constructed and fully occupied. This section follows the City's TIA Guidelines for intersection LOS analysis. An intersection LOS analysis was prepared for the Near-Term (2027) conditions using HCM 7 methodology via the PTV Vistro LOS software as discussed in Chapter 1.3. Table 8 shows the results of the existing conditions analysis. LOS worksheets are provided in Appendix B. For Willow Road intersections between Bayfront Expressway and US-101 ramps, the overall delay is reported as OVERSAT (LOS E or F) for oversaturated conditions based on previous simulation models that the increased volumes will cause queuing that extends past multiple intersections and results in oversaturated conditions.

Table 8 identifies the LOS for each intersection included in the study area under the Near-Term (2027) conditions with and without project traffic, and whether the project could cause the City's LOS standards to be exceeded. With the addition of project traffic, the following intersections would exceed the thresholds identified in the City's TIA guidelines and increase the average critical movement delay by 0.8 seconds or more during AM and/or PM peak hours. As such, the following intersections would be non-compliant with the City's TIA Guidelines under Near Term (2027) plus Project conditions.

- #1 Willow Road/Bayfront Expressway – LOS E in AM peak hour (signalized)
- #2 Willow Road/Hamilton Avenue – LOS F in AM peak hour (signalized)
- #3 Willow Road/Ivy Drive – LOS F in PM peak hour (signalized)
- #4 Willow Road/O'Brien Drive – LOS F in AM and PM peak hours (signalized)
- #5 Willow Road/Newbridge Street – LOS F in AM and PM peak hours (signalized)
- #8 O'Brien Drive/Kavanaugh Drive – LOS F in AM peak hour (unsignalized)
- #9 University Avenue/Bayfront Expressway – LOS E in PM peak hour (signalized)

The Manual on Uniform Traffic Control Devices (MUTCD) peak hour signal warrant was performed at the unsignalized intersections (#8 and #10) and is provided in Appendix C. The warrant is met for intersection #8 (O'Brien Drive/Kavanaugh Drive) in both peak hours for both baseline and plus project conditions. The warrant is not met in either peak hour for all other remaining unsignalized intersections.

A summary of recommended improvement measures is provided in Table 10 to improve intersection operations to pre-project conditions or better for consistency with the City's TIA Guidelines.

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Table 8. Near Term (2027) Plus Project Peak Hour Intersection Level of Service

No.	Intersection	Jurisdiction	LOS Method	Critical Approach	Near Term (2027)				Near Term (2027) plus Project				Change in Avg. Delay		Inconsistent w/City Standards?[1]		Inconsistent w/TIA Guidelines?[2]		Near Term (2027) plus Project w/Improvements[3]			
					AM Peak		PM Peak		AM Peak		PM Peak								AM Peak		PM Peak	
					Avg. Delay	LOS	Avg. Delay	LOS	Avg. Delay	LOS	Avg. Delay	LOS	AM	PM	AM	PM	AM	PM	Avg. Delay	LOS	Avg. Delay	LOS
1	Willow Road/ Bayfront Expressway	Menlo Park/State	HCM Signal		OVERSAT[4]		OVERSAT[4]		OVERSAT[4]		OVERSAT[4]		0.6	-2.3	Yes	Yes	Yes	No	44.8	D	N/A	N/A
				SB	N/A	N/A	OVERSAT[4]		N/A	N/A	OVERSAT[4]		N/A	-0.4	No	Yes			47.6	D	N/A	N/A
				NB	OVERSAT[4]		OVERSAT[4]		OVERSAT[4]		OVERSAT[4]		0.9	0.3	Yes	Yes			40.0	D	N/A	N/A
2	Willow Road/ Hamilton Avenue	Menlo Park/State	HCM Signal		OVERSAT[4]		OVERSAT[4]		OVERSAT[4]		OVERSAT[4]		5.2	3.4	Yes	Yes	Yes	No	232.6	F	N/A	N/A
				WB	OVERSAT[4]		OVERSAT[4]		OVERSAT[4]		OVERSAT[4]		4.9	-1.2	Yes	Yes			290.4	F	N/A	N/A
3	Willow Road/Ivy Drive	Menlo Park/State	HCM Signal		OVERSAT[4]		OVERSAT[4]		OVERSAT[4]		OVERSAT[4]		2.1	6.3	Yes	Yes	No	Yes	N/A	N/A	45.2	D
				EB	OVERSAT[4]		OVERSAT[4]		OVERSAT[4]		OVERSAT[4]		-1.4	10.0	Yes	Yes			N/A	N/A	59.0	E
4	Willow Road/ O'Brien Drive	Menlo Park/State	HCM Signal		OVERSAT[4]		OVERSAT[4]		OVERSAT[4]		OVERSAT[4]		4.1	42.2	Yes	Yes	Yes	Yes	46.0	D	230.8	F
				NB	OVERSAT[4]		OVERSAT[4]		OVERSAT[4]		OVERSAT[4]		13.7	163.4	Yes	Yes			191.1	F	548.6	F
5	Willow Road/ Newbridge Street	Menlo Park/State	HCM Signal		OVERSAT[4]		OVERSAT[4]		OVERSAT[4]		OVERSAT[4]		0.4	7.5	Yes	Yes	Yes	Yes	162.0	F	175.7	F
				WB	OVERSAT[4]		OVERSAT[4]		OVERSAT[4]		OVERSAT[4]		4.3	21.2	Yes	Yes			279.5	F	188.9	F
6	Willow Road/US 101 NB Off-ramps	Menlo Park/State	HCM Signal		OVERSAT[4]		OVERSAT[4]		OVERSAT[4]		OVERSAT[4]		0.0	-.07	Yes	Yes	No	No				
				NB	OVERSAT[4]		OVERSAT[4]		OVERSAT[4]		OVERSAT[4]		-0.3	-0.1	Yes	Yes	No	No				
7	Willow Road/US 101 SB Off-ramps	Menlo Park/State	HCM Signal		OVERSAT[4]		OVERSAT[4]		OVERSAT[4]		OVERSAT[4]		0.2	0.0	Yes	Yes	No	No				
				SB	OVERSAT[4]		N/A	N/A	OVERSAT[4]		N/A	N/A	0.1	0.0	Yes	Yes						
				WB	N/A	N/A	OVERSAT[4]		N/A	N/A	OVERSAT[4]		0.0	0.0	Yes	Yes						
8	O'Brien Drive/ Kavanaugh Drive	Menlo Park	HCM AWSC		86.7	F	15.2	C	92.3	F	15.4	C	5.6	0.2	Yes	No	Yes	No	84.8	F	N/A	N/A
9	University Avenue/ Bayfront Expressway	Menlo Park/State	HCM Signal		24.0	C	69.0	E	24.1	C	70.2	E	0.1	1.4	No	Yes	No	Yes	N/A	N/A	46.1	D
				SB	N/A	N/A	66.2	E	N/A	N/A	67.9	E	N/A	2.0	No	Yes			N/A	N/A	26.1	C
10	University Avenue/Adams Drive	Menlo Park/East Palo Alto/State	HCM TWSC		77.6	F	38.4	E	79.6	F	38.7	E	2.0	0.3	Yes	Yes	No	No				
11	University Avenue/ O'Brien Drive	Menlo Park/East Palo Alto/State	HCM Signal		23.4	C	20.5	C	23.5	C	20.5	C	0.1	0.0	No	No	No	No				
			V/C Ratio		0.765	C	0.673	C	0.770	C	0.754	C	0.005	0.081	No	No						
12	University Avenue/ Kavanaugh Drive	East Palo Alto/State	HCM Signal		22.1	C	17.9	B	22.2	C	18.0	B	0.1	0.1	No	No	No	No				

Notes: **Bold** – Exceeds LOS threshold
TWSC = two-way stop control; AWSC = all-way stop control LOS reported for the movement with highest delay
N/A = not applicable – critical approach information is not relevant. Critical approach information is relevant where the proposed project would increase delay over the City's LOS thresholds.

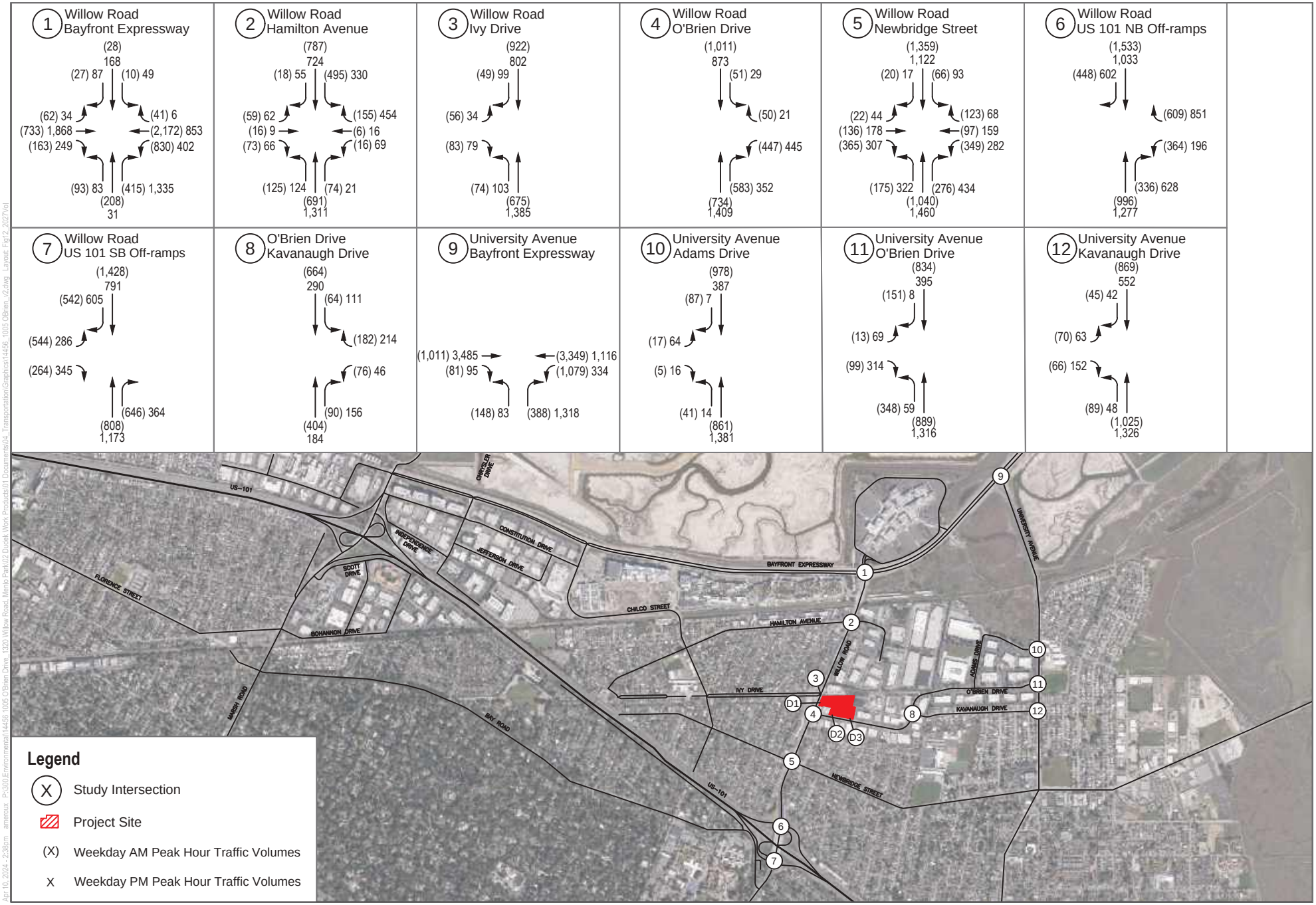
1 Inconsistency with City standards is provided for informational purposes only to determine whether intersection LOS meets General Plan standards.

2 The City of Menlo Park TIA guidelines indicate that intersections with deficient LOS may result in "...a project [being] considered potentially noncompliant with local policies." The City of Menlo Park has discretion to allow LOS to be exceeded in order to achieve other Circulation Element goals and policies.

3 TIF improvements include adaptive traffic signal coordination along the Bayfront Expressway corridor and the Willow Road corridor which is likely to improve LOS operations; however, the direct effect these improvements would have on LOS is unable to be quantified at this time. Therefore, all physical improvements would be conservative since they do not take into account the effect of the traffic signal improvements along both corridors. Additionally, many physical intersection improvements are considered infeasible due to right-of way (ROW) constraints.

F For Willow Road intersections between Bayfront Expressway and US-101 ramps, the overall delay is reported as OVERSAT (LOS E or F) for oversaturated conditions based on previous simulation models that the increased volumes will cause queuing that extends past multiple intersections and results in oversaturated conditions.

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SOURCE: Bing Maps

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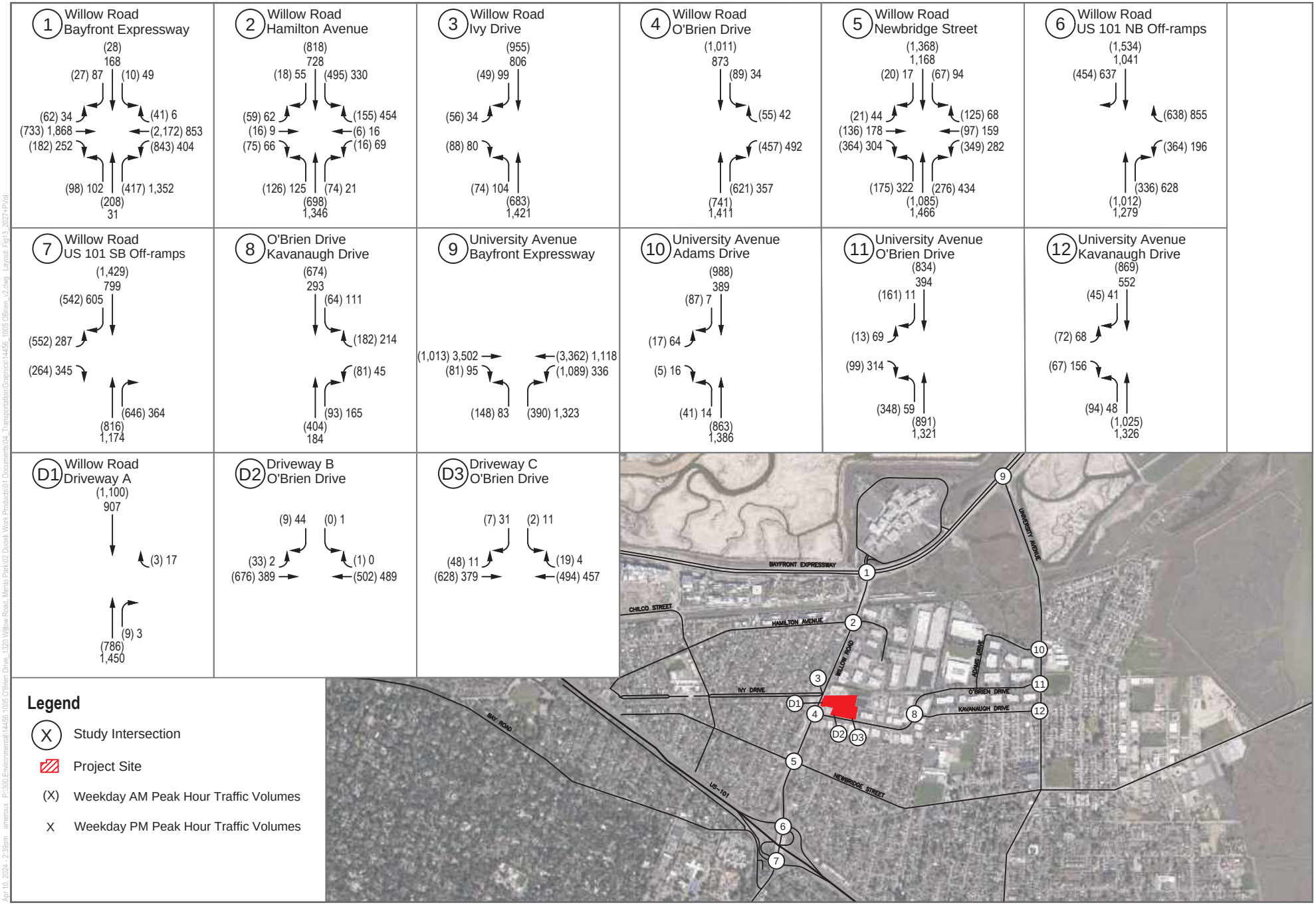
Figure 12

Near-Term (2027) Peak Hour Traffic Volumes

1005 O'Brien Drive and 1320 Willow Road Life Sciences Project

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SOURCE: Bing Maps

Figure 13

Near-Term (2027) plus Project Peak Hour Traffic Volumes

1005 O'Brien Drive and 1320 Willow Road Life Sciences Project

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5.3 Cumulative (2040) and Cumulative (2040) plus Project Traffic Operations

This section details the Cumulative (2040) intersection and roadway segment operations within the study area with and without the addition of project traffic. Cumulative (2040) weekday AM and PM peak hour traffic volumes are summarized in Figure 14, and Cumulative (2040) plus Project AM and PM peak hour traffic volumes are summarized in Figure 15.

Cumulative (2040) conditions are representative of a cumulative conditions analysis for a long-term horizon year (2040) assuming both buildout of the General Plan and full operation of the proposed project. This section follows the City's TIA Guidelines for intersection LOS analysis. The PTV Vistro software was used to determine intersection LOS, consistent with HCM 7 methodology for both signalized and unsignalized intersections, and detailed LOS calculation worksheets are included in Appendix B. For Willow Road intersections between Bayfront Expressway and US-101 ramps, the overall delay is reported as OVERSAT (LOS E or F) for oversaturated conditions based on previous simulation models that the increased volumes will cause queuing that extends past multiple intersections and results in oversaturated conditions.

Table 9 identifies the LOS for each intersection included in the study area under the Cumulative (2040) conditions with and without project traffic and whether the project could cause the City's LOS standards to be exceeded. With the addition of project traffic, the following intersections would exceed the thresholds identified in the City's TIA guidelines and increase the average critical movement delay by 0.8 seconds or more during AM and/or PM peak hours. As such, the following intersections would be non-compliant with the City's TIA Guidelines under Cumulative (2040) plus Project conditions.

- #1 Willow Road/Bayfront Expressway – LOS F in AM and PM peak hours (signalized)
- #2 Willow Road/Hamilton Avenue - LOS F in AM peak hour (signalized)
- #3 Willow Road/Ivy Drive - LOS E in PM peak hour (signalized)
- #4 Willow Road/O'Brien Drive - LOS E in AM peak hour; LOS F in PM peak hour (signalized)
- #5 Willow Road/Newbridge Street – LOS F in AM and PM peak hours (signalized)
- #7 Willow Road/US 101 SB Off-ramps – LOS F in AM peak hour (signalized)
- #8 O'Brien Drive/Kavanaugh Drive – LOS F in AM and PM peak hours (unsignalized)
- #9 University Avenue/Bayfront Expressway – LOS F in PM peak hour (signalized)
- #11 University Avenue/O'Brien Drive - LOS F in AM peak hour (signalized)

The MUTCD peak hour signal warrant was performed at the unsignalized intersections (#8 and #10) and is provided in Appendix C. The warrant is met for intersection #8 (O'Brien Drive/Kavanaugh Drive) in both peak hours for both baseline and plus project conditions. The warrant is not met in either peak hour for all other remaining unsignalized intersections.

A summary of recommended improvement measures is provided in Table 10 to improve intersection operations to pre-project conditions or better for consistency with the City's TIA Guidelines.

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Table 9. Cumulative (2040) Plus Project Peak Hour Intersection Level of Service

No.	Intersection	Jurisdiction	LOS Method	Critical Approach	Cumulative (2040)				Cumulative (2040) plus Project				Change in Avg. Delay		Inconsistent w/City Standards?[1]		Inconsistent w/TIA Guidelines?[2]		Cumulative (2040) plus Project w/Improvements[3]			
					AM Peak		PM Peak		AM Peak		PM Peak								AM Peak		PM Peak	
					Avg. Delay	LOS	Avg. Delay	LOS	Avg. Delay	LOS	Avg. Delay	LOS	AM	PM	AM	PM	AM	PM	Avg. Delay	LOS	Avg. Delay	LOS
1	Willow Road/ Bayfront Expressway	Menlo Park/ State	HCM Signal		**OVERSAT[4]**		**OVERSAT[4]**		**OVERSAT[4]**		**OVERSAT[4]**		0.3	-1.8	**Yes**	**Yes**	**Yes**	No	56.4	**E**	N/A	N/A
				SB	**OVERSAT[4]**		**OVERSAT[4]**		**OVERSAT[4]**		**OVERSAT[4]**		0.0	0.7	**Yes**	**Yes**			57.4	**E**	N/A	N/A
				NB	**OVERSAT[4]**		**OVERSAT[4]**		**OVERSAT[4]**		**OVERSAT[4]**		0.6	0.3	**Yes**	**Yes**			80.3	**F**	N/A	N/A
2	Willow Road/ Hamilton Avenue	Menlo Park/ State	HCM Signal		**OVERSAT[4]**		**OVERSAT[4]**		**OVERSAT[4]**		**OVERSAT[4]**		4.1	3.2	**Yes**	**Yes**	**Yes**	No	243.7	**F**	N/A	N/A
				WB	**OVERSAT[4]**		**OVERSAT[4]**		**OVERSAT[4]**		**OVERSAT[4]**		2.9	-1.1	**Yes**	**Yes**			280.5	**F**	N/A	N/A
3	Willow Road/Ivy Drive	Menlo Park/ State	HCM Signal		**OVERSAT[4]**		**OVERSAT[4]**		**OVERSAT[4]**		**OVERSAT[4]**		0.6	5.2	**Yes**	**Yes**	No	**Yes**	N/A	N/A	50.7	D
				EB	**OVERSAT[4]**		**OVERSAT[4]**		**OVERSAT[4]**		**OVERSAT[4]**		-1.0	7.8	**Yes**	**Yes**			N/A	N/A	48.7	D
4	Willow Road/ O'Brien Drive	Menlo Park/ State	HCM Signal		**OVERSAT[4]**		**OVERSAT[4]**		**OVERSAT[4]**		**OVERSAT[4]**		4.4	47.7	**Yes**	**Yes**	**Yes**	**Yes**	46.2	D	348.1	**F**
				NB	**OVERSAT[4]**		**OVERSAT[4]**		**OVERSAT[4]**		**OVERSAT[4]**		11.1	144.3	**Yes**	**Yes**			147.2	**F**	893.2	**F**
5	Willow Road/ Newbridge Street	Menlo Park/ State	HCM Signal		**OVERSAT[4]**		**OVERSAT[4]**		**OVERSAT[4]**		**OVERSAT[4]**		0.2	6.3	**Yes**	**Yes**	**Yes**	**Yes**	178.0	**F**	194.8	**F**
				WB	**OVERSAT[4]**		**OVERSAT[4]**		**OVERSAT[4]**		**OVERSAT[4]**		2.9	21.7	**Yes**	**Yes**			271.2	**F**	228.0	**F**
6	Willow Road/US 101 NB Off-ramps	Menlo Park/ State	HCM Signal		**OVERSAT[4]**		**OVERSAT[4]**		**OVERSAT[4]**		**OVERSAT[4]**		0.0	0.9	**Yes**	**Yes**	No	No				
				NB	**OVERSAT[4]**		**OVERSAT[4]**		**OVERSAT[4]**		**OVERSAT[4]**		-0.4	-0.1	**Yes**	**Yes**						
7	Willow Road/US 101 SB Off-ramps	Menlo Park/ State	HCM Signal		**OVERSAT[4]**		**OVERSAT[4]**		**OVERSAT[4]**		**OVERSAT[4]**		1.0	18.5	**Yes**	**Yes**	**Yes**	No	15.5	B	N/A	N/A
				SB	**OVERSAT[4]**		N/A	N/A	**OVERSAT[4]**		N/A	N/A	3.8	0.0	**Yes**	**Yes**			22.3	C	N/A	N/A
				WB	N/A	N/A	**OVERSAT[4]**		N/A	N/A	**OVERSAT[4]**		0.0	0.0	**Yes**	**Yes**			17.1	B	N/A	N/A
8	O'Brien Drive/ Kavanaugh Drive	Menlo Park	HCM AWSC		250.0	**F**	76.7	**F**	258.0	**F**	80.6	**F**	8.0	3.9	**Yes**	**Yes**	**Yes**	**Yes**	235.7	**F**	59.2	**F**
9	University Avenue/ Bayfront Expressway	Menlo Park/ State	HCM Signal		24.8	C	91.9	**F**	24.9	C	93.5	**F**	0.1	1.6	No	**Yes**	No	**Yes**	N/A	N/A	51.5	D
				SB	N/A	N/A	99.6	**F**	N/A	N/A	101.2	**F**	N/A	1.6	No	**Yes**			N/A	N/A	26.0	C
10	University Avenue/ Adams Drive	Menlo Park/East Palo Alto/State	HCM TWSC		82.1	**F**	37.1	**E**	84.5	**F**	37.6	**E**	2.4	0.5	**Yes**	**Yes**	No	No				
11	University Avenue/ O'Brien Drive	Menlo Park/East Palo Alto/State	HCM Signal		149.9	**F**	32.0	C	153.6	**F**	32.0	C	3.7	0.0	**Yes**	No	**Yes**	No	106.0	**F**	N/A	N/A
				WB	353.8	**F**	N/A	N/A	362.8	**F**	N/A	N/A	8.9	N/A	**Yes**	No			228.9	**F**	N/A	N/A
				SB	66.8	**E**	61.2	**E**	66.8	**E**	61.2	**E**	0.0	0.0	**Yes**	**Yes**			66.8	**E**	N/A	N/A
				V/C Ratio	1.119	**F**	0.751	C	1.125	**F**	0.754	C	0.006	0.003	**Yes**	**Yes**			1.063	**F**	N/A	N/A
12	University Avenue/ Kavanaugh Drive	East Palo Alto/ State	HCM Signal		30.8	C	20.3	C	31.4	C	20.5	C	0.6	0.2	No	No	No	No				

Notes: **Bold** – Exceeds LOS threshold
TWSC = two-way stop control; AWSC = all-way stop control LOS reported for the movement with highest delay
N/A = not applicable – critical approach information is not relevant. Critical approach information is relevant where the proposed project would increase delay over the City's LOS thresholds.

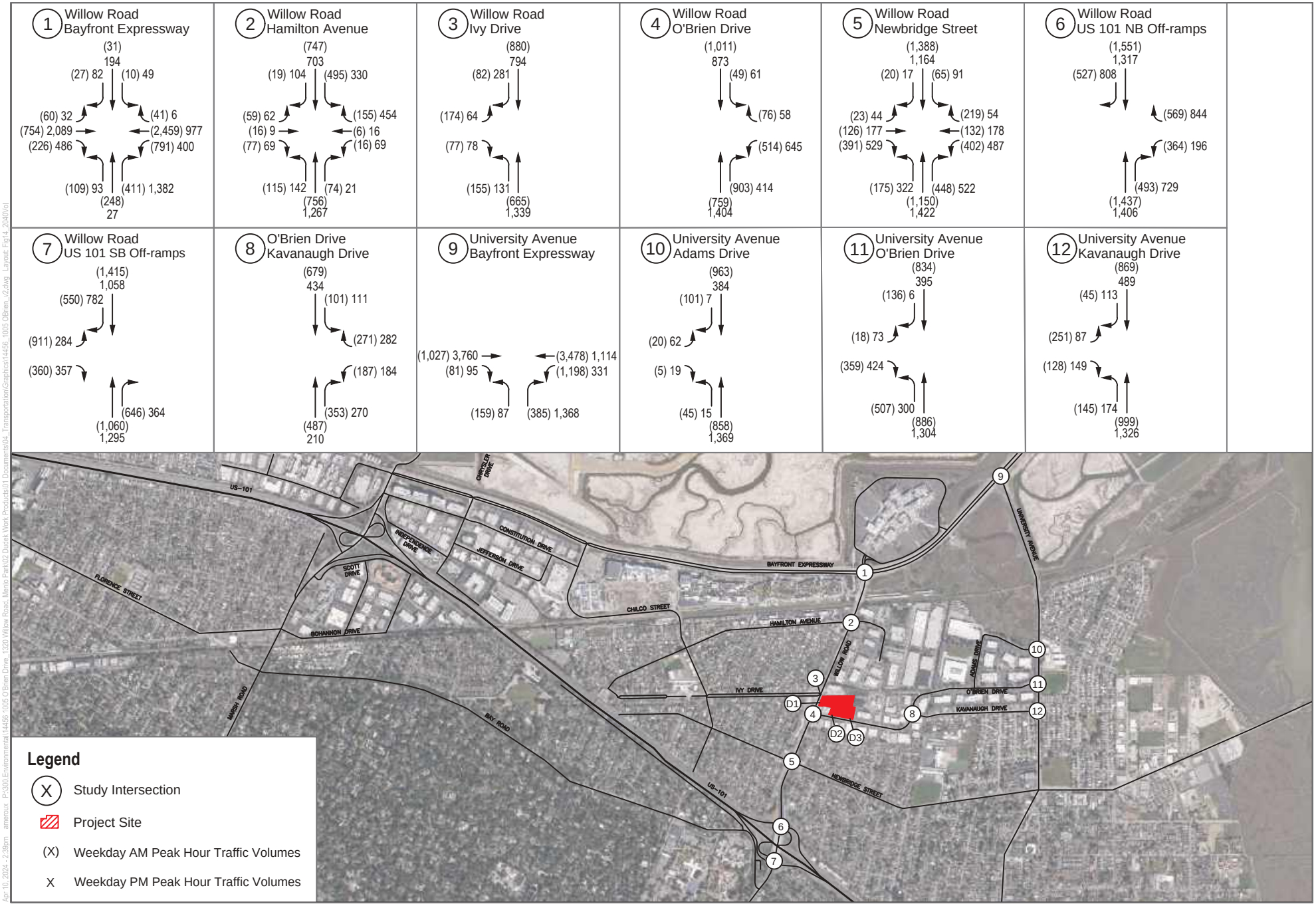
1 Inconsistency with City standards is provided for informational purposes only to determine whether intersection LOS meets General Plan standards.

2 The City of Menlo Park TIA guidelines indicate that intersections with deficient LOS may result in "...a project [being] considered potentially noncompliant with local policies." The City of Menlo Park has discretion to allow LOS to be exceeded in order to achieve other Circulation Element goals and policies.

3 TIF improvements include adaptive traffic signal coordination along the Bayfront Expressway corridor and the Willow Road corridor which is likely to improve LOS operations; however, the direct effect these improvements would have on LOS is unable to be quantified at this time. Therefore, all physical improvements would be conservative since they do not take into account the effect of the traffic signal improvements along both corridors. Additionally, many physical intersection improvements are considered infeasible due to right-of way (ROW) constraints.

4 For Willow Road intersections between Bayfront Expressway and US-101 ramps, the overall delay is reported as OVERSAT (LOS E or F) for oversaturated conditions based on previous simulation models that the increased volumes will cause queuing that extends past multiple intersections and results in oversaturated conditions.

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SOURCE: Bing Maps

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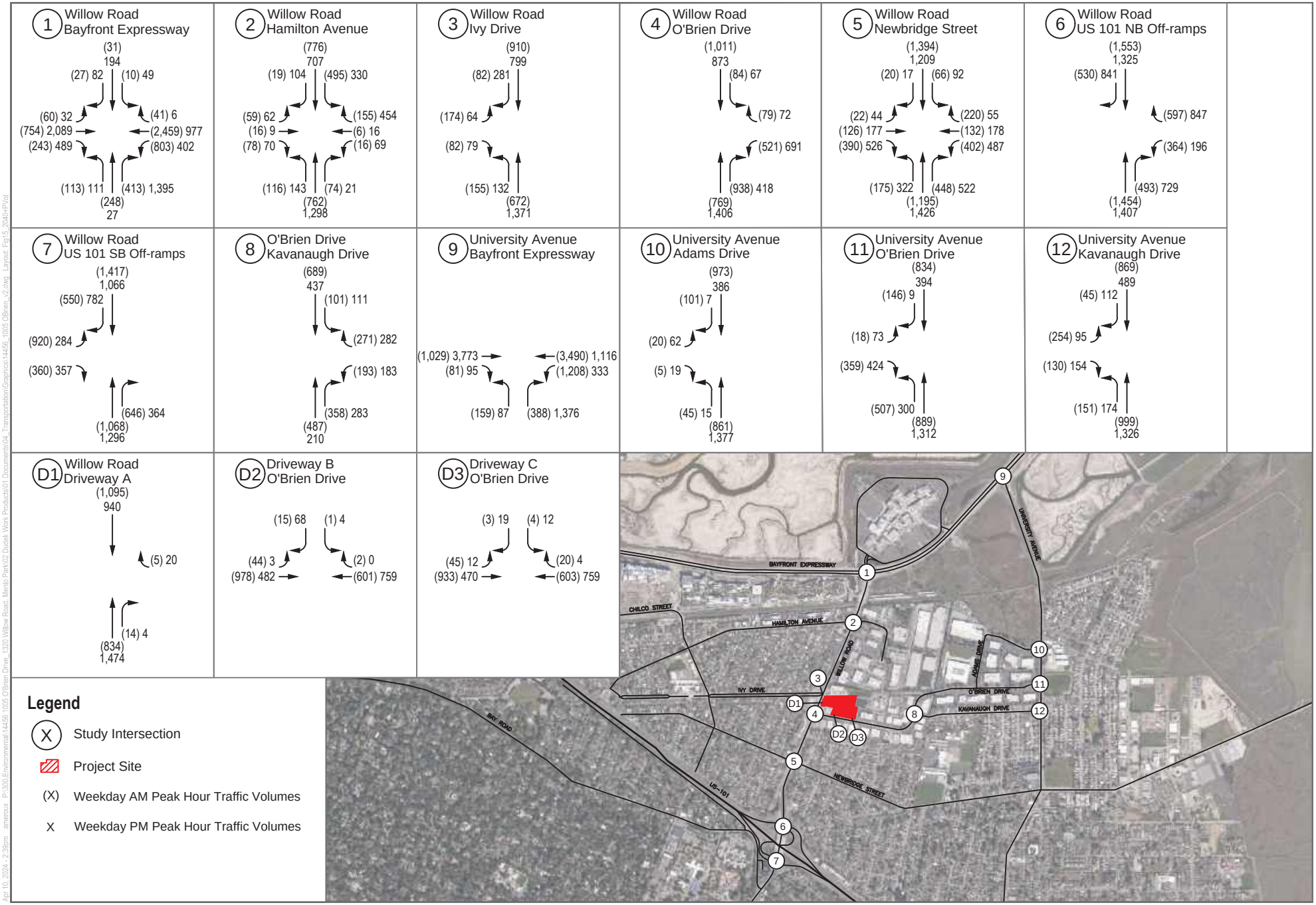
Figure 14

Cumulative (2040) Peak Hour Traffic Volumes

1005 O'Brien Drive and 1320 Willow Road Life Sciences Project

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SOURCE: Bing Maps

Figure 15

Cumulative (2040) plus Project Peak Hour Traffic Volumes

1005 O'Brien Drive and 1320 Willow Road Life Sciences Project

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5.4 Recommended Improvements

The improvements summarized in Table 10 would be necessary to bring the LOS back to acceptable levels per the City's TIA Guidelines under Near-Term (2027) and Cumulative (2040) plus Project conditions at the intersections identified in Chapters 5.2 and 5.3. LOS worksheets for intersections with recommended improvement measures are included in Appendix D. Figure 16 and Figure 17 display the conceptual geometrics for recommended improvement measures.

5.4.1 ConnectMenlo Mitigation Measures and City of Menlo Park Transportation Impact Fee (TIF) Program

It is noted that the ConnectMenlo EIR concluded that additional motor vehicle trips generated on the local roadway network as a result of the project would cause an increase in delay to peak hour vehicle traffic, resulting in significant impacts at some study intersections and roadway segments. The ConnectMenlo EIR was prepared before the 2018 CEQA Guidelines update, which included the section implementing SB 743 (CEQA Guidelines Section 15064.3) and before the City updated its Traffic Impact Analysis Guidelines. Thus, the ConnectMenlo EIR relied on LOS as a metric for defining significant environmental effects.

ConnectMenlo EIR Mitigation Measure TRANS-1a would require the widening of impacted roadway segments at appropriate locations throughout the city to add travel lanes and capacity to accommodate the increase in net daily trips. Implementation of Mitigation Measure TRANS-1a would reduce the impacts but not to a less than significant level. The ConnectMenlo EIR found that fully mitigating the impact to less than significant levels would be infeasible because it would require eliminating most of the year 2040 traffic growth on impacted segments, including background traffic growth and regional traffic growth outside the boundary of the City. Therefore, impacts to roadway segments were considered significant and unavoidable. However, these impacts are no longer considered environmental effects under CEQA.

ConnectMenlo EIR Mitigation Measure TRANS-1b requires updates to the City's TIF program to secure a funding mechanism for future roadway and infrastructure improvements to mitigate impacts from future projects (based on the current standards at the time the Final EIR was certified) but would not reduce the impact to less than significant levels. The City could not guarantee improvements at the impacted intersections because the nexus study (for development impact fees under AB 1600) had not been prepared, some improvements could cause secondary environmental impacts that would need to be addressed prior to construction, and some impacted intersections are within the jurisdiction of the City of East Palo Alto and Caltrans. Therefore, impacts to intersections were considered significant and unavoidable. Recently, the City's TIF program was updated and approved by the City Council. The City's Transportation Master Plan has been updated and was adopted by the City Council on November 17, 2020. The identified roadway improvements would not fully mitigate the intersection impacts identified in the ConnectMenlo EIR; however, these impacts are no longer considered environmental effects under CEQA.

The City of Menlo Park Transportation Impact Fee Nexus Study (dated January 30, 2020) was also reviewed to determine locations where intersection improvement measures were recommended, and costs associated with those improvements were identified. Where feasible, recommended intersection improvements listed in Table 10 generally follow those listed in Appendix C of the City's TIF Nexus Study and note where additional funding may be necessary to construct recommended improvements that are beyond those in the TIF program. However, it should be noted that per OPR's Technical Advisory Guidelines, roadway improvements that are confined to the intersection and do not extend through to the next roadway segment (i.e., roadway remaining at 4-lane capacity, even with

widening of lanes at intersection level), would not likely lead to a substantial or measurable increase in vehicle travel, and therefore generally should not require an induced travel analysis.

Table 10. Summary of Recommended Improvement Measures

No.	Intersection	Jurisdiction	Near Term (2027) Plus Project	Cumulative (2040) Plus Project	Improvement in TIF Fee Program?[1]	Project Responsibility[2]
1	Willow Road/ Bayfront Expressway	Menlo Park/ State	Widen the northbound approach with an additional left-turn lane. These physical improvements would not be feasible.[3]	Same[3]	Yes - Bayfront Expressway Multimodal Corridor Project	TIF Payment
2	Willow Road/Hamilton Avenue	Menlo Park/ State	Reconfigure northbound approach to one northbound through-right turn lane and one northbound left-turn lane. These physical improvements would not be feasible due to potential impacts to bicyclists and bicycle travel.	Same[3]	Yes – Willow Road Corridor Improvement Project	TIF Payment
3	Willow Road/Ivy Drive	Menlo Park/ State	Install right-turn overlap on southbound Ivy Drive and restrict eastbound Willow Road U-turns.	Same[3]	Yes – Willow Road Corridor Improvement Project	TIF Payment
4	Willow Road/O'Brien Drive	Menlo Park/ State	Reconfigure northbound approach to two northbound left-turn lanes and one northbound right-turn lane.[4] These physical improvements would not be feasible due to potential impacts to bicyclists and bicycle travel.	Same[4]	Yes – Willow Road Corridor Improvement Project	TIF Payment
5	Willow Road/Newbridge Street	Menlo Park/ State	Physical intersection improvements are considered infeasible due to ROW constraints.[3]	Same[3]	Yes – Willow Road Corridor Improvement Project	TIF Payment
7	Willow Road/US 101 SB Off-ramps	Menlo Park/ State	N/A	Install an additional southbound left-turn lane. These physical improvements would not be feasible.[3]	Yes – Willow Road Corridor Improvement Project	TIF Payment

Table 10. Summary of Recommended Improvement Measures

No.	Intersection	Jurisdiction	Near Term (2027) Plus Project	Cumulative (2040) Plus Project	Improvement in TIF Fee Program?[1]	Project Responsibility[2]
8	O'Brien Drive/Kavanaugh Drive	Menlo Park	Install a westbound left-turn lane.[5] These physical improvements would not be feasible due to potential impacts to bicyclists and bicycle travel.	Same[5]	No	None (intersection not in TIF and there are no feasible improvements)
9	University Avenue/Bayfront Expressway	Menlo Park/ State	Widen the southbound approach with an additional through lane. These physical improvements would not be feasible.[3]	Same[3]	Yes - Bayfront Expressway Multimodal Corridor Project	TIF Payment
11	University Avenue/O'Brien Drive	Menlo Park/East Palo Alto/State	N/A	Reconfigure westbound approach to two westbound through lanes and one westbound right-turn lane. These physical improvements would not be feasible.[6]	No	None (intersection not in TIF and there are no feasible improvements)

Notes:

1 Improvements included in City of Menlo Park Transportation Impact Fee (TIF) program and noted in the City of Menlo Park TIF Nexus Study (January 3, 2020).

2 Identifies either the project's responsibility to construct an improvement or contribute fair share towards the implementation of improvements outside of payment to the TIF program. Project responsibility and improvements will be determined in the project's conditions of approval.

3 TIF improvements include adaptive traffic signal coordination along both the Bayfront Expressway corridor and the Willow Road corridor which is likely to improve LOS operations; however, LOS is unable to be quantified at this time. Additionally, physical intersection improvements are considered infeasible due to ROW constraints.

4 May require right-of-way (ROW) acquisition and/or relocation of utilities and/or mature trees. This approach is also along private ROW.

5 MUTCD peak hour signal warrants are met under both 2027 and 2040 conditions with the addition of project traffic.

6 While there are no feasible physical improvements possible, improvements in the TIF Nexus Study include signalization of #10 (University Avenue/Adams Drive) which may further improve LOS along the University Avenue corridor.

#1 Willow Road and Bayfront Expressway



#2 Willow Road and Hamilton Avenue



#4 Willow Road and O'Brien Drive



SOURCE: Bing Maps

Figure 16

Conceptual Geometrics for Recommended Improvement Measures (#1, #2, #4)

1005 O'Brien Drive and 1320 Willow Road Life Sciences Project

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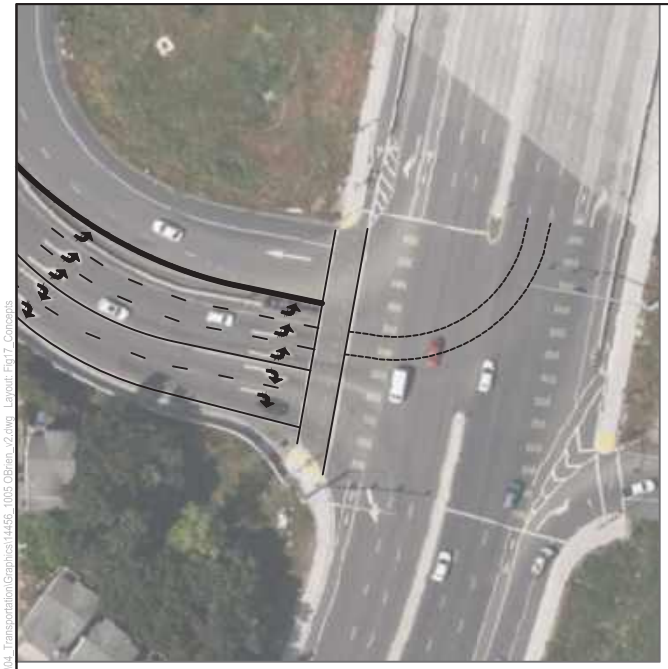
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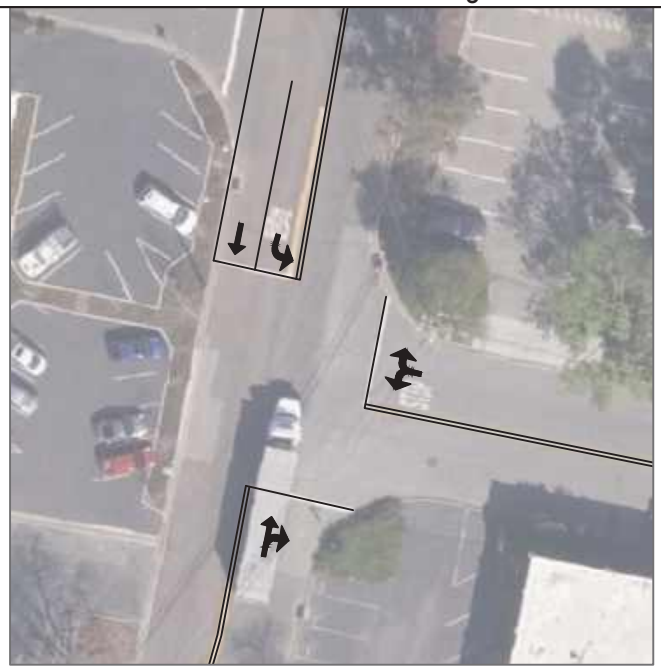
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#7 Willow Road and US 101 SB Off-Ramps



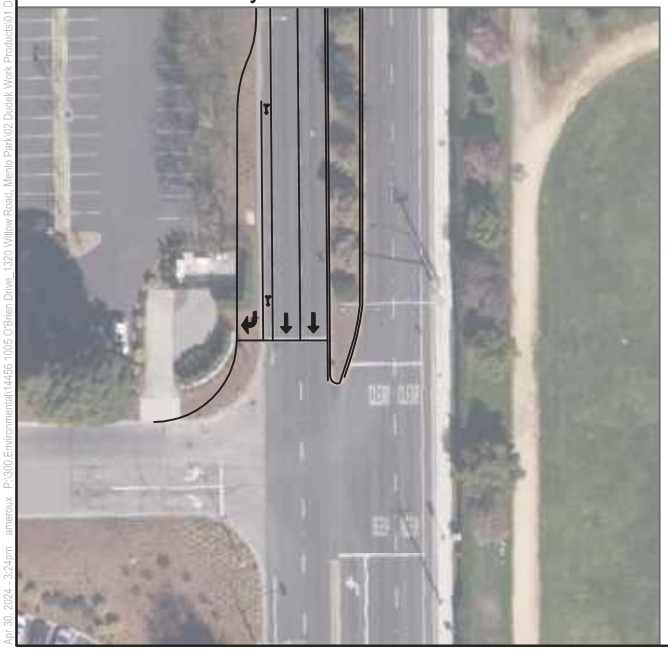
#8 O'Brien Drive and Kavanaugh Drive



#9 University Avenue and Bayfront Expressway



#11 University Avenue and O'Brien Drive



SOURCE: Bing Maps

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Figure 17

Conceptual Geometrics for Recommended Improvement Measures (#7, #8, #9, #11)

1005 O'Brien Drive and 1320 Willow Road Life Sciences Project

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6 Project Access and Circulation

6.1 Intersection Queuing Analysis

Vehicular queues are discussed for Cumulative (2040) plus Project condition and represents the addition of project traffic to the horizon year traffic volumes of the traffic model utilized. The analysis evaluates whether the project would result in hazards due to design features created by the project (i.e., new project access points/driveways on to public streets).

A queuing analysis was prepared using SimTraffic 11 software at the project's proposed new project access intersections to determine whether proposed storage pockets lengths would be exceeded. The following project driveways were analyzed for queuing impacts:

1. Willow Road/Driveway A (unsignalized; right-in, right-out)
2. Driveway B/O'Brien Drive (unsignalized; full access)
3. Driveway C/O'Brien Drive (unsignalized; full access)

Per the Highway Capacity Manual 6th Edition, the 95th percentile queue is defined as "the queue length that has only a 5% probability of being exceeded during the analysis time period." All intersections were evaluated based on the Cumulative (2040) plus Project scenario. Detailed vehicular queuing worksheets are included in Appendix E.

As shown in Table 11, most of the calculated 95th percentile (design) queues are forecast not to exceed storage capacities within the existing turn pockets. Westbound queues exiting the project site would have potential queues of approximately up to 457-feet during the PM peak hour, however these queues would be confined to the site, and it is assumed that the vehicular queues would not impact the operations of adjacent parcels or roadways. Eastbound inbound vehicles accessing Driveway A along Willow Road may encounter queuing, however the addition of the proposed project does not create the resulting queue and improvements recommended in Chapter 5 would further improve potential vehicular queuing at the Willow Road/O'Brien Drive intersection. The project will pay its fees towards the Willow Road Corridor Improvement Project which has planned TIF improvements along Willow Road including the installation of a Class IV separated bikeway, implementation of on-street parking restrictions during the peak hours, and various pedestrian improvements (e.g., refuge islands and bulb-outs), which would improve overall vehicle, bicycle, and pedestrian safety. Therefore, the project would not cause a substantial direct or cumulative effect to vehicular queueing.

Table 11. Intersection and Driveway Queuing Summary

Intersection/Driveway	Movement	Vehicle Storage Length[1]	Cumulative (2040) plus Project[2]		Exceeds Vehicle Storage Length?		Improvement Warranted?
			AM	PM	AM	PM	
Willow Road/Driveway A	NBR[3]	430	47	39	No	No	No
	EBTR[4]	160	227	247	Yes	Yes	No
Driveway B/O'Brien Drive	SBTL[4]	275	180	68	No	No	No
	NBTR[5]	315	261	257	No	No	No
	WBLR[3]	300	162	457	No	Yes	No

Table 11. Intersection and Driveway Queuing Summary

Intersection/Driveway	Movement	Vehicle Storage Length[1]	Cumulative (2040) plus Project[2]		Exceeds Vehicle Storage Length?		Improvement Warranted?
			AM	PM	AM	PM	
Driveway C/O'Brien Drive	SBTL[5]	315	174	109	No	No	No
	NBTR[4]	1,175	798	1,053	No	No	No
	WBLR[3]	300	31	222	No	No	No

Notes: NBR = northbound right-turn lane; NBTR = northbound through-right-turn lane; WBLR = westbound left-right-turn lane; SBTL = southbound through-left-turn lane; EBTR = eastbound through-right-turn lane.

1 Measured in feet
2 Based on 95th percentile (design) queue length in SimTraffic 11
3 Length is measured based on the estimated capacity of the site to queue vehicles prior to the parking garage entrance/exit
4 Length is measured to the nearest intersection
5 Length is measured to the nearest project driveway

Site Circulation

As described previously, the proposed project would provide a vehicular circulation system within each of the two proposed building lots and would provide access from Willow Road and O'Brien Drive. The 1320 Willow Road lot would be accessed from both Willow Road and O'Brien Drive. Internal streets within the 1320 Willow Road lot would not be connected with the adjacent 1005 O'Brien lot, except for through the parking structure. The 1005 O'Brien lot would be accessed from O'Brien Drive and is connected to the neighboring parcel via internal streets and Kelly Court to the south.

All project driveways and access to the project site would be designed according to the City's standards and guidelines for construction and coordinated with the City's Public Works Department for work done at existing intersections, such as Willow Road and O'Brien Drive. Vehicular queuing is expected to be minimally affected by the proposed project, and almost all queues are expected to be within all available storage lengths and would cause nominal changes in existing or future conditions at nearby intersections and roadways. Queues at Driveway A will exceed the available storage length at the eastbound through-right-turn lane movement as the Willow Road/O'Brien Drive intersection is nearby; this should only cause delay to those entering or exiting the site but should not cause delays for cars moving through the intersection, and no improvements are feasible. At Driveways B and C, the modeled queues show that they may exceed the provided storage length, but both driveways lead to the parking garage entrance thus will not block any internal circulation, and no improvements are necessary.

During construction of the proposed project, an Encroachment Permit will be required for any work within the City's right-of-way including the project frontages and driveways on Willow Road and O'Brien Drive per Municipal Code Section 13.18.020. The Encroachment Permit will require the applicant to disclose details of the proposed construction activities and may require a traffic control plan (to be determined by the City's Public Works Department). The traffic control plan will also require adequate traffic management signage and require construction truck traffic to avoid all residential areas to the extent possible and follow all local and regional regulations as it relates to operation of heavy vehicles on public roadways. The proposed project is a life science office use that is compatible with the life science, research and development nature of the area and would not introduce vehicles, such as farm tractors, heavy machinery and equipment, or oversized haul trucks, that could be incompatible with the other residential, institutional, and commercial uses in the area. The trash enclosures are

located to the north of 1005 O'Brien and there is adequate space for garbage collection trucks to circulate throughout the site. Delivery and service trucks not of oversize will have adequate space to access the loading docks and shall not provide hinderance to pedestrian or employee pathways.

Therefore, as described above, the proposed project would not substantially increase hazards due to a geometric design feature or introduce incompatible uses.

6.2 Sight Distance Analysis

A sight distance analysis was conducted using the methodology from the Caltrans Highway Design Manual (HDM) (2020). The Caltrans HDM provides minimum sight distance standards for intersections, however at certain locations and instances, sight distance greater than stopping sight distance is desirable to allow time for decisions without making last minute erratic maneuvers. The Caltrans HDM refers to the American Association of State Highway Transportation Officials' (AASHTO 2018) – Geometric Design of Highways and Streets ("Green Book") as a reference for such cases. Therefore, the AASHTO criteria are more conservative than the sight distance standards listed in the Caltrans HDM. Stopping sight distance is the distance needed for a vehicle traveling at a specified design speed to react, assess, and then stop when an object crosses its path of travel. Therefore, stopping sight distance for project access driveways was determined by using methodology provided in AASHTO.

The posted speed limit on O'Brien Drive is 25 mph and the posted speed limit along Willow Road is 40 mph; therefore, the design speed in the project vicinity was assumed to be 25 and 40 mph, respectively. The stopping sight distance for O'Brien Dive is 155-feet, and the stopping sight distance for Willow Road is 305-feet. The adequacy of sight distance and recommendations are described below. Figure 18 illustrates the stopping sight distance analysis. As shown on Figure 18, for both vehicles exiting along O'Brien Drive and along Willow Road, the stopping sight distance analysis shows that there are limited impediments for vehicles, however, overhanging trees/vegetation should be reviewed and maintained properly to provide clear sight distance.

6.3 Emergency Access

As described previously, the proposed project would provide three vehicular driveways. The northern driveway located along Willow Road and the western driveway located along O'Brien Drive would provide access to the northern portion of the project site and the northern parking garage entrance. The western driveway located along O'Brien Drive would provide access to the southern portion of the project site and the southern parking garage entrance.

All driveways (internal and entrances) would have a total width of 26 feet and would serve as an emergency vehicle access entrance and exit. Within the 1320 Willow lot, there is a firetruck turn around area for emergency vehicles to maneuver within the lot. The fire district will review the proposed site plan, including fire hydrant placement and emergency vehicle access, prior to issuance of building permits. Along Willow Road and O'Brien Drive, there is adequate width for emergency vehicles to access adjacent properties and where other vehicles can safely pull over and yield to emergency vehicles. The proposed project would not result in inadequate emergency access to adjacent parcels or properties within the study area. The vehicular circulation network would not change and overall emergency response to adjacent properties would remain adequate. Therefore, the proposed project would not result in inadequate emergency access. All future development projects would be required to comply with all City regulations and site plan review as part of the City's project approval process. The Fire Department would review certain projects and together with the policies and goals as outlined in the City's General Plan, would ensure that

minimal impacts result to emergency access and there would be no significant cumulative impact to which the project could contribute.

6.4 Parking Assessment

The project would include a total of 520 vehicle parking spaces for employees and visitors. The seven-level parking garage would offer 497 parking spaces, and 23 parking spaces would be provided at surface level. Nine of the garage and four of the surface-level parking spaces would be Americans with Disabilities Act (ADA) accessible. At the time of construction completion, 15% of the total parking spaces would be equipped with an electric vehicle (EV) charging station (78 spaces) and 30% of the total parking spaces would be "EV Ready," meaning that conduits would be installed to facilitate adding a charging station in the future (157 spaces).

The project would include a total of 68 bicycle parking spaces for employees and visitors. Long-term parking spaces, defined as for use over several hours or overnight, will be provided within enclosed areas in the parking garage and within each of the office buildings. A total of 48 long-term bicycle parking spaces would be provided. Short-term parking spaces, defined as visitor parking or for use for several minutes to a few hours, will be provided near the entrances of each office building, and at the sports court.

According to Municipal Code Section 16.44.080, the project would need to meet the parking requirements for light industrial, research and development land use. The required minimum vehicle parking spaces per 1,000 SF is 1.5 spaces, and the maximum spaces per 1,000 SF is 2.5 spaces. The project would provide a total of 520 parking spaces, totaling approximately 2.3 spaces per 1,000 SF. Additionally, the project must provide a minimum of 1 bicycle parking space per 5,000 SF of gross floor area of which, 80% must be viable for long-term parking and 20% must be viable for short-term parking. The project would provide a total of 68 bicycle parking spaces, totaling approximately 1.5 spaces per 5,000 SF. Therefore, the project would meet the City's parking requirements. Table 12 breaks down the number of spaces provided for each required parking type.

Table 12. Parking Summary

Parking Type	Spaces Required	Spaces Provided
On-Site Vehicle Parking Spaces		
Surface-level Parking	343– 573[1]	23
Garage Parking		497
Total Vehicle Parking Spaces	**343 – 573**	**520**[2]
Breakdown of Vehicle Parking Spaces		
Standard Parking		
Surface-level Parking	248 – 420[3]	15
Garage Parking		203
Total Standard Parking Spaces	**248 – 420**	**218**
Electric Vehicle (EV) Parking		
EV Charging Station Standard Parking	at least 5% of total (17 – 29)[4]	78
EV Ready Standard Parking	at least 10% of total (34 – 57)[4]	157
Total EV Spaces	**51 – 86**	**235**

Table 12. Parking Summary

Parking Type	Spaces Required	Spaces Provided
ADA Accessible Parking		
ADA Accessible Surface-level Parking	11	4
ADA Accessible Garage Parking		7
ADA Accessible EV Charging Station Parking	5 – 10	14
Total ADA Accessible Parking	**16 – 21**	**25**
Clean Air/Vanpool/Carpool Parking		
Clean Air/Vanpool/Carpool Surface-level Parking	28 – 46	0
Clean Air/Vanpool/Carpool Garage Parking		42
Total Clean Air/Vanpool/Carpool Parking	**28 – 46**	**42**
Vehicle Parking Totals	**343 – 573**	**520**
On-Site Bicycle Parking Spaces		
Long-term Bicycle Parking	46	48
Short-term Bicycle Parking	9	20
Total Bicycle Parking Spaces	**55**	**68**

Notes:

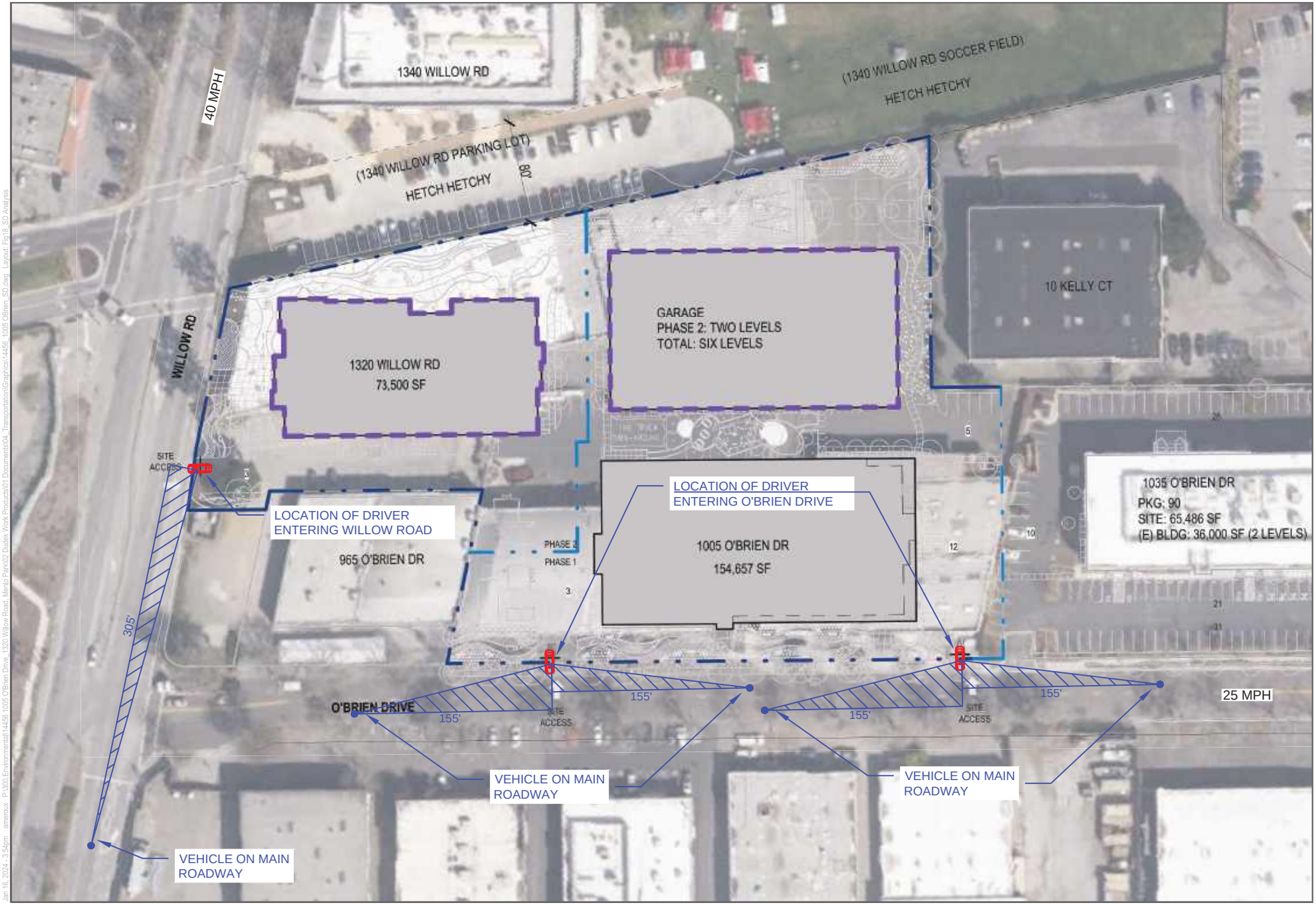
1 Per City of Menlo Park Municipal Code, the minimum required total parking spaces is 343 spaces (1.5 spaces per 1,000 SF), and the maximum required parking spaces is 573 spaces (2.5 spaces per 1,000 SF). All parking spaces accrue towards the total, including EV, ADA, and Clean Air/Vanpool/Carpool spaces.

2 To meet the LEED v4.1 standard, the project must not exceed 620 total vehicle parking spaces.

3 Required Standard Parking spaces adjusted based on EV, ADA, and Clean Air/Vanpool/Carpool parking requirements.

4 Per City of Menlo Park Municipal Code, and to meet the LEED V4.1 standard, a minimum of 5% of total parking spaces must be EV Charging spaces (EVCS), and 10% of total parking spaces must be EV Ready Charging spaces (EVSE). The total number of EV spaces exceeds the City Code and CalGreen requirements, and complies with the Tier 2 CalGreen Non-Residential Voluntary Measures. Approximately 45% of the on-site parking spaces are EV spaces (EV Charging and EV Ready parking spaces).

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SOURCE: Bing Maps; TARLTON, DES Architects/Engineers 2022, AASHTO 2018

DUDEK

1" = 100' 0 50 100 Feet

Figure 18

Stopping Sight Distances at Project Driveways

1005 O'Brien Drive and 1320 Willow Road Life Sciences Project

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7 Findings and Recommendations

Vehicle Miles Traveled

As discussed in Chapter 4, the estimated project VMT does not account for the project's proposed TDM plan. Without any TDM measures, the project's employee use may cause substantial additional VMT. The TDM plan would need to achieve a minimum 28.4% reduction in VMT to reduce the proposed project's impacts to less-than-significant levels, which is not within the 20% reduction in vehicle trips required by Section 16.44.090 of the Menlo Park Municipal Code. However, at least a 35% reduction in VMT is possible using the C/CAG TDM Mitigation score sheet for large, transit proximate, non-residential uses such as the project. The TDM Plan reporting shall include annual commute surveys, annual driveway counts and annual reporting to demonstrate that the 35% C/CAG peak hour trip reduction requirement has been achieved. If the reduction has not been achieved in the reporting period, the report shall provide additional measures that will be implemented in the coming year in order to achieve the City's requirement.

The required non-residential TDM Plan will include annual monitoring and reporting requirements on the effectiveness of the TDM program. The project applicant submitted a draft TDM Plan (Appendix A), which contains specific measures that would meet this trip reduction requirement. The draft TDM Plan is subject to City review and approval. If the annual monitoring finds that the TDM reduction is not met, the TDM coordinator will be required to work with City staff to detail next steps to achieve the TDM reduction. With the implementation of the required TDM Plan, the project's VMT impact would be less than significant.

Level of Service Analysis

Existing Conditions

As discussed in Chapter 5.1, all of the study area intersections are currently operating at satisfactory levels of service (LOS D or better) under existing conditions per City standards, with the exception of the following intersections:

- #1 Willow Road/Bayfront Expressway – LOS F in AM and PM peak hours (signalized)
- #2 Willow Road/Hamilton Avenue – LOS E in PM peak hour (signalized)
- #4 Willow Road/O'Brien Drive – LOS F in PM peak hour (signalized)
- #5 Willow Road/Newbridge Street – LOS F in AM and PM peak hours (signalized)
- #9 University Avenue/Bayfront Expressway – LOS E in PM peak hour (signalized)
- #10 University Avenue/Adams Drive – LOS F in AM peak hour; LOS E in PM peak hour (unsignalized)

Near-Term (2027) plus Project Conditions

Under Near-Term (2027) plus Project conditions, the following intersections would exceed the thresholds identified in the City's TIA guidelines and increase the average critical movement delay by 0.8 seconds or more during AM and/or PM peak hours:

- #1 Willow Road/Bayfront Expressway – LOS F in AM peak hour (signalized)
- #2 Willow Road/Hamilton Avenue – LOS F in AM peak hour (signalized)

- #3 Willow Road/Ivy Drive – LOS F in PM peak hour (signalized)
- #4 Willow Road/O'Brien Drive – LOS F in AM and PM peak hours (signalized)
- #5 Willow Road/Newbridge Street – LOS F in AM and PM peak hours (signalized)
- #8 O'Brien Drive/Kavanaugh Drive – LOS F in AM peak hour (unsignalized)
- #9 University Avenue/Bayfront Expressway – LOS E in PM peak hour (signalized)

For Willow Road intersections between Bayfront Expressway and US-101 ramps, the overall delay is reported as OVERSAT (LOS E or F) for oversaturated conditions based on previous simulation models that the increased volumes will cause queuing that extends past multiple intersections and results in oversaturated conditions. The Manual on Uniform Traffic Control Devices (MUTCD) peak hour signal warrant was performed at the unsignalized intersections (#8 and #10) and is provided in Appendix C. The warrant is met for intersection #8 (O'Brien Drive/Kavanaugh Drive) in both peak hours for both baseline and plus project conditions. The warrant is not met in either peak hour for all other remaining unsignalized intersections.

Recommendations

A summary of recommended improvements at the intersections identified above is provided in Table 10 and summarized below:

- #1 Willow Road/Bayfront Expressway
  - No feasible physical improvements are possible (The TIF Nexus Study include adaptive traffic signal coordination along both the Bayfront Expressway corridor and Willow Road corridor which is likely to reduce delay but the intersection would still not be compliant with the City's LOS policy).
- #2 Willow Road/Hamilton Avenue
  - Reconfigure northbound approach to one northbound through-right turn lane and one northbound left-turn lane. These physical improvements would not be feasible due to potential impacts to bicyclists and bicycle travel.
- #3 Willow Road/Ivy Drive
  - Install right-turn overlap on southbound Ivy Drive and restrict eastbound Willow Road U-turns (included in TIF Nexus Study).
- #4 Willow Road/O'Brien Drive
  - Reconfigure northbound approach to two northbound left-turn lanes and one northbound right-turn lane. Additional improvements in the TIF Nexus Study include adaptive traffic signal coordination along the Willow Road corridor which is likely to improve LOS operations. These physical improvements would not be feasible due to potential impacts to bicyclists and bicycle travel.
- #5 Willow Road/Newbridge Street
  - There are no feasible physical improvements possible (The City plans to implement adaptive traffic signal coordination along the Willow Road corridor which is likely to reduce delay but the intersection would still not be compliant with the City's LOS policy).
- #8 O'Brien Drive/Kavanaugh Drive
  - Install a westbound left-turn lane. These physical improvements would not be feasible due to potential impacts to bicyclists and bicycle travel.
- #9 University Avenue/Bayfront Expressway

- There are no feasible physical improvements possible (The TIF Nexus Study include adaptive traffic signal coordination along the Bayfront Expressway corridor which is likely to reduce delay but the intersection would still not be compliant with the City's LOS policy).

Cumulative (2040) plus Project Conditions

Under Cumulative (2040) plus Project conditions, the following intersections would exceed the thresholds identified in the City's TIA guidelines and increase the average critical movement delay by 0.8 seconds or more during AM and/or PM peak hours:

- #1 Willow Road/Bayfront Expressway – LOS F in AM and PM peak hours (signalized)
- #2 Willow Road/Hamilton Avenue - LOS F in AM peak hour (signalized)
- #3 Willow Road/Ivy Drive - LOS E in PM peak hour (signalized)
- #4 Willow Road/O'Brien Drive - LOS E in AM peak hour; LOS F in PM peak hour (signalized)
- #5 Willow Road/Newbridge Street – LOS F in AM and PM peak hours (signalized)
- #7 Willow Road/US 101 SB Off-ramps – LOS F in AM peak hour (signalized)
- #8 O'Brien Drive/Kavanaugh Drive – LOS F in AM and PM peak hours (unsignalized)
- #9 University Avenue/Bayfront Expressway – LOS F in PM peak hour (signalized)
- #11 University Avenue/O'Brien Drive - LOS F in AM peak hour (signalized)

For Willow Road intersections between Bayfront Expressway and US-101 ramps, the overall delay is reported as OVERSAT (LOS E or F) for oversaturated conditions based on previous simulation models that the increased volumes will cause queuing that extends past multiple intersections and results in oversaturated conditions. The MUTCD peak hour signal warrant was performed at the unsignalized intersections (#8 and #10) and is provided in Appendix C. The warrant is met for intersection #8 (O'Brien Drive/Kavanaugh Drive) in both peak hours for both baseline and plus project conditions. The warrant is not met in either peak hour for all other remaining unsignalized intersections.

Recommendations

The same improvement measures noted under Near-Term (2027) plus Project conditions are recommended for incompliant intersections noted above, where overlap occurs. A summary of any additional improvements warranted under Cumulative (2040) plus Project conditions is provided in Table 10 and summarized below:

- #7 Willow Road/US 101 SB Off-ramps
  - Install an additional southbound left-turn lane. These physical improvements would not be feasible.
- #11 University Avenue/O'Brien Drive
  - There are no feasible physical improvements possible (improvements in the TIF Nexus Study include signalization of #10 (University Avenue/Adams Drive) which may further improve LOS along the University Avenue corridor.

Pedestrian and Bicycle Access

As discussed in Chapter 2.3, no deficiencies to pedestrian or bicycle facilities were identified in the study area that would restrict access to or from the project site. Sidewalks are present along the eastern portions of O'Brien Drive, and on both north and south sides of Willow Road. However, there are missing sidewalk segments on both eastern and western portions of O'Brien Drive including directly along the project site boundary, and along Adams Drive.

These roadways are outfitted with storm drain outlets that either flow into the municipal storm drain system or directly into vegetated swales. Designated crosswalks are also present along most of the intersections near the project site. The project will work with City staff to identify other necessary pedestrian and bicycle improvements as needed. The proposed project would provide three driveways, including internal connections leading to a public plaza that functions as a central gathering place. The public plaza will consist of a concrete pad with a trellis and backdrop screening and flexible seating, suitable for picnics and similar activities. A total of 68 bicycle parking spaces will be provided on-site. The closest designated bicycle facility is a Class III Bike Route along O'Brien Drive, located immediately west of the project site, and buffered Class II Bike Lanes along Willow Road, immediately north of the project site. In addition, an existing Class I Bike Path is provided along Bayfront Expressway and a Class II Bike Lanes are present on Newbridge Street and University Avenue. As indicated in the TMP, proposed bicycle facilities in the vicinity of the project site include future Class IV Bikeways on Willow Road, an extension of the Class II Bike Lane along O'Brien Drive and a Class II Bike Lane along Marsh Road, from Bayfront Expressway to Bay Road. The current right of way on Willow Road along the Project's frontage can accommodate a Class IV bikeway under adopted bikeway standards. The Project sponsor should work with the City to accommodate its proposed design.

Project Site Access and Circulation

As discussed in Chapter 6, with the construction of the proposed project, there would be a total of three driveways with access from both Willow Road and O'Brien Drive and would provide a vehicular circulation system within each of the two proposed building lots. The 1320 Willow Road lot would be accessed from both Willow Road and O'Brien Drive. Internal streets within the 1320 Willow Road lot would not be connected with the adjacent 1005 O'Brien lot, except for through the parking structure. The 1005 O'Brien lot would be accessed from O'Brien Drive and is connected to the neighboring parcel via internal streets and Kelly Court to the south. Internal streets that would provide emergency vehicle access would be 26 feet wide while other internal streets and driveways would be 20 feet wide.

All driveways and access to the project site would be designed according to the City's standards and guidelines for construction and coordinated with the City's Public Works Department. The stopping sight distance for both vehicles exiting along O'Brien Drive and along Willow Road, shows that there are limited impediments for vehicles, however, overhanging trees/vegetation should be reviewed and maintained properly to provide clear sight distance. westbound queues exiting the project site would have potential queues of approximately up to 457-feet during the PM peak hour, however these queues would be confined to the site, and it is assumed that the vehicular queues would not impact the operations of adjacent parcels or roadways. eastbound inbound vehicles accessing Driveway A along Willow Road may encounter queuing, however the addition of the proposed project does not create the resulting queue and improvements recommended in Chapter 5 would further improve potential vehicular queuing at the Willow Road/O'Brien Drive intersection. Therefore, the project would not cause a substantial direct or cumulative effect to vehicular queueing. During construction of the proposed project, construction truck traffic would remain on the most efficient path of travel to all regional and locally signed truck routes.

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Appendix A

Transportation Demand Management Plan

MEMORANDUM

To: Ron Krietemeyer
Tarlton Properties, Inc.

From: Ben Huie, P.E.

Date: January 31, 2024

Subject: **Transportation Demand Management (TDM) Memorandum for 985-1005 O'Brien Drive**

Kimley-Horn and Associates, Inc. (KHA) was retained by Tarlton Properties, Inc. to prepare a transportation demand management (TDM) memorandum for the project located at 985-1005 O'Brien Drive in Menlo Park, CA. The proposed project replaces the existing 1320 Willow building, 985 O'Brien Drive building, and the 1001 O'Brien Drive building with a new 1320 Willow building, a new 1005 O'Brien Drive building, and a parking garage. The project would be completed in two phases:

- Phase 1 – 1005 O'Brien Drive and a 4-level parking garage
- Phase 2 – 1320 Willow and add two levels to the parking garage

The total project would result in approximately 227,050 square feet of research and development building and approximately 530 parking spaces.

Per the zoning ordinance in the City of Menlo Park City Code[1], new construction development projects are required to develop a TDM plan to reduce the number of vehicle trips to at least 20 percent below the standard trip generation rates for the project. In addition, the project would be required to meet the applicable City of Menlo Park vehicle miles traveled (VMT) threshold of 15 percent below the existing regionwide VMT per employee and the City/County Association of Governments of San Mateo County (C/CAG) requirement of a 35 percent trip reduction for transit proximate projects. C/CAG defines transit proximate projects as projects located between 0.5-3 miles of a transit station or stop featuring a maximum 15-minute service frequency (headways) during weekday peak hours between 6-10 AM and 3-7 PM.

Although the project is being completed in two phases, the TDM has been proposed for the entire project because the entire project would be required to meet the same trip reduction and VMT reductions (i.e., they are not different for each phase). In addition, the project would likely be monitored as a single project due to the buildings sharing a parking garage.

[1] Zoning Ordinance 16.44.090 Transportation demand management, City of Menlo Park, October 2017.

PROJECT PEAK HOUR TRIPS

The number of project trips for the project site was estimated using the industry standard Institute of Transportation Engineer's (ITE) *Trip Generation Manual*[2]. This reference estimates project trips based on land use from survey data. The proposed project is a redevelopment, so existing trip credits will be taken.

Table 1 summarizes the trip generation for the project proposal. Specific details of the trip generation are provided in **Attachment A**.

Table 1 – Trip Generation Summary – Proposed Use

Existing or Proposed	Address	ITE Land Use Code	Land Use	Vehicle Trips		
				Daily	AM Peak	PM Peak
Existing	985 O'Brien Dr	151	10.022 KSF Mini-Warehouse	14	1	2
	985 O'Brien Dr	760	10.022 KSF R&D	111	10	10
	1001 O'Brien Dr	760	20.542 KSF R&D	228	21	20
	1320 Willow Rd	151	50.045 KSF Mini-Warehouse	73	5	8
Existing Total Trips				**426**	**37**	**40**
Proposed	1005 O'Brien Dr	760	154.581 KSF R&D	1,713	159	151
	1320 Willow Rd	760	73.500 KSF R&D	814	75	72
Proposed Total Trips				**2,527**	**234**	**223**
Net Trips Generated (Proposed – Existing)				**+2,101**	**+197**	**+183**

Note: The trip generation summary does not include a 35% trip reduction for the TDM plan.

The proposed land use results in net 2,101 daily trips, 197 AM peak hour trips, and 183 PM peak hour trips. This TDM program was proposed to reduce the vehicle trips by at least 35 percent for the proposed project or by 884 daily trips, 82 AM peak hour trips, and by 78 PM peak hour trips.

[2] *Trip Generation Manual, 11th Edition*, Institute of Transportation Engineers, 2021.

PROJECT VEHICLE-MILES TRAVELED (VMT)

As of June 16, 2020, the City has adopted VMT thresholds and methods described in their staff report to City Council on June 23, 2020. The VMT threshold for an office use is 15 percent below the average Citywide VMT. Since January 11, 2022, this has been revised to be the regionwide VMT average. Based on the information presented in Staff Report 22-005-CC to City Council, **the VMT threshold would be 13.6 VMT per employee**. The project's VMT was based on the VMT for office uses in its traffic analysis zone (TAZ) as determined by the City's travel demand model. The project's TAZ indicates the VMT as 19.0 VMT per employee. Therefore, the project would need a 28.4 percent VMT reduction to be below the City's established VMT threshold.

TRANSPORTATION DEMAND MANAGEMENT PROGRAM

The following summarizes an initial approach to the proposed TDM program for the proposed project. The City's transportation demand management program includes required monitoring and reporting, and it is assumed that the TDM program will be refined over time to adapt to changing transportation trends and to maximize the efficiency of the program. The TDM program is specifically designed to focus on incentives and rewards for employees to participate in the program rather than penalties for not participating.

POTENTIAL PROGRAM ELEMENTS

Tarlton Properties, Inc. should offer a combination of program elements to encourage employees to utilize alternative modes of transportation to driving alone. Potential program elements are listed below:

- Increase employment density
- Participation in a local transportation management association (TMA)
- Preferential carpool parking spaces
- Preferential vanpool parking spaces
- Designated parking spaces for car share vehicles
- Pay for parking program
- Bike share program
- Subsidized transit tickets for employees
- Subsidy for carpool, vanpool, shuttle, or bus service
- Compressed workweek program
- Alternate hours workweek program
- Telecommuting
- Passenger loading zones for carpools and vanpools
- Safe and well-lit and accessible routes to nearby transit or shuttle stops
- Car share membership for employees
- Guaranteed ride home program
- Bike lockers/racks
- Showers/changing rooms
- Shuttle service
- Vanpool program
- Commute assistance center

- Parking cash out program

These program elements are listed in the City of Menlo Park's *Transportation Demand Management Program Guidelines*. Additionally, C/CAG has its own guidelines for a TDM program mentioned in the *Transportation Demand Management Policy Update Approach*. Each of these documents summarizes the potential program measures, a description of each measure, and the trip credits associated with each measure.

PROPOSED PROGRAM ELEMENTS

The project applicant is interested in working with the City to develop a practical TDM plan that can be both effective and provide the most value for all parties.

The effectiveness of the TDM plan was predicted using two separate methodologies:

1. California Air Pollution Control Officers Association (CAPCOA) *Quantifying Greenhouse Gas Mitigation Measures* for the City's VMT reduction analysis
2. City/County Association of Governments of San Mateo County (C/CAG) *Transportation Demand Management Policy Update Approach* for C/CAG's trip reduction analysis

The CAPCOA methodology and the C/CAG methodology are consistent with the methodologies used for other TDM plans in the City of Menlo Park.

CAPCOA Methodology

The CAPCOA methodology is based on the *Quantifying Greenhouse Gas Mitigation Measures* reference. This document estimates trip reductions, VMT reductions, and emissions reductions based on various relevant data sources, reports, and studies around the world.

Focusing on the transportation section, the estimated trip reduction and VMT reduction ranges for various measures are based on different transportation categories. In addition to the specific reductions for each measure, the CAPCOA methodology provides guidance on maximum reductions due to similar measures. The intent is to not double count measures that are similar and work in harmony with similar measures within the same category. CAPCOA provides the following equation for determining reductions when combining similar measures:

Combined Reduction Percentage = 1 – [(1-A) x (1-B) x (1-C)]

where: A, B, and C = Individual mitigation measure reduction percentages

Table 2 shows the estimated trip reduction and VMT reduction for each proposed TDM measure using the CAPCOA methodology.

Table 2 – Proposed TDM Measure Summary – CAPCOA

TDM Measure #	Transportation Demand Management Measure	Description	TDM Type	Estimated VMT Reduction (%)	CAPCOA Measure #
1	Provide End-of-Trip Bicycle facilities	This measure will install and maintain end-of-trip facilities for employee use. End-of-trip facilities include bike parking, bike lockers, showers, and personal lockers. The provision and maintenance of secure bike parking and related facilities encourages commuting by bicycle, thereby reducing VMT and greenhouse gas (GHG) emissions.	Trip Reduction Program	4.4%	T-10
2	Subsidized transit tickets for employees	This measure will provide subsidized or discounted, or free transit passes for employees and/or residents. Reducing the out-of-pocket cost for choosing transit improves the competitiveness of transit against driving, increasing the total number of transit trips and decreasing vehicle trips. This decrease in vehicle trips results in reduced VMT and thus a reduction in GHG emissions.	Trip Reduction Program	1.4%	T-9
3	Implement Commute Trip Reduction Marketing	This measure will implement a marketing strategy to promote the project site employer's CTR program. Information sharing and marketing promote and educate employees about their travel choices to the employment location beyond driving such as carpooling, taking transit, walking, and biking, thereby reducing VMT and GHG emissions. The following features (or similar alternatives) of the marketing strategy are essential for effectiveness. ▪ Onsite or online commuter information services. ▪ Employee transportation coordinators. ▪ Onsite or online transit pass sales. ▪ Guaranteed ride home service.	Trip Reduction Program	4.0%	T-7
4	Implement Pedal (Non-Electric) Bikeshare Program	This measure will establish a bikeshare program. Bikeshare programs provide users with on-demand access to bikes for short-term rentals. This encourages a mode shift from vehicles to bicycles, displacing VMT and thus reducing GHG emissions.	Neighborhood Design	0.0%	T-22 A
5	Implement Conventional Carshare Program	This measure will increase carshare access in the user's community by deploying conventional carshare vehicles. Carsharing offers people convenient access to a vehicle for personal or commuting purposes. This helps encourage transportation alternatives and reduces vehicle ownership, thereby avoiding VMT and associated GHG emissions.	Neighborhood Design	0.0%	T-21 A
6	Provide Employer-Sponsored Vanpool	This measure will implement an employer-sponsored vanpool service. Vanpooling is a flexible form of public transportation that provides groups of 5 to 15 people with a cost-effective and convenient rideshare option for commuting. The mode shift from long-distance, single-occupied vehicles to shared vehicles reduces overall commute VMT, thereby reducing GHG emissions.	Trip Reduction Program	5.2%	T-11

TDM Measure #	Transportation Demand Management Measure	Description	TDM Type	Estimated VMT Reduction (%)	CAPCOA Measure #
7	Provide a ridesharing program	This measure will implement a ridesharing program and establish a permanent transportation management association with funding requirements for employers. Ridesharing encourages carpooled vehicle trips in place of single-occupied vehicle trips, thereby reducing the number of trips, VMT, and GHG emissions.	Trip Reduction Program	4.0%	T-8
8	Implement Commute Trip Reduction Program (Mandatory)	This measure will implement a mandatory Commute Trip Reduction (CTR) program with employers. CTR programs discourage single-occupancy vehicle trips and encourage alternative modes of transportation such as carpooling, taking transit, walking, and biking, thereby reducing VMT and GHG emissions. The mandatory CTR program must include all other elements (i.e., implement commute trip reduction marketing, provide a ridesharing program, subsidized transit tickets for employees, provide end-of-trip bicycle facilities, and provide employee sponsored vanpool) plus include mandatory trip reduction requirements (including penalties for non-compliance) and regular monitoring and reporting to ensure the calculated VMT reduction matches the observed VMT reduction.	Trip Reduction Program	26.0%	T-6
			Estimated Maximum Trip Reduction[1]	**39.1%**	

[1]Estimated maximum trip reduction is calculated by the Combined Reduction Percentage equation on Page 4, not by summing the individual estimated VMT reduction percentages.

As shown in **Table 2**, the estimated trip reduction is 39.1 percent using the CAPCOA methodology. This satisfies the City of Menlo Park requirement of a 28.4 percent VMT reduction.

C/CAG Methodology

The initial set of TDM measures proposed for the 985-1005 O'Brien Drive site using the C/CAG TDM Mitigation score sheet for large, transit proximate, non-residential land uses. The measures and estimated trip reductions are summarized in **Table 3**.

Table 3 – Proposed TDM Measure Summary – C/CAG

TDM Measure		Description	C/CAG	
			Estimated Trip Reduction	Required
1	Free/Preferential Parking for Carpools	Provide free or preferential parking, including reserved spaces or spaces near an entrance or in another desirable location, to incentivize ridesharing.	1.0%	x
2	TDM Coordinator	In addition to, or in place of a building-wide Commute Assistance Center, a TDM Coordinator can be appointed by each building tenant. This representative is responsible for implementing the TDM Plan within its organization, with responsibilities that may include distributing transit and commute alternative information, conducting an annual commuter survey, and preparing an annual report summarizing the TDM Plan activities and performance.	0.5%	x
3	Actively Participate in Commute.org, or Transportation Management Association (TMA) Equivalent	Sites shall register with Commute.org or else join or create a Transportation Management Association (TMA) with equivalent TDM service, whose role is to coordinate transportation-related programs and services in specific geographic areas. Notably, for Large Non-Residential (Office, Industrial, Institutional, as well as Medical & Lodging) projects categorized as Transit Proximate there are five components an applicant must fulfill to satisfactorily implement this measure: 1. Obtain certification of participation with Commute.org, or equivalent program. 2. Provide commute assistance or ride-matching program. 3. Provide (or fund) a dedicated shuttle program/consortium or equivalent transit service. 4. Provide Guaranteed Ride Home 5. Supply orientation, education, and promotional programs and/or materials for tenants	16.5%	x
3a	*Certified participation in Commute.org, or equivalent program such as TMA*	*See above*	*4.0%*	*x*
3b	*Commute assistance and ride-matching*	*Establish a commute assistance program to provide individualized trip planning services. These services can help employees and residents understand the range of transportation options available to them based on their commute patterns. Ride-matching services aim to find carpools or vanpools for employees or residents with similar commute patterns. Dynamic ridesharing apps are increasing in popularity and allow for ride-matching on a day-by-day basis.*	*1.0%*	*x*
3c	*Shuttle Program/Shuttle Consortium/Fund Transit Service*	*Establish a shuttle service to regional transit hubs, commercial centers, or residential areas. Shuttle service should be provided free of charge to residents, employees, and guests. Alternatively, a project site may buy into a shuttle consortium with neighboring developments to pool resources and run shuttle services to multiple nearby sites. Developers may also fund enhanced transit service to/from their project site in collaboration with SamTrans.*	*10.0%*	*x*

TDM Measure		Description	C/CAG	
			Estimated Trip Reduction	Required
3d	*Guaranteed Ride Home*	*Offer employees a Guaranteed Ride Home (GRH) program to provide an occasional subsidized ride to commuters who use alternative modes, for example, if a bus rider must return home in an emergency, or a car pooler must stay at work later than expected. This addresses a common objection to the use of alternative modes. In San Mateo County, a countywide GRH program is managed by Commute.org. This program is open to all persons with a workplace in San Mateo County or students who commute to a participating college in San Mateo County.*	*0.5%*	*x*
3e	*Orientation, Education, Promotional Programs and/or Materials*	*Offer new employees or residents an orientation or education program or materials. This should explain the importance of trip reduction methods and provide information on alternative transport mode options available at the site, including transit schedules, maps, and trip planning. These orientation or education programs and materials can also highlight transportation-focused benefits or amenities available to employees or residents, such as pre-tax benefits, car share, bike share, or shuttle services.*	*1.0%*	*x*
4	Carpool or Vanpool Program	Carpool and vanpooling are types of ridesharing that seek to allow vehicles to carry additional passengers when making a trip, with minimal additional mileage. Carpooling generally uses participants' own automobiles. Vanpooling generally uses leased vans (often supplied by employers, non-profit organizations, or government agencies). Carpool and vanpool programs may receive financial incentives from property managers or employers, as well as ride-matching services to help facilitate these shared trips.	2.0%	x
5	Transit or Ridesharing Passes/Subsidies	Offer public transit passes or subsidies; or carpool/vanpool subsidies to tenants' equivalent to 30% of the value of their monthly fare or $50 monthly, to incentivize transit use and ridesharing and comply with regional environmental sustainability goals. NOTE: Funding contributions towards and/or participation in Commute.org shuttle program does not count for this measure. Passes/subsides provided must be valid for public transportation options, including but not limited to BART, Caltrain, SamTrans, and ridesharing platforms and vanpool subscription (or costs).	10.0%	x
6	Pre-Tax Transportation Benefits	Allow employees to participate in a pre-tax transit and parking benefits program to save money and encourage the use of sustainable transportation modes. In the Bay Area, the Bay Area Air Quality Management District (BAAQMD) requires that employers with 50+ employees within the air district provide commuter benefits.	1.0%	x
7	Secure Bicycle Storage	Provide safe and convenient long-term (Class I) bicycle parking. Long-term bicycle parking should offer protection from weather and convenient access to and from the street, without the need to use stairs and with doorways and corridors that are sufficiently wide to navigate with a bicycle. Short term (Class II) bicycle parking should be near pedestrian entries and may be in the public right-of-way. Short term bicycle parking may be used for visitors, couriers, or customers, typically for less than two hours.	1.0%	x

TDM Measure		Description	C/CAG	
			Estimated Trip Reduction	Required
8	Showers, Lockers, and Changing Rooms for Cyclists	These amenities serve as end of trip facilities for employees arriving by bike or other active transportation forms. Commuters who bicycle or walk often arrive wet, muddy or sweaty. Providing employees with a place to shower, change and store clothes can encourage bicycle commuting. Such facilities also benefit employees who exercise during breaks or may occasionally need to wash and change clothes for other reasons	2.0%	x
9	Design Streets to Encourage Bike/Ped Access	Design street or roadways that provide travel choices and give people the option to avoid traffic congestion, increasing the overall capacity of the transportation network. Street designs should enable safe access for all users of all ages and abilities. Improving pedestrian and cyclist safety and comfort can increase the use of active transportation for residents or employees of a project site.	1.0%	x
10	Bike/Scooter Share On-Site	Provide on-site bike share or bicycle fleets. Availability of bike-share bikes or bicycle fleets reduces the need for individual vehicle ownership and use, which, reduced the number of VMT by individuals. Bike share systems allow for bikes to be rented at one location and returned to another. Bike share systems can play a role in the first or last mile of a commute. Subsidizing or offering complementary bike share memberships, can encourage greater use of the bike share systems and may reduce the barrier for individuals to try bike share. Similarly, on-site fleet bicycles at employer sites allow employees who either drive or a commute alternative to run errands during the day, using a non-motorized form of transport.	1.0%	
		TOTAL	**36.0%**	

As shown in **Table 3**, the estimated trip reduction is 36 percent using the C/CAG TDM Mitigation score sheet for large, transit proximate, non-residential land uses. This satisfies the C/CAG requirement of a 35 percent trip reduction.

Tarlton TDM Monitoring

A TDM plan was proposed and implemented for a similar project on a nearby property at 1305 O'Brien Drive, which is operated by the same applicant as the proposed project here. This project was completed and the TDM effectiveness has been monitored since 2018. The vehicular traffic at each of the project's driveways were counted in 2018, 2019, and 2021 as part of the TDM Monitoring process. Based on this monitoring, the TDM plan for 1305 O'Brien Drive achieved a 32 percent to 57 percent trip reduction for the AM and PM peak hours in 2018, 2019, and 2021 (see Attachment B for monitoring reports). The results from the 2020 TDM monitoring were not used because of the impact from COVID-19. As shown from a similar Tarlton project, a maximum trip reduction of 57 percent was achieved, which suggests that the CAPCOA and C/CAG methodologies provide an accurate estimation of the effectiveness of the proposed TDM program when considering the combination of the TDM and increase in land use density.

TDM Reductions

VMT Results

The estimated VMT reduction for the proposed TDM plan is 39.1 percent based on the CAPCOA methodology. The 39.1 percent VMT reduction for the TDM plan was applied to the project's VMT. As stated previously, the project is estimated to have a VMT of 19.0 VMT per employee without a TDM plan. After applying a 39.1 percent reduction, the project VMT with the TDM plan would be 11.6 VMT per employee. The project's VMT with the TDM plan would be under the City's VMT threshold of 13.6 VMT per employee. Therefore, the project is expected to have a less than significant VMT impact with the TDM plan.

Peak Hour Trip Results

The estimated trip reduction for the proposed TDM plan is 36 percent based on the C/CAG methodology. The 36 percent trip reduction for the TDM plan was applied to the project's trip generation. **Table 3** shows the net new project trips based on the existing trips, and the proposed trips with the TDM reduction. Applying the 36 percent TDM reduction to the proposed project trips results in a net new 1,191 daily trips, 113 AM peak hour trips, and 103 PM peak hour trips.

Table 3 – Trip Generation Summary – Net New Trips

Existing or Proposed	ITE Land Use Code	Land Use	Vehicle Trips		
			Daily	AM Peak	PM Peak
Existing	151	10.022 KSF Mini-Warehouse	14	1	2
	760	10.022 KSF R&D	111	10	10
	760	20.542 KSF R&D	228	21	20
	151	50.045 KSF Mini-Warehouse	73	5	8
Existing Total Trips			**426**	**37**	**40**
Proposed	760	154.581 KSF R&D	1,713	159	151
	760	73.500 KSF R&D	814	75	72
Proposed Total Trips			**2,527**	**234**	**223**
Net Trips Generated (Proposed – Existing)			**+2,101**	**+197**	**+183**
TDM Reduction (36%)			**-910**	**-84**	**-80**
Net Proposed Trips			**+1,191**	**+113**	**+103**

CONCLUSION

The proposed project is anticipated to generate a net new 2,101 daily trips, 197 AM peak hour trips, and 183 PM peak hour trips without the TDM program. The Life Sciences zoning regulations (Section 16.44.090) requires a TDM program to reduce the vehicle trips by at least 20 percent for the proposed project. C/CAG also requires a trip reduction of 35 percent for large, transit proximate, non-residential projects. The proposed TDM plan would result in a 36 percent trip reduction using the C/CAG methodology. Using the 36 percent trip reduction, the project would result in 1,191 daily trips, 113 AM peak hour trips, and 103 PM peak hour trips. The proposed TDM plan would result in a 39.1 percent VMT reduction using the CAPCOA methodology. Using the 39.1 percent VMT reduction, the project VMT would be 11.6 VMT per employee, which is less than the City's VMT threshold of 13.6 VMT per employee. Therefore, the project is expected to have a less than significant VMT impact with the TDM plan.

Attachment A

Tarlton - 985-1005 O'Brien Drive								
TIME PERIOD		**LAND USE**	**Trip Rate**			**Trips**		
			In	**Out**	**Total**	**In**	**Out**	**Total**
Daily	Existing Use	Research and Development Center (10.022 KSF)	5.54	5.54	11.08	55	56	111
		Research and Development Center (20.542 KSF)	5.54	5.54	11.08	114	114	228
		Wholesale Market (10.022 KSF)	0.73	0.73	1.45	7	7	14
		Wholesale Market (50.045 KSF)	2.23	2.23	4.45	37	36	73
		Total Existing Use Daily Trips				213	213	426
	Proposed Use	Research and Development Center (154.581 KSF)	5.54	5.54	11.08	857	856	1,713
		Research and Development Center (73.500 KSF)	5.54	5.54	11.08	407	407	814
		Total Proposed Use Daily Trips				1,264	1,263	2,527
		Net New Daily Trips				**1,051**	**1,050**	**2,101**
AM Peak	Existing Use	Research and Development Center (10.022 KSF)	0.84	0.19	1.03	8	2	10
		Research and Development Center (20.542 KSF)	0.84	0.19	1.03	17	4	21
		Wholesale Market (10.022 KSF)	0.05	0.04	0.09	1	0	1
		Wholesale Market (50.045 KSF)	0.05	0.04	0.09	3	2	5
		Total Existing Use AM Trips				29	8	37
	Proposed Use	Research and Development Center (154.581 KSF)	0.84	0.19	1.03	131	28	159
		Research and Development Center (73.500 KSF)	0.84	0.19	1.03	62	13	75
		Total Proposed Use AM Trips				193	41	234
		Net New AM Trips				**164**	**33**	**197**
PM Peak	Existing Use	Research and Development Center (10.022 KSF)	0.16	0.82	0.98	2	8	10
		Research and Development Center (20.542 KSF)	0.16	0.82	0.98	3	17	20
		Wholesale Market (10.022 KSF)	0.07	0.08	0.15	1	1	2
		Wholesale Market (50.045 KSF)	0.07	0.08	0.15	4	4	8
		Total Existing Use PM Trips				10	30	40
	Proposed Use	Research and Development Center (154.581 KSF)	0.16	0.82	0.98	24	127	151
		Research and Development Center (73.500 KSF)	0.16	0.82	0.98	11	61	72
		Total Proposed Use PM Trips				35	188	223
		Net New PM Trips				**25**	**158**	**183**

Attachment B

November 10, 2021

Ron Krietemeyer
Menlo Park Portfolio II, LLC c/o Tarlton Properties, Inc.
1530 O'Brien Drive, Suite C
Menlo Park, CA 94025
(transmitted via email)

RE: ***Tarlton 1305 O'Brien Drive – 2021 Transportation Demand Management (TDM) Monitoring Final Letter***

Dear Mr. Krietemeyer:

This project is to monitor the vehicular traffic at 1305 O'Brien Drive as part of its Transportation Demand Management (TDM) plan. Kimley-Horn developed a TDM plan[1] (see **Attachments**) for the 1315 O'Brien Drive project in December 2015, which has since been renamed as 1305 O'Brien Drive. The TDM plan was developed to reduce the net new project trips to fewer than 16 peak hour trips. To achieve this, TDM measures were proposed to reduce the number of project trips, in addition to the existing trip credits from the existing site. The City of Menlo Park (City) is requesting that the 1305 O'Brien Drive building be in compliance with this TDM plan for each year of operation. A TDM monitoring report was prepared and submitted in 2018, 2019, and 2020 for this project. In 2020, COVID-19 changed the typical travel patterns due to the shelter-in-place restrictions by local agencies and reduced the traffic levels areawide, including for 1305 O'Brien Drive. Therefore, the 2020 TDM monitoring report estimated vehicles trips based on the number of employees working on-site at the time. This is the fourth year of monitoring to be performed since the building has opened. Although travel patterns have yet to fully return to typical conditions, traffic conditions have been shown to slowly return as many employees are beginning to commute to work and schools are transitioning back to in-person teaching. As directed by the City, traffic counts were collected as part of the 2021 TDM monitoring. In addition to the counts, a survey was distributed electronically to the employees of the 1305 O'Brien Drive building to gather information about each employee's travel pattern before COVID-19 and how those patterns have changed as a result of COVID-19. The following discusses the methodology, analysis, and results of the TDM monitoring process.

VEHICLE TRIPS ALLOWED

The primary purpose of the TDM monitoring process is to determine if the project exceeds the vehicle trip threshold as stated in the TDM plan and the conditions of approval. In the TDM plan, the goal for the project was to generate fewer than 16 net new peak hour trips (based on a 10,000-square foot office building) by including the previous use trip credits and the TDM trip reduction. **Table 1** shows

[1] Transportation Demand Management (TDM) Memorandum for 1315 O'Brien Drive, Kimley-Horn and Associates, Inc., December 8, 2015.

the estimated trip generation summary for the 1305 O'Brien Drive project in the TDM plan. The project is allowed to generate the number of vehicle trips from the existing trip credits plus the 16-vehicle threshold. **Table 2** shows the number of vehicle trips the project is allowed to generate. The project is allowed to generate 152 AM peak hour trips and 151 PM peak hour trips.

Table 1 – Trip Generation Summary for 1305 O'Brien Drive

Uses	Vehicle Trips		
	Daily	AM Peak Hour	PM Peak Hour
Proposed Use Trips	1,316	189	174
TDM Trip Reduction (21.1%)	-278	-40	-36
Previous Use Trip Credits	-1,196	-136	-135
Net New Trips	**-158**	**13**	**3**

Table 2 – Trips Allowed for 1305 O'Brien Drive (10,000-SF Office Building Trip Threshold)

Uses	Vehicle Trips		
	Daily	AM Peak Hour	PM Peak Hour
Previous Use Trip Credits	1,196	136	135
City Threshold Allowed	110	16	16
Net New Trips Allowed	**1,306**	**152**	**151**

Although, there was no specified maximum for daily trips generated by the project in the TDM plan, the conditions of approval (COA) specifically mentioned a daily maximum number of trips. Therefore, the City has directed us to use a daily threshold of 110 new daily vehicle trips, which was calculated based on the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 9th Edition* for a 10,000-square foot office building. The ITE *Trip Generation Manual, 9th Edition* was used because it was the current reference when the TDM plan was developed and was used for the AM and PM peak hour vehicle trip thresholds. **Table 2** also shows the number of daily vehicle trips the project is allowed to generate. The project is allowed to generate 1,306 daily vehicle trips.

Although not specified in the TDM plan, the City also has required that buildings in the Life Sciences zone develop a transportation demand management (TDM) plan. *"All new construction, regardless of size, and building additions of ten thousand (10,000) or more square feet of gross floor area, or a change of use of ten thousand (10,000) or more square feet of gross floor area shall develop a Transportation Demand Management (TDM) plan necessary to reduce associated vehicle trips to at*

least twenty percent (20%) below the standard generation rates for uses on the project site."[2] This zoning requirement was implemented in November 2016, which was subsequent to the approval of the TDM plan in December 2015 and therefore was not included in the TDM plan. Nonetheless, the 20 percent TDM reduction was considered for the trip thresholds in this monitoring report. **Table 3** shows the required trip threshold for a reduction in vehicle trips by 20 percent.

Table 3 – Trips Allowed for 1305 O'Brien Drive (20% TDM Reduction)

Uses	Vehicle Trips		
	Daily	AM Peak Hour	PM Peak Hour
Proposed Use Trips	1,316	189	174
TDM Trip Reduction (20%)	-263	-38	-35
Net New Trips Allowed	**1,053**	**151**	**139**

VEHICLE TRIPS COUNTED

To determine if the project met the vehicle trip thresholds described above, the project driveways were monitored.

Methodology

The project driveways for 1305 O'Brien Drive were counted for three (3) days, at 15-minute intervals, to determine the number of vehicle trips in and out of the project site. The project site is isolated and therefore all the vehicles counted at the driveways can be attributed to the 1305 O'Brien Drive project. **Figure 1** shows the location of the driveways counted relative to 1305 O'Brien Drive. It should be noted that there were vehicles related to the UPS center (both UPS trucks and employee passenger cars), just north of the project site, that would cut-through the project site. Therefore, to remove these vehicles from the 1305 O'Brien Drive vehicle trips, Driveway #1 and the UPS driveway were counted simultaneously to determine if there were any vehicles going directly between the two driveways. Further review of the data showed UPS trucks also cut-through the site at Driveways #2, #3A, and #3B in the AM peak period. Many UPS trucks exiting the UPS center would enter Driveway #2 and wait in the 1305 O'Brien Drive parking lot to begin their route since there is limited on-street parking along Adams Court. Once they are ready to begin their route, the UPS truck will exit the project site at Driveways #3A and #3B. Because these vehicle trips are not associated with the 1305 O'Brien Drive project, they were removed from the TDM monitoring for 1305 O'Brien Drive.

[2] Ordinance No. 1025 Ordinance of the City Council of the City of Menlo Park adding the LS (Life Sciences) Zoning District to Title 16 of the Municipal Code, City of Menlo Park, November 2016.

Data Collection

The project driveways were counted on three days:

- Tuesday, September 28, 2021
- Wednesday, September 29, 2021
- Thursday, September 30, 2021

The counts for each driveway are shown in the **Attachments**.

For each day of data collected, the peak hour in the AM peak and in the PM peak was determined for the site combined (i.e. all the driveways combined). For the AM peak hour, the 8:30 AM to 9:30 AM hour was determined to have the highest combined volumes for all driveways on each day of the data collection. For the PM peak hour, the 4:30 PM to 5:30 PM was determined to have the highest combined volumes for all driveways on September 28 and September 30, 2021 and the 5:00 PM to 6:00 PM was the highest for September 28 and September 29, 2021. It should be noted that the PM peak hour volume occurred during both peak periods from 4:30 PM to 5:30 PM and from 5:00 PM to 6:00 PM on September 28, 2021. These driveway volumes were then averaged for these specific peak hours to determine the average peak hour volumes. **Table 4** summarizes the average of the daily, AM peak hour, and PM peak hour trips for all the driveways combined. It should be noted that UPS cut-through traffic at Driveways #2, #3A, and #3B were removed only in the AM peak hour trips. The UPS cut-through traffic at these driveways were not removed from the Daily and PM peak hour trips as the traffic count for all the driveways during these two time periods are expected to be less than the vehicle trip threshold allowed even without removing cut-through traffic.

Figure 1 – Driveway Locations

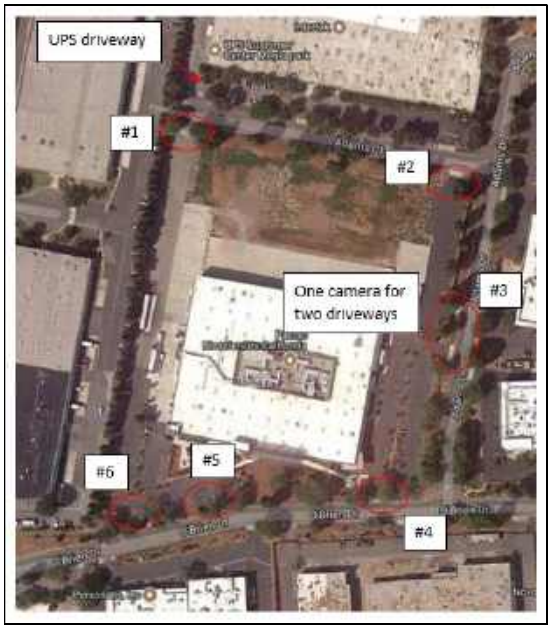


Table 4 – Vehicle Counts Summary

#	Driveway	Vehicle Trips					
		Daily		AM Peak Hour		PM Peak Hour	
		In	Out	In	Out	In	Out
1	NW Driveway on Adams Ct	73	53	23	6	1	7
2	NE Driveway on Adams Dr	70	25	33	1	2	2
3A	East Driveway on Adams Dr (North)	17	51	0	29	1	3
3B	East Driveway on Adams Dr (South)	29	44	6	2	1	8
4	SE Driveway on O'Brien Dr	66	63	15	2	2	15
5	South Driveway on O'Brien Dr	44	33	8	1	2	4
6	SW Driveway on O'Brien Dr	139	169	29	17	2	29
Subtotal (a)		***438***	***438***	***114***	***58***	***11***	***68***
1	UPS Driveway to NW Driveway on Adams Ct	51	51	17	17	1	1
2	UPS Trucks at NE Driveway on Adams Dr	-	-	29	0	-	-
3A	UPS Trucks East Driveway on Adams Dr (North)	-	-	0	28	-	-
3B	UPS Trucks East Driveway on Adams Dr (South)	-	-	0	1	-	-
Cut-through Traffic Subtotal (b)		***-51***	***-51***	***-46***	***-46***	***-1***	***-1***
Total (a + b)		**387**	**387**	**68**	**12**	**10**	**67**

Note – Vehicle trips are an average of Tuesday, Wednesday, and Thursday counts during the week of September 28th to 30th, 2021. UPS cut-through traffic at Driveways #2, #3A, and #3B were determined only in the AM peak hour.

VEHICLE TRIPS COMPARISON

The 1305 O'Brien Drive building generates 774 daily trips, 80 AM peak hour trips, and 77 PM peak hour trips. Each of these trip totals are well below the allowed daily and peak hour trips for the project. Using the existing credits and the 10,000-square foot office building trip threshold, the project is allowed 1,306 daily trips, 152 AM peak hour trips, and 151 PM peak hour trips. As shown in **Table 5**, the project generates 532 fewer daily trips, 72 fewer AM peak hour trips, and 74 fewer PM peak hour trips than the threshold. This is expected as COVID-19 has resulted in many employees telecommuting rather than commuting to work.

Table 5 – Trip Comparison (10,000-SF Office Building Trip Threshold)

Uses	Vehicle Trips		
	Daily	AM Peak Hour	PM Peak Hour
Net New Trips Allowed	1,306	152	151
Net New Trips Generated	774	80	77
Net Difference	-532	-72	-74

Using the 20 percent TDM threshold, the project is allowed 1,053 daily trips, 151 AM peak hour trips, and 139 PM peak hour trips. As shown in **Table 6**, the project generates 279 fewer daily trips, 71 fewer AM peak hour trips, and 62 fewer PM peak hour trips than the threshold.

Table 6 – Trip Comparison (20% TDM Reduction)

Uses	Vehicle Trips		
	Daily	AM Peak Hour	PM Peak Hour
Net New Trips Allowed	1,053	151	139
Net New Trips Generated	774	80	77
Net Difference	-279	-71	-62

The project is compliant with the TDM plan with regards to the number of vehicle trips generated. Although the project is compliant with the TDM plan, a travel survey was still conducted to determine the change in commute patterns as a result of COVID-19.

PREVIOUS TDM MONITORING

The 2021 TDM monitoring project is the fourth year of TDM monitoring for the 1305 O'Brien Drive project. For comparison purposes, **Table 7** summarizes the vehicle trips from the previous TDM monitoring. Between the 2018 to 2021 TDM monitoring, the vehicle trips are each below the allowed number of vehicle trips for each time period. As shown in the table, vehicle trips for both the 2020 and 2021 TDM monitoring shows a significant decrease from 2018 and 2019 as a result of COVID-19. Vehicle trips for the 2020 TDM monitoring were not collected as mentioned previously but were instead estimated based on the 2018 and 2019 vehicle trip counts, as well as the number of employees working on-site at the time of the 2020 TDM monitoring.

Table 7 – Previous TDM Monitoring

Monitoring Year	Vehicle Trips		
	Daily	AM Peak Hour	PM Peak Hour
Net New Trips Allowed (10,000-SF Office Threshold)	1,306	152	151
Net New Trips Allowed (20% TDM Reduction)	1,053	151	139
2018 Monitoring	1,030	118	114
2019 Monitoring	1,009	114	118
2020 Monitoring[1]	340	110	110
2021 Monitoring	774	80	77

[1] Vehicle trips were not collected as part of the 2020 TDM Monitoring due to COVID-19. Instead, the vehicle trips shown were determined using the 2018 and 2019 counts with an adjustment based on the number of employees working on-site at the time of the 2020 TDM monitoring.

TRAVEL SURVEY

A survey was developed using Survey Monkey and distributed electronically for the employees of 1305 O'Brien Drive to help determine their typical commute before COVID-19 and their change in travel patterns as a result of COVID-19. The survey also assists in determining which TDM measures would more likely be utilized if implemented. The survey is included in the **Attachments**. A total of 92 employees responded to the questionnaire. Based on the 2020 TDM monitoring report, the project employs a total of 304 employees. Therefore, the survey results are only representative of approximately 30 percent of the total employees. The results of the survey, by question, are also included in the **Attachments**. Some of the key results from the survey responses are:

- Primary mode of transportation before COVID:
  - 78 percent of the respondents drive alone
  - 3 percent of the respondents carpool
  - 0 percent of the respondents telecommute
  - 19 percent of the respondents use alternative modes of transportation

- Primary mode of transportation as a result of COVID
  - 60 percent of the respondents drive alone as a result of COVID
  - 3 percent of the respondents carpool
  - 29 percent of the respondents telecommute
  - 8 percent of the respondents use alternative modes of transportation

- Time period employees typically arrive to work in the AM period:
  - Before COVID:
    - 42 percent of respondents arrive between 8:00 – 9:00 AM
    - 32 percent of respondents arrive between 9:00 – 10:00 AM
  - As a result of COVID:
    - 41 percent of respondents arrive between 8:00 – 9:00 AM
    - 29 percent of respondents arrive between 9:00 – 10:00 AM

- Time period employees typically leave work in the PM period:
  - Before COVID:
    - 3 percent of respondents leave before 4:00 PM
    - 31 percent of respondents leave between 4:00 – 5:00 PM
    - 52 percent of respondents leave between 5:00 – 6:00 PM
  - As a result of COVID:
    - 14 percent of respondents leave before 4:00 PM
    - 21 percent of respondents leave between 4:00 – 5:00 PM
    - 51 percent of respondents leave between 5:00 – 6:00 PM

- Approximately 42 percent of employees who telecommute as a result of COVID will only be comfortable returning to their typical (pre-COVID) transportation mode under certain circumstances (i.e. when it is safe, when employees or family members are all vaccinated, or when it is more convenient)

- Approximately 14 percent of employees plan to telecommute indefinitely.

- The primary reason respondents chose their preferred commute method (pre-COVID) is for convenience (48 percent).

- Although employees typically drive alone, they have researched or considered other means of transportation. The highest alternative mode that respondents considered was using a shuttle (42 percent) and riding Caltrain (34 percent).

- The biggest obstacles preventing respondents to commute using alternative modes (pre-COVID) are no nearby transit to their home (45 percent of respondents) and people require a car for personal commitments after work (39 percent of respondents).

- The majority of the respondents (52 percent) stated that none of the proposed measures would cause them to switch to an alternate means of commuting other than driving alone. The second highest response (35 percent) was having a guaranteed ride home program.

- If respondents were offered a rewards or discount program, 31 percent stated that a reward programs for carpooling would cause them to switch to an alternate means of commuting to work other than driving alone.

- The following is the ranking of which alternate means of commuting to work (pre-COVID) they would consider:

1) Carpool	2) Shuttle	3) Transit
4) Vanpool	5) Bicycle	6) Walk

CONCLUSIONS

The proposed project at 1305 O'Brien Drive is allowed to generate 1,306 daily trips, 152 AM peak hour trips, and 151 PM peak hour trips based on the 10,000-square foot office building trip allowance (including the existing trip credits). Based on the 2021 driveway counts, the project generates 774 daily trips, 80 AM peak hour trips and 77 PM peak hour trips. Therefore, the project is below the vehicle trip threshold as stated in the TDM plan.

Subsequent to the TDM plan being developed for 1305 O'Brien Drive, the City of Menlo Park developed a TDM trip reduction goal of 20 percent for buildings in the Life Sciences zone. Based on this trip threshold, the project is allowed to generate 1,053 daily trips, 151 AM peak hour trips, and 139 PM peak hour trips. Based on the 2021 driveway counts, the project generates 774 daily trips, 80 AM peak hour trips, and 77 PM peak hour trips. Therefore, the project is below this trip threshold as well. The project meets the requirements in the TDM plan.

An employee survey was administered electronically to understand the changes in commute trends as a result of COVID-19. The results showed that 78 percent of the respondents drove alone for their typical commute (pre-COVID) and 60 percent of the respondents drove alone as a result of COVID-19, a reduction in 18 percent. However, although fewer respondents drove as a result of COVID-19, the number of respondents telecommuting has increased to 29 percent. Approximately 13 percent of employees used shuttle as their primary mode of transportation before COVID, whether it was shuttle alone or in combination with Caltrain, bike, or bus. As a result of COVID, approximately 4 percent of employees now use shuttle as their primary mode. The biggest difference in time period of when employees would arrive or leave work was in the PM peak period where 31 percent of employees typically leave work between 4:00 PM to 5:00 PM and was reduced to 21 percent of employees leaving during this time period as a result of COVID-19, a reduction in 10 percent. These employees now leave work earlier, before 4:00 PM. In addition, approximately 14 percent of employees plan to telecommute indefinitely.

Sincerely,



Ben Huie, P.E.
California Professional Engineer #C76682

Attachments:

Attachment A – TDM Memorandum for 1315 O'Brien Drive (dated December 8, 2015)

Attachment B – Driveway Counts

Attachment C – Travel Survey Results

Attachment A

Kimley»Horn

MEMORANDUM

To:	Ron Krietemeyer Tarlton Properties, Inc.
From:	Michael Mowery, P.E. Ben Huie, P.E.
Date:	December 8, 2015
Subject:	**Transportation Demand Management (TDM) Memorandum for 1315 O'Brien Drive**

Kimley-Horn and Associates, Inc. (KHA) was retained by Tarlton Properties, Inc. to evaluate the expected number of project trips based on the existing and proposed land uses at 1315 O'Brien Drive in the City of Menlo Park and mitigate the number of trips by implementing a Transportation Demand Management (TDM) Plan. The proposed project will realign the previous building uses. Below are the proposed sizes and land uses for the proposed site:

- 113,382 square feet of research & development (Pac Bio)
- 45,796 square feet of manufacturing (Pac Bio)
- 17,797 square feet of warehousing (Pac Bio)
- 43,541 square feet of warehousing (other tenants)

The previous use for the project site consisted of:

- 162,839 square feet of warehousing
- 55,787 square feet of general office building

These changes in land use for 1315 O'Brien Drive will result in an increase in peak hour trips generated from the project site.

PROJECT PEAK HOUR TRIPS

The number of project trips for the project site was estimated using the industry standard Institute of Transportation Engineer's (ITE) *Trip Generation* Manual. This reference estimates project trips based on land use from survey data. Since the proposed project is not a new project, but updating an existing land use, trip rates were calculated for both the proposed use and the previous use.

The previous land use was a distribution center with regional administrative offices including a showroom and sales offices. A distribution center does not have a specific land use in the ITE *Trip Generation* manual. There are similar land uses in the *Trip Generation* manual such as: the warehousing land use (ITE LU code 150), the general light industrial (ITE LU code 110), and the high-

cube warehouse/distribution center (ITE LU code 152). The *Dumbarton Distribution Center EIR*[1], which was the name of the Menlo Business Park before 1984, was reviewed as well. It documented the distribution center as a warehousing and light industrial land use. Therefore, for trip generation purposes, the existing use for the 1315 O'Brien Drive site was a warehousing land use, along with office, as described previously. **Table 1** summarizes the trip generation for the previous use. Specific land use and trip generation breakdowns are provided in **Attachment A**.

Table 1 – Trip Generation Summary – Previous Use

Previous Use	Vehicle Trips		
	Daily	AM Peak	PM Peak
55.787 KSF Office and 162.839 KSF Warehousing	1,196	136	135

The previous land uses resulted in 136 AM peak hour trips and 135 PM peak hour trips. No adjustments for trip reductions (e.g. pass-by trips or internal capture) were used in this calculation. The previous use trips will be used as a trip credit for determining the overall net change in proposed project trips.

Table 2 summarizes the trip generation for the proposed use. Specific land use and trip generation breakdowns are provided in **Attachment A**.

Table 2 – Trip Generation Summary – Proposed Use

Proposed Use	Vehicle Trips		
	Daily	AM Peak	PM Peak
113.382 KSF R&D 45.796 KSF Manufacturing 61.338 KSF Warehousing	1,316	189	174

The proposed land uses result in 189 AM peak hour trips and 174 PM peak hour trips. No adjustments for trip reductions (e.g. pass-by trips or internal capture) were used in this calculation. A Transportation Demand Management (TDM) program is being proposed to reduce the proposed project vehicle trips.

TRANSPORTATION DEMAND MANAGEMENT PROGRAM

The following summarizes an initial approach to the proposed TDM program for the proposed project at 1315 O'Brien Drive. It is assumed that the TDM program will be refined over time to adapt to changing transportation trends and to maximize the efficiency of the program. The TDM program is

[1] Dumbarton Distribution Center Final EIR, The Environmental Center, March 12, 1982.

specifically designed to focus on incentives and rewards for employees to participate in the program rather than penalties for not participating.

POTENTIAL PROGRAM ELEMENTS

Tarlton Properties, Inc. should offer a combination of program elements to encourage employees to utilize alternative modes of transportation to driving alone. Potential program elements are listed below:

- Bike lockers/racks
- Showers/changing rooms
- Shuttle service
- Subsidized transit tickets for employees
- Preferential carpool parking spaces
- Preferential vanpool parking spaces
- Vanpool program
- Commute assistance center
- Allowance program for bicyclists, walkers, and carpoolers
- Parking cash out program
- Telecommuting
- Compressed workweek program
- Alternate hours workweek program
- Join the Alliance's guaranteed ride home program

These program elements are listed in the City of Menlo Park's *Transportation Demand Management Program Guidelines*. Additionally, the City/County Association of Governments of San Mateo County (C/CAG) has its own guidelines for a TDM program mentioned in the *Revised C/CAG Guideline for the Implementation of the Land Use Component of the Congestion Management Program*. Each of these documents summarizes the potential program measures, a description of each measure, and the trip credits associated with each measure.

PROPOSED PROGRAM ELEMENTS

Tarlton Properties, Inc. is interested in working with the City to develop a practical TDM plan that can be both effective and provide the most value for all parties. An initial set of TDM measures are proposed for the 1315 O'Brien Drive site and is summarized in **Table 3**. The number of trip credits was determined from the City of Menlo Park's TDM Guidelines. The following provides a brief description of each proposed TDM element:

- **Bike Storage**: Bike lockers are proposed to be located on the property. The specific location will be shown on the proposed site plan. Secure bike storage lockers for 20 bicycles are proposed. The bike lockers are furnished by the American Bicycle Security Company and provide a safe storage for bikes at work. Additionally, bike racks for 12 bicycles are proposed and will be shown on the proposed site plan.

Table 3 – Proposed TDM Measure Summary

TDM Measure	Number of Trips Credited	Peak Hour Trip Credits	Program Elements	Trip Credits[1]
Bike Storage	One credit per 3 bike lockers/racks	1/3	32	10
Showers/Changing Rooms	Two credits per 1 shower/changing room	2	12	24
Shuttle service	One trip credit for each round trip seat on the shuttle	1	60	60
Additional credit for combination with Guaranteed Ride Home Program	*Additional one trip credit for each seat*	*1*	*60*	*60*
Subsidized transit tickets (Go Pass for Caltrain)	One trip credit for each transit pass provided	1	100	100
Preferential carpool parking	Two credits per 1 space reserved	2	32	64
Commute assistance center				
Transit brochure rack	*One peak hour trip credited for each feature*	*1*	*1*	*1*
Computer kiosk connected to Internet	*One peak hour trip credited for each feature*	*1*	*1*	*1*
Telephone	*One peak hour trip credited for each feature*	*1*	*1*	*1*
Desk and chairs	*One peak hour trip credited for each feature*	*1*	*1*	*1*
Allowance for bicyclists, walkers, and carpoolers	One trip credit for each monthly allowance offered to an employee	1	30	30
Join Alliance's guaranteed ride home program	One credit for every two slots purchased in the program with Alliance[2]	-	-	-
Implement flexible work hours	One peak hour credit for each employee offered the opportunity to work flexible hours	1	35	35
Combine any two of these elements and receive additional five credits	Five trip credits for combination of two elements	5	1	5
			Total Trip Credits:	**392**

[1]The number of peak hour trips credited is outlined in the City of Menlo Park's *Transportation Demand Management (TDM) Guidelines*.

[2]The Alliance's guaranteed ride home program operates differently than when the TDM guidelines were created. The Alliance no longer offers slots to be purchased. Trip credits for this TDM measure are combined with the shuttle service.

- **Showers/Changing Rooms**: Twelve shower/changing rooms are proposed for the building on the first floor. The shower/changing rooms provide a dedicated facility for the cyclists and persons walking to work. This measure, combined with the bike lockers/racks, should provide employees with a great alternative for commuting to work.
- **Guaranteed Ride Home Program**: Tarlton Properties, Inc. will also enroll its tenants in a Guaranteed Ride Home Program administered by the Peninsula Traffic Congestion Relief Alliance. The program provides employees a free taxi ride home in the case of an emergency. Employers will pay 25 percent of the taxi costs and the Peninsula Traffic Congestion Relief Alliance will pay the remaining 75 percent. There is no additional cost to

join the program. This program provides a safety net when an emergency arises for those carpooling, vanpooling, taking transit, walking to work, or bicycling to work.

- **Shuttle Service**: A shuttle service will be provided for employees to use for commuting to work. The shuttle service is provided by Bauers and is currently being implemented in the existing business park surrounding the proposed project. A new shuttle service, specifically serving the buildings along O'Brien Drive, recently started on February 1, 2015. The shuttle service has a stop in front of 1505 O'Brien Drive. This shuttle service will include a separate BART shuttle and Caltrain shuttle.
  - The BART shuttle will carry up to 20 passengers between the Union City BART Station and the project site during each of the AM and PM peak hours. There is also a pick-up/drop-off location at Decoto Road/Ozark Park Way in Fremont, CA. The shuttle departs every 60-65 minutes. It should be noted that the BART shuttle service does provide 80 passenger seats during the AM (6-10 AM) and PM (4-8 PM) periods, but only 20 passenger seats were used in the TDM credit calculations because the other 60 seats are outside the peak hour.
  - The Caltrain shuttle service will provide two shuttles of 20 passenger seats each between the Palo Alto Caltrain Station and the project site during the AM and PM peak hours. The shuttle departs every 40-45 minutes and currently provides a minimum of two roundtrips in the AM and PM peak hours, each carrying 20 passengers, for a total of 40 additional seats per peak hour. It should be noted that the shuttle service will expand its operations if the demand is needed in the future. It should also be noted that the Caltrain shuttle service does provide up to 100 passenger seats during the AM (6-10 AM) and PM (4-8 PM) periods, but only 40 passenger seats were used in the TDM credit calculations because the other 60 seats are outside the peak hour.
  - The combined BART and Caltrain shuttle services currently provide a total of 60 seats during each of the AM and PM peak hours.
- **Subsidized Transit Tickets**: Caltrain Go Passes will be provided to employees at no cost to the employees. The Caltrain Go Pass allows for unlimited rides, seven days a week. The cost of the Go Pass is $180 per person, but a minimum of $15,120 per employer. This equates to 84 Go Passes at a minimum to distribute to all employees. For TDM calculations, it was assumed that 100 Go Passes will be provided for this specific site.
- **Preferential Carpool Parking**: 32 preferential carpool parking spaces are provided. The carpool parking spaces will be located close to the building's entrances to provide an incentive for employees to carpool. Marked carpool parking spaces will be shown on the proposed site plan.
- **Commute Assistance Center**: A Commute Assistance Center will be provided with the following features: transit brochure rack, computer kiosk connected to internet, telephone, and a desk and chairs. The center should encourage employees to use transit to commute to work and provide ease of access to determine the optimal mode of transportation home.
- **Monthly Allowance for Bicyclists, Walkers, and Carpoolers**: A monthly allowance of $20 will be offered to those employees who walk, bicycle, or carpool to work. This measure provides further incentive to not drive alone to work. The $20 monthly allowance equates to approximately $1 per day.

- **Flexible work hours**: Employees will be offered the opportunity to work a flexible work schedule. Employees can work outside the traditional 8 AM to 5 PM work day. This measure will result in employees avoiding the AM peak (7 AM to 9 AM) and PM peak (4 PM and 6 PM) for their daily commute. It is anticipated that 35 employees would participate in this flexible work schedule.
- **Combination of Two Elements**: Combining at least two elements in the TDM program results in five additional peak hour trips. By offering complimentary TDM elements, experience has shown that the effectiveness of the program increases.

As shown in **Table 3**, the proposed TDM measures total to 392 trip credits. Although the TDM program results in 392 trip credits, the effectiveness of the TDM program was calculated separately.

EFFECTIVENESS OF TDM PROGRAM ELEMENTS

The effectiveness of the TDM plan was predicted using the COMMUTER model developed by the United States Environmental Protection Agency (EPA). The COMMUTER model is a spreadsheet based model that predicts the travel and emission effects resulting from an employer implemented transportation management program. The model allows for inputs to local work-trip mode shares, work trip lengths, vehicle occupancy, financial incentives for alternative modes of transportation, employer participation rates, and the level of each program to determine the predicted trip reduction rates. After inputting the specific TDM measures mentioned in **Table 3** for the proposed project, the anticipated trip reduction percentage is 21.1 percent. The 21.1 percent effectiveness is similar to other TDM plans in the local area. The COMMUTER model output for this project is shown in **Attachment B**.

The anticipated trip reduction of 21.1 percent was applied to the proposed project trips only, not the trip credits. **Table 4** shows the trip generation summary including the previous use trip credits and the TDM trip reduction.

Table 4 – Trip Generation Summary with Trip Credits

Uses	Vehicle Trips		
	Daily	AM Peak	PM Peak
Proposed Use Trips	1,316	189	174
TDM Trip Reduction (21.1%)	-278	-40	-36
Previous Use Trip Credits	-1,196	-136	-135
Net New Trips	***-158***	***13***	***3***

The net new trips for the proposed project after taking trip credits for the previous use and the TDM program are -159 daily trips, 13 AM peak hour trips, and three (3) PM peak hour trips. The 13 AM peak hour trips and three (3) PM peak hour trips are below the City's threshold of 16 peak hour trips (the equivalent number of peak hour trips for a 10 KSF office building).

Attachment A

1315 O'Brien Trip Generation Table

TIME PERIOD		LAND USE	Trip Rate			Trips		
			In	Out	Total	In	Out	Total
Daily	Previous	Warehousing (162.839 KSF)	1.78	1.78	3.56	290	290	580
		General Office Building (55.787 KSF)	5.515	5.515	11.03	308	308	616
		Total Previous Use Daily Trips				**(598)**	**(598)**	**(1,196)**
	Proposed	Research and Development Center (113.382 KSF)	4.06	4.06	8.11	460	460	920
		Manufacturing (45.796 KSF)	1.91	1.91	3.82	88	88	176
		Warehousing (61.338 KSF)	1.78	1.78	3.56	110	110	220
		Total Proposed Use Daily Trips				**658**	**658**	**1,316**
		TDM Reduction (21.1%)				(139)	(139)	(278)
		Net New Daily Trips				**(79)**	**(79)**	**(158)**
AM Peak	Previous	Warehousing (162.839 KSF)	0.24	0.06	0.30	39	10	49
		General Office Building (55.787 KSF)	1.37	0.19	1.56	77	10	87
		Total Previous Use AM Trips				**(116)**	**(20)**	**(136)**
	Proposed	Research and Development Center (113.382 KSF)	1.01	0.21	1.22	115	23	138
		Manufacturing (45.796 KSF)	0.57	0.16	0.73	26	7	33
		Warehousing (61.338 KSF)	0.24	0.06	0.30	14	4	18
		Total Proposed Use AM Trips				**155**	**34**	**189**
		TDM Reduction (21.1%)				(33)	(7)	(40)
		Net New AM Peak Trips				**6**	**7**	**13**
PM Peak	Previous	Warehousing (162.839 KSF)	0.08	0.24	0.32	13	39	52
		General Office Building (55.787 KSF)	0.25	1.24	1.49	14	69	83
		Total Previous Use PM Trips				**(27)**	**(108)**	**(135)**
	Proposed	Research and Development Center (113.382 KSF)	0.16	0.91	1.07	18	103	121
		Manufacturing (45.796 KSF)	0.26	0.47	0.73	12	21	33
		Warehousing (61.338 KSF)	0.08	0.24	0.32	5	15	20
		Total Proposed Use PM Trips				**35**	**139**	**174**
		TDM Reduction (21.1%)				(7)	(29)	(36)
		Net New PM Peak Trips				**1**	**2**	**3**

Attachment B

COMMUTER MODEL RESULTS

SCENARIO INFORMATION

Description	C/CAG Base TDM Program
Scenario Filename	Tarlton1315-incAltWorkWeek.vme
Emission Factor File	
Performing Agency	Kimley-Horn and Associates, Inc
Analyst	Ben Huie
Metropolitan Area	Menlo Park, CA
Area Size	1 - Large (over 2 million)
Analysis Scope	2 - Site or Employer-Based
Analysis Area/Site	1315 O'Brien Drive
Total Employment	360

PROGRAMS EVALUATED

- [X] Site Walk Access Improvements
- [ ] Transit Service Improvements
- [X] Financial Incentives
- [X] Employer Support Programs
- [X] Alternative Work Schedules

- [ ] User-Supplied Final Mode Shares

MODE SHARE IMPACTS

Mode	Baseline	Final	%Change
Drive Alone	70.5%	55.2%	-15.3%
Carpool	6.5%	9.0%	+2.5%
Vanpool	0.0%	0.0%	+0.0%
Transit	4.3%	17.4%	+13.1%
Bicycle	7.3%	8.6%	+1.3%
Pedestrian	2.7%	2.8%	+0.1%
Other	8.7%	7.0%	-1.7%
No Trip	-	0.0%	+0.0%
Total	100.0%	100.0%	-

Shifted from Peak to Off-Peak	1.1%

TRAVEL IMPACTS (relative to affected employment)

Quantity	Peak	Off-Peak	Total
Baseline VMT	4,483	2,818	7,301
Final VMT	3,688	2,425	6,113
VMT Reduction	794	394	1,188
% VMT Reduction	17.7%	14.0%	16.3%
Baseline Trips	324	204	528
Final Trips	256	170	426
Trip Reduction	68	34	102
% Trip Reduction	21.1%	16.6%	19.4%

Attachment B

Prepared by National Data & Surveying Services

Trip Gen Study

Location: Pacific Biosciences West Dwy@Adams Ct **City:** Menlo Park, CA

TIME	28-Sep		29-Sep		30-Sep	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
12:00 AM	0	0	0	0	0	0
12:15 AM	0	0	0	0	0	0
12:30 AM	0	0	0	0	0	0
12:45 AM	0	0	0	0	0	0
1:00 AM	0	0	0	0	1	0
1:15 AM	0	0	0	0	0	0
1:30 AM	0	0	0	0	0	0
1:45 AM	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0
2:15 AM	0	0	0	0	0	0
2:30 AM	0	0	0	1	0	1
2:45 AM	0	2	0	1	0	2
3:00 AM	1	0	0	1	1	1
3:15 AM	0	1	0	3	0	2
3:30 AM	0	2	0	3	0	2
3:45 AM	1	2	0	0	1	2
4:00 AM	1	0	0	0	1	2
4:15 AM	0	0	1	1	0	0
4:30 AM	0	1	0	1	0	2
4:45 AM	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0
5:15 AM	0	0	0	0	0	0
5:30 AM	0	0	0	0	1	0
5:45 AM	0	0	0	0	1	0
6:00 AM	0	0	1	0	2	1
6:15 AM	0	0	0	0	0	0
6:30 AM	0	1	0	0	0	0
6:45 AM	0	1	0	0	0	0
7:00 AM	0	0	0	0	0	1
7:15 AM	0	0	2	0	0	0
7:30 AM	1	0	0	0	0	0
7:45 AM	1	0	0	1	0	0
8:00 AM	0	1	1	2	2	1
8:15 AM	2	0	1	0	4	0
8:30 AM	8	1	6	0	10	1
8:45 AM	1	1	11	3	7	2
9:00 AM	8	3	7	1	3	3
9:15 AM	2	1	2	0	5	2
9:30 AM	1	0	3	0	1	1
9:45 AM	2	1	1	2	3	0
10:00 AM	3	1	2	0	1	0
10:15 AM	1	1	1	0	1	0
10:30 AM	3	1	1	0	4	0
10:45 AM	1	2	2	1	1	0
11:00 AM	1	0	3	0	1	0
11:15 AM	1	2	1	0	1	2

11:30 AM	1	0	0	0	0	0
11:45 AM	1	0	0	1	1	1
12:00 PM	1	1	0	0	0	1
12:15 PM	0	1	0	0	0	0
12:30 PM	0	0	0	0	3	1
12:45 PM	1	1	0	0	2	1
1:00 PM	0	1	2	1	0	0
1:15 PM	0	1	1	0	1	2
1:30 PM	0	0	1	1	0	1
1:45 PM	0	0	1	1	1	0
2:00 PM	1	1	1	0	0	1
2:15 PM	0	0	1	1	1	0
2:30 PM	0	1	3	1	1	0
2:45 PM	2	2	3	1	3	2
3:00 PM	3	0	0	1	1	0
3:15 PM	1	2	1	0	1	0
3:30 PM	1	0	2	0	2	0
3:45 PM	1	1	0	1	0	1
4:00 PM	0	1	1	2	2	2
4:15 PM	0	1	0	1	2	0
4:30 PM	0	1	0	0	0	4
4:45 PM	1	1	1	1	0	0
5:00 PM	1	1	0	4	2	3
5:15 PM	0	2	0	1	0	1
5:30 PM	0	1	0	2	0	1
5:45 PM	1	2	0	2	1	1
6:00 PM	0	3	1	2	2	3
6:15 PM	1	1	0	0	0	0
6:30 PM	1	0	0	0	2	0
6:45 PM	0	0	1	0	1	0
7:00 PM	0	0	0	0	0	0
7:15 PM	0	0	0	1	0	2
7:30 PM	0	0	0	0	1	0
7:45 PM	0	0	1	0	0	1
8:00 PM	1	0	0	0	0	0
8:15 PM	0	0	0	0	0	0
8:30 PM	0	0	0	0	1	0
8:45 PM	0	0	0	0	0	1
9:00 PM	0	0	0	0	2	1
9:15 PM	0	0	0	0	0	0
9:30 PM	1	0	3	0	0	0
9:45 PM	0	0	1	0	0	0
10:00 PM	2	1	0	0	1	0
10:15 PM	0	0	0	0	0	0
10:30 PM	0	0	0	1	0	0
10:45 PM	0	0	0	0	0	0
11:00 PM	0	0	0	1	0	0
11:15 PM	1	0	0	0	0	0
11:30 PM	0	0	0	0	0	0
11:45 PM	0	0	0	0	0	0
Totals	***62***	***52***	***71***	***48***	***86***	***59***

Prepared by National Data & Surveying Services

Trip Gen Study

Location: Pacific Biosciences East Dwy@Adams Ct **City:** Menlo Park, CA

TIME	28-Sep		29-Sep		30-Sep	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
12:00 AM	0	0	0	0	0	0
12:15 AM	0	0	0	0	1	0
12:30 AM	0	0	0	0	1	0
12:45 AM	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	1
1:15 AM	0	0	0	0	0	0
1:30 AM	0	0	0	0	0	0
1:45 AM	0	0	0	0	0	0
2:00 AM	0	0	0	0	1	0
2:15 AM	0	0	0	0	0	0
2:30 AM	0	0	0	0	0	0
2:45 AM	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0
3:15 AM	0	0	0	0	0	0
3:30 AM	0	0	0	0	0	0
3:45 AM	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0
4:15 AM	0	0	0	0	0	0
4:30 AM	0	0	0	0	0	0
4:45 AM	0	0	0	0	0	0
5:00 AM	2	0	1	0	1	0
5:15 AM	0	0	1	0	1	0
5:30 AM	1	0	2	0	0	0
5:45 AM	1	0	1	0	1	0
6:00 AM	3	0	1	0	2	0
6:15 AM	0	0	2	1	0	0
6:30 AM	0	0	0	0	1	0
6:45 AM	1	0	2	1	0	0
7:00 AM	1	1	1	0	3	0
7:15 AM	2	0	0	0	1	0
7:30 AM	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0
8:00 AM	1	0	2	0	2	0
8:15 AM	2	0	0	0	0	1
8:30 AM	9	0	4	0	13	0
8:45 AM	12	0	18	1	10	1
9:00 AM	9	1	9	0	7	0
9:15 AM	3	0	1	1	3	0
9:30 AM	1	0	1	0	1	1
9:45 AM	2	0	1	0	1	0
10:00 AM	3	1	1	0	2	0
10:15 AM	0	0	1	0	1	1
10:30 AM	2	1	1	0	0	0
10:45 AM	1	0	1	1	2	0
11:00 AM	1	2	0	1	0	1
11:15 AM	1	0	1	1	0	0

11:30 AM	0	0	0	0	2	0
11:45 AM	1	1	2	0	2	1
12:00 PM	1	1	0	1	0	0
12:15 PM	1	1	1	0	1	0
12:30 PM	0	0	0	0	0	0
12:45 PM	1	1	0	1	1	1
1:00 PM	1	1	1	0	0	0
1:15 PM	2	1	0	0	0	0
1:30 PM	0	1	0	1	0	0
1:45 PM	0	0	0	0	0	0
2:00 PM	0	0	0	0	1	1
2:15 PM	0	1	0	0	0	0
2:30 PM	1	1	1	1	1	0
2:45 PM	0	0	1	3	0	0
3:00 PM	0	2	0	2	1	1
3:15 PM	0	0	0	0	0	0
3:30 PM	0	1	1	1	0	2
3:45 PM	1	1	0	0	0	0
4:00 PM	0	1	1	0	0	0
4:15 PM	2	2	1	1	0	0
4:30 PM	0	0	0	0	1	0
4:45 PM	0	0	0	0	3	1
5:00 PM	0	0	1	0	1	2
5:15 PM	0	0	0	1	0	2
5:30 PM	0	1	0	0	0	0
5:45 PM	0	1	0	1	1	1
6:00 PM	0	0	1	1	0	1
6:15 PM	2	0	1	1	0	3
6:30 PM	1	1	0	0	0	0
6:45 PM	0	0	0	1	0	0
7:00 PM	0	1	0	1	0	0
7:15 PM	0	0	0	0	0	0
7:30 PM	0	0	0	0	0	0
7:45 PM	0	0	0	1	0	0
8:00 PM	0	0	1	1	0	1
8:15 PM	0	0	0	0	0	0
8:30 PM	0	0	1	0	0	0
8:45 PM	0	0	0	0	1	0
9:00 PM	0	1	0	0	0	0
9:15 PM	0	0	0	0	0	0
9:30 PM	0	0	0	0	0	0
9:45 PM	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0
10:15 PM	0	0	0	0	0	0
10:30 PM	0	0	0	0	0	0
10:45 PM	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0
11:15 PM	0	0	0	0	0	0
11:30 PM	0	0	0	0	0	0
11:45 PM	0	0	0	0	0	0
Totals	***72***	***27***	***66***	***26***	***71***	***23***

Prepared by National Data & Surveying Services

Trip Gen Study

Location: Pacific Biosciences North Dwy@Adams Dr **City:** Menlo Park, CA

TIME	28-Sep		29-Sep		30-Sep	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
12:00 AM	0	0	0	0	0	0
12:15 AM	0	0	0	0	0	0
12:30 AM	0	0	0	0	1	2
12:45 AM	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0
1:15 AM	0	0	0	0	0	0
1:30 AM	0	0	0	0	0	0
1:45 AM	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0
2:15 AM	0	0	0	0	0	0
2:30 AM	0	0	0	0	0	0
2:45 AM	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0
3:15 AM	0	0	0	0	0	0
3:30 AM	0	0	0	0	0	0
3:45 AM	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0
4:15 AM	0	0	0	0	0	0
4:30 AM	0	0	0	0	0	0
4:45 AM	0	0	0	0	1	0
5:00 AM	0	0	0	0	0	0
5:15 AM	0	0	0	0	0	0
5:30 AM	1	1	0	0	0	0
5:45 AM	0	0	1	1	2	2
6:00 AM	0	0	0	0	0	0
6:15 AM	1	0	1	0	0	0
6:30 AM	0	0	0	0	1	0
6:45 AM	0	0	1	0	0	0
7:00 AM	0	0	0	0	0	2
7:15 AM	0	0	0	0	0	1
7:30 AM	0	1	1	1	1	0
7:45 AM	0	0	0	1	0	0
8:00 AM	1	0	0	0	0	0
8:15 AM	1	1	1	0	0	0
8:30 AM	0	6	0	2	0	4
8:45 AM	0	12	1	11	0	11
9:00 AM	0	8	0	8	0	9
9:15 AM	0	6	0	6	0	3
9:30 AM	0	0	0	1	0	0
9:45 AM	0	0	0	1	0	0
10:00 AM	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0
10:30 AM	0	0	0	1	0	0
10:45 AM	0	2	0	2	0	0
11:00 AM	1	0	1	0	0	1
11:15 AM	0	1	0	0	0	0

11:30 AM	0	0	0	0	0	0
11:45 AM	2	0	1	0	1	0
12:00 PM	0	1	0	0	0	0
12:15 PM	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0
12:45 PM	1	0	0	0	0	1
1:00 PM	0	0	0	1	0	0
1:15 PM	0	0	0	0	0	0
1:30 PM	0	0	0	0	0	0
1:45 PM	0	0	0	0	0	0
2:00 PM	0	0	0	0	1	0
2:15 PM	1	0	0	0	0	0
2:30 PM	1	0	0	0	1	0
2:45 PM	0	1	1	0	0	1
3:00 PM	0	4	2	5	0	4
3:15 PM	1	0	0	1	1	1
3:30 PM	0	0	2	1	1	0
3:45 PM	1	1	0	0	1	0
4:00 PM	1	1	0	2	0	0
4:15 PM	0	0	1	1	0	0
4:30 PM	0	1	0	0	1	0
4:45 PM	0	0	0	0	1	2
5:00 PM	0	0	0	3	0	1
5:15 PM	0	0	1	2	0	0
5:30 PM	1	2	0	0	1	1
5:45 PM	0	0	1	1	0	1
6:00 PM	0	0	1	0	1	0
6:15 PM	0	1	0	0	0	1
6:30 PM	0	0	0	0	0	0
6:45 PM	0	0	0	0	0	0
7:00 PM	0	0	1	1	0	0
7:15 PM	0	0	0	0	0	0
7:30 PM	0	0	0	0	0	0
7:45 PM	0	0	0	0	0	0
8:00 PM	0	0	0	0	2	1
8:15 PM	0	0	0	0	0	0
8:30 PM	1	1	0	0	0	0
8:45 PM	0	0	0	0	0	0
9:00 PM	1	0	0	0	0	0
9:15 PM	0	0	0	0	0	0
9:30 PM	0	0	0	0	0	0
9:45 PM	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0
10:15 PM	0	0	0	0	0	0
10:30 PM	0	0	0	0	0	0
10:45 PM	0	1	0	0	0	0
11:00 PM	0	0	0	0	0	0
11:15 PM	0	0	0	0	0	0
11:30 PM	0	0	0	0	0	0
11:45 PM	0	0	0	0	0	0
Totals	***16***	***52***	***18***	***53***	***18***	***49***

Prepared by National Data & Surveying Services

Trip Gen Study

Location: Pacific Biosciences South Dwy@Adams Dr **City:** Menlo Park, CA

TIME	28-Sep		29-Sep		30-Sep	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
12:00 AM	1	1	1	1	1	1
12:15 AM	0	0	0	0	0	0
12:30 AM	0	0	0	0	0	0
12:45 AM	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0
1:15 AM	1	0	0	1	0	1
1:30 AM	0	1	0	0	0	0
1:45 AM	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0
2:15 AM	0	0	0	0	0	0
2:30 AM	0	0	0	0	0	0
2:45 AM	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0
3:15 AM	0	0	0	0	0	0
3:30 AM	0	0	0	0	0	0
3:45 AM	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0
4:15 AM	0	0	0	0	0	0
4:30 AM	0	0	0	0	0	0
4:45 AM	0	0	0	0	0	1
5:00 AM	0	0	0	0	0	0
5:15 AM	0	0	0	0	0	0
5:30 AM	0	0	0	0	0	0
5:45 AM	0	0	0	1	0	0
6:00 AM	0	1	0	0	0	0
6:15 AM	0	1	0	0	1	0
6:30 AM	1	0	1	0	0	0
6:45 AM	0	1	0	1	0	1
7:00 AM	0	1	0	1	0	1
7:15 AM	0	0	0	0	1	0
7:30 AM	0	0	0	0	1	0
7:45 AM	0	0	0	0	0	0
8:00 AM	1	1	1	1	2	1
8:15 AM	1	0	1	0	1	0
8:30 AM	1	0	0	0	0	0
8:45 AM	2	1	3	1	1	1
9:00 AM	2	1	1	2	2	1
9:15 AM	2	0	3	0	2	0
9:30 AM	1	0	1	0	3	0
9:45 AM	0	0	1	0	1	0
10:00 AM	1	2	3	1	0	1
10:15 AM	0	0	0	0	0	0
10:30 AM	0	1	0	0	1	1
10:45 AM	1	1	0	0	0	1
11:00 AM	2	0	0	0	0	0
11:15 AM	0	1	0	0	0	0

11:30 AM	0	1	0	0	0	0
11:45 AM	0	2	0	1	1	2
12:00 PM	1	0	2	3	1	0
12:15 PM	0	0	0	1	1	0
12:30 PM	0	1	1	0	0	2
12:45 PM	2	0	1	1	1	0
1:00 PM	0	2	0	0	0	0
1:15 PM	0	0	0	2	2	1
1:30 PM	0	1	0	0	0	3
1:45 PM	0	0	0	0	1	0
2:00 PM	0	0	0	1	1	0
2:15 PM	0	0	0	0	0	1
2:30 PM	0	1	0	2	0	3
2:45 PM	0	1	0	0	1	0
3:00 PM	0	0	0	1	1	0
3:15 PM	0	0	1	1	0	1
3:30 PM	0	0	3	1	0	0
3:45 PM	0	1	2	0	0	2
4:00 PM	0	1	0	1	0	1
4:15 PM	0	2	0	2	0	0
4:30 PM	0	0	0	1	0	1
4:45 PM	2	2	2	1	0	4
5:00 PM	0	3	0	2	0	2
5:15 PM	0	1	0	5	0	3
5:30 PM	0	0	1	1	0	1
5:45 PM	0	0	0	1	1	1
6:00 PM	0	2	1	2	0	3
6:15 PM	0	0	0	2	2	1
6:30 PM	0	2	0	1	0	0
6:45 PM	0	1	0	0	0	0
7:00 PM	0	0	1	0	0	0
7:15 PM	0	0	1	0	0	0
7:30 PM	0	0	0	0	0	0
7:45 PM	0	0	1	0	0	0
8:00 PM	0	0	0	0	0	0
8:15 PM	0	0	0	0	0	0
8:30 PM	0	0	0	2	0	1
8:45 PM	0	0	0	0	0	2
9:00 PM	0	0	0	0	1	1
9:15 PM	0	0	0	0	0	0
9:30 PM	0	0	0	0	0	0
9:45 PM	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0
10:15 PM	0	0	1	0	0	0
10:30 PM	0	0	0	0	0	0
10:45 PM	0	0	1	0	0	0
11:00 PM	0	0	0	0	0	1
11:15 PM	0	0	0	0	0	0
11:30 PM	0	0	0	0	0	0
11:45 PM	0	0	0	0	0	0
Totals	***22***	***38***	***35***	***45***	***31***	***48***

Prepared by National Data & Surveying Services

Trip Gen Study

Location: Pacific Biosciences East Dwy@O'Brien Dr **City:** Menlo Park, CA

TIME	28-Sep		29-Sep		30-Sep	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
12:00 AM	0	0	0	0	0	1
12:15 AM	0	0	0	0	1	1
12:30 AM	0	0	0	0	0	0
12:45 AM	0	0	0	0	0	3
1:00 AM	0	0	1	0	0	0
1:15 AM	0	0	0	0	0	0
1:30 AM	0	0	0	0	0	0
1:45 AM	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0
2:15 AM	0	0	0	0	0	1
2:30 AM	0	0	0	0	0	0
2:45 AM	0	0	0	0	1	0
3:00 AM	0	0	0	0	1	0
3:15 AM	0	0	0	0	1	0
3:30 AM	0	0	0	0	0	0
3:45 AM	0	0	0	0	1	0
4:00 AM	0	0	0	0	0	0
4:15 AM	0	0	0	0	0	0
4:30 AM	0	0	0	0	0	0
4:45 AM	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0
5:15 AM	0	0	0	0	0	0
5:30 AM	0	0	1	0	0	0
5:45 AM	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0
6:15 AM	4	0	1	0	2	0
6:30 AM	1	0	1	0	2	0
6:45 AM	0	0	1	0	0	0
7:00 AM	1	0	1	0	2	0
7:15 AM	0	1	1	1	1	0
7:30 AM	3	0	3	0	4	0
7:45 AM	4	0	2	0	2	0
8:00 AM	1	0	2	0	3	0
8:15 AM	2	0	2	1	7	2
8:30 AM	6	1	4	0	1	1
8:45 AM	9	1	7	1	5	1
9:00 AM	2	0	3	2	5	0
9:15 AM	0	0	1	0	3	0
9:30 AM	3	2	3	0	2	0
9:45 AM	5	0	1	1	1	0
10:00 AM	1	1	2	0	2	0
10:15 AM	1	1	1	0	0	0
10:30 AM	0	0	1	0	1	0
10:45 AM	1	0	0	1	1	0
11:00 AM	0	1	2	1	1	0
11:15 AM	1	1	1	0	0	0

11:30 AM	0	0	0	0	0	1
11:45 AM	3	0	3	1	1	0
12:00 PM	2	2	0	1	0	7
12:15 PM	1	2	2	3	3	0
12:30 PM	0	1	0	0	2	1
12:45 PM	2	2	2	0	1	1
1:00 PM	1	1	2	1	3	1
1:15 PM	3	0	0	0	1	1
1:30 PM	2	1	1	1	2	2
1:45 PM	1	1	1	1	0	1
2:00 PM	1	0	0	0	0	1
2:15 PM	0	0	0	0	1	0
2:30 PM	0	1	0	2	0	5
2:45 PM	1	1	2	0	1	0
3:00 PM	0	1	0	1	0	2
3:15 PM	0	0	0	0	0	3
3:30 PM	0	2	0	0	0	0
3:45 PM	0	2	0	1	1	1
4:00 PM	0	0	1	2	0	1
4:15 PM	0	0	0	2	0	0
4:30 PM	1	3	0	0	2	7
4:45 PM	0	4	1	2	0	0
5:00 PM	1	3	0	5	0	5
5:15 PM	0	7	0	3	0	4
5:30 PM	0	2	1	3	0	0
5:45 PM	0	5	0	0	0	3
6:00 PM	0	4	0	5	0	5
6:15 PM	1	3	1	3	1	2
6:30 PM	1	2	0	2	0	1
6:45 PM	0	0	0	2	0	3
7:00 PM	0	1	1	1	0	1
7:15 PM	0	0	0	0	1	1
7:30 PM	0	0	0	0	0	0
7:45 PM	0	0	0	1	0	0
8:00 PM	0	0	0	1	0	0
8:15 PM	0	0	0	0	0	0
8:30 PM	0	0	0	2	0	0
8:45 PM	0	0	0	0	0	1
9:00 PM	0	0	0	0	0	0
9:15 PM	0	0	0	0	0	0
9:30 PM	0	0	0	0	0	0
9:45 PM	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0
10:15 PM	0	0	0	1	0	0
10:30 PM	0	0	0	0	0	0
10:45 PM	0	0	0	1	1	1
11:00 PM	0	0	0	0	1	0
11:15 PM	0	0	0	0	0	0
11:30 PM	0	0	0	0	0	0
11:45 PM	0	0	0	0	0	0
Totals	***66***	***60***	***60***	***56***	***72***	***72***

Prepared by National Data & Surveying Services

Trip Gen Study

Location: Pacific Biosciences Middle Dwy@O'Brien Dr **City:** Menlo Park, CA

TIME	28-Sep		29-Sep		30-Sep	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
12:00 AM	0	0	0	0	0	0
12:15 AM	0	0	0	1	0	0
12:30 AM	0	0	0	0	0	0
12:45 AM	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0
1:15 AM	0	0	0	0	0	0
1:30 AM	0	0	0	0	0	0
1:45 AM	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0
2:15 AM	0	0	0	0	0	1
2:30 AM	0	2	0	2	0	1
2:45 AM	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0
3:15 AM	0	0	0	0	0	0
3:30 AM	0	0	0	0	0	0
3:45 AM	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0
4:15 AM	0	0	0	0	0	0
4:30 AM	0	0	0	0	2	0
4:45 AM	0	0	2	0	1	0
5:00 AM	0	0	1	0	0	0
5:15 AM	1	0	0	0	0	0
5:30 AM	0	0	0	0	0	0
5:45 AM	0	0	0	0	0	0
6:00 AM	1	0	0	0	0	0
6:15 AM	0	0	0	0	1	0
6:30 AM	1	0	1	1	0	0
6:45 AM	0	0	0	0	1	0
7:00 AM	2	0	1	0	0	0
7:15 AM	0	0	2	0	1	0
7:30 AM	1	0	2	1	1	0
7:45 AM	1	0	0	0	2	0
8:00 AM	1	0	1	0	0	0
8:15 AM	1	0	2	0	4	0
8:30 AM	1	0	1	0	4	0
8:45 AM	2	0	0	0	3	0
9:00 AM	3	0	3	0	2	0
9:15 AM	2	2	2	0	0	0
9:30 AM	1	0	2	0	1	0
9:45 AM	1	0	1	1	0	1
10:00 AM	2	0	0	0	0	0
10:15 AM	2	0	1	0	1	2
10:30 AM	0	2	0	1	0	0
10:45 AM	4	2	2	0	0	0
11:00 AM	0	0	1	0	0	0
11:15 AM	1	0	0	0	0	1

11:30 AM	2	1	1	2	0	0
11:45 AM	2	2	1	0	0	1
12:00 PM	1	0	0	0	0	1
12:15 PM	0	0	1	0	2	3
12:30 PM	1	1	1	1	2	2
12:45 PM	1	1	0	0	2	0
1:00 PM	0	0	2	1	1	1
1:15 PM	0	0	0	0	2	0
1:30 PM	0	2	0	1	0	1
1:45 PM	1	0	1	0	1	0
2:00 PM	0	1	0	0	0	0
2:15 PM	0	0	0	1	1	0
2:30 PM	0	0	1	0	2	2
2:45 PM	1	0	0	1	0	1
3:00 PM	0	1	0	0	0	0
3:15 PM	1	0	0	0	0	0
3:30 PM	0	0	0	0	0	0
3:45 PM	0	1	0	0	1	1
4:00 PM	1	4	1	1	0	3
4:15 PM	0	0	0	1	1	1
4:30 PM	2	1	0	2	2	1
4:45 PM	0	1	0	3	0	1
5:00 PM	0	1	1	1	0	3
5:15 PM	0	0	0	2	0	0
5:30 PM	0	1	0	0	1	2
5:45 PM	1	0	0	2	2	2
6:00 PM	0	2	1	0	0	0
6:15 PM	0	0	2	2	0	1
6:30 PM	0	0	0	0	0	0
6:45 PM	0	0	0	1	0	1
7:00 PM	0	0	0	0	0	0
7:15 PM	0	0	0	0	0	1
7:30 PM	0	0	0	0	0	1
7:45 PM	0	0	0	1	1	0
8:00 PM	0	0	1	0	0	0
8:15 PM	0	0	0	0	0	0
8:30 PM	0	0	1	0	0	0
8:45 PM	0	0	0	0	1	0
9:00 PM	0	0	0	0	0	0
9:15 PM	0	0	0	0	0	0
9:30 PM	0	0	0	0	0	1
9:45 PM	1	0	0	0	0	0
10:00 PM	0	0	0	0	0	0
10:15 PM	0	0	1	0	0	0
10:30 PM	0	0	0	0	0	0
10:45 PM	0	0	0	0	0	1
11:00 PM	0	0	1	0	0	0
11:15 PM	0	1	0	0	0	0
11:30 PM	0	0	0	0	0	0
11:45 PM	0	1	0	1	1	0
Totals	***43***	***30***	***42***	***31***	***47***	***38***

Prepared by National Data & Surveying Services

Trip Gen Study

Location: Pacific Biosciences West Dwy@O'Brien Dr **City:** Menlo Park, CA

TIME	28-Sep		29-Sep		30-Sep	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
12:00 AM	0	0	0	0	0	0
12:15 AM	0	0	0	1	0	0
12:30 AM	0	0	0	0	0	0
12:45 AM	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	1
1:15 AM	0	0	0	0	0	0
1:30 AM	0	0	0	0	0	0
1:45 AM	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0
2:15 AM	0	0	0	0	0	0
2:30 AM	0	0	1	0	2	0
2:45 AM	2	0	1	0	2	0
3:00 AM	0	0	1	0	1	1
3:15 AM	1	0	3	0	2	0
3:30 AM	2	0	3	0	2	0
3:45 AM	1	0	0	0	2	0
4:00 AM	0	0	0	0	2	1
4:15 AM	1	0	3	0	2	0
4:30 AM	3	0	2	0	3	0
4:45 AM	1	0	0	0	1	0
5:00 AM	0	0	0	0	0	0
5:15 AM	0	0	0	0	0	0
5:30 AM	1	0	1	0	0	1
5:45 AM	0	0	0	0	0	1
6:00 AM	1	0	1	1	2	2
6:15 AM	1	0	0	0	0	1
6:30 AM	2	0	3	0	2	0
6:45 AM	1	0	2	0	1	0
7:00 AM	1	0	1	0	1	0
7:15 AM	3	0	1	2	5	0
7:30 AM	2	0	5	2	2	0
7:45 AM	5	0	4	0	4	0
8:00 AM	9	0	6	1	6	2
8:15 AM	5	3	6	2	2	5
8:30 AM	3	9	3	3	5	10
8:45 AM	8	3	6	9	6	0
9:00 AM	8	3	7	4	10	6
9:15 AM	12	1	10	1	10	3
9:30 AM	5	3	7	3	5	2
9:45 AM	4	2	5	1	9	2
10:00 AM	5	1	1	2	6	1
10:15 AM	1	0	0	0	5	1
10:30 AM	3	2	4	1	4	4
10:45 AM	3	3	1	3	4	1
11:00 AM	1	2	1	4	3	5
11:15 AM	2	2	1	2	3	4

11:30 AM	3	4	3	4	5	5
11:45 AM	3	3	1	3	2	4
12:00 PM	2	2	1	1	3	0
12:15 PM	1	1	2	1	1	1
12:30 PM	2	3	2	1	3	1
12:45 PM	4	3	1	1	1	5
1:00 PM	1	0	0	3	1	0
1:15 PM	3	0	2	4	2	6
1:30 PM	2	0	0	2	4	0
1:45 PM	3	1	4	1	0	3
2:00 PM	2	2	1	5	2	1
2:15 PM	3	5	0	2	2	3
2:30 PM	0	1	2	6	1	5
2:45 PM	0	0	0	3	2	4
3:00 PM	2	5	0	2	2	4
3:15 PM	1	6	0	3	0	5
3:30 PM	1	5	0	1	1	6
3:45 PM	0	4	1	2	2	9
4:00 PM	1	6	1	5	0	4
4:15 PM	0	7	0	3	1	5
4:30 PM	1	10	0	3	0	9
4:45 PM	0	4	1	5	0	7
5:00 PM	0	9	0	7	1	12
5:15 PM	1	8	2	3	0	3
5:30 PM	0	8	0	4	0	4
5:45 PM	2	7	1	12	2	3
6:00 PM	2	2	0	3	0	5
6:15 PM	0	7	0	5	1	6
6:30 PM	0	1	0	3	0	2
6:45 PM	0	1	0	3	0	4
7:00 PM	0	3	0	0	0	1
7:15 PM	0	0	0	1	1	1
7:30 PM	0	1	0	0	1	2
7:45 PM	0	0	0	1	0	3
8:00 PM	0	1	0	0	0	0
8:15 PM	0	1	0	0	0	1
8:30 PM	0	0	2	2	1	1
8:45 PM	0	0	0	1	0	1
9:00 PM	0	1	0	0	0	2
9:15 PM	0	0	0	0	0	0
9:30 PM	0	1	0	3	0	0
9:45 PM	0	0	0	1	0	0
10:00 PM	0	1	0	0	0	1
10:15 PM	0	0	1	0	0	0
10:30 PM	0	0	0	1	0	0
10:45 PM	0	0	0	1	1	0
11:00 PM	0	0	1	0	0	0
11:15 PM	0	0	0	0	0	0
11:30 PM	0	1	1	0	1	0
11:45 PM	1	0	1	1	0	1
Totals	***138***	***159***	***121***	***155***	***158***	***194***

Prepared by National Data & Surveying Services

In & Out

Location: Pacific Biosciences (PacBio) West Dwy & Adams Ct
City: Menlo Park
Date: 9/28/2021
Day: Tuesday

TIME	NT	ST	TIME	NT	ST
12:00 AM	0	0	12:00 PM	0	0
12:15 AM	0	0	12:15 PM	0	0
12:30 AM	0	0	12:30 PM	0	0
12:45 AM	0	0	12:45 PM	0	0
1:00 AM	0	0	1:00 PM	0	0
1:15 AM	0	0	1:15 PM	0	0
1:30 AM	0	0	1:30 PM	0	0
1:45 AM	0	0	1:45 PM	0	0
2:00 AM	0	0	2:00 PM	0	0
2:15 AM	0	0	2:15 PM	0	0
2:30 AM	0	0	2:30 PM	0	0
2:45 AM	2	0	2:45 PM	0	0
3:00 AM	0	0	3:00 PM	0	0
3:15 AM	1	0	3:15 PM	0	0
3:30 AM	2	0	3:30 PM	0	0
3:45 AM	2	0	3:45 PM	1	1
4:00 AM	0	0	4:00 PM	0	0
4:15 AM	0	0	4:15 PM	0	0
4:30 AM	1	0	4:30 PM	0	0
4:45 AM	0	0	4:45 PM	0	1
5:00 AM	0	0	5:00 PM	0	0
5:15 AM	0	0	5:15 PM	0	0
5:30 AM	0	0	5:30 PM	0	0
5:45 AM	0	0	5:45 PM	1	0
6:00 AM	0	0	6:00 PM	1	0
6:15 AM	0	0	6:15 PM	0	0
6:30 AM	0	0	6:30 PM	0	1
6:45 AM	0	0	6:45 PM	0	0
7:00 AM	0	0	7:00 PM	0	0
7:15 AM	0	0	7:15 PM	0	0
7:30 AM	0	0	7:30 PM	0	0
7:45 AM	0	0	7:45 PM	0	0
8:00 AM	1	0	8:00 PM	0	0
8:15 AM	0	2	8:15 PM	0	0
8:30 AM	0	8	8:30 PM	0	0
8:45 AM	0	1	8:45 PM	0	0
9:00 AM	0	4	9:00 PM	0	0
9:15 AM	0	0	9:15 PM	0	0
9:30 AM	0	1	9:30 PM	0	0
9:45 AM	0	1	9:45 PM	0	0
10:00 AM	1	0	10:00 PM	1	2
10:15 AM	0	0	10:15 PM	0	0
10:30 AM	0	1	10:30 PM	0	0
10:45 AM	0	0	10:45 PM	0	0
11:00 AM	0	1	11:00 PM	0	0
11:15 AM	1	0	11:15 PM	0	0
11:30 AM	0	0	11:30 PM	0	0
11:45 AM	0	0	11:45 PM	0	0
			Totals	***11***	***19***

Prepared by National Data & Surveying Services

In & Out

Location: Pacific Biosciences (PacBio) West Dwy & Adams Ct
City: Menlo Park
Date: 9/29/2021
Day: Wednesday

TIME	NT	ST	TIME	NT	ST
12:00 AM	0	0	12:00 PM	0	0
12:15 AM	0	0	12:15 PM	0	0
12:30 AM	0	0	12:30 PM	0	0
12:45 AM	0	0	12:45 PM	0	0
1:00 AM	0	0	1:00 PM	0	0
1:15 AM	0	0	1:15 PM	0	0
1:30 AM	0	0	1:30 PM	0	0
1:45 AM	0	0	1:45 PM	0	0
2:00 AM	0	0	2:00 PM	0	0
2:15 AM	0	0	2:15 PM	0	0
2:30 AM	1	0	2:30 PM	0	1
2:45 AM	1	0	2:45 PM	0	2
3:00 AM	1	0	3:00 PM	0	0
3:15 AM	3	0	3:15 PM	0	0
3:30 AM	3	0	3:30 PM	0	0
3:45 AM	0	0	3:45 PM	0	0
4:00 AM	0	0	4:00 PM	0	0
4:15 AM	1	0	4:15 PM	0	0
4:30 AM	1	0	4:30 PM	0	0
4:45 AM	0	0	4:45 PM	1	0
5:00 AM	0	0	5:00 PM	0	0
5:15 AM	0	0	5:15 PM	0	0
5:30 AM	0	0	5:30 PM	0	0
5:45 AM	0	0	5:45 PM	0	0
6:00 AM	0	1	6:00 PM	0	0
6:15 AM	0	0	6:15 PM	0	0
6:30 AM	0	0	6:30 PM	0	0
6:45 AM	0	0	6:45 PM	0	0
7:00 AM	0	0	7:00 PM	0	0
7:15 AM	0	2	7:15 PM	0	0
7:30 AM	0	0	7:30 PM	0	0
7:45 AM	0	0	7:45 PM	0	0
8:00 AM	1	0	8:00 PM	0	0
8:15 AM	0	1	8:15 PM	0	0
8:30 AM	0	3	8:30 PM	0	0
8:45 AM	1	10	8:45 PM	0	0
9:00 AM	0	3	9:00 PM	0	0
9:15 AM	0	0	9:15 PM	0	0
9:30 AM	0	2	9:30 PM	0	3
9:45 AM	1	0	9:45 PM	0	1
10:00 AM	0	1	10:00 PM	0	0
10:15 AM	0	0	10:15 PM	0	0
10:30 AM	0	0	10:30 PM	0	0
10:45 AM	0	1	10:45 PM	0	0
11:00 AM	0	1	11:00 PM	0	0
11:15 AM	0	0	11:15 PM	0	0
11:30 AM	0	0	11:30 PM	0	0
11:45 AM	0	0	11:45 PM	0	0
			Totals	***14***	***25***

Prepared by National Data & Surveying Services

In & Out

Location: Pacific Biosciences (PacBio) West Dwy & Adams Ct
City: Menlo Park
Date: 9/30/2021
Day: Thursday

TIME	NT	ST	TIME	NT	ST
12:00 AM	0	0	12:00 PM	0	0
12:15 AM	0	0	12:15 PM	0	0
12:30 AM	0	0	12:30 PM	0	0
12:45 AM	0	0	12:45 PM	0	0
1:00 AM	0	1	1:00 PM	0	0
1:15 AM	0	0	1:15 PM	0	1
1:30 AM	0	0	1:30 PM	0	0
1:45 AM	0	0	1:45 PM	0	1
2:00 AM	0	0	2:00 PM	0	0
2:15 AM	0	0	2:15 PM	0	1
2:30 AM	1	0	2:30 PM	0	0
2:45 AM	2	0	2:45 PM	0	1
3:00 AM	1	1	3:00 PM	0	1
3:15 AM	2	0	3:15 PM	0	0
3:30 AM	2	0	3:30 PM	0	0
3:45 AM	2	1	3:45 PM	0	0
4:00 AM	2	0	4:00 PM	0	0
4:15 AM	0	0	4:15 PM	0	0
4:30 AM	1	0	4:30 PM	0	0
4:45 AM	0	0	4:45 PM	0	0
5:00 AM	0	0	5:00 PM	0	1
5:15 AM	0	0	5:15 PM	0	0
5:30 AM	0	1	5:30 PM	0	0
5:45 AM	0	1	5:45 PM	0	0
6:00 AM	1	2	6:00 PM	0	1
6:15 AM	0	0	6:15 PM	0	0
6:30 AM	0	0	6:30 PM	0	0
6:45 AM	0	0	6:45 PM	0	0
7:00 AM	0	0	7:00 PM	0	0
7:15 AM	0	0	7:15 PM	2	0
7:30 AM	0	0	7:30 PM	0	0
7:45 AM	0	0	7:45 PM	0	0
8:00 AM	1	2	8:00 PM	0	0
8:15 AM	0	3	8:15 PM	0	0
8:30 AM	1	9	8:30 PM	0	0
8:45 AM	0	5	8:45 PM	0	0
9:00 AM	2	3	9:00 PM	1	2
9:15 AM	0	1	9:15 PM	0	0
9:30 AM	0	1	9:30 PM	0	0
9:45 AM	0	1	9:45 PM	0	0
10:00 AM	0	1	10:00 PM	0	1
10:15 AM	0	0	10:15 PM	0	0
10:30 AM	0	0	10:30 PM	0	0
10:45 AM	0	1	10:45 PM	0	0
11:00 AM	0	0	11:00 PM	0	0
11:15 AM	1	1	11:15 PM	0	0
11:30 AM	0	0	11:30 PM	0	0
11:45 AM	0	1	11:45 PM	0	0
			Totals	***19***	***36***

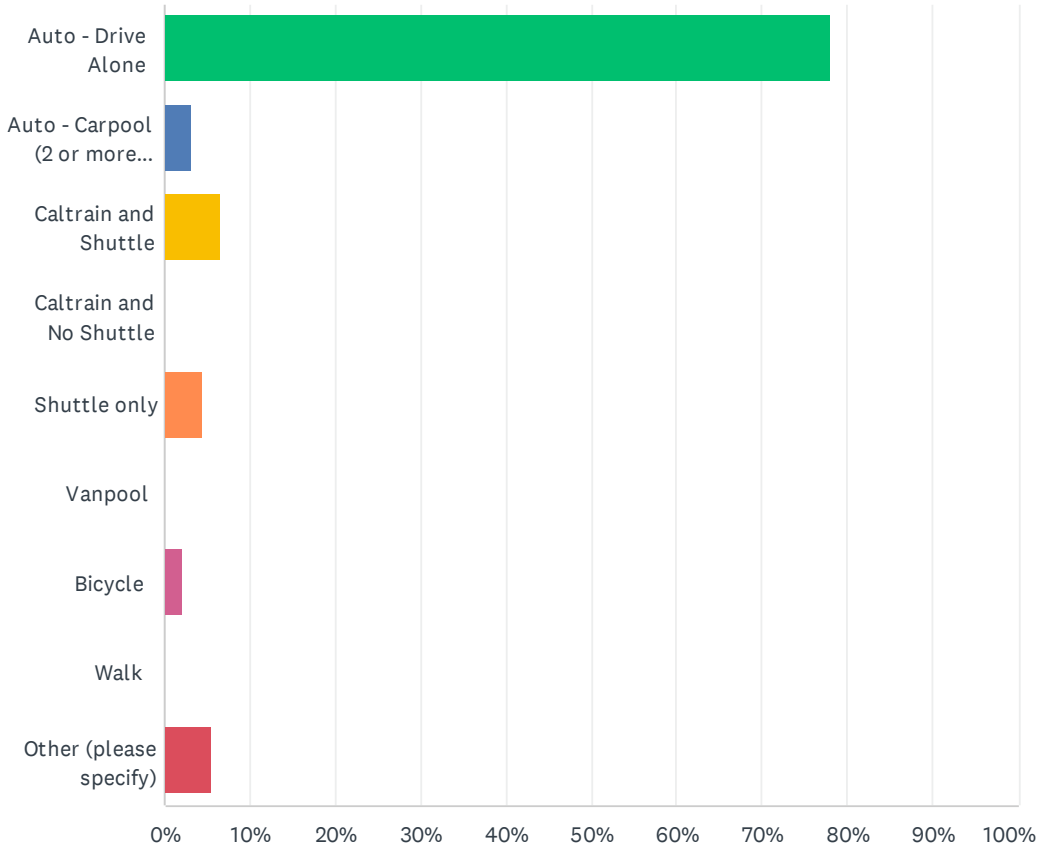
UPS Cut-Through Counts - AM Peak Hour

Driveway #	Location	AM Peak Hour (8:30 AM to 9:30 AM)					
		9/28/2021		9/29/2021		9/30/2021	
		IN	OUT	IN	OUT	IN	OUT
UPS Cut-Through							
2	Northeast Dwy on Adams Dr	30		29	1	28	
3A	East Dwy on Adams Drive (North)		31		25		27
3B	East Dwy on Adams Drive (South)				2		2
Total		30	31	29	28	28	29

Attachment C

Q1 On a typical workday (pre-COVID), what is your primary mode of transportation for getting to/from work?

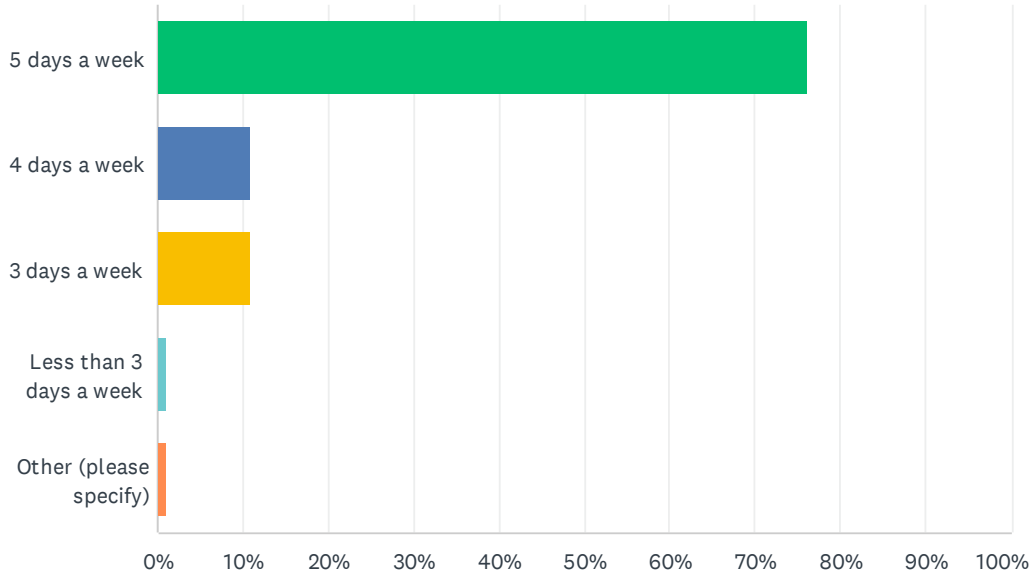
Answered: 91 Skipped: 1



ANSWER CHOICES	RESPONSES	
Auto - Drive Alone	78.02%	71
Auto - Carpool (2 or more persons)	3.30%	3
Caltrain and Shuttle	6.59%	6
Caltrain and No Shuttle	0.00%	0
Shuttle only	4.40%	4
Vanpool	0.00%	0
Bicycle	2.20%	2
Walk	0.00%	0
Other (please specify)	5.49%	5
TOTAL		91

Q2 For your answer to Question #1, how often a week do you use that mode of transportation on average (pre-COVID)?

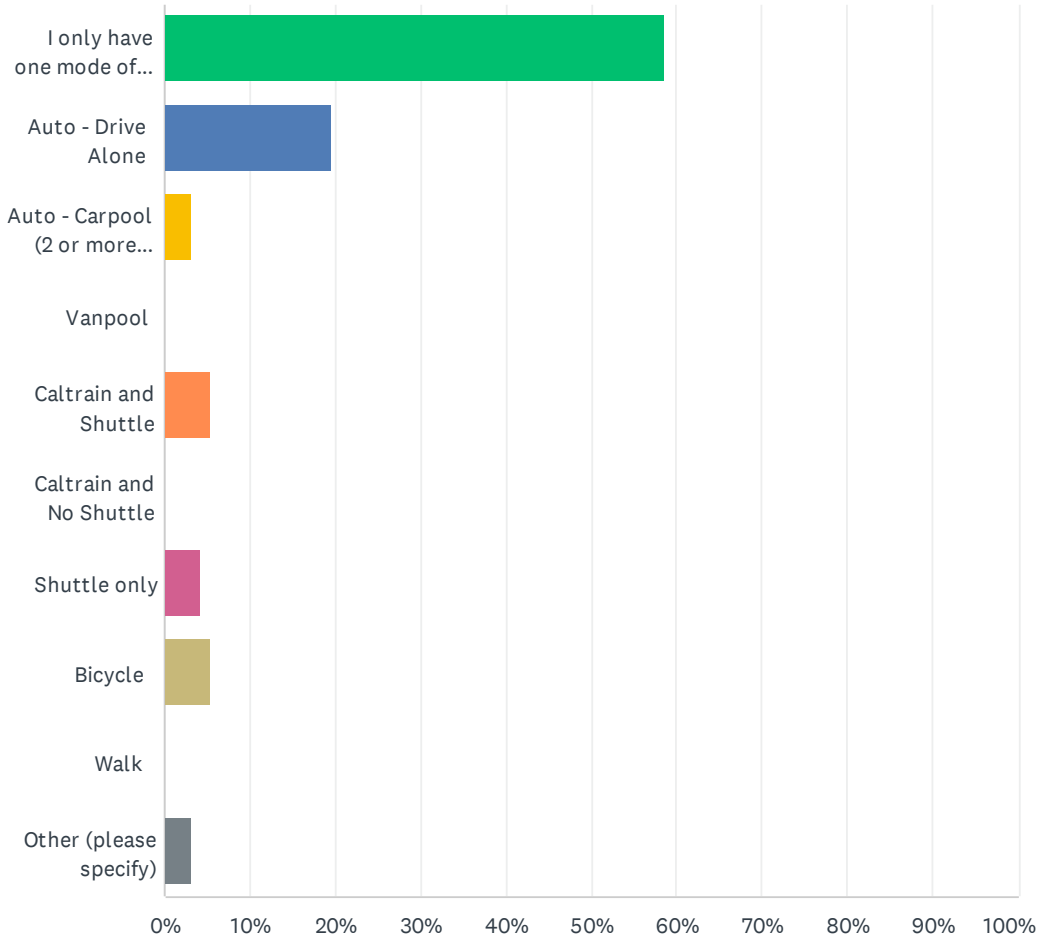
Answered: 92 Skipped: 0



ANSWER CHOICES	RESPONSES	
5 days a week	76.09%	70
4 days a week	10.87%	10
3 days a week	10.87%	10
Less than 3 days a week	1.09%	1
Other (please specify)	1.09%	1
TOTAL		92

Q3 On a typical workday (pre-COVID), what is your secondary mode of transportation for getting to/from work?

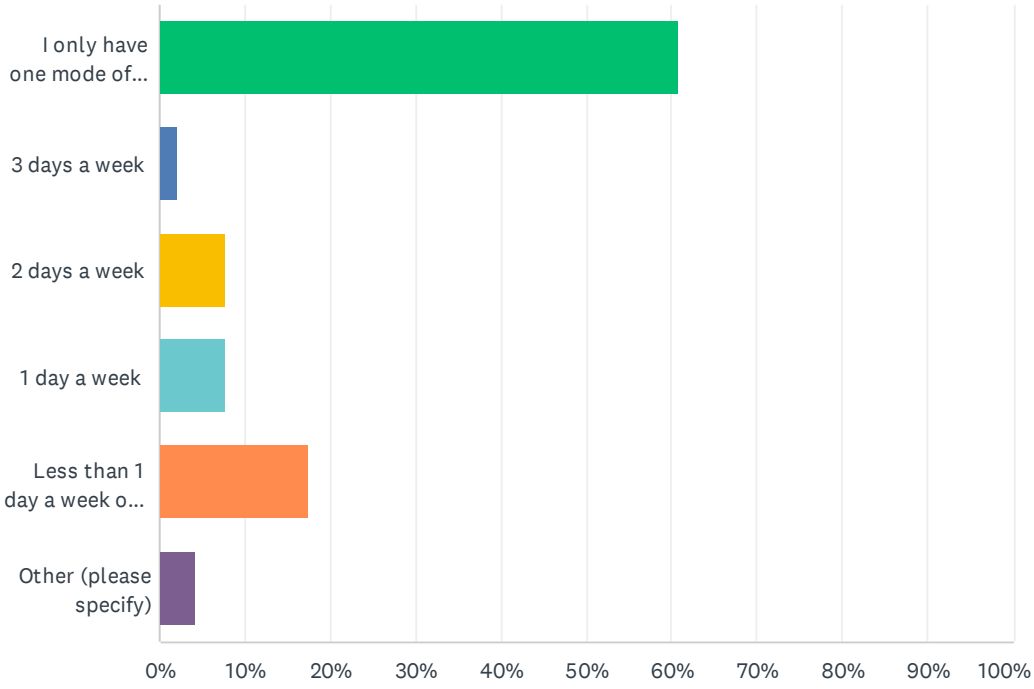
Answered: 92 Skipped: 0



ANSWER CHOICES	RESPONSES	
I only have one mode of transportation (same answer as Question #1)	58.70%	54
Auto - Drive Alone	19.57%	18
Auto - Carpool (2 or more persons)	3.26%	3
Vanpool	0.00%	0
Caltrain and Shuttle	5.43%	5
Caltrain and No Shuttle	0.00%	0
Shuttle only	4.35%	4
Bicycle	5.43%	5
Walk	0.00%	0
Other (please specify)	3.26%	3
TOTAL		92

Q4 For your answer to Question #3, how often a week do you use that mode of transportation on average (pre-COVID)?

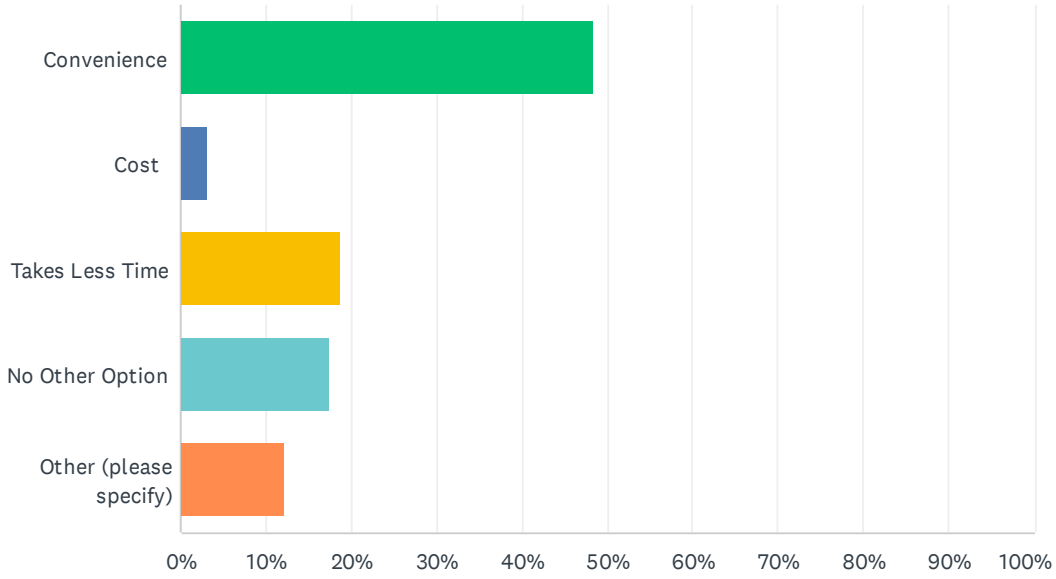
Answered: 92 Skipped: 0



ANSWER CHOICES	RESPONSES	
I only have one mode of transportation (same answer as Questions #1)	60.87%	56
3 days a week	2.17%	2
2 days a week	7.61%	7
1 day a week	7.61%	7
Less than 1 day a week on average	17.39%	16
Other (please specify)	4.35%	4
TOTAL		92

Q5 What is the reason why you have chosen your primary commute method (pre-COVID)?

Answered: 91 Skipped: 1



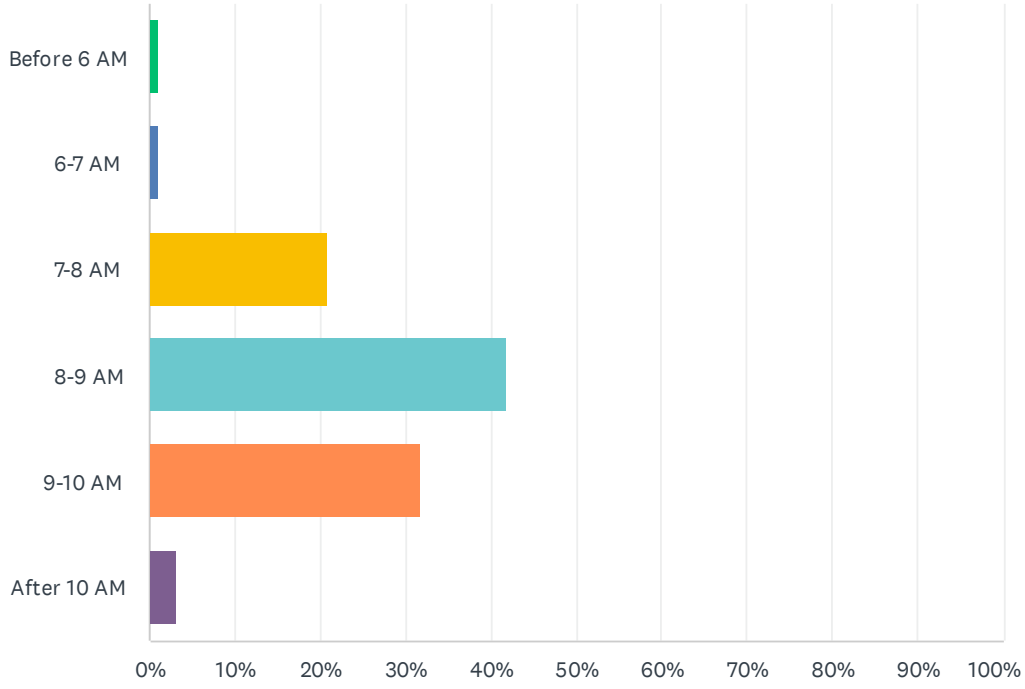
ANSWER CHOICES	RESPONSES	
Convenience	48.35%	44
Cost	3.30%	3
Takes Less Time	18.68%	17
No Other Option	17.58%	16
Other (please specify)	12.09%	11
TOTAL		91

Q6 On a typical workday (pre-COVID), approximately how long is your one-way trip to work (in miles)?

Answered: 89 Skipped: 3

Q7 What approximate time do you typically arrive to work (pre-COVID)?

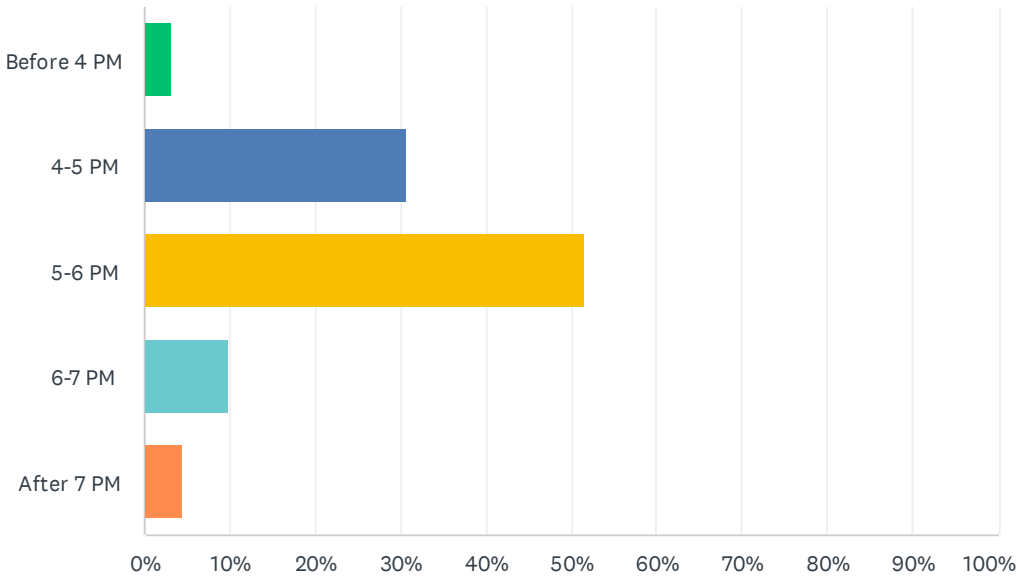
Answered: 91 Skipped: 1



ANSWER CHOICES	RESPONSES	
Before 6 AM	1.10%	1
6-7 AM	1.10%	1
7-8 AM	20.88%	19
8-9 AM	41.76%	38
9-10 AM	31.87%	29
After 10 AM	3.30%	3
TOTAL		91

Q8 What approximate time do you typically leave work (pre-COVID)?

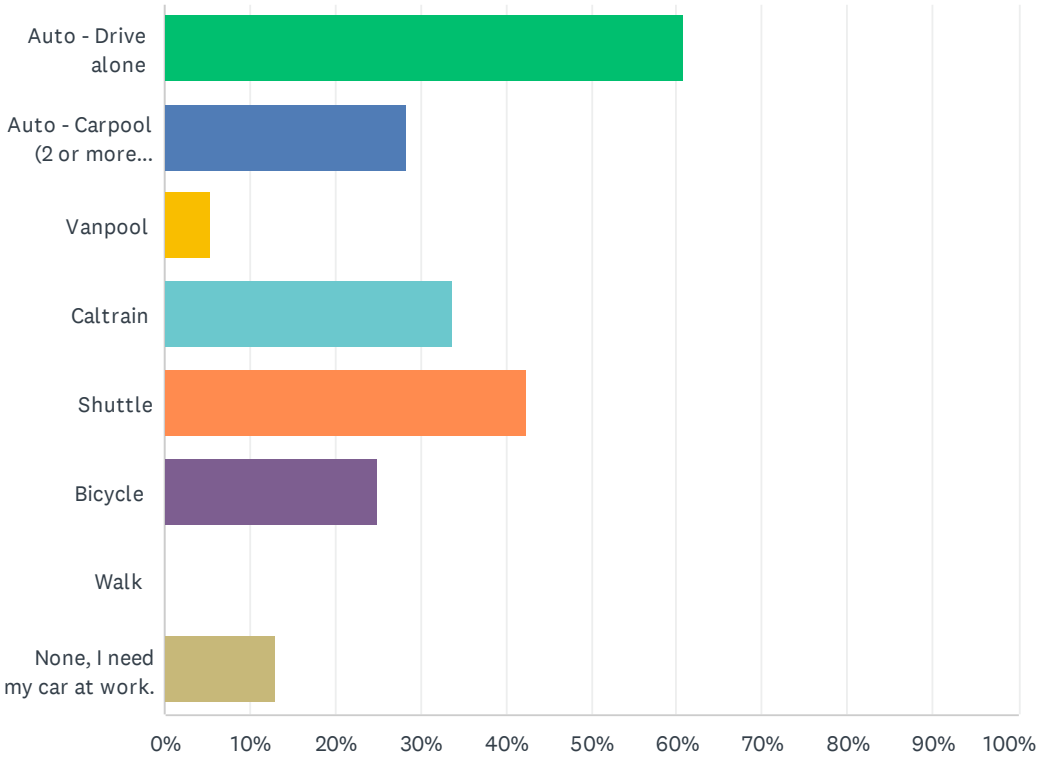
Answered: 91 Skipped: 1



ANSWER CHOICES	RESPONSES	
Before 4 PM	3.30%	3
4-5 PM	30.77%	28
5-6 PM	51.65%	47
6-7 PM	9.89%	9
After 7 PM	4.40%	4
TOTAL		91

Q9 What options have you researched or considered to travel to work? (Please check all that apply)

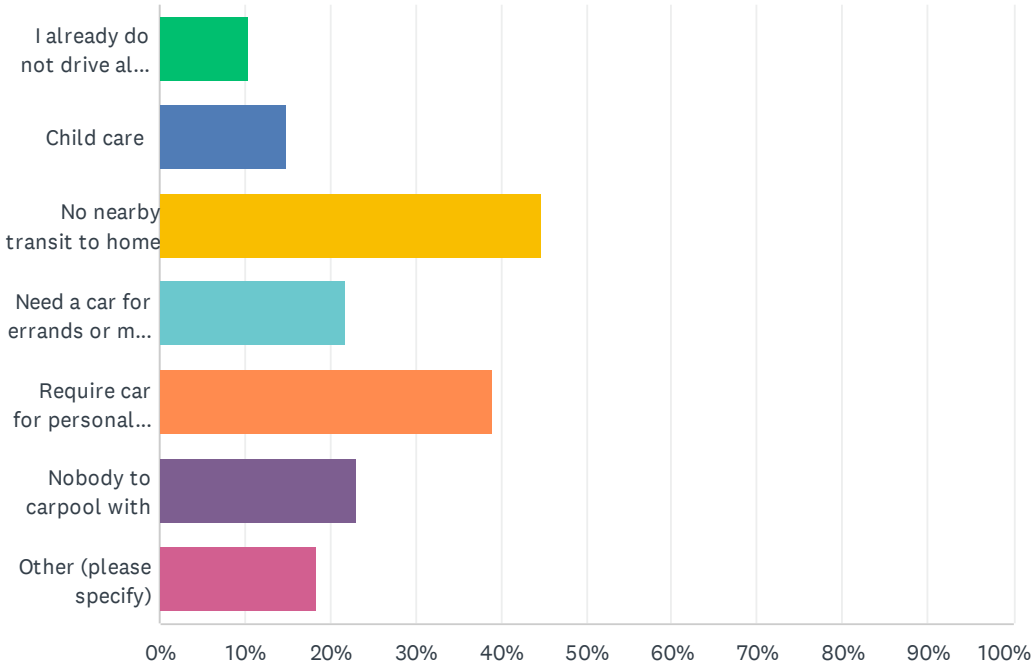
Answered: 92 Skipped: 0



ANSWER CHOICES	RESPONSES	
Auto - Drive alone	60.87%	56
Auto - Carpool (2 or more persons)	28.26%	26
Vanpool	5.43%	5
Caltrain	33.70%	31
Shuttle	42.39%	39
Bicycle	25.00%	23
Walk	0.00%	0
None, I need my car at work.	13.04%	12
Total Respondents: 92		

Q10 If you typically drive alone to work (pre-COVID), what are the obstacles preventing you from commuting by other means? (Please check all that apply)

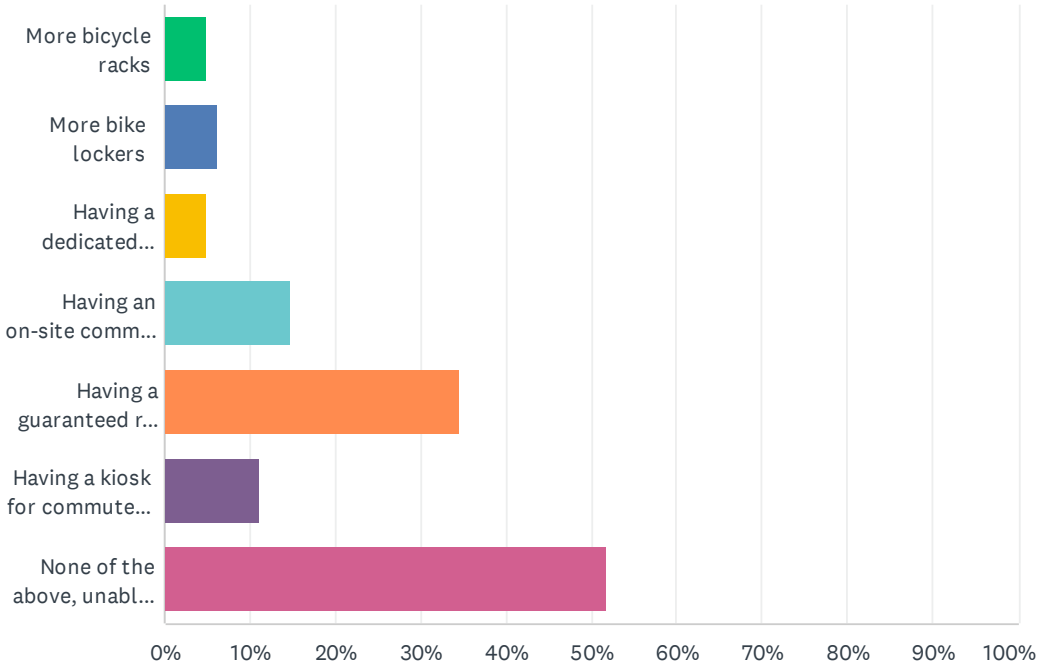
Answered: 87 Skipped: 5



ANSWER CHOICES	RESPONSES	
I already do not drive alone to work	10.34%	9
Child care	14.94%	13
No nearby transit to home	44.83%	39
Need a car for errands or my work during the day	21.84%	19
Require car for personal commitments after work	39.08%	34
Nobody to carpool with	22.99%	20
Other (please specify)	18.39%	16
Total Respondents: 87		

Q11 Please check if any of the following would cause you to use alternate means of commuting to work other than driving alone (pre-COVID). (Please check all that apply)

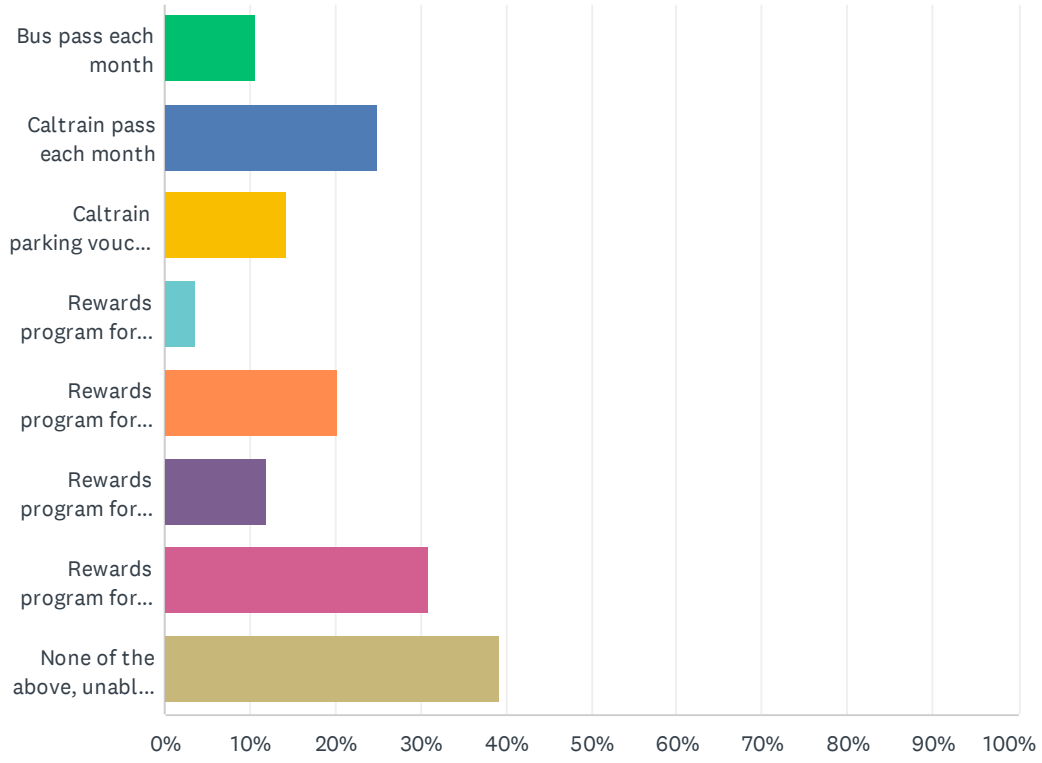
Answered: 81 Skipped: 11



ANSWER CHOICES	RESPONSES	
More bicycle racks	4.94%	4
More bike lockers	6.17%	5
Having a dedicated carpool or vanpool parking space nearest to the building entrance	4.94%	4
Having an on-site commute coordinator	14.81%	12
Having a guaranteed ride home program (e.g. taxi voucher when emergency arises)	34.57%	28
Having a kiosk for commute info	11.11%	9
None of the above, unable to use alternate means other than driving alone	51.85%	42
Total Respondents: 81		

Q12 Please check if any of the following rewards or discount programs would cause you to use alternate means of commuting to work other than driving alone (pre-COVID). (Please check all that apply)

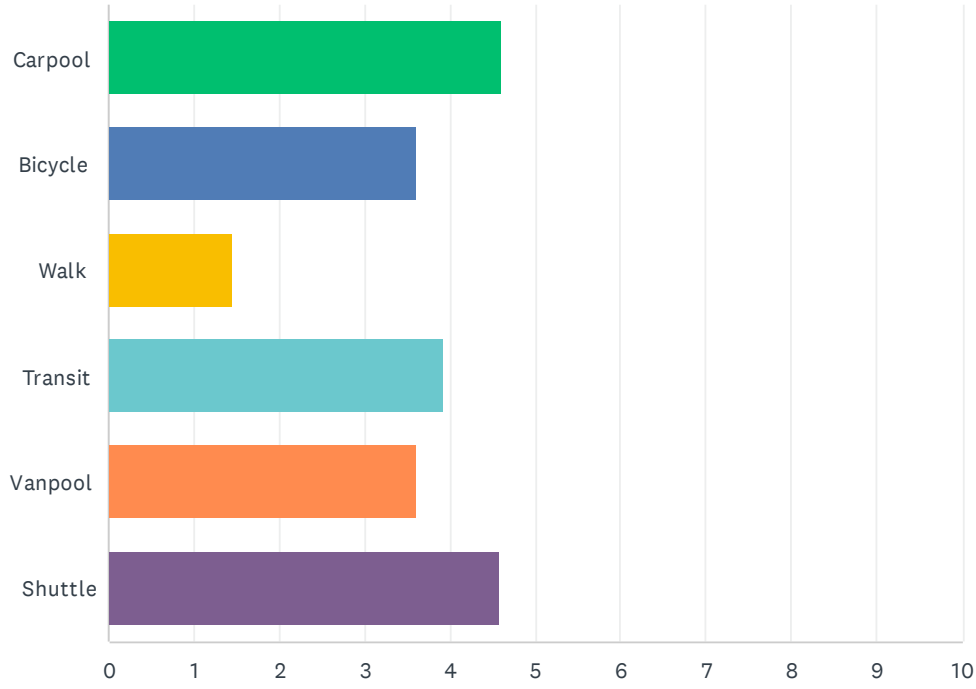
Answered: 84 Skipped: 8



ANSWER CHOICES	RESPONSES	
Bus pass each month	10.71%	9
Caltrain pass each month	25.00%	21
Caltrain parking voucher each month	14.29%	12
Rewards program for walking	3.57%	3
Rewards program for bicycling	20.24%	17
Rewards program for using a vanpool	11.90%	10
Rewards program for carpooling	30.95%	26
None of the above, unable to use alternate means other than driving alone	39.29%	33
Total Respondents: 84		

Q13 If you had to choose another means of transportation to driving alone, which would you choose (pre-COVID)? (Please rank with 1 being the highest)

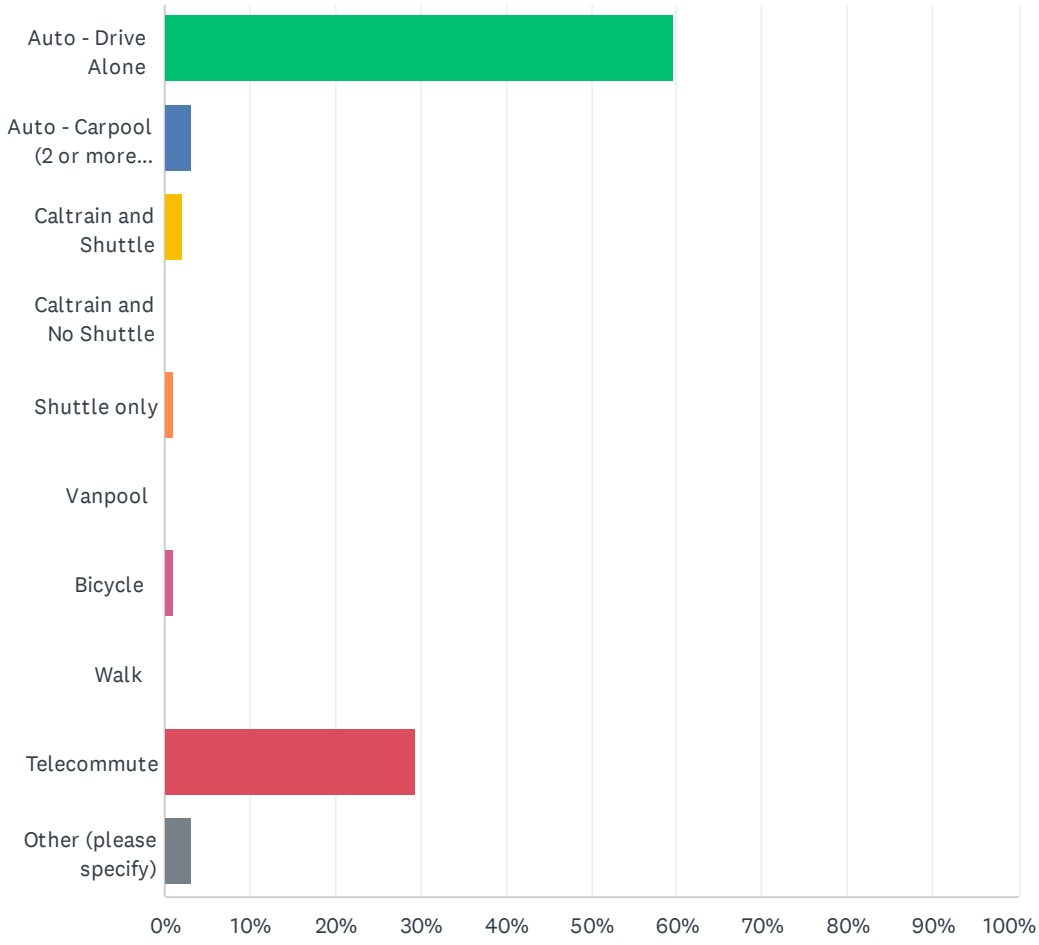
Answered: 84 Skipped: 8



	1	2	3	4	5	6	TOTAL	SCORE
Carpool	37.66% 29	18.18% 14	16.88% 13	20.78% 16	6.49% 5	0.00% 0	77	4.60
Bicycle	24.24% 16	12.12% 8	7.58% 5	13.64% 9	40.91% 27	1.52% 1	66	3.61
Walk	1.75% 1	1.75% 1	3.51% 2	5.26% 3	8.77% 5	78.95% 45	57	1.46
Transit	15.71% 11	21.43% 15	20.00% 14	28.57% 20	11.43% 8	2.86% 2	70	3.93
Vanpool	5.97% 4	20.90% 14	32.84% 22	14.93% 10	19.40% 13	5.97% 4	67	3.61
Shuttle	28.95% 22	31.58% 24	22.37% 17	9.21% 7	1.32% 1	6.58% 5	76	4.58

Q14 What is your current mode of transportation for getting to/from work as a result of COVID-19?

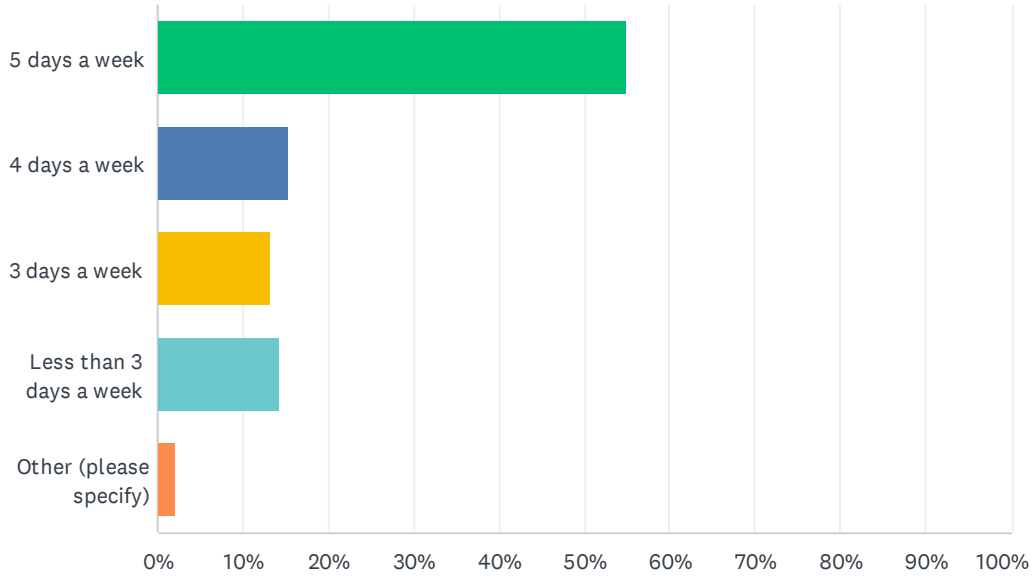
Answered: 92 Skipped: 0



ANSWER CHOICES	RESPONSES	
Auto - Drive Alone	59.78%	55
Auto - Carpool (2 or more persons)	3.26%	3
Caltrain and Shuttle	2.17%	2
Caltrain and No Shuttle	0.00%	0
Shuttle only	1.09%	1
Vanpool	0.00%	0
Bicycle	1.09%	1
Walk	0.00%	0
Telecommute	29.35%	27
Other (please specify)	3.26%	3
TOTAL		92

Q15 For your answer to Question #14, how often a week do you use that mode of transportation on average during COVID?

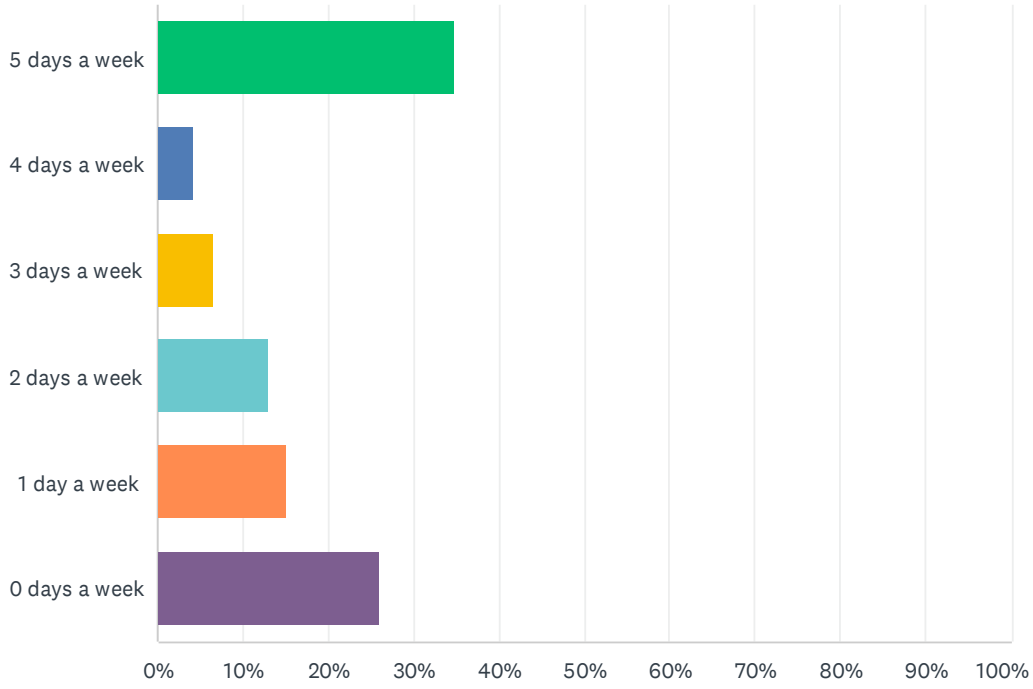
Answered: 91 Skipped: 1



ANSWER CHOICES	RESPONSES	
5 days a week	54.95%	50
4 days a week	15.38%	14
3 days a week	13.19%	12
Less than 3 days a week	14.29%	13
Other (please specify)	2.20%	2
TOTAL		91

Q16 How many days a week on average do you telecommute to work as a result of COVID-19?

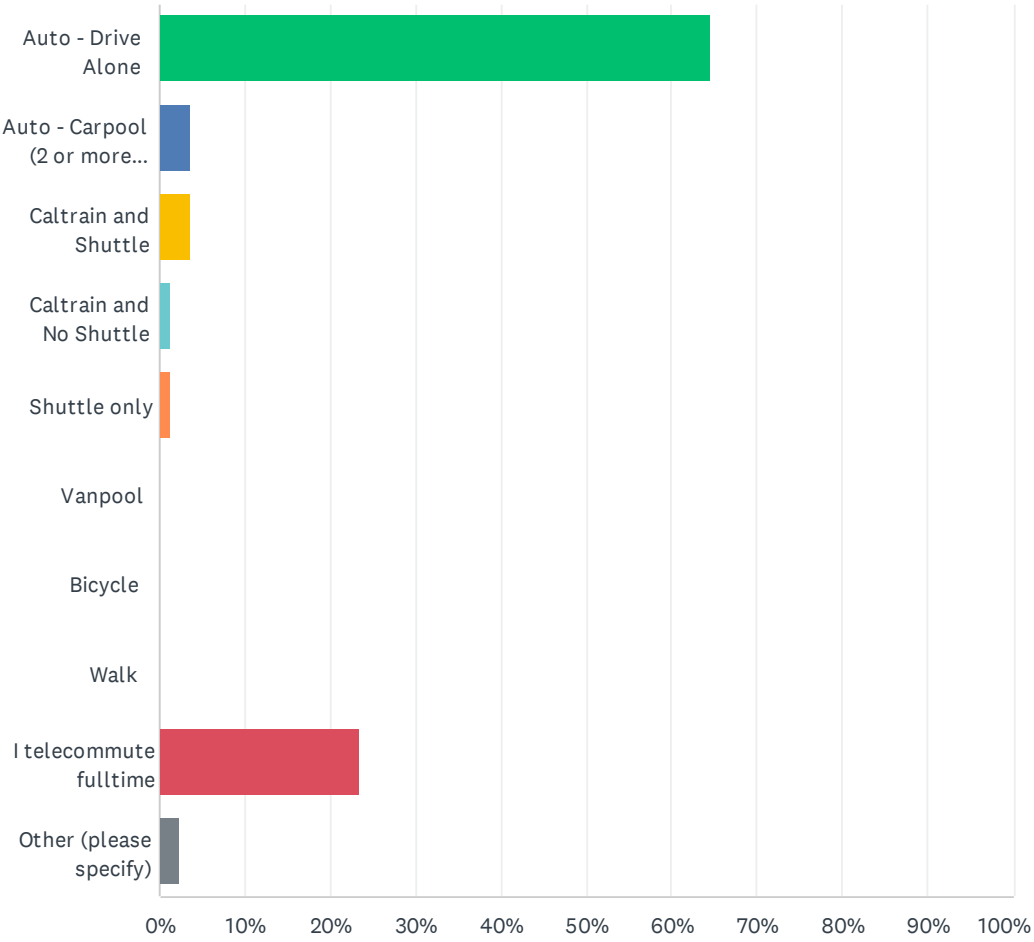
Answered: 92 Skipped: 0



ANSWER CHOICES	RESPONSES	
5 days a week	34.78%	32
4 days a week	4.35%	4
3 days a week	6.52%	6
2 days a week	13.04%	12
1 day a week	15.22%	14
0 days a week	26.09%	24
TOTAL		92

Q17 If you currently telecommute less than 5 days a week as a result of COVID-19, what is your mode of transportation when you are not telecommuting?

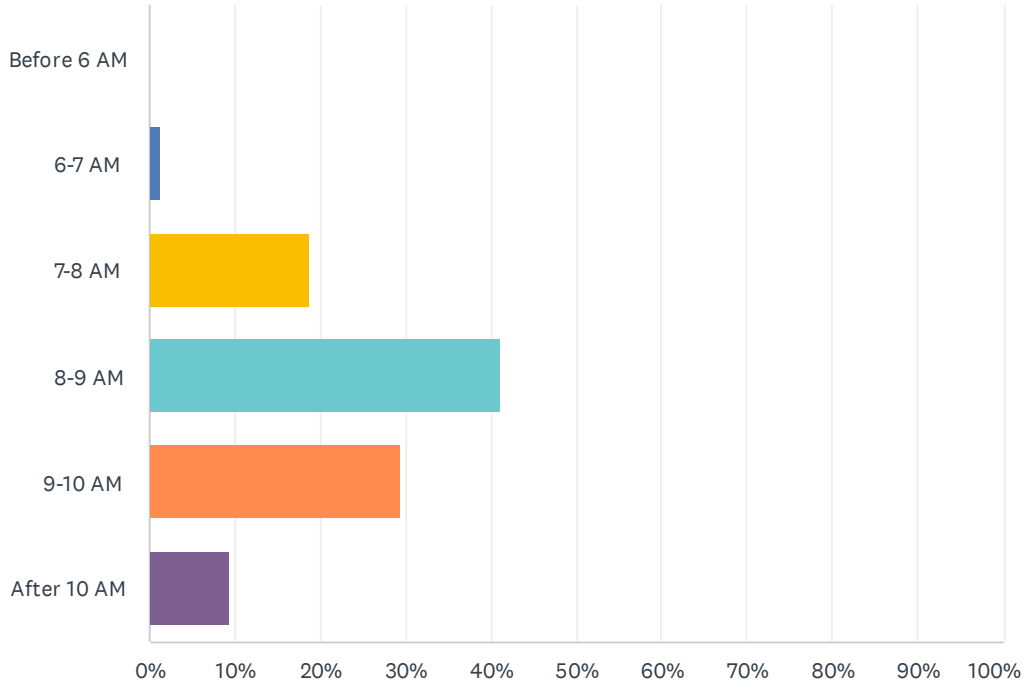
Answered: 85 Skipped: 7



ANSWER CHOICES	RESPONSES	
Auto - Drive Alone	64.71%	55
Auto - Carpool (2 or more persons)	3.53%	3
Caltrain and Shuttle	3.53%	3
Caltrain and No Shuttle	1.18%	1
Shuttle only	1.18%	1
Vanpool	0.00%	0
Bicycle	0.00%	0
Walk	0.00%	0
I telecommute fulltime	23.53%	20
Other (please specify)	2.35%	2
TOTAL		85

Q18 If/when you are not telecommuting during COVID, what approximate time do you typically arrive to work?

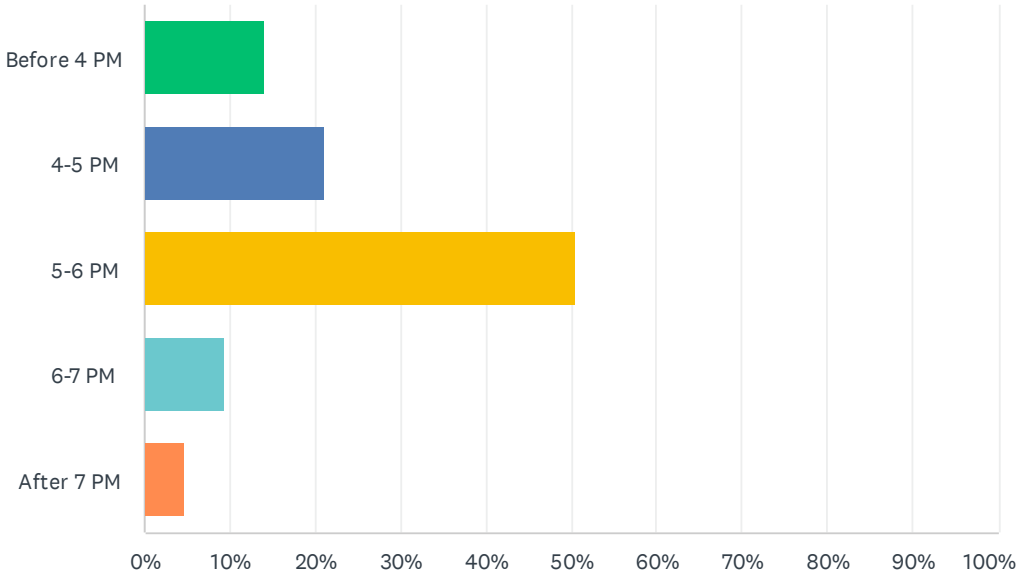
Answered: 85 Skipped: 7



ANSWER CHOICES	RESPONSES	
Before 6 AM	0.00%	0
6-7 AM	1.18%	1
7-8 AM	18.82%	16
8-9 AM	41.18%	35
9-10 AM	29.41%	25
After 10 AM	9.41%	8
TOTAL		85

Q19 If/when you are not telecommuting during COVID, what approximate time do you typically leave work?

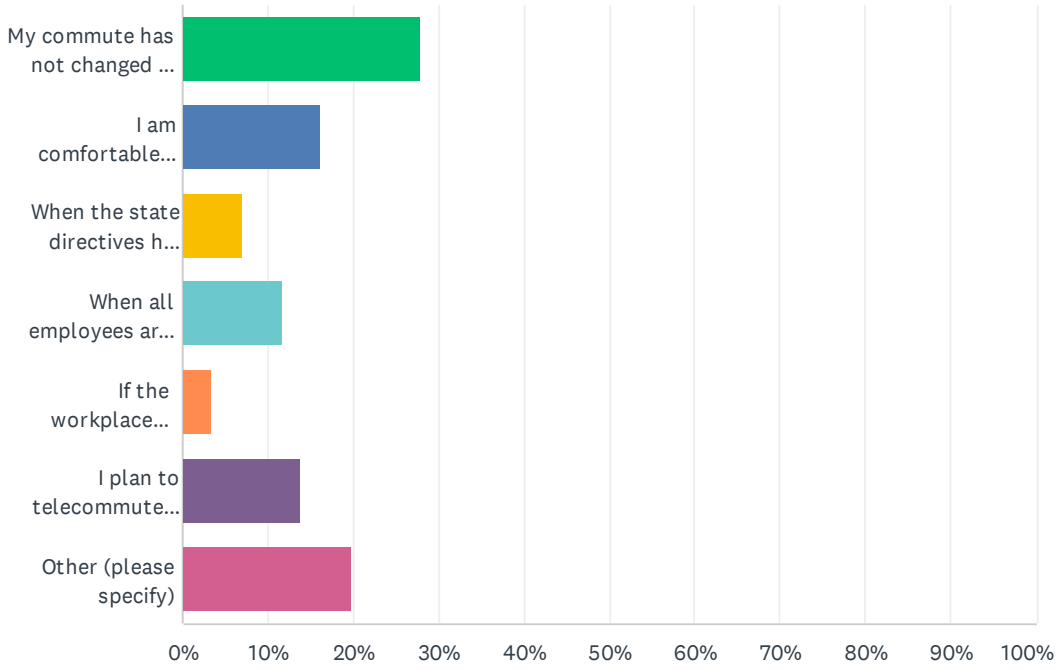
Answered: 85 Skipped: 7



ANSWER CHOICES	RESPONSES	
Before 4 PM	14.12%	12
4-5 PM	21.18%	18
5-6 PM	50.59%	43
6-7 PM	9.41%	8
After 7 PM	4.71%	4
TOTAL		85

Q20 If you currently are telecommuting as a result of COVID-19, when would you return back to your typical (pre-COVID) transportation mode?

Answered: 86 Skipped: 6



ANSWER CHOICES	RESPONSES	
My commute has not changed due to COVID	27.91%	24
I am comfortable returning now	16.28%	14
When the state directives have deemed it safe to work in the office	6.98%	6
When all employees are vaccinated	11.63%	10
If the workplace requires COVID testing for all employees	3.49%	3
I plan to telecommute indefinitely	13.95%	12
Other (please specify)	19.77%	17
TOTAL		86

Appendix B
Intersection LOS Worksheets

1005 O'Brien Drive and 1320 Willow Road

Vistro File: P:\...\OBrien_Willow_AM_Revised_V3.vistro
Report File: P:\...\EX_AM_v3.pdf

Scenario 16 Existing AM (2023 vols)
3/14/2025

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1000	Bayfront Expy (SR 84)/Willow Rd (SR 114)	Signalized	HCM 7th Edition	EB Left	0.649	54.8	D
2000	Willow Rd (SR 114)/Hamilton Ave	Signalized	HCM 7th Edition	SB Left	0.876	25.5	C
3000	Willow Rd (SR 114)/Ivy Dr	Signalized	HCM 7th Edition	NB Left	0.774	18.6	B
4000	Willow Rd (SR 114)/O'Brien Dr	Signalized	HCM 7th Edition	WB Left	0.842	28.4	C
5000	Willow Rd (SR 114) /Newbridge St	Signalized	HCM 7th Edition	SB Right	1.280	156.4	F
6000	Willow Rd/US-101 NB Ramps	Signalized	HCM 7th Edition	WB Left	0.842	9.5	A
7000	Willow Rd/US-101 SB Ramps	Signalized	HCM 7th Edition	EB Left	0.892	7.8	A
8000	O'Brien Drive/Kavanaugh Drive	All-way stop	HCM 7th Edition	SB Thru	0.666	13.6	B
9000	Bayfront Expy (SR 84) /University Ave (SR 109)	Signalized	HCM 7th Edition	NB Left	0.807	23.6	C
10000	University Avenue/Adams Drive	Two-way stop	HCM 7th Edition	EB Left	0.250	72.1	F
11000	University Ave/O'Brien Dr	Signalized	HCM 7th Edition	EB Right	0.481	7.3	A
12000	University Avenue/Kavanaugh Drive	Signalized	HCM 7th Edition	NB Left	0.401	21.3	C
13000	Willow Road/Driveway A	Two-way stop	HCM 7th Edition	SB Thru	0.011	0.0	A
14000	Driveway B/O'Brien Drive	Two-way stop	HCM 7th Edition	WB Thru	0.004	0.0	A
15000	Driveway C/O'Brien Drive	Two-way stop	HCM 7th Edition	WB Thru	0.004	0.0	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1000: Bayfront Expy (SR 84)/Willow Rd (SR 114)

Control Type:	Signalized	Delay (sec / veh):	54.8
Analysis Method:	HCM 7th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.649

Intersection Setup

Name	Willow Road (SR 114)			Willow Road			Bayfront Expy (SR 84)			Bayfront Expy (SR 84)		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	3	0	1	0	0	0	2	0	1	2	0	1
Entry Pocket Length [ft]	265.00	100.00	200.00	100.00	100.00	100.00	530.00	100.00	630.00	1500.00	100.00	600.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			20.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			No			Yes			No		

Volumes

Name	Willow Road (SR 114)			Willow Road			Bayfront Expy (SR 84)			Bayfront Expy (SR 84)		
Base Volume Input [veh/h]	86	144	407	10	25	27	60	712	113	798	2109	41
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	16	0	0	106	0	0	0
Total Hourly Volume [veh/h]	86	144	407	10	25	11	60	712	7	798	2109	41
Peak Hour Factor	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	23	38	108	3	7	3	16	190	2	213	562	11
Total Analysis Volume [veh/h]	92	154	434	11	27	12	64	759	7	851	2248	44
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			2			3			0		
v_di, Inbound Pedestrian Volume crossing m	0			3			2			0		
v_co, Outbound Pedestrian Volume crossing	4			0			3			0		
v_ci, Inbound Pedestrian Volume crossing mi	3			0			4			0		
v_ab, Corner Pedestrian Volume [ped/h]	12			0			0			1		
Bicycle Volume [bicycles/h]	2			0			0			1		

Intersection Settings

Located in CBD	No
Signal Coordination Group	2 - Willow Road
Cycle Length [s]	180
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	17.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Protecte	Permiss	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	7	4	4	3	8	4	1	6	2	5	2	6
Auxiliary Signal Groups			4,5									
Lead / Lag	Lag	-	-	Lead	-	-	Lead	-	-	Lag	-	-
Minimum Green [s]	13	12	12	15	15	12	6	25	10	11	10	25
Maximum Green [s]	22	15	15	9	9	15	26	40	30	25	30	40
Amber [s]	3.6	3.9	3.9	3.6	3.6	3.9	3.6	5.0	5.0	3.6	5.0	5.0
All red [s]	0.0	0.5	0.5	1.5	1.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0
Split [s]	20	36	36	17	36	36	23	42	79	59	79	42
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Walk [s]	0	0	0	0	4	0	0	4	0	4	0	4
Pedestrian Clearance [s]	0	0	0	0	29	0	0	35	0	11	0	35
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	3.0	0.0	3.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	1.6	2.4	2.4	3.1	3.1	2.4	2.6	4.0	4.0	2.6	4.0	4.0
Minimum Recall	No	No	No	No	No		No	Yes		No	Yes	
Maximum Recall	No	No	No	No	No		No	No		No	No	
Pedestrian Recall	No	No	No	No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
C, Cycle Length [s]	180	180	180	180	180	180	180	180	180	180	180	180
L, Total Lost Time per Cycle [s]	3.60	4.40	4.40	5.10	5.10	5.10	4.60	6.00	6.00	4.60	6.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.60	2.40	0.00	3.10	3.10	3.10	2.60	4.00	4.00	2.60	4.00	4.00
g_i, Effective Green Time [s]	60	62	138	6	9	9	9	31	31	60	82	82
g / C, Green / Cycle	0.34	0.35	0.77	0.04	0.05	0.05	0.05	0.17	0.17	0.33	0.46	0.46
(v / s)_i Volume / Saturation Flow Rate	0.12	0.07	0.10	0.01	0.01	0.01	0.04	0.15	0.00	0.30	0.44	0.03
s, saturation flow rate [veh/h]	797	2249	4179	954	3560	1542	1547	5094	1589	2821	5094	1570
c, Capacity [veh/h]	267	777	3209	63	178	77	78	889	277	939	2329	718
d1, Uniform Delay [s]	44.95	41.36	5.41	86.69	81.81	81.81	84.65	72.04	61.57	57.32	47.45	27.26
k, delay calibration	0.41	0.50	0.50	0.11	0.11	0.11	0.11	0.11	0.11	0.49	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	2.85	0.57	0.09	1.30	0.39	0.93	18.77	2.46	0.04	13.59	3.74	0.04
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.34	0.20	0.14	0.17	0.15	0.16	0.82	0.85	0.03	0.91	0.97	0.06
d, Delay for Lane Group [s/veh]	47.80	41.93	5.50	88.00	82.20	82.74	103.41	74.50	61.61	70.91	51.19	27.30
Lane Group LOS	D	D	A	F	F	F	F	E	E	E	D	C
Critical Lane Group	Yes	No	No	No	No	Yes	Yes	No	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	3.32	2.49	1.36	0.54	0.62	0.56	1.69	11.61	0.27	20.33	33.32	1.10
50th-Percentile Queue Length [ft/ln]	83.04	62.27	34.03	13.47	15.56	14.12	42.28	290.30	6.82	508.25	833.08	27.60
95th-Percentile Queue Length [veh/ln]	5.98	4.48	2.45	0.97	1.12	1.02	3.04	17.20	0.49	27.72	42.79	1.99
95th-Percentile Queue Length [ft/ln]	149.47	112.08	61.26	24.24	28.02	25.41	76.11	430.01	12.27	693.12	1069.76	49.69

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	47.80	41.93	5.50	88.00	82.20	82.74	103.41	74.50	61.61	70.91	51.19	27.30
Movement LOS	D	D	A	F	F	F	F	E	E	E	D	C
d_A, Approach Delay [s/veh]	19.47			83.60			76.62			56.19		
Approach LOS	B			F			E			E		
d_I, Intersection Delay [s/veh]	54.78											
Intersection LOS	D											
Intersection V/C	0.649											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	0.0	8.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	665.43	0.00	891.45	0.00
d_p, Pedestrian Delay [s]	82.16	0.00	82.16	0.00
l_p,int, Pedestrian LOS Score for Intersectio	3.085	0.000	3.339	0.000
Crosswalk LOS	C	F	C	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	351	310	367	811
d_b, Bicycle Delay [s]	61.22	64.25	60.01	31.80
l_b,int, Bicycle LOS Score for Intersection	2.121	1.614	2.074	3.288
Bicycle LOS	B	A	B	C

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 2000: Willow Rd (SR 114)/Hamilton Ave

Control Type:	Signalized	Delay (sec / veh):	25.5
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.876

Intersection Setup

Name	Willow Road (SR 114)			Willow Road (SR 114)			Hamilton Avenue			Hamilton Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			30.00			25.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Willow Road (SR 114)			Willow Road (SR 114)			Hamilton Avenue			Hamilton Avenue		
Base Volume Input [veh/h]	116	608	11	16	784	18	59	2	72	10	6	12
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	116	608	11	16	784	18	59	2	72	10	6	12
Peak Hour Factor	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	30	156	3	4	201	5	15	1	18	3	2	3
Total Analysis Volume [veh/h]	119	623	11	16	803	18	60	2	74	10	6	12
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	6			57			5			57		
v_di, Inbound Pedestrian Volume crossing m	5			57			6			57		
v_co, Outbound Pedestrian Volume crossing	5			18			18			6		
v_ci, Inbound Pedestrian Volume crossing mi	6			18			18			5		
v_ab, Corner Pedestrian Volume [ped/h]	5			6			13			5		
Bicycle Volume [bicycles/h]	1			1			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	48
Active Pattern	Free Running
Coordination Type	*Free Running*
Actuation Type	*Fully actuated*
Offset [s]	8.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	1	6	2	5	2	6	4	8	4	8	4	8
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	Lead	-	-	Lag	-	-	Lag	-	-
Minimum Green [s]	4	10	10	4	10	10	4	4	4	4	4	4
Maximum Green [s]	21	30	30	16	30	30	26	26	26	26	26	26
Amber [s]	3.0	4.4	4.4	3.0	4.4	4.4	3.6	3.7	3.6	3.7	3.6	3.7
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	0	30	0	0	0	30	30	0	30	0	30	0
Vehicle Extension [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walk [s]	0	4	4	0	4	4	4	4	4	4	4	4
Pedestrian Clearance [s]	0	19	15	0	15	19	25	25	25	25	25	25
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	1.0	2.4	2.4	1.0	2.4	2.4	1.6	1.7	1.6	1.7	1.6	1.7
Minimum Recall	No	Yes		No	Yes			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	6.0	6.0	6.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	C	C
C, Cycle Length [s]	55	55	55	55	55	55	55	55
L, Total Lost Time per Cycle [s]	3.00	4.40	4.40	3.00	4.40	4.40	3.70	3.60
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.00
l2, Clearance Lost Time [s]	1.00	2.40	2.40	1.00	2.40	2.40	1.70	0.00
g_i, Effective Green Time [s]	9	32	32	1	24	24	11	11
g / C, Green / Cycle	0.16	0.58	0.58	0.02	0.44	0.44	0.20	0.20
(v / s)_i Volume / Saturation Flow Rate	0.15	0.38	0.38	0.02	0.42	0.42	0.16	0.03
s, saturation flow rate [veh/h]	797	837	830	937	984	973	829	988
c, Capacity [veh/h]	124	487	484	15	435	431	261	252
d1, Uniform Delay [s]	23.24	7.80	7.81	27.31	14.84	14.88	21.32	18.14
k, delay calibration	0.04	0.18	0.18	0.04	0.24	0.24	0.04	0.04
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	14.76	2.44	2.48	87.99	19.38	20.17	0.60	0.07
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.96	0.65	0.65	1.08	0.95	0.95	0.52	0.11
d, Delay for Lane Group [s/veh]	38.00	10.24	10.29	115.30	34.22	35.05	21.93	18.21
Lane Group LOS	D	B	B	F	C	D	C	B
Critical Lane Group	Yes	No	No	No	No	Yes	Yes	No
50th-Percentile Queue Length [veh/ln]	1.86	1.91	1.91	0.55	6.38	6.43	1.62	0.28
50th-Percentile Queue Length [ft/ln]	46.48	47.85	47.74	13.70	159.51	160.71	40.40	7.03
95th-Percentile Queue Length [veh/ln]	3.35	3.45	3.44	0.99	10.52	10.59	2.91	0.51
95th-Percentile Queue Length [ft/ln]	83.66	86.13	85.93	24.66	263.07	264.66	72.71	12.65

Movement, Approach, & Intersection Results

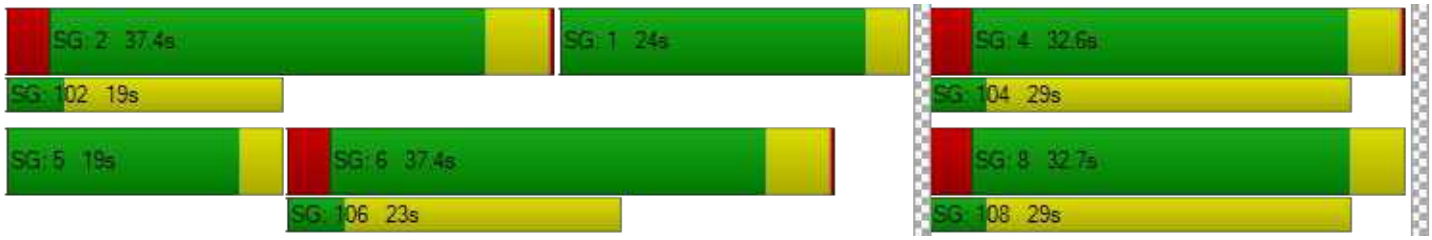
d_M, Delay for Movement [s/veh]	38.00	10.27	10.29	115.30	34.62	35.05	21.93	21.93	21.93	18.21	18.21	18.21
Movement LOS	D	B	B	F	C	D	C	C	C	B	B	B
d_A, Approach Delay [s/veh]	14.65			36.18			21.93			18.21		
Approach LOS	B			D			C			B		
d_I, Intersection Delay [s/veh]	25.54											
Intersection LOS	C											
Intersection V/C	0.876											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	1157.72	119.02	336.51	1182.85
d_p, Pedestrian Delay [s]	20.26	20.26	20.26	20.26
l_p,int, Pedestrian LOS Score for Intersectio	2.743	2.662	1.806	1.716
Crosswalk LOS	B	B	A	A
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1084	1084	939	939
d_b, Bicycle Delay [s]	5.82	5.82	7.79	7.79
l_b,int, Bicycle LOS Score for Intersection	2.181	2.250	1.784	1.606
Bicycle LOS	B	B	A	A

Sequence

Ring 1	2	1	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 3000: Willow Rd (SR 114)/Ivy Dr

Control Type:	Signalized	Delay (sec / veh):	18.6
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.774

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		Ivy Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	1	0
Entry Pocket Length [ft]	85.00	100.00	100.00	100.00	135.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	1	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	100.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		Ivy Drive	
Base Volume Input [veh/h]	34	674	919	14	16	83
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	34	674	919	14	16	83
Peak Hour Factor	0.9670	0.9670	0.9670	0.9670	0.9670	0.9670
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	9	174	238	4	4	21
Total Analysis Volume [veh/h]	35	697	950	14	17	86
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	4		9		3	
v_di, Inbound Pedestrian Volume crossing m	3		9		4	
v_co, Outbound Pedestrian Volume crossing	9		2		2	
v_ci, Inbound Pedestrian Volume crossing mi	9		2		2	
v_ab, Corner Pedestrian Volume [ped/h]	3		6		7	
Bicycle Volume [bicycles/h]	1		3		1	

Intersection Settings

Located in CBD	No
Signal Coordination Group	2 - Willow Road
Cycle Length [s]	160
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	90.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal Group	5	2	6	6	4	4
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	4	10	10	10	11	11
Maximum Green [s]	21	30	30	30	29	29
Amber [s]	3.0	4.4	4.4	4.4	3.0	3.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	17	125	107	107	35	35
Vehicle Extension [s]	2.0	2.0	2.0	2.0	2.0	2.0
Walk [s]	0	0	4	4	4	4
Pedestrian Clearance [s]	0	0	22	22	24	24
Delayed Vehicle Green [s]	0.0	0.0	3.0	3.0	3.0	3.0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	1.0	2.4	2.4	2.4	1.0	1.0
Minimum Recall	No	Yes	Yes		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	L	R
C, Cycle Length [s]	160	160	160	160	160	160
L, Total Lost Time per Cycle [s]	3.00	4.40	4.40	4.40	3.00	3.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.00	2.40	2.40	2.40	1.00	1.00
g_i, Effective Green Time [s]	7	133	123	123	20	20
g / C, Green / Cycle	0.04	0.83	0.77	0.77	0.12	0.12
(v / s)_i Volume / Saturation Flow Rate	0.04	0.44	0.58	0.58	0.01	0.11
s, saturation flow rate [veh/h]	797	1593	837	832	1702	803
c, Capacity [veh/h]	35	1324	643	639	208	98
d1, Uniform Delay [s]	76.35	4.04	10.12	10.20	62.20	68.72
k, delay calibration	0.04	0.50	0.50	0.50	0.04	0.06
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	40.53	1.50	7.85	8.05	0.06	12.23
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.99	0.53	0.75	0.75	0.08	0.88
d, Delay for Lane Group [s/veh]	116.88	5.54	17.97	18.25	62.26	80.94
Lane Group LOS	F	A	B	B	E	F
Critical Lane Group	Yes	No	No	Yes	No	Yes
50th-Percentile Queue Length [veh/ln]	1.83	2.85	9.32	9.41	0.62	3.80
50th-Percentile Queue Length [ft/ln]	45.75	71.30	233.04	235.27	15.59	94.95
95th-Percentile Queue Length [veh/ln]	3.29	5.13	14.33	14.44	1.12	6.84
95th-Percentile Queue Length [ft/ln]	82.34	128.34	358.22	361.05	28.06	170.91

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	116.88	5.54	18.11	18.25	62.26	80.94
Movement LOS	F	A	B	B	E	F
d_A, Approach Delay [s/veh]	10.86		18.11		77.86	
Approach LOS	B		B		E	
d_I, Intersection Delay [s/veh]	18.58					
Intersection LOS	B					
Intersection V/C	0.774					

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	539.26	274.76	1192.46
d_p, Pedestrian Delay [s]	72.17	72.17	72.17
l_p,int, Pedestrian LOS Score for Intersectio	2.788	2.705	2.197
Crosswalk LOS	C	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1508	1246	363
d_b, Bicycle Delay [s]	4.84	11.40	53.62
l_b,int, Bicycle LOS Score for Intersection	2.164	2.355	1.560
Bicycle LOS	B	B	A

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 4000: Willow Rd (SR 114)/O'Brien Dr

Control Type:	Signalized	Delay (sec / veh):	28.4
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.842

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		O'Brien Drive	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	1	0	1	0
Entry Pocket Length [ft]	100.00	60.00	100.00	100.00	50.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	No		No		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		O'Brien Drive	
Base Volume Input [veh/h]	731	279	48	1011	331	49
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	731	279	48	1011	331	49
Peak Hour Factor	0.9510	0.9510	0.9510	0.9510	0.9510	0.9510
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	192	73	13	266	87	13
Total Analysis Volume [veh/h]	769	293	50	1063	348	52
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	13		0		14	
v_ci, Inbound Pedestrian Volume crossing mi	14		0		13	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	1		6		2	

Intersection Settings

Located in CBD	No
Signal Coordination Group	2 - Willow Road
Cycle Length [s]	160
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	93.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Permissive	Permissive	Protected	Permissive	Permissive	Permissive
Signal Group	2	2	1	6	4	8
Auxiliary Signal Groups						
Lead / Lag	-	-	Lead	-	Lead	-
Minimum Green [s]	10	10	5	10	8	0
Maximum Green [s]	35	35	21	35	21	0
Amber [s]	4.4	4.4	3.0	4.4	3.2	0.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	116	116	19	135	25	0
Vehicle Extension [s]	2.0	2.0	2.0	2.0	2.0	0.0
Walk [s]	4	4	0	0	0	0
Pedestrian Clearance [s]	17	17	0	0	0	0
Delayed Vehicle Green [s]	3.0	3.0	0.0	0.0	0.0	0.0
Rest In Walk	No			No	No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.4	2.4	1.0	2.4	1.2	0.0
Minimum Recall	Yes		No	Yes	No	
Maximum Recall	No		No	No	No	
Pedestrian Recall	No		No	No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	L	C	L	C
C, Cycle Length [s]	160	160	160	160	160	160
L, Total Lost Time per Cycle [s]	4.40	4.40	3.00	4.40	3.20	3.20
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.40	2.40	1.00	2.40	1.20	1.20
g_i, Effective Green Time [s]	122	122	6	131	22	22
g / C, Green / Cycle	0.76	0.76	0.04	0.82	0.14	0.14
(v / s)_i Volume / Saturation Flow Rate	0.48	0.19	0.03	0.67	0.13	0.13
s, saturation flow rate [veh/h]	1593	1529	1781	1593	1406	1732
c, Capacity [veh/h]	1213	1165	64	1300	191	236
d1, Uniform Delay [s]	8.79	5.57	76.42	8.10	68.36	68.37
k, delay calibration	0.50	0.50	0.04	0.50	0.39	0.40
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	2.53	0.52	7.40	5.79	43.40	38.24
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.63	0.25	0.78	0.82	0.94	0.94
d, Delay for Lane Group [s/veh]	11.32	6.09	83.82	13.90	111.76	106.62
Lane Group LOS	B	A	F	B	F	F
Critical Lane Group	No	No	No	Yes	No	Yes
50th-Percentile Queue Length [veh/ln]	5.82	2.77	2.16	8.75	9.59	11.49
50th-Percentile Queue Length [ft/ln]	145.53	69.37	54.08	218.81	239.84	287.19
95th-Percentile Queue Length [veh/ln]	9.78	4.99	3.89	13.60	14.67	17.05
95th-Percentile Queue Length [ft/ln]	244.45	124.86	97.35	340.11	366.83	426.16

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	11.32	6.09	83.82	13.90	109.31	106.62
Movement LOS	B	A	F	B	F	F
d_A, Approach Delay [s/veh]	9.87		17.04		108.92	
Approach LOS	A		B		F	
d_I, Intersection Delay [s/veh]	28.36					
Intersection LOS	C					
Intersection V/C	0.842					

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	72.16
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	2.211
Crosswalk LOS	F	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1358	1633	273
d_b, Bicycle Delay [s]	8.24	2.70	59.71
l_b,int, Bicycle LOS Score for Intersection	2.436	2.478	2.220
Bicycle LOS	B	B	B

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 5000: Willow Rd (SR 114)/Newbridge St

Control Type:	Signalized	Delay (sec / veh):	156.4
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.280

Intersection Setup

Name	Willow Road (SR 114)			Willow Road (SR 114)			Newbridge Street			Newbridge Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	1	0	0	1	0	0	0
Entry Pocket Length [ft]	390.00	100.00	100.00	185.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	1	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	49.21	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			25.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Willow Road (SR 114)			Willow Road (SR 114)			Newbridge Street			Newbridge Street		
Base Volume Input [veh/h]	175	908	217	66	1303	20	22	126	343	344	92	33
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	44	0	0	34
Total Hourly Volume [veh/h]	175	908	217	66	1303	20	22	126	299	344	92	0
Peak Hour Factor	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	47	246	59	18	353	5	6	34	81	93	25	0
Total Analysis Volume [veh/h]	190	985	235	72	1413	22	24	137	324	373	100	0
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	2			2			3			3		
v_di, Inbound Pedestrian Volume crossing m	3			3			2			2		
v_co, Outbound Pedestrian Volume crossing	8			12			7			11		
v_ci, Inbound Pedestrian Volume crossing mi	7			11			8			12		
v_ab, Corner Pedestrian Volume [ped/h]	16			65			10			12		
Bicycle Volume [bicycles/h]	10			2			0			8		

Intersection Settings

Located in CBD	No
Signal Coordination Group	2 - Willow Road
Cycle Length [s]	160
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	97.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Split	Split	Split	Split	Split	Split
Signal Group	5	2	2	1	6	6	4	4	4	8	3	8
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lag	-	-	Lag	-	-	-	-	-
Minimum Green [s]	4	12	12	4	12	12	4	4	4	0	4	0
Maximum Green [s]	21	40	40	21	40	40	25	25	25	0	21	0
Amber [s]	3.0	4.4	4.4	3.0	4.4	4.4	3.6	3.6	3.6	0.0	3.0	0.0
All red [s]	0.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0
Split [s]	16	76	76	10	70	70	38	38	38	0	36	0
Vehicle Extension [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walk [s]	0	4	4	0	4	4	4	4	4	0	4	0
Pedestrian Clearance [s]	0	19	19	0	16	16	23	23	23	0	23	0
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	3.0	0.0	3.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	1.0	3.4	3.4	1.0	3.4	3.4	2.6	2.6	2.6	0.0	1.0	0.0
Minimum Recall	No	Yes		No	Yes			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	L	C	R	L	C	R
C, Cycle Length [s]	160	160	160	160	160	160	160	160	160	160	160	160
L, Total Lost Time per Cycle [s]	3.00	5.40	5.40	3.00	5.40	5.40	4.60	4.60	4.60	3.00	3.00	3.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.00	3.40	3.40	1.00	3.40	3.40	2.60	2.60	2.60	1.00	1.00	1.00
g_i, Effective Green Time [s]	13	71	71	7	65	65	34	34	34	33	33	33
g / C, Green / Cycle	0.08	0.44	0.44	0.04	0.40	0.40	0.21	0.21	0.21	0.21	0.21	0.21
(v / s)_i Volume / Saturation Flow Rate	0.11	0.23	0.24	0.04	0.59	0.59	0.02	0.09	0.24	0.24	0.12	0.00
s, saturation flow rate [veh/h]	1781	3560	1654	1781	1593	829	1528	1604	1334	1547	837	711
c, Capacity [veh/h]	145	1568	729	78	642	334	321	337	280	319	172	147
d1, Uniform Delay [s]	73.50	32.64	32.86	76.23	47.77	47.77	50.74	54.61	62.85	63.52	57.28	0.00
k, delay calibration	0.29	0.50	0.50	0.04	0.50	0.50	0.04	0.04	0.50	0.10	0.10	0.04
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	166.77	1.27	2.85	15.48	220.06	228.27	0.04	0.29	103.08	83.75	2.77	0.00
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	1.31	0.53	0.54	0.92	1.47	1.47	0.07	0.41	1.16	1.17	0.58	0.00
d, Delay for Lane Group [s/veh]	240.27	33.91	35.72	91.71	267.83	276.04	50.78	54.90	165.93	147.26	60.05	0.00
Lane Group LOS	F	C	D	F	F	F	D	D	F	F	E	A
Critical Lane Group	Yes	No	No	No	No	Yes	No	No	Yes	Yes	No	No
50th-Percentile Queue Length [veh/ln]	12.61	11.87	11.67	3.32	32.43	34.51	0.79	4.86	19.39	10.21	3.81	0.00
50th-Percentile Queue Length [ft/ln]	315.22	296.74	291.70	83.11	810.83	862.82	19.74	121.47	484.65	255.31	95.31	0.00
95th-Percentile Queue Length [veh/ln]	20.16	17.52	17.27	5.98	51.67	54.71	1.42	8.47	28.71	16.63	6.86	0.00
95th-Percentile Queue Length [ft/ln]	504.09	437.99	431.75	149.60	1291.78	1367.75	35.53	211.84	717.82	415.86	171.56	0.00

Movement, Approach, & Intersection Results

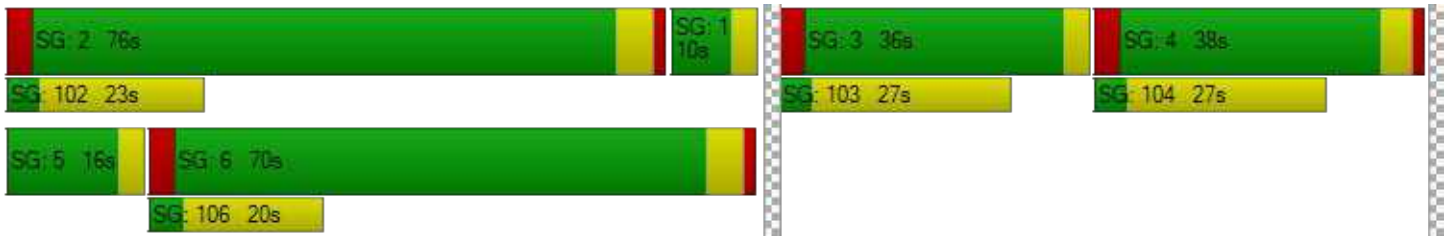
d_M, Delay for Movement [s/veh]	240.27	34.20	35.72	91.71	270.56	276.04	50.78	54.90	165.93	147.26	60.05	0.00
Movement LOS	F	C	D	F	F	F	D	D	F	F	E	A
d_A, Approach Delay [s/veh]	62.22			262.09			128.87			128.83		
Approach LOS	E			F			F			F		
d_I, Intersection Delay [s/veh]	156.42											
Intersection LOS	F											
Intersection V/C	1.280											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	67.01	223.38	931.23	344.39
d_p, Pedestrian Delay [s]	72.20	72.20	72.20	72.20
l_p,int, Pedestrian LOS Score for Intersectio	3.285	2.919	2.428	2.563
Crosswalk LOS	C	C	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	845	770	380	375
d_b, Bicycle Delay [s]	26.81	30.29	52.49	53.02
l_b,int, Bicycle LOS Score for Intersection	2.335	2.388	2.432	2.396
Bicycle LOS	B	B	B	B

Sequence

Ring 1	2	1	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 6000: Willow Rd/US-101 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	9.5
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.842

Intersection Setup

Name	Willow Road			Willow Road (SR 114)			US-101 NB Ramps			US-101 NB Ramps		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	1	0	0	0	1	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	200.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No						No		
Crosswalk	No			Yes			No			Yes		

Volumes

Name	Willow Road			Willow Road (SR 114)			US-101 NB Ramps			US-101 NB Ramps		
Base Volume Input [veh/h]	0	716	258	0	1477	432	0	0	0	425	0	606
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	2.00	2.00	0.00	2.00	2.00	0.00	0.00	0.00	2.00	0.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	716	258	0	1477	432	0	0	0	425	0	606
Peak Hour Factor	1.0000	0.9580	0.9580	1.0000	0.9580	0.9580	1.0000	1.0000	1.0000	0.9580	1.0000	0.9580
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	187	67	0	385	113	0	0	0	111	0	158
Total Analysis Volume [veh/h]	0	747	269	0	1542	451	0	0	0	444	0	633
Presence of On-Street Parking	No		No	No		No				No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			3			27		
Bicycle Volume [bicycles/h]	5			3			0			1		

Intersection Settings

Located in CBD	No
Signal Coordination Group	2 - Willow Road
Cycle Length [s]	80
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	38.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Overlap
Signal Group	0	2	5	0	6	1	0	0	0	8	0	8
Auxiliary Signal Groups												6,8
Lead / Lag	-	-	-	-	-	-	-	-	-	Lead	-	-
Minimum Green [s]	0	4	6	0	4	5	0	0	0	5	0	5
Maximum Green [s]	0	35	6	0	35	5	0	0	0	35	0	35
Amber [s]	0.0	4.1	3.0	0.0	4.1	3.0	0.0	0.0	0.0	3.0	0.0	3.0
All red [s]	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	2.0	0.0	2.0
Split [s]	0	45	9	0	45	9	0	0	0	35	0	35
Vehicle Extension [s]	0.0	3.0	3.0	0.0	3.0	3.0	0.0	0.0	0.0	3.0	0.0	3.0
Walk [s]	0	1	0	0	1	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	30	0	0	7	0	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	3.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No					No		
l1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	2.0	2.0	0.0	0.0	0.0	2.0	0.0	2.0
l2, Clearance Lost Time [s]	0.0	2.1	1.0	0.0	2.1	2.0	0.0	0.0	0.0	3.0	0.0	3.0
Minimum Recall		No			No					No		No
Maximum Recall		No			No					No		No
Pedestrian Recall		No			No					No		No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	C	R		L	R
C, Cycle Length [s]	80	80	80	80		80	80
L, Total Lost Time per Cycle [s]	4.10	4.10	4.10	4.10		5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00		0.00	0.00
l2, Clearance Lost Time [s]	2.10	2.10	2.10	2.10		3.00	0.00
g_i, Effective Green Time [s]	56	56	56	56		15	75
g / C, Green / Cycle	0.70	0.70	0.70	0.70		0.19	0.94
(v / s)_i Volume / Saturation Flow Rate	0.15	0.17	0.55	0.29		0.13	0.23
s, saturation flow rate [veh/h]	5094	1553	2828	1555		3459	2779
c, Capacity [veh/h]	3557	1085	1975	1086		650	2605
d1, Uniform Delay [s]	4.26	4.38	8.00	5.08		30.26	0.20
k, delay calibration	0.50	0.50	0.50	0.50		0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00		1.00	1.00
d2, Incremental Delay [s]	0.13	0.55	3.14	1.17		1.28	0.22
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00		0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00		1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00		1.00	1.00

Lane Group Results

X, volume / capacity	0.21	0.25	0.78	0.42		0.68	0.24
d, Delay for Lane Group [s/veh]	4.40	4.93	11.14	6.25		31.54	0.42
Lane Group LOS	A	A	B	A		C	A
Critical Lane Group	No	No	Yes	No		Yes	No
50th-Percentile Queue Length [veh/ln]	1.15	1.39	4.87	2.74		3.98	0.08
50th-Percentile Queue Length [ft/ln]	28.81	34.86	121.67	68.62		99.56	2.00
95th-Percentile Queue Length [veh/ln]	2.07	2.51	8.49	4.94		7.17	0.14
95th-Percentile Queue Length [ft/ln]	51.86	62.75	212.13	123.52		179.20	3.61

Movement, Approach, & Intersection Results

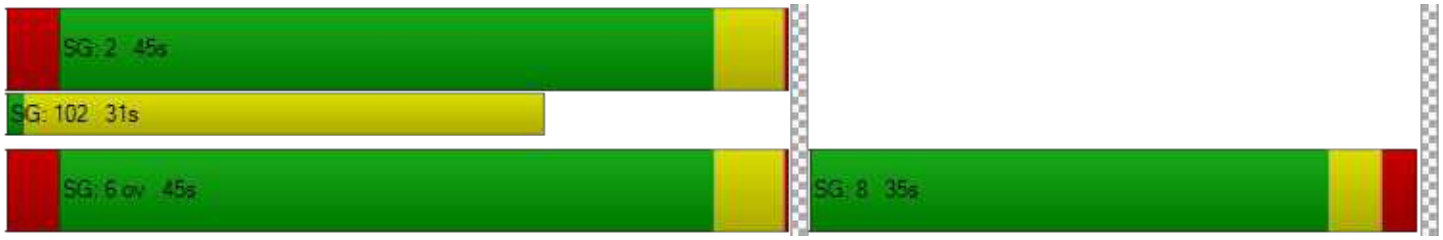
d_M, Delay for Movement [s/veh]	0.00	4.40	4.93	0.00	11.14	6.25	0.00	0.00	0.00	31.54	0.00	0.42
Movement LOS		A	A		B	A				C		A
d_A, Approach Delay [s/veh]	4.54			10.04			0.00			13.25		
Approach LOS	A			B			A			B		
d_I, Intersection Delay [s/veh]	9.52											
Intersection LOS	A											
Intersection V/C	0.842											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	30.0	0.0	5.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	15.62	0.00	35.15
l_p,int, Pedestrian LOS Score for Intersectio	0.000	3.031	0.000	2.562
Crosswalk LOS	F	C	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	948	948	0	750
d_b, Bicycle Delay [s]	11.10	11.09	40.00	15.63
l_b,int, Bicycle LOS Score for Intersection	2.118	2.656	4.132	1.560
Bicycle LOS	B	B	D	A

Sequence

Ring 1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 7000: Willow Rd/US-101 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	7.8
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.892

Intersection Setup

Name	Willow Road			Willow Road			US-101 SB Ramps			US-101 SB Ramps		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	0	1	0	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No					
Crosswalk	Yes			No			Yes			No		

Volumes

Name	Willow Road			Willow Road			US-101 SB Ramps			US-101 SB Ramps		
Base Volume Input [veh/h]	0	702	646	0	1417	542	276	0	233	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	2.00	2.00	0.00	2.00	2.00	2.00	0.00	2.00	0.00	0.00	0.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	702	646	0	1417	542	276	0	233	0	0	0
Peak Hour Factor	1.0000	0.9190	0.9190	1.0000	0.9190	0.9190	0.9190	1.0000	0.9190	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	191	176	0	385	147	75	0	63	0	0	0
Total Analysis Volume [veh/h]	0	764	703	0	1542	590	300	0	254	0	0	0
Presence of On-Street Parking	No		No	No		No	No		No			
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			29		
Bicycle Volume [bicycles/h]	9			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	2 - Willow Road
Cycle Length [s]	80
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	54.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Overlap	Permiss	Permiss	Permiss
Signal Group	0	2	0	0	6	0	4	0	4	0	0	0
Auxiliary Signal Groups									2,4			
Lead / Lag	-	-	-	-	-	-	Lead	-	-	-	-	-
Minimum Green [s]	0	4	0	0	4	0	4	0	4	0	0	0
Maximum Green [s]	0	35	0	0	35	0	30	0	30	0	0	0
Amber [s]	0.0	4.1	0.0	0.0	4.1	0.0	3.0	0.0	3.0	0.0	0.0	0.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	2.0	0.0	0.0	0.0
Split [s]	0	55	0	0	55	0	25	0	25	0	0	0
Vehicle Extension [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	0.0	3.0	0.0	0.0	0.0
Walk [s]	0	1	0	0	1	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	7	0	0	32	0	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	3.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No		No					
l1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	0.0	2.0	0.0	0.0	0.0
l2, Clearance Lost Time [s]	0.0	2.1	0.0	0.0	2.1	0.0	3.0	0.0	3.0	0.0	0.0	0.0
Minimum Recall		No			No		No		No			
Maximum Recall		No			No		No		No			
Pedestrian Recall		No			No		No		No			
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	C	R	L	R	
C, Cycle Length [s]	80	80	80	80	80	80	
L, Total Lost Time per Cycle [s]	4.10	4.10	4.10	4.10	5.00	5.00	
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	
l2, Clearance Lost Time [s]	2.10	2.10	2.10	2.10	3.00	0.00	
g_i, Effective Green Time [s]	61	61	61	61	10	75	
g / C, Green / Cycle	0.76	0.76	0.76	0.76	0.12	0.94	
(v / s)_i Volume / Saturation Flow Rate	0.15	0.45	0.30	0.63	0.09	0.09	
s, saturation flow rate [veh/h]	5094	1551	5094	941	3459	2813	
c, Capacity [veh/h]	3878	1181	3878	716	432	2637	
d1, Uniform Delay [s]	2.68	4.09	3.27	6.11	33.52	0.17	
k, delay calibration	0.50	0.50	0.50	0.50	0.11	0.50	
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	
d2, Incremental Delay [s]	0.11	2.22	0.31	10.37	2.02	0.07	
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	

Lane Group Results

X, volume / capacity	0.20	0.60	0.40	0.82	0.69	0.10	
d, Delay for Lane Group [s/veh]	2.79	6.30	3.57	16.47	35.54	0.24	
Lane Group LOS	A	A	A	B	D	A	
Critical Lane Group	No	No	No	Yes	Yes	No	
50th-Percentile Queue Length [veh/ln]	0.76	3.76	1.88	5.87	2.84	0.03	
50th-Percentile Queue Length [ft/ln]	19.06	94.05	47.12	146.77	71.05	0.67	
95th-Percentile Queue Length [veh/ln]	1.37	6.77	3.39	9.84	5.12	0.05	
95th-Percentile Queue Length [ft/ln]	34.30	169.29	84.81	246.11	127.90	1.20	

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	0.00	2.79	6.30	0.00	3.57	16.47	35.54	0.00	0.24	0.00	0.00	0.00
Movement LOS		A	A		A	B	D		A			
d_A, Approach Delay [s/veh]	4.48			7.14			19.36			0.00		
Approach LOS	A			A			B			A		
d_I, Intersection Delay [s/veh]	7.83											
Intersection LOS	A											
Intersection V/C	0.892											

Other Modes

g_Walk,mi, Effective Walk Time [s]	20.0	0.0	5.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	22.49	0.00	35.14	0.00
l_p,int, Pedestrian LOS Score for Intersectio	3.031	0.000	2.523	0.000
Crosswalk LOS	C	F	B	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1198	1198	500	0
d_b, Bicycle Delay [s]	6.46	6.43	22.49	39.99
l_b,int, Bicycle LOS Score for Intersection	2.366	2.732	1.560	4.132
Bicycle LOS	B	B	A	D

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 8000: O'Brien Drive/Kavanaugh Drive

Control Type:	All-way stop	Delay (sec / veh):	13.6
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.666

Intersection Setup

Name	O'Brien Drive		O'Brien Drive		Kavanaugh Drive	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	O'Brien Drive		O'Brien Drive		Kavanaugh Drive	
Base Volume Input [veh/h]	156	43	8	497	75	2
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	156	43	8	497	75	2
Peak Hour Factor	0.9340	0.9340	0.9340	0.9340	0.9340	0.9340
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	42	12	2	133	20	1
Total Analysis Volume [veh/h]	167	46	9	532	80	2
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	775	812	621
Degree of Utilization, x	0.27	0.67	0.13

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	1.12	5.20	0.45
95th-Percentile Queue Length [ft]	27.97	129.89	11.34
Approach Delay [s/veh]	9.39	15.82	9.68
Approach LOS	A	C	A
Intersection Delay [s/veh]	13.58		
Intersection LOS	B		

Intersection Level Of Service Report
Intersection 9000: Bayfront Expy (SR 84)/University Ave (SR 109)

Control Type:	Signalized	Delay (sec / veh):	23.6
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.807

Intersection Setup

Name	University Avenue (SR109)		Bayfront Expy (SR84)		Bayfront Expy (SR84)	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	2	0	1	2	0
Entry Pocket Length [ft]	100.00	250.00	100.00	100.00	830.00	100.00
No. of Lanes in Exit Pocket	0	2	0	0	0	0
Exit Pocket Length [ft]	0.00	74.61	0.00	0.00	0.00	0.00
Speed [mph]	35.00		55.00		55.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		No	

Volumes

Name	University Avenue (SR109)		Bayfront Expy (SR84)		Bayfront Expy (SR84)	
Base Volume Input [veh/h]	148	388	978	81	1026	3279
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	148	388	978	81	1026	3279
Peak Hour Factor	0.9240	0.9240	0.9240	0.9240	0.9240	0.9240
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	40	105	265	22	278	887
Total Analysis Volume [veh/h]	160	420	1058	88	1110	3549
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	1		2		0	
v_ci, Inbound Pedestrian Volume crossing mi	2		1		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	4		6		5	

Intersection Settings

Located in CBD	No
Signal Coordination Group	2 - Willow Road
Cycle Length [s]	180
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	113.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	10.00

Phasing & Timing

Control Type	Permissive	Overlap	Permissive	Permissive	Protected	Permissive
Signal Group	4	4	6	2	5	2
Auxiliary Signal Groups		4,5				
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	12	12	10	10	11	10
Maximum Green [s]	15	15	60	60	30	60
Amber [s]	3.0	3.0	5.0	5.4	3.0	5.4
All red [s]	1.0	1.0	1.0	0.5	0.5	0.5
Split [s]	36	36	54	144	90	144
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	3.0
Walk [s]	4	4	4	0	0	0
Pedestrian Clearance [s]	29	29	35	0	0	0
Delayed Vehicle Green [s]	3.0	3.0	3.0	0.0	0.0	0.0
Rest In Walk	No		No			No
l1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0
l2, Clearance Lost Time [s]	2.0	2.0	4.0	3.9	1.5	3.9
Minimum Recall	No	No	No		No	No
Maximum Recall	No	No	No		No	No
Pedestrian Recall	No	No	No		No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	20.0	20.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	R	C	R	L	C
C, Cycle Length [s]	180	180	180	180	180	180
L, Total Lost Time per Cycle [s]	4.00	3.50	6.00	6.00	3.50	5.90
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	0.00	4.00	4.00	1.50	3.90
g_i, Effective Green Time [s]	15	82	88	88	63	155
g / C, Green / Cycle	0.08	0.46	0.49	0.49	0.35	0.86
(v / s)_i Volume / Saturation Flow Rate	0.05	0.10	0.21	0.06	0.32	0.70
s, saturation flow rate [veh/h]	3459	4200	5094	1563	3459	5094
c, Capacity [veh/h]	289	1917	2498	767	1214	4388
d1, Uniform Delay [s]	79.24	29.48	29.49	24.73	55.80	5.69
k, delay calibration	0.11	0.11	0.50	0.50	0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	1.66	0.06	0.53	0.30	3.16	1.70
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.55	0.22	0.42	0.11	0.91	0.81
d, Delay for Lane Group [s/veh]	80.90	29.54	30.01	25.03	58.96	7.39
Lane Group LOS	F	C	C	C	E	A
Critical Lane Group	No	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	3.65	3.75	9.67	2.06	23.76	12.00
50th-Percentile Queue Length [ft/ln]	91.23	93.71	241.80	51.59	593.91	299.98
95th-Percentile Queue Length [veh/ln]	6.57	6.75	14.77	3.71	31.75	17.68
95th-Percentile Queue Length [ft/ln]	164.21	168.68	369.31	92.85	793.75	442.01

Movement, Approach, & Intersection Results

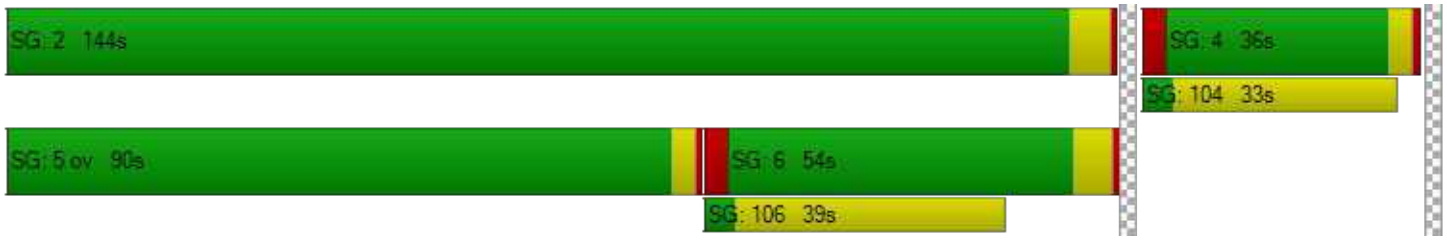
d_M, Delay for Movement [s/veh]	80.90	29.54	30.01	25.03	58.96	7.39
Movement LOS	F	C	C	C	E	A
d_A, Approach Delay [s/veh]	43.71		29.63		19.68	
Approach LOS	D		C		B	
d_I, Intersection Delay [s/veh]	23.65					
Intersection LOS	C					
Intersection V/C	0.807					

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	1341.40	0.00	0.00
d_p, Pedestrian Delay [s]	82.16	82.16	0.00
l_p,int, Pedestrian LOS Score for Intersectio	3.108	3.868	0.000
Crosswalk LOS	C	D	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	322	500	1535
d_b, Bicycle Delay [s]	63.45	50.76	4.88
l_b,int, Bicycle LOS Score for Intersection	1.670	2.190	4.122
Bicycle LOS	A	B	D

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 10000: University Avenue/Adams Drive

Control Type:	Two-way stop	Delay (sec / veh):	72.1
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.250

Intersection Setup

Name	University Avenue		University Avenue (SR109)		Adams Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	University Avenue		University Avenue (SR109)		Adams Drive	
Base Volume Input [veh/h]	41	859	976	73	15	5
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	41	859	976	73	15	5
Peak Hour Factor	0.8610	0.8610	0.8610	0.8610	0.8610	0.8610
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	12	249	283	21	4	1
Total Analysis Volume [veh/h]	48	998	1134	85	17	6
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.08	0.01	0.01	0.00	0.25	0.01
d_M, Delay for Movement [s/veh]	11.93	0.00	0.00	0.00	72.07	27.38
Movement LOS	B	A	A	A	F	D
95th-Percentile Queue Length [veh/ln]	0.28	0.00	0.00	0.00	0.96	0.96
95th-Percentile Queue Length [ft/ln]	6.90	0.00	0.00	0.00	23.98	23.98
d_A, Approach Delay [s/veh]	0.55		0.00		60.41	
Approach LOS	A		A		F	
d_I, Intersection Delay [s/veh]	0.86					
Intersection LOS	F					

Intersection Level Of Service Report
Intersection 11000: University Ave/O'Brien Dr

Control Type:	Signalized	Delay (sec / veh):	7.3
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.481

Intersection Setup

Name	University Avenue		University Avenue		O'Brien Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	1	0
Entry Pocket Length [ft]	90.00	100.00	100.00	100.00	45.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00		25.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	No		No		No	

Volumes

Name	University Avenue		University Avenue		O'Brien Drive	
Base Volume Input [veh/h]	65	889	834	149	13	37
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	65	889	834	149	13	37
Peak Hour Factor	0.8540	0.8540	0.8540	0.8540	0.8540	0.8540
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	19	260	244	44	4	11
Total Analysis Volume [veh/h]	76	1041	977	174	15	43
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		2	
Bicycle Volume [bicycles/h]	1		1		1	

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	130
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	48.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	11.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal Group	1	6	2	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	5	5	5	0	5	0
Maximum Green [s]	30	30	30	0	30	0
Amber [s]	3.0	3.0	3.0	0.0	3.0	0.0
All red [s]	1.0	1.0	1.0	0.0	1.0	0.0
Split [s]	67	76	9	0	54	0
Vehicle Extension [s]	3.0	3.0	3.0	0.0	3.0	0.0
Walk [s]	0	5	5	0	5	0
Pedestrian Clearance [s]	0	10	10	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
Minimum Recall	No	No	No		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	L	R
C, Cycle Length [s]	130	130	130	130	130	130
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	8	117	105	105	5	5
g / C, Green / Cycle	0.06	0.90	0.81	0.81	0.04	0.04
(v / s)_i Volume / Saturation Flow Rate	0.05	0.32	0.34	0.36	0.01	0.03
s, saturation flow rate [veh/h]	1603	3204	1683	1587	1603	1406
c, Capacity [veh/h]	95	2877	1359	1281	65	57
d1, Uniform Delay [s]	60.33	1.01	3.66	3.78	60.36	61.65
k, delay calibration	0.11	0.50	0.50	0.50	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	13.92	0.35	0.97	1.14	1.78	17.85
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.80	0.36	0.42	0.45	0.23	0.75
d, Delay for Lane Group [s/veh]	74.25	1.36	4.63	4.92	62.14	79.51
Lane Group LOS	E	A	A	A	E	E
Critical Lane Group	Yes	No	No	Yes	No	Yes
50th-Percentile Queue Length [veh/ln]	2.87	0.93	4.11	4.28	0.51	1.69
50th-Percentile Queue Length [ft/ln]	71.64	23.35	102.82	106.88	12.82	42.28
95th-Percentile Queue Length [veh/ln]	5.16	1.68	7.40	7.67	0.92	3.04
95th-Percentile Queue Length [ft/ln]	128.96	42.03	185.08	191.65	23.08	76.10

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	74.25	1.36	4.75	4.92	62.14	79.51
Movement LOS	E	A	A	A	E	E
d_A, Approach Delay [s/veh]	6.32		4.77		75.01	
Approach LOS	A		A		E	
d_I, Intersection Delay [s/veh]	7.27					
Intersection LOS	A					
Intersection V/C	0.481					

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	0.000
Crosswalk LOS	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1108	77	769
d_b, Bicycle Delay [s]	12.94	60.11	24.62
l_b,int, Bicycle LOS Score for Intersection	2.481	2.509	1.560
Bicycle LOS	B	B	A

Sequence

Ring 1	1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 12000: University Avenue/Kavanaugh Drive

Control Type:	Signalized	Delay (sec / veh):	21.3
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.401

Intersection Setup

Name	University Avenue		University Avenue		Kavanaugh Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		No		No	

Volumes

Name	University Avenue		University Avenue		Kavanaugh Drive	
Base Volume Input [veh/h]	26	966	869	45	26	37
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	26	966	869	45	26	37
Peak Hour Factor	0.8550	0.8550	0.8550	0.8550	0.8550	0.8550
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	8	282	254	13	8	11
Total Analysis Volume [veh/h]	30	1130	1016	53	30	43
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		1		2	
Bicycle Volume [bicycles/h]	1		3		1	

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fixed time
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal Group	1	6	2	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	5	5	5	0	5	0
Maximum Green [s]	30	30	30	0	30	0
Amber [s]	3.0	3.0	3.0	0.0	3.0	0.0
All red [s]	1.0	1.0	1.0	0.0	1.0	0.0
Split [s]	19	60	41	0	30	0
Vehicle Extension [s]	3.0	3.0	3.0	0.0	3.0	0.0
Walk [s]	0	5	5	0	5	0
Pedestrian Clearance [s]	0	10	10	0	21	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
Minimum Recall	No	No	No		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	C
C, Cycle Length [s]	90	90	90	90	90
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	15	56	37	37	26
g / C, Green / Cycle	0.17	0.62	0.41	0.41	0.29
(v / s)_i Volume / Saturation Flow Rate	0.02	0.35	0.32	0.32	0.05
s, saturation flow rate [veh/h]	1603	3204	1683	1650	1497
c, Capacity [veh/h]	267	1994	692	678	432
d1, Uniform Delay [s]	31.85	9.92	22.87	23.09	23.92
k, delay calibration	0.50	0.50	0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.85	1.17	8.18	9.02	0.84
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.11	0.57	0.77	0.79	0.17
d, Delay for Lane Group [s/veh]	32.70	11.09	31.05	32.11	24.77
Lane Group LOS	C	B	C	C	C
Critical Lane Group	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	0.62	6.25	10.84	11.06	1.24
50th-Percentile Queue Length [ft/ln]	15.47	156.20	271.11	276.49	31.11
95th-Percentile Queue Length [veh/ln]	1.11	10.35	16.25	16.51	2.24
95th-Percentile Queue Length [ft/ln]	27.84	258.68	406.13	412.83	55.99

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	32.70	11.09	31.55	32.11	24.77	24.77
Movement LOS	C	B	C	C	C	C
d_A, Approach Delay [s/veh]	11.65		31.58		24.77	
Approach LOS	B		C		C	
d_I, Intersection Delay [s/veh]	21.32					
Intersection LOS	C					
Intersection V/C	0.401					

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	36.45	0.00	0.00
l_p,int, Pedestrian LOS Score for Intersectio	2.662	0.000	0.000
Crosswalk LOS	B	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1244	822	578
d_b, Bicycle Delay [s]	6.43	15.63	22.77
l_b,int, Bicycle LOS Score for Intersection	2.517	2.442	1.680
Bicycle LOS	B	B	A

Sequence

Ring 1	1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 13000: Willow Road/Driveway A

Control Type:	Two-way stop	Delay (sec / veh):	0.0
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.011

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		Driveway A	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		Driveway A	
Base Volume Input [veh/h]	780	0	0	1059	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	780	0	0	1059	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	195	0	0	265	0	0
Total Analysis Volume [veh/h]	780	0	0	1059	0	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	0.00	0.00	10.91
Movement LOS	A	A		A		B
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.00		0.00		10.91	
Approach LOS	A		A		B	
d_I, Intersection Delay [s/veh]	0.00					
Intersection LOS	A					

Intersection Level Of Service Report
Intersection 14000: Driveway B/O'Brien Drive

Control Type:	Two-way stop	Delay (sec / veh):	0.0
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.004

Intersection Setup

Name	Driveway B		O'Brien Drive		O'Brien Drive	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Driveway B		O'Brien Drive		O'Brien Drive	
Base Volume Input [veh/h]	0	0	0	327	380	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	327	380	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	82	95	0
Total Analysis Volume [veh/h]	0	0	0	327	380	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	13.96	10.40	8.05	0.00	0.00	0.00
Movement LOS	B	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	12.18		0.00		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	0.00					
Intersection LOS	A					

Intersection Level Of Service Report
Intersection 15000: Driveway C/O'Brien Drive

Control Type:	Two-way stop	Delay (sec / veh):	0.0
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.004

Intersection Setup

Name	Driveway C		O'Brien Drive		O'Brien Drive	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Driveway C		O'Brien Drive		O'Brien Drive	
Base Volume Input [veh/h]	0	0	0	327	380	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	327	380	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	82	95	0
Total Analysis Volume [veh/h]	0	0	0	327	380	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	13.96	10.40	8.05	0.00	0.00	0.00
Movement LOS	B	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	12.18		0.00		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	0.00					
Intersection LOS	A					

1005 O'Brien Drive and 1320 Willow Road

Vistro File: P:\...\OBrien_Willow_PM_Revised_V3.vistro
Report File: P:\...\EX_PM_v3.pdf

Scenario 16 Existing PM (2023 vols)
3/18/2025

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1000	Bayfront Expy (SR 84)/Willow Rd (SR 114)	Signalized	HCM 7th Edition	EB Thru	1.109	407.3	F
2000	Willow Rd (SR 114)/Hamilton Ave	Signalized	HCM 7th Edition	SB Left	1.071	69.7	E
3000	Willow Rd (SR 114)/Ivy Dr	Signalized	HCM 7th Edition	NB Left	1.054	43.2	D
4000	Willow Rd (SR 114)/O'Brien Dr	Signalized	HCM 7th Edition	WB Right	1.438	157.0	F
5000	Willow Rd (SR 114) /Newbridge St	Signalized	HCM 7th Edition	NB Left	1.020	124.3	F
6000	Willow Rd/US-101 NB Ramps	Signalized	HCM 7th Edition	WB Left	0.552	10.2	B
7000	Willow Rd/US-101 SB Ramps	Signalized	HCM 7th Edition	EB Left	1.045	26.6	C
8000	O'Brien Drive/Kavanaugh Drive	All-way stop	HCM 7th Edition	WB Left	0.218	7.9	A
9000	Bayfront Expy (SR 84) /University Ave (SR 109)	Signalized	HCM 7th Edition	NB Right	0.855	60.5	E
10000	University Avenue/Adams Drive	Two-way stop	HCM 7th Edition	EB Left	0.392	37.6	E
11000	University Ave/O'Brien Dr	Signalized	HCM 7th Edition	NB Left	0.493	7.9	A
12000	University Avenue/Kavanaugh Drive	Signalized	HCM 7th Edition	NB Left	0.512	16.2	B
13000	Willow Road/Driveway A	Two-way stop	HCM 7th Edition	NB Thru	0.014	0.0	A
14000	Driveway B/O'Brien Drive	Two-way stop	HCM 7th Edition	WB Thru	0.003	0.0	A
15000	Driveway C/O'Brien Drive	Two-way stop	HCM 7th Edition	WB Thru	0.003	0.0	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1000: Bayfront Expy (SR 84)/Willow Rd (SR 114)

Control Type:	Signalized	Delay (sec / veh):	407.3
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.109

Intersection Setup

Name	Willow Road (SR 114)			Willow Road			Ba Ex			Ba Ex		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	3	0	1	0	0	0	2	0	1	1	0	1
Entry Pocket Length [ft]	265.00	100.00	200.00	100.00	100.00	100.00	530.00	100.00	630.00	1500.00	100.00	600.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			20.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			No			Yes			No		

Volumes

Name	Willow Road (SR 114)			Willow Road			Ba Ex			Ba Ex		
Base Volume Input [veh/h]	41	27	1319	49	118	75	32	1801	159	402	822	6
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	70	0	0	45	0	0	1
Total Hourly Volume [veh/h]	41	27	1319	49	118	5	32	1801	114	402	822	5
Peak Hour Factor	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	11	7	343	13	31	1	8	469	30	105	214	1
Total Analysis Volume [veh/h]	43	28	1373	51	123	5	33	1874	119	418	855	5
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			11			11			0		
v_di, Inbound Pedestrian Volume crossing m	0			11			11			0		
v_co, Outbound Pedestrian Volume crossing	8			0			8			0		
v_ci, Inbound Pedestrian Volume crossing mi	8			0			8			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	1			2			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	200
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	120.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Protecte	Permiss	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	7	4	4	3	8	4	1	6	2	5	2	6
Auxiliary Signal Groups			4,5									
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	13	12	12	15	15	12	6	25	10	11	10	25
Maximum Green [s]	22	15	15	9	9	15	26	40	30	25	30	40
Amber [s]	3.6	3.9	3.9	3.6	3.6	3.9	3.6	5.0	5.0	3.6	5.0	5.0
All red [s]	0.0	0.5	0.5	1.5	1.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0
Split [s]	18	27	27	30	39	27	17	82	126	61	126	82
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Walk [s]	0	0	0	0	4	0	0	4	0	4	0	4
Pedestrian Clearance [s]	0	0	0	0	29	0	0	35	0	11	0	35
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	3.0	0.0	3.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	1.6	2.4	2.4	3.1	3.1	2.4	2.6	4.0	4.0	2.6	4.0	4.0
Minimum Recall	No	No	No	No	No		No	Yes		No	Yes	
Maximum Recall	No	No	No	No	No		No	No		No	No	
Pedestrian Recall	No	No	No	No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
C, Cycle Length [s]	200	200	200	200	200	200	200	200	200	200	200	200
L, Total Lost Time per Cycle [s]	3.60	4.40	4.60	5.10	5.10	5.10	4.60	6.00	6.00	4.60	6.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.60	2.40	0.00	3.10	3.10	3.10	2.60	4.00	4.00	2.60	4.00	4.00
g_i, Effective Green Time [s]	12	101	130	14	104	104	5	40	40	25	60	60
g / C, Green / Cycle	0.06	0.50	0.65	0.07	0.52	0.52	0.03	0.20	0.20	0.13	0.30	0.30
(v / s)_i Volume / Saturation Flow Rate	0.02	0.02	0.33	0.03	0.08	0.00	0.02	0.61	0.12	0.12	0.17	0.00
s, saturation flow rate [veh/h]	1781	1593	4151	1781	1593	1549	2102	3097	966	3459	5094	1589
c, Capacity [veh/h]	105	802	2701	126	827	804	53	620	193	433	1528	477
d1, Uniform Delay [s]	90.64	25.06	18.06	88.86	25.05	23.18	96.42	79.91	72.89	86.99	58.84	49.12
k, delay calibration	0.11	0.50	0.50	0.11	0.22	0.11	0.11	0.43	0.15	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	2.53	0.08	0.69	2.10	0.16	0.00	11.12	914.24	4.48	13.55	0.32	0.01
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.41	0.03	0.51	0.41	0.15	0.01	0.62	3.02	0.62	0.97	0.56	0.01
d, Delay for Lane Group [s/veh]	93.17	25.14	18.75	90.97	25.21	23.19	107.54	994.15	77.38	100.54	59.17	49.13
Lane Group LOS	F	C	B	F	C	C	F	F	E	F	E	D
Critical Lane Group	No	No	Yes	Yes	No	No	No	Yes	No	Yes	No	No
50th-Percentile Queue Length [veh/ln]	2.23	0.35	11.06	2.66	1.64	0.12	0.94	63.20	5.88	11.68	12.37	0.18
50th-Percentile Queue Length [ft/ln]	55.73	8.85	276.52	66.39	40.90	3.06	23.53	1580.04	146.95	291.98	309.34	4.54
95th-Percentile Queue Length [veh/ln]	4.01	0.64	16.52	4.78	2.94	0.22	1.69	100.91	9.85	17.28	18.14	0.33
95th-Percentile Queue Length [ft/ln]	100.32	15.94	412.88	119.50	73.62	5.51	42.36	2522.76	246.35	432.09	453.56	8.18

Movement, Approach, & Intersection Results

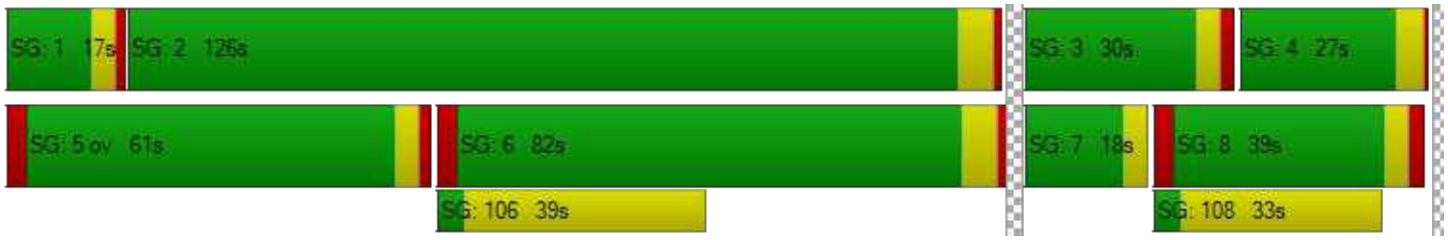
d_M, Delay for Movement [s/veh]	93.17	25.14	18.75	90.97	25.21	23.19	107.54	994.15	77.38	100.54	59.17	49.13
Movement LOS	F	C	B	F	C	C	F	F	E	F	E	D
d_A, Approach Delay [s/veh]	21.09			43.89			925.86			72.66		
Approach LOS	C			D			F			E		
d_I, Intersection Delay [s/veh]	407.34											
Intersection LOS	F											
Intersection V/C	1.109											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	0.0	8.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	206.41	0.00	184.39	0.00
d_p, Pedestrian Delay [s]	92.12	0.00	92.12	0.00
l_p,int, Pedestrian LOS Score for Intersectio	3.127	0.000	3.248	0.000
Crosswalk LOS	C	F	C	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	226	309	730	1201
d_b, Bicycle Delay [s]	78.67	71.52	40.28	15.97
l_b,int, Bicycle LOS Score for Intersection	2.751	1.765	2.699	2.263
Bicycle LOS	C	A	B	B

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 2000: Willow Rd (SR 114)/Hamilton Ave

Control Type:	Signalized	Delay (sec / veh):	69.7
Analysis Method:	HCM 7th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.071

Intersection Setup

Name	Willow Road (SR 114)			Willow Road (SR 114)			Hamilton Avenue			Main Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			30.00			25.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Willow Road (SR 114)			Willow Road (SR 114)			Hamilton Avenue			Main Street		
Base Volume Input [veh/h]	95	1307	11	24	709	54	62	2	57	15	3	20
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	95	1307	11	24	709	54	62	2	57	15	3	20
Peak Hour Factor	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	25	341	3	6	185	14	16	1	15	4	1	5
Total Analysis Volume [veh/h]	99	1366	11	25	741	56	65	2	60	16	3	21
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	1			13			5			1		
v_di, Inbound Pedestrian Volume crossing m	5			1			1			13		
v_co, Outbound Pedestrian Volume crossing	3			5			13			1		
v_ci, Inbound Pedestrian Volume crossing mi	1			13			5			3		
v_ab, Corner Pedestrian Volume [ped/h]	3			13			5			1		
Bicycle Volume [bicycles/h]	1			1			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	20.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	1	6	2	5	2	6	4	8	4	8	4	8
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	Lead	-	-	Lag	-	-	Lag	-	-
Minimum Green [s]	4	10	10	4	10	10	4	4	4	4	4	4
Maximum Green [s]	21	30	30	16	30	30	26	26	26	26	26	26
Amber [s]	3.0	4.4	4.4	3.0	4.4	4.4	3.6	3.7	3.6	3.7	3.6	3.7
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	24	92	85	17	85	92	36	36	36	36	36	36
Vehicle Extension [s]	3.0	4.0	4.0	2.0	4.0	4.0	2.0	3.0	2.0	3.0	2.0	3.0
Walk [s]	0	4	4	0	4	4	4	4	4	4	4	4
Pedestrian Clearance [s]	0	19	15	0	15	19	25	25	25	25	25	25
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	1.0	2.4	2.4	1.0	2.4	2.4	1.6	1.7	1.6	1.7	1.6	1.7
Minimum Recall	No	Yes		No	Yes			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	6.0	6.0	6.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	C	C
C, Cycle Length [s]	145	145	145	145	145	145	145	145
L, Total Lost Time per Cycle [s]	3.00	4.40	4.40	3.00	4.40	4.40	3.70	3.60
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.00
l2, Clearance Lost Time [s]	1.00	2.40	2.40	1.00	2.40	2.40	1.70	0.00
g_i, Effective Green Time [s]	10	106	106	4	100	100	24	24
g / C, Green / Cycle	0.07	0.73	0.73	0.03	0.69	0.69	0.17	0.17
(v / s)_i Volume / Saturation Flow Rate	0.06	0.82	0.82	0.03	0.48	0.49	0.15	0.06
s, saturation flow rate [veh/h]	1781	837	834	797	837	812	853	696
c, Capacity [veh/h]	121	611	610	21	577	559	179	140
d1, Uniform Delay [s]	66.63	19.49	19.49	70.54	13.51	13.59	60.00	52.82
k, delay calibration	0.11	0.50	0.50	0.04	0.50	0.50	0.04	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	12.48	76.68	77.16	118.35	6.91	7.25	1.93	1.11
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.82	1.13	1.13	1.19	0.70	0.70	0.71	0.29
d, Delay for Lane Group [s/veh]	79.11	96.18	96.65	188.89	20.43	20.84	61.93	53.93
Lane Group LOS	E	F	F	F	C	C	E	D
Critical Lane Group	No	No	Yes	Yes	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	4.00	30.03	30.01	1.47	8.61	8.49	4.73	1.34
50th-Percentile Queue Length [ft/ln]	100.08	750.63	750.33	36.76	215.25	212.32	118.13	33.56
95th-Percentile Queue Length [veh/ln]	7.21	43.12	43.14	2.65	13.42	13.27	8.29	2.42
95th-Percentile Queue Length [ft/ln]	180.15	1077.98	1078.41	66.17	335.55	331.81	207.26	60.41

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	79.11	96.41	96.65	188.89	20.62	20.84	61.93	61.93	61.93	53.93	53.93	53.93
Movement LOS	E	F	F	F	C	C	E	E	E	D	D	D
d_A, Approach Delay [s/veh]	95.25			25.75			61.93			53.93		
Approach LOS	F			C			E			D		
d_I, Intersection Delay [s/veh]	69.69											
Intersection LOS	E											
Intersection V/C	1.071											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	662.31	319.58	190.59	1207.56
d_p, Pedestrian Delay [s]	64.69	64.69	64.69	64.69
l_p,int, Pedestrian LOS Score for Intersectio	3.030	2.860	1.855	1.986
Crosswalk LOS	C	C	A	A
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1167	1071	404	406
d_b, Bicycle Delay [s]	12.57	15.65	46.13	46.05
l_b,int, Bicycle LOS Score for Intersection	2.777	2.238	1.769	1.626
Bicycle LOS	C	B	A	A

Sequence

Ring 1	2	1	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 3000: Willow Rd (SR 114)/Ivy Dr

Control Type:	Signalized	Delay (sec / veh):	43.2
Analysis Method:	HCM 7th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.054

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		Ivy Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	1
Entry Pocket Length [ft]	85.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	1	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	100.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		Ivy Drive	
Base Volume Input [veh/h]	87	1381	801	18	5	79
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	87	1381	801	18	5	79
Peak Hour Factor	0.9670	0.9670	0.9670	0.9670	0.9670	0.9670
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	22	357	207	5	1	20
Total Analysis Volume [veh/h]	90	1428	828	19	5	82
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	3		7		2	
v_di, Inbound Pedestrian Volume crossing m	2		6		3	
v_co, Outbound Pedestrian Volume crossing	6		3		3	
v_ci, Inbound Pedestrian Volume crossing mi	7		3		3	
v_ab, Corner Pedestrian Volume [ped/h]	9		10		5	
Bicycle Volume [bicycles/h]	0		4		1	

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	10.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal Group	5	2	6	6	4	4
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	4	10	10	10	11	11
Maximum Green [s]	21	30	30	30	28	28
Amber [s]	3.0	4.4	4.4	4.4	3.0	3.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	22	111	89	89	34	34
Vehicle Extension [s]	2.0	2.0	2.0	2.0	2.0	2.0
Walk [s]	0	0	4	4	4	4
Pedestrian Clearance [s]	0	0	22	22	24	24
Delayed Vehicle Green [s]	0.0	0.0	3.0	3.0	3.0	3.0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	1.0	2.4	2.4	2.4	1.0	1.0
Minimum Recall	No	Yes	Yes		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	L	R
C, Cycle Length [s]	145	145	145	145	145	145
L, Total Lost Time per Cycle [s]	3.00	4.40	4.40	4.40	3.00	3.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.00	2.40	2.40	2.40	1.00	1.00
g_i, Effective Green Time [s]	12	122	107	107	16	16
g / C, Green / Cycle	0.08	0.84	0.74	0.74	0.11	0.11
(v / s)_i Volume / Saturation Flow Rate	0.07	0.90	0.51	0.51	0.01	0.09
s, saturation flow rate [veh/h]	1265	1593	837	829	994	895
c, Capacity [veh/h]	104	1340	618	613	107	96
d1, Uniform Delay [s]	65.75	11.49	10.01	10.10	57.99	63.34
k, delay calibration	0.04	0.50	0.50	0.50	0.04	0.04
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	8.15	44.11	6.08	6.29	0.07	7.74
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.87	1.07	0.69	0.69	0.05	0.85
d, Delay for Lane Group [s/veh]	73.91	55.60	16.08	16.39	58.06	71.08
Lane Group LOS	E	F	B	B	E	E
Critical Lane Group	No	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	3.49	21.11	7.21	7.29	0.17	3.18
50th-Percentile Queue Length [ft/ln]	87.31	527.76	180.17	182.25	4.20	79.53
95th-Percentile Queue Length [veh/ln]	6.29	30.30	11.61	11.72	0.30	5.73
95th-Percentile Queue Length [ft/ln]	157.17	757.53	290.24	292.95	7.56	143.16

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	73.91	55.60	16.23	16.39	58.06	71.08
Movement LOS	E	F	B	B	E	E
d_A, Approach Delay [s/veh]	56.69		16.24		70.33	
Approach LOS	E		B		E	
d_I, Intersection Delay [s/veh]	43.20					
Intersection LOS	D					
Intersection V/C	1.054					

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	869.04	420.42	868.71
d_p, Pedestrian Delay [s]	64.69	64.69	64.69
l_p,int, Pedestrian LOS Score for Intersectio	2.956	2.897	2.203
Crosswalk LOS	C	C	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1471	1126	386
d_b, Bicycle Delay [s]	5.07	13.87	47.20
l_b,int, Bicycle LOS Score for Intersection	2.812	2.258	1.560
Bicycle LOS	C	B	A

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 4000: Willow Rd (SR 114)/O'Brien Dr

Control Type:	Signalized	Delay (sec / veh):	157.0
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.438

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		O'Brien Drive	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	1	0	1	0
Entry Pocket Length [ft]	100.00	60.00	100.00	100.00	50.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	No		No		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		O'Brien Drive	
Base Volume Input [veh/h]	1407	199	28	873	248	17
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	1407	199	28	873	248	17
Peak Hour Factor	0.9860	0.9860	0.9860	0.9860	0.9860	0.9860
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	357	50	7	221	63	4
Total Analysis Volume [veh/h]	1427	202	28	885	252	17
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	5		0		5	
v_ci, Inbound Pedestrian Volume crossing mi	5		0		5	
v_ab, Corner Pedestrian Volume [ped/h]	3		0		13	
Bicycle Volume [bicycles/h]	2		0		4	

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	10.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Permissive	Permissive	Protected	Permissive	Permissive	Permissive
Signal Group	2	2	1	6	4	8
Auxiliary Signal Groups						
Lead / Lag	-	-	Lead	-	Lead	-
Minimum Green [s]	10	10	5	10	8	0
Maximum Green [s]	35	35	21	35	21	0
Amber [s]	4.4	4.4	3.0	4.4	3.2	0.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	105	105	15	120	25	0
Vehicle Extension [s]	2.0	2.0	2.0	2.0	2.0	0.0
Walk [s]	4	4	0	0	0	0
Pedestrian Clearance [s]	17	17	0	0	0	0
Delayed Vehicle Green [s]	3.0	3.0	0.0	0.0	0.0	0.0
Rest In Walk	No			No	No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.4	2.4	1.0	2.4	1.2	0.0
Minimum Recall	Yes		No	Yes	No	
Maximum Recall	No		No	No	No	
Pedestrian Recall	No		No	No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	L	C	L	C
C, Cycle Length [s]	145	145	145	145	145	145
L, Total Lost Time per Cycle [s]	4.40	4.40	3.00	4.40	3.20	3.20
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.40	2.40	1.00	2.40	1.20	1.20
g_i, Effective Green Time [s]	108	108	5	116	22	22
g / C, Green / Cycle	0.74	0.74	0.03	0.80	0.15	0.15
(v / s)_i Volume / Saturation Flow Rate	1.10	0.36	0.04	0.68	0.21	0.21
s, saturation flow rate [veh/h]	1302	561	647	1293	647	637
c, Capacity [veh/h]	969	418	21	1031	97	96
d1, Uniform Delay [s]	18.54	7.29	70.15	9.45	61.59	61.59
k, delay calibration	0.50	0.50	0.04	0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	218.12	3.97	177.68	9.25	227.18	229.42
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	1.47	0.48	1.34	0.86	1.39	1.40
d, Delay for Lane Group [s/veh]	236.66	11.26	247.83	18.70	288.77	291.01
Lane Group LOS	F	B	F	B	F	F
Critical Lane Group	Yes	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	42.52	2.62	1.80	8.10	9.72	9.64
50th-Percentile Queue Length [ft/ln]	1062.88	65.41	44.95	202.42	243.10	240.92
95th-Percentile Queue Length [veh/ln]	69.14	4.71	3.24	12.76	16.75	16.63
95th-Percentile Queue Length [ft/ln]	1728.38	117.74	80.90	319.08	418.67	415.82

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	236.66	11.26	247.83	18.70	289.81	291.01
Movement LOS	F	B	F	B	F	F
d_A, Approach Delay [s/veh]	208.71		25.73		289.88	
Approach LOS	F		C		F	
d_I, Intersection Delay [s/veh]	157.05					
Intersection LOS	F					
Intersection V/C	1.438					

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	168.25
d_p, Pedestrian Delay [s]	0.00	0.00	64.71
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	2.127
Crosswalk LOS	F	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1346	1595	301
d_b, Bicycle Delay [s]	7.75	2.98	52.44
l_b,int, Bicycle LOS Score for Intersection	2.904	2.313	2.003
Bicycle LOS	C	B	B

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 5000: Willow Rd (SR 114)/Newbridge St

Control Type:	Signalized	Delay (sec / veh):	124.3
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.020

Intersection Setup

Name	Willow Road (SR 114)			Willow Road (SR 114)			Newbridge Street			Newbridge Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	1	0	0	1	0	0	0
Entry Pocket Length [ft]	390.00	100.00	100.00	185.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	1	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	49.21	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			25.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Willow Road (SR 114)			Willow Road (SR 114)			Newbridge Street			Newbridge Street		
Base Volume Input [veh/h]	322	1384	416	93	1008	17	44	143	256	201	159	55
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	175	0	0	45
Total Hourly Volume [veh/h]	322	1384	416	93	1008	17	44	143	81	201	159	10
Peak Hour Factor	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	86	368	111	25	268	5	12	38	22	53	42	3
Total Analysis Volume [veh/h]	343	1472	443	99	1072	18	47	152	86	214	169	11
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	3			7			7			3		
v_di, Inbound Pedestrian Volume crossing m	3			7			7			3		
v_co, Outbound Pedestrian Volume crossing	11			20			10			19		
v_ci, Inbound Pedestrian Volume crossing mi	10			19			11			20		
v_ab, Corner Pedestrian Volume [ped/h]	31			48			41			8		
Bicycle Volume [bicycles/h]	5			0			3			1		

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	140.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Split	Split	Split	Split	Split	Split
Signal Group	5	2	2	1	6	6	4	4	4	8	3	8
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lag	-	-	Lag	-	-	-	-	-
Minimum Green [s]	4	12	12	4	12	12	4	4	4	0	4	0
Maximum Green [s]	21	40	40	21	40	40	25	25	25	0	21	0
Amber [s]	3.0	4.4	4.4	3.0	4.4	4.4	3.6	3.6	3.6	0.0	3.0	0.0
All red [s]	0.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0
Split [s]	34	66	66	19	51	51	30	30	30	0	30	0
Vehicle Extension [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walk [s]	0	4	4	0	4	4	4	4	4	0	4	0
Pedestrian Clearance [s]	0	19	19	0	16	16	23	23	23	0	23	0
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	3.0	0.0	3.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	1.0	3.4	3.4	1.0	3.4	3.4	2.6	2.6	2.6	0.0	1.0	0.0
Minimum Recall	No	Yes		No	Yes			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	L	C	R	L	C	R
C, Cycle Length [s]	145	145	145	145	145	145	145	145	145	145	145	145
L, Total Lost Time per Cycle [s]	3.00	5.40	5.40	3.00	5.40	5.40	4.60	4.60	4.60	3.00	3.00	3.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.00	3.40	3.40	1.00	3.40	3.40	2.60	2.60	2.60	1.00	1.00	1.00
g_i, Effective Green Time [s]	31	64	64	16	49	49	25	25	25	24	24	24
g / C, Green / Cycle	0.21	0.44	0.44	0.11	0.34	0.34	0.17	0.17	0.17	0.16	0.16	0.16
(v / s)_i Volume / Saturation Flow Rate	0.27	0.51	0.54	0.11	0.38	0.38	0.03	0.15	0.06	0.06	0.13	0.01
s, saturation flow rate [veh/h]	1265	2530	1153	937	1874	975	1781	984	1508	3459	1329	1457
c, Capacity [veh/h]	270	1122	512	104	639	332	307	169	260	565	217	238
d1, Uniform Delay [s]	57.02	40.31	40.31	64.10	47.74	47.74	51.01	58.73	52.50	54.07	58.12	51.08
k, delay calibration	0.50	0.50	0.50	0.22	0.50	0.50	0.04	0.24	0.04	0.04	0.19	0.04
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	148.29	78.42	115.08	48.26	73.81	86.81	0.09	27.53	0.27	0.16	9.90	0.03
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	1.27	1.15	1.22	0.96	1.12	1.12	0.15	0.90	0.33	0.38	0.78	0.05
d, Delay for Lane Group [s/veh]	205.31	118.73	155.40	112.36	121.55	134.56	51.09	86.25	52.77	54.22	68.01	51.11
Lane Group LOS	F	F	F	F	F	F	D	F	D	D	E	D
Critical Lane Group	Yes	No	No	No	No	Yes	No	Yes	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	20.81	31.46	33.90	5.06	18.14	20.08	1.48	6.77	2.79	3.53	6.56	0.34
50th-Percentile Queue Length [ft/ln]	520.31	786.43	847.44	126.48	453.57	501.88	36.92	169.21	69.70	88.13	164.01	8.58
95th-Percentile Queue Length [veh/ln]	31.84	44.89	49.65	8.75	26.98	29.49	2.66	11.03	5.02	6.35	10.76	0.62
95th-Percentile Queue Length [ft/ln]	796.01	1122.13	1241.15	218.70	674.45	737.37	66.46	275.87	125.46	158.64	269.03	15.44

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	205.31	123.22	155.40	112.36	125.86	134.56	51.09	86.25	52.77	54.22	68.01	51.11
Movement LOS	F	F	F	F	F	F	D	F	D	D	E	D
d_A, Approach Delay [s/veh]	142.00			124.87			70.35			60.05		
Approach LOS	F			F			E			E		
d_I, Intersection Delay [s/veh]	124.29											
Intersection LOS	F											
Intersection V/C	1.020											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	213.17	142.16	372.60	0.00
d_p, Pedestrian Delay [s]	64.70	64.70	64.70	64.70
l_p,int, Pedestrian LOS Score for Intersectio	3.325	2.939	2.646	2.609
Crosswalk LOS	C	C	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	795	588	309	331
d_b, Bicycle Delay [s]	26.39	36.14	51.89	50.49
l_b,int, Bicycle LOS Score for Intersection	2.802	2.214	2.319	2.284
Bicycle LOS	C	B	B	B

Sequence

Ring 1	2	1	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 6000: Willow Rd/US-101 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	10.2
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.552

Intersection Setup

Name	Willow Road			Willow Road (SR 114)			US-101 NB Ramps			US-101 NB Ramps		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	1	0	0	0	1	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	200.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No						No		
Crosswalk	No			No			Yes			Yes		

Volumes

Name	Willow Road			Willow Road (SR 114)			US-101 NB Ramps			US-101 NB Ramps		
Base Volume Input [veh/h]	0	1090	608	0	986	398	0	0	0	266	0	849
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	2.00	2.00	0.00	2.00	2.00	0.00	0.00	0.00	2.00	0.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	1090	608	0	986	398	0	0	0	266	0	849
Peak Hour Factor	1.0000	0.9330	0.9330	1.0000	0.9330	0.9330	1.0000	1.0000	1.0000	0.9330	1.0000	0.9330
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	292	163	0	264	107	0	0	0	71	0	227
Total Analysis Volume [veh/h]	0	1168	652	0	1057	427	0	0	0	285	0	910
Presence of On-Street Parking	No		No	No		No				No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			6			16		
Bicycle Volume [bicycles/h]	0			7			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	2.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	8.00

Phasing & Timing

Control Type	Permiss	Permiss	Overlap	Permiss	Permiss	Overlap	Permiss	Permiss	Permiss	Permiss	Permiss	Overlap
Signal Group	0	6	6	0	2	2	0	0	0	3	0	4
Auxiliary Signal Groups			3,4,6			2,3,4						2,3,4
Lead / Lag	-	-	-	-	-	-	-	-	-	Lead	-	-
Minimum Green [s]	0	4	4	0	4	4	0	0	0	6	0	4
Maximum Green [s]	0	35	35	0	35	35	0	0	0	24	0	34
Amber [s]	0.0	4.1	4.1	0.0	4.1	4.1	0.0	0.0	0.0	3.0	0.0	3.0
All red [s]	0.0	1.8	1.8	0.0	1.0	1.0	0.0	0.0	0.0	2.0	0.0	0.0
Split [s]	0	89	89	0	89	89	0	0	0	17	0	22
Vehicle Extension [s]	0.0	3.0	3.0	0.0	3.0	3.0	0.0	0.0	0.0	3.0	0.0	3.0
Walk [s]	0	4	4	0	4	4	0	0	0	0	0	0
Pedestrian Clearance [s]	0	29	29	0	7	7	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No					No		
I1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	2.0	2.0	0.0	0.0	0.0	2.0	0.0	2.0
I2, Clearance Lost Time [s]	0.0	3.9	3.9	0.0	3.1	3.1	0.0	0.0	0.0	3.0	0.0	1.0
Minimum Recall		No	No		No	No				No		No
Maximum Recall		No	No		No	No				No		No
Pedestrian Recall		No	No		No	No				No		No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	C	R		L	R
C, Cycle Length [s]	145	145	145	145		145	145
L, Total Lost Time per Cycle [s]	5.90	5.90	5.10	5.00		5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00		0.00	0.00
l2, Clearance Lost Time [s]	3.90	3.00	3.10	0.00		3.00	0.00
g_i, Effective Green Time [s]	107	134	108	135		12	135
g / C, Green / Cycle	0.74	0.92	0.75	0.93		0.08	0.93
(v / s)_i Volume / Saturation Flow Rate	0.39	0.41	0.35	0.27		0.08	0.32
s, saturation flow rate [veh/h]	3003	1589	3003	1553		3459	2813
c, Capacity [veh/h]	2220	1470	2237	1445		288	2617
d1, Uniform Delay [s]	8.04	0.35	7.27	0.24		66.35	0.26
k, delay calibration	0.50	0.50	0.50	0.50		0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00		1.00	1.00
d2, Incremental Delay [s]	0.90	0.97	0.72	0.52		22.58	0.37
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00		0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00		1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00		1.00	1.00

Lane Group Results

X, volume / capacity	0.53	0.44	0.47	0.30		0.99	0.35
d, Delay for Lane Group [s/veh]	8.94	1.32	7.99	0.76		88.93	0.63
Lane Group LOS	A	A	A	A		F	A
Critical Lane Group	Yes	Yes	No	No		Yes	No
50th-Percentile Queue Length [veh/ln]	5.02	0.40	4.16	0.21		6.19	0.13
50th-Percentile Queue Length [ft/ln]	125.55	9.93	103.90	5.23		154.68	3.33
95th-Percentile Queue Length [veh/ln]	8.70	0.71	7.48	0.38		10.27	0.24
95th-Percentile Queue Length [ft/ln]	217.42	17.87	187.03	9.42		256.67	5.99

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	0.00	8.94	1.32	0.00	7.99	0.76	0.00	0.00	0.00	88.93	0.00	0.63
Movement LOS		A	A		A	A				F		A
d_A, Approach Delay [s/veh]	6.21			5.91			0.00			21.69		
Approach LOS	A			A			A			C		
d_I, Intersection Delay [s/veh]	10.22											
Intersection LOS	B											
Intersection V/C	0.552											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	64.68	64.68
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	1.864	2.685
Crosswalk LOS	F	F	A	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1105	1116	0	166
d_b, Bicycle Delay [s]	14.50	14.19	72.46	60.96
l_b,int, Bicycle LOS Score for Intersection	2.561	2.376	4.132	1.560
Bicycle LOS	B	B	D	A

Sequence

Ring 1	-	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 7000: Willow Rd/US-101 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	26.6
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.045

Intersection Setup

Name	Willow Road			Willow Road			US-101 SB Ramps			US-101 SB Ramps		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	0	1	0	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No					
Crosswalk	No			No			Yes			Yes		

Volumes

Name	Willow Road			Willow Road			US-101 SB Ramps			US-101 SB Ramps		
Base Volume Input [veh/h]	0	1116	364	0	751	596	534	0	333	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	2.00	2.00	0.00	2.00	2.00	2.00	0.00	2.00	0.00	0.00	0.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	1116	364	0	751	596	534	0	333	0	0	0
Peak Hour Factor	1.0000	0.9520	0.9520	1.0000	0.9520	0.9520	0.9520	1.0000	0.9520	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	293	96	0	197	157	140	0	87	0	0	0
Total Analysis Volume [veh/h]	0	1172	382	0	789	626	561	0	350	0	0	0
Presence of On-Street Parking	No		No	No		No	No		No			
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	1			0			7			17		
Bicycle Volume [bicycles/h]	0			3			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	99.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Permiss	Permiss	Overlap	Permiss	Permiss	Overlap	Permiss	Permiss	Overlap	Permiss	Permiss	Permiss
Signal Group	0	6	6	0	2	2	4	0	4	0	0	0
Auxiliary Signal Groups			4,6			2,4			4,6			
Lead / Lag	-	-	-	-	-	-	Lead	-	-	-	-	-
Minimum Green [s]	0	4	4	0	4	4	4	0	4	0	0	0
Maximum Green [s]	0	35	35	0	35	35	50	0	50	0	0	0
Amber [s]	0.0	4.1	4.1	0.0	4.1	4.1	3.0	0.0	3.0	0.0	0.0	0.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	2.0	0.0	0.0	0.0
Split [s]	0	103	103	0	103	103	25	0	25	0	0	0
Vehicle Extension [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	0.0	3.0	0.0	0.0	0.0
Walk [s]	0	4	4	0	4	4	0	0	0	0	0	0
Pedestrian Clearance [s]	0	7	7	0	32	32	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No		No					
l1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	2.0	2.0	2.0	0.0	2.0	0.0	0.0	0.0
l2, Clearance Lost Time [s]	0.0	2.1	2.1	0.0	2.1	2.1	3.0	0.0	3.0	0.0	0.0	0.0
Minimum Recall		No	No		No	No	No		No			
Maximum Recall		No	No		No	No	No		No			
Pedestrian Recall		No	No		No	No	No		No			
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	C	R	L	R	
C, Cycle Length [s]	145	145	145	145	145	145	
L, Total Lost Time per Cycle [s]	4.10	5.00	4.10	5.00	5.00	5.00	
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	
l2, Clearance Lost Time [s]	2.10	0.00	2.10	0.00	3.00	0.00	
g_i, Effective Green Time [s]	116	140	116	140	20	140	
g / C, Green / Cycle	0.80	0.97	0.80	0.97	0.14	0.97	
(v / s)_i Volume / Saturation Flow Rate	0.23	0.24	0.15	0.90	0.16	0.12	
s, saturation flow rate [veh/h]	5094	1589	5094	694	3459	2813	
c, Capacity [veh/h]	4069	1535	4069	670	479	2716	
d1, Uniform Delay [s]	3.81	0.11	3.47	0.75	62.42	0.10	
k, delay calibration	0.50	0.23	0.50	0.50	0.11	0.11	
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	
d2, Incremental Delay [s]	0.18	0.18	0.11	21.90	82.48	0.02	
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	

Lane Group Results

X, volume / capacity	0.29	0.25	0.19	0.93	1.17	0.13	
d, Delay for Lane Group [s/veh]	3.99	0.29	3.58	22.66	144.90	0.12	
Lane Group LOS	A	A	A	C	F	A	
Critical Lane Group	No	No	No	Yes	Yes	No	
50th-Percentile Queue Length [veh/ln]	2.71	0.08	1.66	4.08	14.32	0.01	
50th-Percentile Queue Length [ft/ln]	67.74	1.91	41.52	101.94	358.12	0.20	
95th-Percentile Queue Length [veh/ln]	4.88	0.14	2.99	7.34	22.00	0.01	
95th-Percentile Queue Length [ft/ln]	121.93	3.45	74.73	183.49	549.90	0.36	

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	0.00	3.99	0.29	0.00	3.58	22.66	144.90	0.00	0.12	0.00	0.00	0.00
Movement LOS		A	A		A	C	F		A			
d_A, Approach Delay [s/veh]	3.08			12.02			89.28			0.00		
Approach LOS	A			B			F			A		
d_I, Intersection Delay [s/veh]	26.58											
Intersection LOS	C											
Intersection V/C	1.045											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	64.70	64.70
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	2.624	1.820
Crosswalk LOS	F	F	B	A
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1323	1323	276	0
d_b, Bicycle Delay [s]	8.30	8.31	53.85	72.48
l_b,int, Bicycle LOS Score for Intersection	2.414	2.338	1.560	4.132
Bicycle LOS	B	B	A	D

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 8000: O'Brien Drive/Kavanaugh Drive

Control Type:	All-way stop	Delay (sec / veh):	7.9
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.218

Intersection Setup

Name	O'Brien Drive		O'Brien Drive		Kavanaugh Drive	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		Yes		No	

Volumes

Name	O'Brien Drive		O'Brien Drive		Kavanaugh Drive	
Base Volume Input [veh/h]	90	98	2	73	44	3
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	90	98	2	73	44	3
Peak Hour Factor	0.9150	0.9150	0.9150	0.9150	0.9150	0.9150
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	25	27	1	20	12	1
Total Analysis Volume [veh/h]	98	107	2	80	48	3
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	939	846	769
Degree of Utilization, x	0.22	0.10	0.07

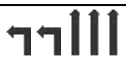
Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	0.83	0.32	0.21
95th-Percentile Queue Length [ft]	20.75	8.02	5.31
Approach Delay [s/veh]	7.90	7.71	8.01
Approach LOS	A	A	A
Intersection Delay [s/veh]	7.87		
Intersection LOS	A		

Intersection Level Of Service Report
Intersection 9000: Bayfront Expy (SR 84)/University Ave (SR 109)

Control Type:	Signalized	Delay (sec / veh):	60.5
Analysis Method:	HCM 7th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.855

Intersection Setup

Name	University Avenue (SR109)		Bayfront Expressway (SR84)		Bayfront Expressway (SR84)	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	2	0	1	2	0
Entry Pocket Length [ft]	100.00	250.00	100.00	100.00	830.00	100.00
No. of Lanes in Exit Pocket	0	2	0	0	0	0
Exit Pocket Length [ft]	0.00	74.61	0.00	0.00	0.00	0.00
Speed [mph]	35.00		55.00		55.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		No	

Volumes

Name	University Avenue (SR109)		Bayfront Expressway (SR84)		Bayfront Expressway (SR84)	
Base Volume Input [veh/h]	83	1293	3369	95	333	1116
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	83	1293	3369	95	333	1116
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	21	330	859	24	85	285
Total Analysis Volume [veh/h]	85	1319	3438	97	340	1139
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	1		2		0	
v_ci, Inbound Pedestrian Volume crossing mi	2		1		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	3		5		8	

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	200
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	198.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	10.00

Phasing & Timing

Control Type	Permissive	Overlap	Permissive	Permissive	Protected	Permissive
Signal Group	4	4	6	2	5	2
Auxiliary Signal Groups		4,5				
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	12	12	10	10	11	10
Maximum Green [s]	15	15	60	60	30	60
Amber [s]	3.0	3.0	5.0	5.4	3.0	5.4
All red [s]	1.0	1.0	1.0	0.5	0.5	0.5
Split [s]	36	36	124	154	26	154
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	3.0
Walk [s]	4	4	4	0	0	0
Pedestrian Clearance [s]	29	29	35	0	0	0
Delayed Vehicle Green [s]	3.0	3.0	3.0	0.0	0.0	0.0
Rest In Walk	No		No			No
l1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0
l2, Clearance Lost Time [s]	2.0	2.0	4.0	3.9	1.5	3.9
Minimum Recall	No	No	No		No	No
Maximum Recall	No	No	No		No	No
Pedestrian Recall	No	No	No		No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	20.0	20.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	R	C	R	L	C
C, Cycle Length [s]	200	200	200	200	200	200
L, Total Lost Time per Cycle [s]	4.00	3.50	6.00	6.00	3.50	5.90
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	0.00	4.00	4.00	1.50	3.90
g_i, Effective Green Time [s]	32	58	132	132	23	158
g / C, Green / Cycle	0.16	0.29	0.66	0.66	0.11	0.79
(v / s)_i Volume / Saturation Flow Rate	0.02	0.32	0.67	0.06	0.10	0.22
s, saturation flow rate [veh/h]	3459	4162	5094	1566	3459	5094
c, Capacity [veh/h]	553	1217	3361	1033	390	4027
d1, Uniform Delay [s]	72.29	70.26	33.99	12.31	87.25	5.65
k, delay calibration	0.11	0.20	0.50	0.50	0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.13	44.42	21.66	0.18	6.17	0.18
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.15	1.08	1.02	0.09	0.87	0.28
d, Delay for Lane Group [s/veh]	72.42	114.67	55.65	12.49	93.42	5.82
Lane Group LOS	E	F	F	B	F	A
Critical Lane Group	No	Yes	Yes	No	No	No
50th-Percentile Queue Length [veh/ln]	1.91	25.62	55.70	1.59	8.87	3.79
50th-Percentile Queue Length [ft/ln]	47.67	640.51	1392.60	39.68	221.68	94.71
95th-Percentile Queue Length [veh/ln]	3.43	35.71	69.41	2.86	13.75	6.82
95th-Percentile Queue Length [ft/ln]	85.81	892.67	1735.24	71.43	343.77	170.47

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	72.42	114.67	55.65	12.49	93.42	5.82
Movement LOS	E	F	F	B	F	A
d_A, Approach Delay [s/veh]	112.12		54.46		25.96	
Approach LOS	F		D		C	
d_I, Intersection Delay [s/veh]	60.51					
Intersection LOS	E					
Intersection V/C	0.855					

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	1160.89	0.00	0.00
d_p, Pedestrian Delay [s]	92.12	92.12	0.00
l_p,int, Pedestrian LOS Score for Intersectio	3.121	3.848	0.000
Crosswalk LOS	C	D	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	290	1150	1482
d_b, Bicycle Delay [s]	73.17	18.08	6.74
l_b,int, Bicycle LOS Score for Intersection	1.670	3.504	2.373
Bicycle LOS	A	D	B

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 10000: University Avenue/Adams Drive

Control Type:	Two-way stop	Delay (sec / veh):	37.6
Analysis Method:	HCM 7th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.392

Intersection Setup

Name	University Avenue		University Avenue (SR109)		Adams Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		No	

Volumes

Name	University Avenue		University Avenue (SR109)		Adams Drive	
Base Volume Input [veh/h]	14	1379	386	7	62	16
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	14	1379	386	7	62	16
Peak Hour Factor	0.9160	0.9160	0.9160	0.9160	0.9160	0.9160
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	376	105	2	17	4
Total Analysis Volume [veh/h]	15	1505	421	8	68	17
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.02	0.00	0.00	0.39	0.02
d_M, Delay for Movement [s/veh]	8.24	0.00	0.00	0.00	37.60	21.39
Movement LOS	A	A	A	A	E	C
95th-Percentile Queue Length [veh/ln]	0.04	0.00	0.00	0.00	1.88	1.88
95th-Percentile Queue Length [ft/ln]	1.01	0.00	0.00	0.00	47.04	47.04
d_A, Approach Delay [s/veh]	0.08		0.00		34.36	
Approach LOS	A		A		D	
d_I, Intersection Delay [s/veh]	1.50					
Intersection LOS	E					

Intersection Level Of Service Report
Intersection 11000: University Ave/O'Brien Dr

Control Type:	Signalized	Delay (sec / veh):	7.9
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.493

Intersection Setup

Name	University Avenue		University Avenue		O'Brien Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	1	0
Entry Pocket Length [ft]	90.00	100.00	100.00	100.00	45.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00		25.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	No		No		No	

Volumes

Name	University Avenue		University Avenue		O'Brien Drive	
Base Volume Input [veh/h]	14	1314	394	8	69	76
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	14	1314	394	8	69	76
Peak Hour Factor	0.9250	0.9250	0.9250	0.9250	0.9250	0.9250
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	355	106	2	19	21
Total Analysis Volume [veh/h]	15	1421	426	9	75	82
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		1	
Bicycle Volume [bicycles/h]	2		3		1	

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	130
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	48.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	11.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	1	6	2	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	5	5	5	0	5	0
Maximum Green [s]	30	30	30	0	30	0
Amber [s]	3.0	3.0	3.0	0.0	3.0	0.0
All red [s]	1.0	1.0	1.0	0.0	1.0	0.0
Split [s]	67	76	9	0	54	0
Vehicle Extension [s]	3.0	3.0	3.0	0.0	3.0	0.0
Walk [s]	0	5	5	0	5	0
Pedestrian Clearance [s]	0	10	10	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
Minimum Recall	No	No	No		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	L	R
C, Cycle Length [s]	130	130	130	130	130	130
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	2	113	107	107	9	9
g / C, Green / Cycle	0.02	0.87	0.82	0.82	0.07	0.07
(v / s)_i Volume / Saturation Flow Rate	0.01	0.40	0.12	0.12	0.04	0.05
s, saturation flow rate [veh/h]	1781	3560	1870	1854	1781	1565
c, Capacity [veh/h]	29	3096	1538	1525	123	108
d1, Uniform Delay [s]	63.38	1.84	2.32	2.32	58.82	59.40
k, delay calibration	0.11	0.50	0.50	0.50	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	13.10	0.49	0.19	0.20	4.87	10.49
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.51	0.46	0.14	0.14	0.61	0.76
d, Delay for Lane Group [s/veh]	76.48	2.33	2.51	2.52	63.68	69.89
Lane Group LOS	E	A	A	A	E	E
Critical Lane Group	No	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	0.60	2.63	1.00	1.01	2.57	2.97
50th-Percentile Queue Length [ft/ln]	15.09	65.80	25.11	25.15	64.31	74.28
95th-Percentile Queue Length [veh/ln]	1.09	4.74	1.81	1.81	4.63	5.35
95th-Percentile Queue Length [ft/ln]	27.17	118.44	45.19	45.27	115.75	133.71

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	76.48	2.33	2.52	2.52	63.68	69.89
Movement LOS	E	A	A	A	E	E
d_A, Approach Delay [s/veh]	3.10		2.52		66.93	
Approach LOS	A		A		E	
d_I, Intersection Delay [s/veh]	7.92					
Intersection LOS	A					
Intersection V/C	0.493					

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	0.000
Crosswalk LOS	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1108	77	769
d_b, Bicycle Delay [s]	12.94	60.17	24.62
l_b,int, Bicycle LOS Score for Intersection	2.744	1.918	1.560
Bicycle LOS	B	A	A

Sequence

Ring 1	1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 12000: University Avenue/Kavanaugh Drive

Control Type:	Signalized	Delay (sec / veh):	16.2
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.512

Intersection Setup

Name	University Avenue		University Avenue		Kavanaugh Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00		25.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		No		No	

Volumes

Name	University Avenue		University Avenue		Kavanaugh Drive	
Base Volume Input [veh/h]	24	1326	479	29	51	54
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	24	1326	479	29	51	54
Peak Hour Factor	0.9440	0.9440	0.9440	0.9440	0.9440	0.9440
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	6	351	127	8	14	14
Total Analysis Volume [veh/h]	25	1405	507	31	54	57
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		13		4	
Bicycle Volume [bicycles/h]	1		5		2	

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fixed time
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal Group	1	6	2	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	5	5	5	0	5	0
Maximum Green [s]	30	30	30	0	30	0
Amber [s]	3.0	3.0	3.0	0.0	3.0	0.0
All red [s]	1.0	1.0	1.0	0.0	1.0	0.0
Split [s]	19	60	41	0	30	0
Vehicle Extension [s]	3.0	3.0	3.0	0.0	3.0	0.0
Walk [s]	0	5	5	0	5	0
Pedestrian Clearance [s]	0	10	10	0	21	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
Minimum Recall	No	No	No		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	C
C, Cycle Length [s]	90	90	90	90	90
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	15	56	37	37	26
g / C, Green / Cycle	0.17	0.62	0.41	0.41	0.29
(v / s)_i Volume / Saturation Flow Rate	0.02	0.44	0.16	0.16	0.07
s, saturation flow rate [veh/h]	1603	3204	1683	1644	1509
c, Capacity [veh/h]	267	1994	692	676	436
d1, Uniform Delay [s]	31.75	11.44	18.57	18.66	24.56
k, delay calibration	0.50	0.50	0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.69	2.12	1.65	1.75	1.40
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.09	0.70	0.39	0.40	0.25
d, Delay for Lane Group [s/veh]	32.44	13.56	20.22	20.41	25.97
Lane Group LOS	C	B	C	C	C
Critical Lane Group	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	0.51	9.08	4.18	4.21	1.95
50th-Percentile Queue Length [ft/ln]	12.83	226.92	104.47	105.22	48.86
95th-Percentile Queue Length [veh/ln]	0.92	14.02	7.52	7.57	3.52
95th-Percentile Queue Length [ft/ln]	23.09	350.45	188.04	189.33	87.95

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	32.44	13.56	20.31	20.41	25.97	25.97
Movement LOS	C	B	C	C	C	C
d_A, Approach Delay [s/veh]	13.89		20.31		25.97	
Approach LOS	B		C		C	
d_I, Intersection Delay [s/veh]	16.20					
Intersection LOS	B					
Intersection V/C	0.512					

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	36.45	0.00	0.00
l_p,int, Pedestrian LOS Score for Intersectio	2.625	0.000	0.000
Crosswalk LOS	B	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1244	822	578
d_b, Bicycle Delay [s]	6.43	15.64	22.78
l_b,int, Bicycle LOS Score for Intersection	2.739	2.003	1.743
Bicycle LOS	B	B	A

Sequence

Ring 1	1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 13000: Willow Road/Driveway A

Control Type:	Two-way stop	Delay (sec / veh):	0.0
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.014

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		Driveway A	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		Driveway A	
Base Volume Input [veh/h]	1424	0	0	901	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	1424	0	0	901	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	356	0	0	225	0	0
Total Analysis Volume [veh/h]	1424	0	0	901	0	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	0.00	0.00	14.60
Movement LOS	A	A		A		B
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.00		0.00		14.60	
Approach LOS	A		A		B	
d_I, Intersection Delay [s/veh]	0.00					
Intersection LOS	A					

Intersection Level Of Service Report
Intersection 14000: Driveway B/O'Brien Drive

Control Type:	Two-way stop	Delay (sec / veh):	0.0
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.003

Intersection Setup

Name	Driveway B		O'Brien Drive		O'Brien Drive	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Driveway B		O'Brien Drive		O'Brien Drive	
Base Volume Input [veh/h]	0	0	0	227	265	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	227	265	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	57	66	0
Total Analysis Volume [veh/h]	0	0	0	227	265	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	11.72	9.65	7.77	0.00	0.00	0.00
Movement LOS	B	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	10.68		0.00		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	0.00					
Intersection LOS	A					

Intersection Level Of Service Report
Intersection 15000: Driveway C/O'Brien Drive

Control Type:	Two-way stop	Delay (sec / veh):	0.0
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.003

Intersection Setup

Name	Driveway C		O'Brien Drive		O'Brien Drive	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Driveway C		O'Brien Drive		O'Brien Drive	
Base Volume Input [veh/h]	0	0	0	227	265	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	227	265	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	57	66	0
Total Analysis Volume [veh/h]	0	0	0	227	265	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop		Free		Free
Flared Lane	No				
Storage Area [veh]	0		0		0
Two-Stage Gap Acceptance	No				
Number of Storage Spaces in Median	0		0		0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	11.72	9.65	7.77	0.00	0.00	0.00
Movement LOS	B	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	10.68		0.00		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	0.00					
Intersection LOS	A					

1005 O'Brien Drive and 1320 Willow Road

Vistro File: P:\...\OBrien_Willow_AM_Revised_V3.vistro
Report File: P:\...\NT_AM_v3.pdf

Scenario 17 Near-term AM (2027)
3/14/2025

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1000	Bayfront Expy (SR 84)/Willow Rd (SR 114)	Signalized	HCM 7th Edition	EB Left	0.675	59.1	E
2000	Willow Rd (SR 114)/Hamilton Ave	Signalized	HCM 7th Edition	SB Left	1.434	251.7	F
3000	Willow Rd (SR 114)/Ivy Dr	Signalized	HCM 7th Edition	NB Left	0.864	29.5	C
4000	Willow Rd (SR 114)/O'Brien Dr	Signalized	HCM 7th Edition	WB Left	0.883	46.1	D
5000	Willow Rd (SR 114) /Newbridge St	Signalized	HCM 7th Edition	SB Right	1.331	163.7	F
6000	Willow Rd/US-101 NB Ramps	Signalized	HCM 7th Edition	WB Left	0.844	8.8	A
7000	Willow Rd/US-101 SB Ramps	Signalized	HCM 7th Edition	EB Left	0.998	13.1	B
8000	O'Brien Drive/Kavanaugh Drive	All-way stop	HCM 7th Edition	SB Thru	1.258	86.7	F
9000	Bayfront Expy (SR 84) /University Ave (SR 109)	Signalized	HCM 7th Edition	NB Left	0.820	24.0	C
10000	University Avenue/Adams Drive	Two-way stop	HCM 7th Edition	EB Left	0.299	77.6	F
11000	University Ave/O'Brien Dr	Signalized	HCM 7th Edition	EB Right	0.765	23.4	C
12000	University Avenue/Kavanaugh Drive	Signalized	HCM 7th Edition	NB Left	0.494	22.1	C
13000	Willow Road/Driveway A	Two-way stop	HCM 7th Edition	WB Right	0.003	10.9	B
14000	Driveway B/O'Brien Drive	Two-way stop	HCM 7th Edition	SB Right	0.002	11.3	B
15000	Driveway C/O'Brien Drive	Two-way stop	HCM 7th Edition	EB Thru	0.006	0.0	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1000: Bayfront Expy (SR 84)/Willow Rd (SR 114)

Control Type:	Signalized	Delay (sec / veh):	59.1
Analysis Method:	HCM 7th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.675

Intersection Setup

Name	Willow Road (SR 114)			Willow Road			Bayfront Expy (SR 84)			Bayfront Expy (SR 84)		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	3	0	1	0	0	0	2	0	1	2	0	1
Entry Pocket Length [ft]	265.00	100.00	200.00	100.00	100.00	100.00	530.00	100.00	630.00	1500.00	100.00	600.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			20.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			No			Yes			No		

Volumes

Name	Willow Road (SR 114)			Willow Road			Bayfront Expy (SR 84)			Bayfront Expy (SR 84)		
Base Volume Input [veh/h]	93	208	414	10	28	27	62	733	161	829	2172	41
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	1	0	0	0	0	0	2	1	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	16	0	0	106	0	0	0
Total Hourly Volume [veh/h]	93	208	415	10	28	11	62	733	57	830	2172	41
Peak Hour Factor	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	25	55	111	3	7	3	17	195	15	221	579	11
Total Analysis Volume [veh/h]	99	222	442	11	30	12	66	781	61	885	2316	44
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			2			3			0		
v_di, Inbound Pedestrian Volume crossing m	0			3			2			0		
v_co, Outbound Pedestrian Volume crossing	4			0			3			0		
v_ci, Inbound Pedestrian Volume crossing mi	3			0			4			0		
v_ab, Corner Pedestrian Volume [ped/h]	12			0			0			1		
Bicycle Volume [bicycles/h]	2			0			0			1		

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	180
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	17.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Protecte	Permiss	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	7	4	4	3	8	4	1	6	2	5	2	6
Auxiliary Signal Groups			4,5									
Lead / Lag	Lag	-	-	Lead	-	-	Lead	-	-	Lag	-	-
Minimum Green [s]	13	12	12	15	15	12	6	25	10	11	10	25
Maximum Green [s]	22	15	15	9	9	15	26	40	30	25	30	40
Amber [s]	3.6	3.9	3.9	3.6	3.6	3.9	3.6	5.0	5.0	3.6	5.0	5.0
All red [s]	0.0	0.5	0.5	1.5	1.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0
Split [s]	20	36	36	17	36	36	23	42	79	59	79	42
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Walk [s]	0	0	0	0	4	0	0	4	0	4	0	4
Pedestrian Clearance [s]	0	0	0	0	29	0	0	35	0	11	0	35
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	3.0	0.0	3.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	1.6	2.4	2.4	3.1	3.1	2.4	2.6	4.0	4.0	2.6	4.0	4.0
Minimum Recall	No	No	No	No	No		No	Yes		No	Yes	
Maximum Recall	No	No	No	No	Yes		No	No		No	No	
Pedestrian Recall	No	No	No	No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
C, Cycle Length [s]	180	180	180	180	180	180	180	180	180	180	180	180
L, Total Lost Time per Cycle [s]	3.60	4.40	4.40	5.10	5.10	5.10	4.60	6.00	6.00	4.60	6.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.60	2.40	0.00	3.10	3.10	3.10	2.60	4.00	4.00	2.60	4.00	4.00
g_i, Effective Green Time [s]	60	62	137	6	9	9	9	32	32	59	82	82
g / C, Green / Cycle	0.34	0.35	0.76	0.04	0.05	0.05	0.05	0.18	0.18	0.33	0.46	0.46
(v / s)_i Volume / Saturation Flow Rate	0.12	0.10	0.11	0.01	0.01	0.01	0.04	0.15	0.04	0.31	0.45	0.03
s, saturation flow rate [veh/h]	797	2249	4179	947	3560	1542	1547	5094	1589	2821	5094	1570
c, Capacity [veh/h]	267	777	3191	63	178	77	80	911	284	928	2322	715
d1, Uniform Delay [s]	45.40	42.75	5.62	86.70	81.88	81.81	84.50	71.66	63.10	59.06	48.86	27.40
k, delay calibration	0.46	0.50	0.50	0.11	0.50	0.50	0.11	0.11	0.11	0.50	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	3.60	0.92	0.09	1.31	2.04	4.25	18.52	2.48	0.37	20.33	8.13	0.04
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.37	0.29	0.14	0.18	0.17	0.16	0.82	0.86	0.21	0.95	1.00	0.06
d, Delay for Lane Group [s/veh]	49.00	43.67	5.71	88.01	83.92	86.06	103.02	74.14	63.47	79.39	56.99	27.44
Lane Group LOS	D	D	A	F	F	F	F	E	E	E	E	C
Critical Lane Group	Yes	No	No	No	Yes	No	Yes	No	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	3.65	3.72	1.42	0.54	0.73	0.64	1.74	11.94	2.45	22.39	36.17	1.11
50th-Percentile Queue Length [ft/ln]	91.18	92.97	35.61	13.47	18.30	15.90	43.51	298.60	61.26	559.79	904.22	27.68
95th-Percentile Queue Length [veh/ln]	6.56	6.69	2.56	0.97	1.32	1.14	3.13	17.61	4.41	30.15	46.03	1.99
95th-Percentile Queue Length [ft/ln]	164.12	167.34	64.10	24.24	32.94	28.62	78.32	440.29	110.27	753.80	1150.79	49.83

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	49.00	43.67	5.71	88.01	83.92	86.06	103.02	74.14	63.47	79.39	56.99	27.44
Movement LOS	D	D	A	F	F	F	F	E	E	E	E	C
d_A, Approach Delay [s/veh]	22.37			85.25			75.53			62.70		
Approach LOS	C			F			E			E		
d_I, Intersection Delay [s/veh]	59.09											
Intersection LOS	E											
Intersection V/C	0.675											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	0.0	8.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	604.85	0.00	891.45	0.00
d_p, Pedestrian Delay [s]	82.16	0.00	82.16	0.00
l_p,int, Pedestrian LOS Score for Intersectio	3.098	0.000	3.344	0.000
Crosswalk LOS	C	F	C	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	351	310	367	811
d_b, Bicycle Delay [s]	61.22	64.25	60.01	31.80
l_b,int, Bicycle LOS Score for Intersection	2.189	1.617	2.117	3.344
Bicycle LOS	B	A	B	C

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 2000: Willow Rd (SR 114)/Hamilton Ave

Control Type:	Signalized	Delay (sec / veh):	251.7
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.434

Intersection Setup

Name	Willow Road (SR 114)			Willow Road (SR 114)			Hamilton Avenue			Hamilton Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			30.00			25.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Willow Road (SR 114)			Willow Road (SR 114)			Hamilton Avenue			Hamilton Avenue		
Base Volume Input [veh/h]	125	690	74	495	784	18	59	16	73	16	6	155
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	1	0	0	3	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	125	691	74	495	787	18	59	16	73	16	6	155
Peak Hour Factor	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	32	177	19	127	202	5	15	4	19	4	2	40
Total Analysis Volume [veh/h]	128	708	76	507	806	18	60	16	75	16	6	159
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	6			57			5			57		
v_di, Inbound Pedestrian Volume crossing m	5			57			6			57		
v_co, Outbound Pedestrian Volume crossing	5			18			18			6		
v_ci, Inbound Pedestrian Volume crossing mi	6			18			18			5		
v_ab, Corner Pedestrian Volume [ped/h]	5			6			13			5		
Bicycle Volume [bicycles/h]	1			1			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	48
Active Pattern	Free Running
Coordination Type	*Free Running*
Actuation Type	*Fully actuated*
Offset [s]	8.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	1	6	2	5	2	6	4	8	4	8	4	8
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	Lead	-	-	Lag	-	-	Lag	-	-
Minimum Green [s]	4	10	10	4	10	10	4	4	4	4	4	4
Maximum Green [s]	21	30	30	16	30	30	26	26	26	26	26	26
Amber [s]	3.0	4.4	4.4	3.0	4.4	4.4	3.6	3.7	3.6	3.7	3.6	3.7
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	0	30	0	0	0	30	30	0	30	0	30	0
Vehicle Extension [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walk [s]	0	4	4	0	4	4	4	4	4	4	4	4
Pedestrian Clearance [s]	0	19	15	0	15	19	25	25	25	25	25	25
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	1.0	2.4	2.4	1.0	2.4	2.4	1.6	1.7	1.6	1.7	1.6	1.7
Minimum Recall	No	Yes		No	Yes			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	6.0	6.0	6.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	C	C
C, Cycle Length [s]	80	80	80	80	80	80	80	80
L, Total Lost Time per Cycle [s]	3.00	4.40	4.40	3.00	4.40	4.40	3.70	3.60
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.00
l2, Clearance Lost Time [s]	1.00	2.40	2.40	1.00	2.40	2.40	1.70	0.00
g_i, Effective Green Time [s]	16	30	30	16	30	30	23	23
g / C, Green / Cycle	0.20	0.38	0.38	0.20	0.38	0.38	0.28	0.28
(v / s)_i Volume / Saturation Flow Rate	0.16	0.48	0.48	0.54	0.42	0.42	0.25	0.19
s, saturation flow rate [veh/h]	797	837	802	937	984	973	604	957
c, Capacity [veh/h]	160	315	302	188	370	366	234	297
d1, Uniform Delay [s]	30.33	24.86	24.86	31.88	24.88	24.88	28.27	25.64
k, delay calibration	0.12	0.50	0.50	0.50	0.50	0.50	0.24	0.08
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	9.37	142.29	147.39	778.29	82.22	84.34	6.50	1.55
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.80	1.27	1.28	2.70	1.12	1.12	0.64	0.61
d, Delay for Lane Group [s/veh]	39.70	167.15	172.25	810.17	107.10	109.22	34.76	27.18
Lane Group LOS	D	F	F	F	F	F	C	C
Critical Lane Group	No	No	Yes	Yes	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	2.60	17.73	17.42	44.13	14.93	14.97	3.18	3.06
50th-Percentile Queue Length [ft/ln]	65.08	443.32	435.62	1103.27	373.14	374.29	79.54	76.41
95th-Percentile Queue Length [veh/ln]	4.69	28.21	27.89	71.99	22.78	22.90	5.73	5.50
95th-Percentile Queue Length [ft/ln]	117.15	705.36	697.23	1799.79	569.55	572.61	143.18	137.54

Movement, Approach, & Intersection Results

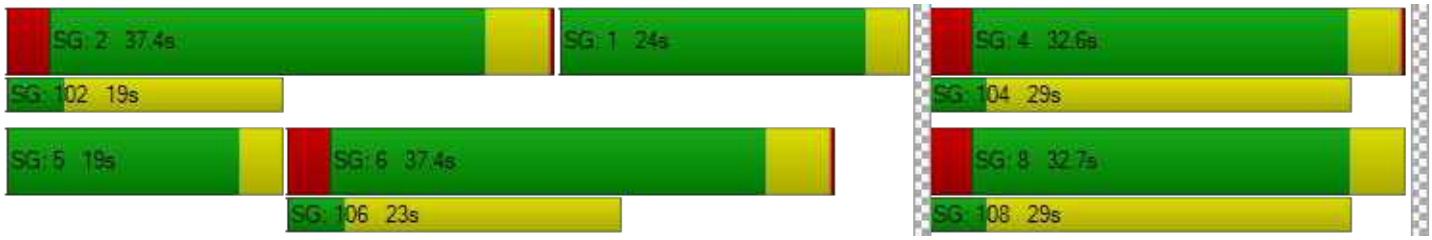
d_M, Delay for Movement [s/veh]	39.70	169.37	172.25	810.17	108.13	109.22	34.76	34.76	34.76	27.18	27.18	27.18
Movement LOS	D	F	F	F	F	F	C	C	C	C	C	C
d_A, Approach Delay [s/veh]	151.41			375.57			34.76			27.18		
Approach LOS	F			F			C			C		
d_I, Intersection Delay [s/veh]	251.70											
Intersection LOS	F											
Intersection V/C	1.434											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	564.86	64.18	229.70	695.40
d_p, Pedestrian Delay [s]	32.22	32.22	32.22	32.22
l_p,int, Pedestrian LOS Score for Intersectio	3.017	2.822	1.835	2.028
Crosswalk LOS	C	C	A	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	753	753	653	653
d_b, Bicycle Delay [s]	15.48	15.48	18.07	18.07
l_b,int, Bicycle LOS Score for Intersection	2.312	2.658	1.809	1.858
Bicycle LOS	B	B	A	A

Sequence

Ring 1	2	1	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 3000: Willow Rd (SR 114)/Ivy Dr

Control Type:	Signalized	Delay (sec / veh):	29.5
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.864

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		Ivy Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	1	0
Entry Pocket Length [ft]	85.00	100.00	100.00	100.00	135.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	1	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	100.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		Ivy Drive	
Base Volume Input [veh/h]	73	674	919	49	56	83
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	1	1	3	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	74	675	922	49	56	83
Peak Hour Factor	0.9670	0.9670	0.9670	0.9670	0.9670	0.9670
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	19	175	238	13	14	21
Total Analysis Volume [veh/h]	77	698	953	51	58	86
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	4		9		3	
v_di, Inbound Pedestrian Volume crossing m	3		9		4	
v_co, Outbound Pedestrian Volume crossing	9		2		2	
v_ci, Inbound Pedestrian Volume crossing mi	9		2		2	
v_ab, Corner Pedestrian Volume [ped/h]	3		6		7	
Bicycle Volume [bicycles/h]	1		3		1	

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	160
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	90.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal Group	5	2	6	6	4	4
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	4	10	10	10	11	11
Maximum Green [s]	21	30	30	30	29	29
Amber [s]	3.0	4.4	4.4	4.4	3.0	3.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	17	125	107	107	35	35
Vehicle Extension [s]	2.0	2.0	2.0	2.0	2.0	2.0
Walk [s]	0	0	4	4	4	4
Pedestrian Clearance [s]	0	0	22	22	24	24
Delayed Vehicle Green [s]	0.0	0.0	3.0	3.0	3.0	3.0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	1.0	2.4	2.4	2.4	1.0	1.0
Minimum Recall	No	Yes	Yes		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	L	R
C, Cycle Length [s]	160	160	160	160	160	160
L, Total Lost Time per Cycle [s]	3.00	4.40	4.40	4.40	3.00	3.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.00	2.40	2.40	2.40	1.00	1.00
g_i, Effective Green Time [s]	14	133	116	116	20	20
g / C, Green / Cycle	0.09	0.83	0.72	0.72	0.12	0.12
(v / s)_i Volume / Saturation Flow Rate	0.10	0.44	0.60	0.61	0.03	0.11
s, saturation flow rate [veh/h]	797	1593	837	820	1703	803
c, Capacity [veh/h]	70	1323	606	594	210	99
d1, Uniform Delay [s]	72.93	4.09	15.22	15.68	63.61	68.56
k, delay calibration	0.23	0.50	0.50	0.50	0.04	0.06
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	102.68	1.51	12.39	13.80	0.26	11.58
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	1.10	0.53	0.83	0.85	0.28	0.87
d, Delay for Lane Group [s/veh]	175.61	5.60	27.61	29.48	63.87	80.14
Lane Group LOS	F	A	C	C	E	F
Critical Lane Group	Yes	No	No	Yes	No	Yes
50th-Percentile Queue Length [veh/ln]	4.84	2.89	13.29	13.82	2.18	3.78
50th-Percentile Queue Length [ft/ln]	120.94	72.18	332.16	345.49	54.51	94.47
95th-Percentile Queue Length [veh/ln]	8.71	5.20	19.26	19.92	3.92	6.80
95th-Percentile Queue Length [ft/ln]	217.70	129.92	481.61	497.91	98.12	170.04

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	175.61	5.60	28.49	29.48	63.87	80.14
Movement LOS	F	A	C	C	E	F
d_A, Approach Delay [s/veh]	22.49		28.54		73.59	
Approach LOS	C		C		E	
d_I, Intersection Delay [s/veh]	29.48					
Intersection LOS	C					
Intersection V/C	0.864					

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	539.26	274.76	1065.00
d_p, Pedestrian Delay [s]	72.17	72.17	72.17
l_p,int, Pedestrian LOS Score for Intersectio	2.800	2.732	2.226
Crosswalk LOS	C	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1508	1246	363
d_b, Bicycle Delay [s]	4.84	11.40	53.62
l_b,int, Bicycle LOS Score for Intersection	2.199	2.388	1.560
Bicycle LOS	B	B	A

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 4000: Willow Rd (SR 114)/O'Brien Dr

Control Type:	Signalized	Delay (sec / veh):	46.1
Analysis Method:	HCM 7th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.883

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		O'Brien Drive	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	1	0	1	0
Entry Pocket Length [ft]	100.00	60.00	100.00	100.00	50.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	No		No		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		O'Brien Drive	
Base Volume Input [veh/h]	731	580	48	1011	446	49
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	3	3	3	0	1	1
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	734	583	51	1011	447	50
Peak Hour Factor	0.9510	0.9510	0.9510	0.9510	0.9510	0.9510
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	193	153	13	266	118	13
Total Analysis Volume [veh/h]	772	613	54	1063	470	53
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	13		0		14	
v_ci, Inbound Pedestrian Volume crossing mi	14		0		13	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	1		6		2	

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	160
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	93.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Permissive	Permissive	Protected	Permissive	Permissive	Permissive
Signal Group	2	2	1	6	4	8
Auxiliary Signal Groups						
Lead / Lag	-	-	Lead	-	Lead	-
Minimum Green [s]	10	10	5	10	8	0
Maximum Green [s]	35	35	21	35	21	0
Amber [s]	4.4	4.4	3.0	4.4	3.2	0.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	116	116	19	135	25	0
Vehicle Extension [s]	2.0	2.0	2.0	2.0	2.0	0.0
Walk [s]	4	4	0	0	0	0
Pedestrian Clearance [s]	17	17	0	0	0	0
Delayed Vehicle Green [s]	3.0	3.0	0.0	0.0	0.0	0.0
Rest In Walk	No			No	No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.4	2.4	1.0	2.4	1.2	0.0
Minimum Recall	Yes		No	Yes	No	
Maximum Recall	No		No	No	No	
Pedestrian Recall	No		No	No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	L	C	L	C
C, Cycle Length [s]	160	160	160	160	160	160
L, Total Lost Time per Cycle [s]	4.40	4.40	3.00	4.40	3.20	3.20
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.40	2.40	1.00	2.40	1.20	1.20
g_i, Effective Green Time [s]	121	121	6	131	22	22
g / C, Green / Cycle	0.76	0.76	0.04	0.82	0.14	0.14
(v / s)_i Volume / Saturation Flow Rate	0.48	0.40	0.03	0.67	0.17	0.17
s, saturation flow rate [veh/h]	1593	1529	1781	1593	1406	1743
c, Capacity [veh/h]	1208	1160	69	1300	192	238
d1, Uniform Delay [s]	9.04	7.58	76.17	8.13	69.03	69.03
k, delay calibration	0.50	0.50	0.04	0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	2.59	1.72	7.03	5.80	135.99	130.12
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.64	0.53	0.78	0.82	1.22	1.22
d, Delay for Lane Group [s/veh]	11.63	9.31	83.20	13.93	205.02	199.15
Lane Group LOS	B	A	F	B	F	F
Critical Lane Group	No	No	No	Yes	No	Yes
50th-Percentile Queue Length [veh/ln]	5.97	7.92	2.33	8.76	15.12	18.35
50th-Percentile Queue Length [ft/ln]	149.15	198.09	58.17	219.08	377.99	458.78
95th-Percentile Queue Length [veh/ln]	9.97	12.54	4.19	13.62	23.37	27.65
95th-Percentile Queue Length [ft/ln]	249.30	313.50	104.71	340.45	584.19	691.21

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	11.63	9.31	83.20	13.93	202.10	199.15
Movement LOS	B	A	F	B	F	F
d_A, Approach Delay [s/veh]	10.60		17.28		201.77	
Approach LOS	B		B		F	
d_I, Intersection Delay [s/veh]	46.12					
Intersection LOS	D					
Intersection V/C	0.883					

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	72.16
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	2.356
Crosswalk LOS	F	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1358	1633	273
d_b, Bicycle Delay [s]	8.24	2.70	59.71
l_b,int, Bicycle LOS Score for Intersection	2.702	2.481	2.423
Bicycle LOS	B	B	B

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 5000: Willow Rd (SR 114)/Newbridge St

Control Type:	Signalized	Delay (sec / veh):	163.7
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.331

Intersection Setup

Name	Willow Road (SR 114)			Willow Road (SR 114)			Newbridge Street			Newbridge Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	1	0	0	1	0	0	0
Entry Pocket Length [ft]	390.00	100.00	100.00	185.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	1	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	49.21	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			25.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Willow Road (SR 114)			Willow Road (SR 114)			Newbridge Street			Newbridge Street		
Base Volume Input [veh/h]	175	1035	276	66	1358	20	22	136	364	349	97	123
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	5	0	0	1	0	0	0	1	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	44	0	0	34
Total Hourly Volume [veh/h]	175	1040	276	66	1359	20	22	136	321	349	97	89
Peak Hour Factor	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	47	282	75	18	368	5	6	37	87	95	26	24
Total Analysis Volume [veh/h]	190	1128	299	72	1474	22	24	148	348	379	105	97
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	2			2			3			3		
v_di, Inbound Pedestrian Volume crossing m	3			3			2			2		
v_co, Outbound Pedestrian Volume crossing	8			12			7			11		
v_ci, Inbound Pedestrian Volume crossing mi	7			11			8			12		
v_ab, Corner Pedestrian Volume [ped/h]	16			65			10			12		
Bicycle Volume [bicycles/h]	10			2			0			8		

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	160
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	97.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Split	Split	Split	Split	Split	Split
Signal Group	5	2	2	1	6	6	4	4	4	8	3	8
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lag	-	-	Lag	-	-	-	-	-
Minimum Green [s]	4	12	12	4	12	12	4	4	4	0	4	0
Maximum Green [s]	21	40	40	21	40	40	25	25	25	0	21	0
Amber [s]	3.0	4.4	4.4	3.0	4.4	4.4	3.6	3.6	3.6	0.0	3.0	0.0
All red [s]	0.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0
Split [s]	16	76	76	10	70	70	38	38	38	0	36	0
Vehicle Extension [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walk [s]	0	4	4	0	4	4	4	4	4	0	4	0
Pedestrian Clearance [s]	0	19	19	0	16	16	23	23	23	0	23	0
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	3.0	0.0	3.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	1.0	3.4	3.4	1.0	3.4	3.4	2.6	2.6	2.6	0.0	1.0	0.0
Minimum Recall	No	Yes		No	Yes			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	L	C	R	L	C	R
C, Cycle Length [s]	160	160	160	160	160	160	160	160	160	160	160	160
L, Total Lost Time per Cycle [s]	3.00	5.40	5.40	3.00	5.40	5.40	4.60	4.60	4.60	3.00	3.00	3.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.00	3.40	3.40	1.00	3.40	3.40	2.60	2.60	2.60	1.00	1.00	1.00
g_i, Effective Green Time [s]	13	71	71	7	65	65	34	34	34	33	33	33
g / C, Green / Cycle	0.08	0.44	0.44	0.04	0.40	0.40	0.21	0.21	0.21	0.21	0.21	0.21
(v / s)_i Volume / Saturation Flow Rate	0.11	0.27	0.28	0.04	0.62	0.62	0.02	0.09	0.26	0.24	0.13	0.14
s, saturation flow rate [veh/h]	1781	3560	1637	1781	1593	829	1528	1604	1334	1547	837	673
c, Capacity [veh/h]	145	1568	721	78	642	334	321	337	280	319	172	139
d1, Uniform Delay [s]	73.50	34.43	34.76	76.23	47.77	47.77	50.75	55.03	62.86	63.52	57.67	58.39
k, delay calibration	0.29	0.50	0.50	0.04	0.50	0.50	0.04	0.04	0.50	0.11	0.12	0.20
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	166.77	1.84	4.22	15.48	247.40	255.19	0.04	0.34	135.81	92.18	3.93	11.32
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	1.31	0.62	0.63	0.92	1.53	1.53	0.07	0.44	1.24	1.19	0.61	0.70
d, Delay for Lane Group [s/veh]	240.27	36.27	38.99	91.71	295.17	302.96	50.78	55.36	198.67	155.70	61.59	69.72
Lane Group LOS	F	D	D	F	F	F	D	E	F	F	E	E
Critical Lane Group	Yes	No	No	No	No	Yes	No	No	Yes	Yes	No	No
50th-Percentile Queue Length [veh/ln]	12.61	14.74	14.50	3.32	34.87	37.03	0.79	5.29	21.93	10.59	4.08	4.08
50th-Percentile Queue Length [ft/ln]	315.22	368.55	362.43	83.11	871.87	925.70	19.74	132.25	548.15	264.66	101.95	101.89
95th-Percentile Queue Length [veh/ln]	20.16	21.04	20.74	5.98	56.00	59.18	1.42	9.06	33.01	17.26	7.34	7.34
95th-Percentile Queue Length [ft/ln]	504.09	525.97	518.54	149.60	1399.99	1479.57	35.54	226.55	825.21	431.46	183.52	183.40

Movement, Approach, & Intersection Results

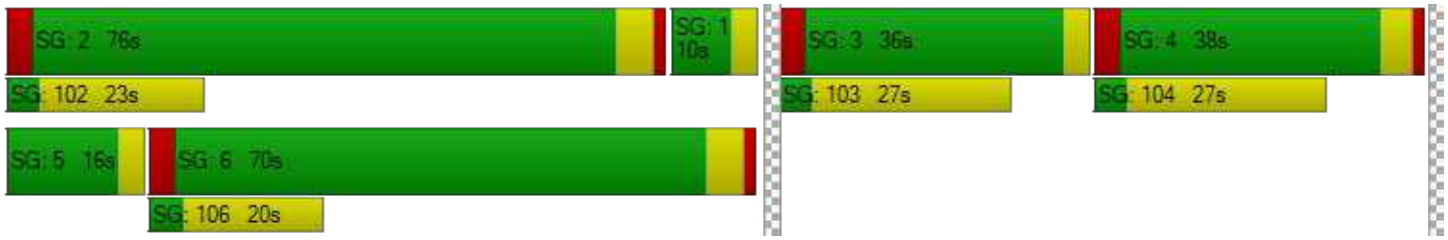
d_M, Delay for Movement [s/veh]	240.27	36.65	38.99	91.71	297.77	302.96	50.78	55.36	198.67	155.70	61.59	69.72
Movement LOS	F	D	D	F	F	F	D	E	F	F	E	E
d_A, Approach Delay [s/veh]	61.01			288.38			151.06			124.34		
Approach LOS	E			F			F			F		
d_I, Intersection Delay [s/veh]	163.70											
Intersection LOS	F											
Intersection V/C	1.331											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	47.16	179.60	931.23	168.06
d_p, Pedestrian Delay [s]	72.20	72.20	72.20	72.20
l_p,int, Pedestrian LOS Score for Intersectio	3.340	2.954	2.437	2.598
Crosswalk LOS	C	C	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	845	770	380	375
d_b, Bicycle Delay [s]	26.81	30.29	52.49	53.02
l_b,int, Bicycle LOS Score for Intersection	2.449	2.422	2.490	2.574
Bicycle LOS	B	B	B	B

Sequence

Ring 1	2	1	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 6000: Willow Rd/US-101 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	8.8
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.844

Intersection Setup

Name	Willow Road			Willow Road (SR 114)			US-101 NB Ramps			US-101 NB Ramps		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	1	0	0	0	1	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	200.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No						No		
Crosswalk	No			Yes			No			Yes		

Volumes

Name	Willow Road			Willow Road (SR 114)			US-101 NB Ramps			US-101 NB Ramps		
Base Volume Input [veh/h]	0	994	336	0	1533	446	0	0	0	364	0	606
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	2.00	2.00	0.00	2.00	2.00	0.00	0.00	0.00	2.00	0.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	2	0	0	0	2	0	0	0	0	0	3
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	996	336	0	1533	448	0	0	0	364	0	609
Peak Hour Factor	1.0000	0.9580	0.9580	1.0000	0.9580	0.9580	1.0000	1.0000	1.0000	0.9580	1.0000	0.9580
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	260	88	0	400	117	0	0	0	95	0	159
Total Analysis Volume [veh/h]	0	1040	351	0	1600	468	0	0	0	380	0	636
Presence of On-Street Parking	No		No	No		No				No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			3			27		
Bicycle Volume [bicycles/h]	5			3			0			1		

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	80
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	38.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Overlap
Signal Group	0	2	5	0	6	1	0	0	0	8	0	8
Auxiliary Signal Groups												6,8
Lead / Lag	-	-	-	-	-	-	-	-	-	Lead	-	-
Minimum Green [s]	0	4	6	0	4	5	0	0	0	5	0	5
Maximum Green [s]	0	35	6	0	35	5	0	0	0	35	0	35
Amber [s]	0.0	4.1	3.0	0.0	4.1	3.0	0.0	0.0	0.0	3.0	0.0	3.0
All red [s]	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	2.0	0.0	2.0
Split [s]	0	45	9	0	45	9	0	0	0	35	0	35
Vehicle Extension [s]	0.0	3.0	3.0	0.0	3.0	3.0	0.0	0.0	0.0	3.0	0.0	3.0
Walk [s]	0	1	0	0	1	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	30	0	0	7	0	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	3.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No					No		
l1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	2.0	2.0	0.0	0.0	0.0	2.0	0.0	2.0
l2, Clearance Lost Time [s]	0.0	2.1	1.0	0.0	2.1	2.0	0.0	0.0	0.0	3.0	0.0	3.0
Minimum Recall		No			No					No		No
Maximum Recall		No			No					No		No
Pedestrian Recall		No			No					No		No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	C	R		L	R
C, Cycle Length [s]	80	80	80	80		80	80
L, Total Lost Time per Cycle [s]	4.10	4.10	4.10	4.10		5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00		0.00	0.00
l2, Clearance Lost Time [s]	2.10	2.10	2.10	2.10		3.00	0.00
g_i, Effective Green Time [s]	57	57	57	57		14	75
g / C, Green / Cycle	0.71	0.71	0.71	0.71		0.17	0.94
(v / s)_i Volume / Saturation Flow Rate	0.20	0.23	0.57	0.30		0.11	0.41
s, saturation flow rate [veh/h]	5094	1554	2828	1555		3459	1543
c, Capacity [veh/h]	3629	1107	2015	1108		601	1447
d1, Uniform Delay [s]	4.15	4.24	7.61	4.69		30.67	0.26
k, delay calibration	0.50	0.50	0.50	0.50		0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00		1.00	1.00
d2, Incremental Delay [s]	0.20	0.75	3.32	1.18		1.11	0.97
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00		0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00		1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00		1.00	1.00

Lane Group Results

X, volume / capacity	0.29	0.32	0.79	0.42		0.63	0.44
d, Delay for Lane Group [s/veh]	4.35	5.00	10.94	5.87		31.78	1.24
Lane Group LOS	A	A	B	A		C	A
Critical Lane Group	No	No	Yes	No		Yes	No
50th-Percentile Queue Length [veh/ln]	1.58	1.80	4.89	2.67		3.40	0.20
50th-Percentile Queue Length [ft/ln]	39.57	44.98	122.33	66.80		85.02	4.88
95th-Percentile Queue Length [veh/ln]	2.85	3.24	8.52	4.81		6.12	0.35
95th-Percentile Queue Length [ft/ln]	71.22	80.96	213.03	120.24		153.04	8.79

Movement, Approach, & Intersection Results

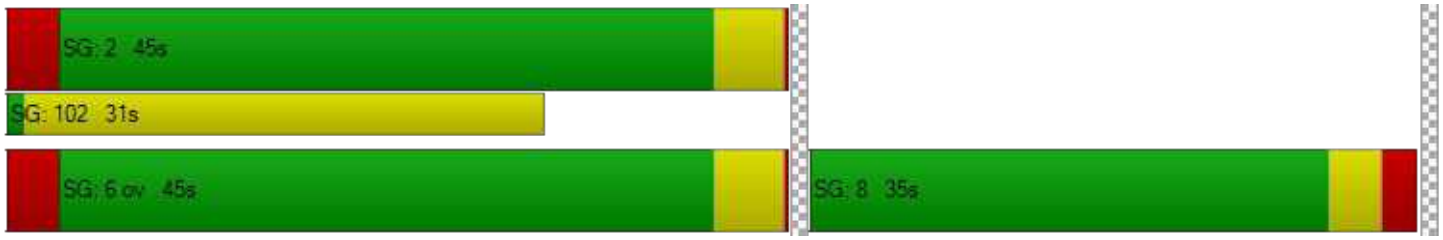
d_M, Delay for Movement [s/veh]	0.00	4.35	5.00	0.00	10.94	5.87	0.00	0.00	0.00	31.78	0.00	1.24
Movement LOS		A	A		B	A				C		A
d_A, Approach Delay [s/veh]	4.52			9.79			0.00			12.66		
Approach LOS	A			A			A			B		
d_I, Intersection Delay [s/veh]	8.80											
Intersection LOS	A											
Intersection V/C	0.844											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	30.0	0.0	5.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	15.62	0.00	35.15
l_p,int, Pedestrian LOS Score for Intersectio	0.000	3.083	0.000	2.566
Crosswalk LOS	F	C	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	948	948	0	750
d_b, Bicycle Delay [s]	11.10	11.09	40.00	15.63
l_b,int, Bicycle LOS Score for Intersection	2.325	2.697	4.132	1.560
Bicycle LOS	B	B	D	A

Sequence

Ring 1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 7000: Willow Rd/US-101 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	13.1
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.998

Intersection Setup

Name	Willow Road			Willow Road			US-101 SB Ramps			US-101 SB Ramps		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	0	1	0	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No					
Crosswalk	Yes			No			Yes			No		

Volumes

Name	Willow Road			Willow Road			US-101 SB Ramps			US-101 SB Ramps		
Base Volume Input [veh/h]	0	807	646	0	1428	542	543	0	264	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	2.00	2.00	0.00	2.00	2.00	2.00	0.00	2.00	0.00	0.00	0.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	1	0	0	0	0	1	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	808	646	0	1428	542	544	0	264	0	0	0
Peak Hour Factor	1.0000	0.9190	0.9190	1.0000	0.9190	0.9190	0.9190	1.0000	0.9190	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	220	176	0	388	147	148	0	72	0	0	0
Total Analysis Volume [veh/h]	0	879	703	0	1554	590	592	0	287	0	0	0
Presence of On-Street Parking	No		No	No		No	No		No			
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			29		
Bicycle Volume [bicycles/h]	9			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	80
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	54.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Overlap	Permiss	Permiss	Permiss
Signal Group	0	2	0	0	6	0	4	0	4	0	0	0
Auxiliary Signal Groups									2,4			
Lead / Lag	-	-	-	-	-	-	Lead	-	-	-	-	-
Minimum Green [s]	0	4	0	0	4	0	4	0	4	0	0	0
Maximum Green [s]	0	35	0	0	35	0	30	0	30	0	0	0
Amber [s]	0.0	4.1	0.0	0.0	4.1	0.0	3.0	0.0	3.0	0.0	0.0	0.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	2.0	0.0	0.0	0.0
Split [s]	0	55	0	0	55	0	25	0	25	0	0	0
Vehicle Extension [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	0.0	3.0	0.0	0.0	0.0
Walk [s]	0	1	0	0	1	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	7	0	0	32	0	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	3.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No		No					
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	0.0	2.0	0.0	0.0	0.0
I2, Clearance Lost Time [s]	0.0	2.1	0.0	0.0	2.1	0.0	3.0	0.0	3.0	0.0	0.0	0.0
Minimum Recall		No			No		No		No			
Maximum Recall		No			No		No		No			
Pedestrian Recall		No			No		No		No			
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	C	R	L	R	
C, Cycle Length [s]	80	80	80	80	80	80	
L, Total Lost Time per Cycle [s]	4.10	4.10	4.10	4.10	5.00	5.00	
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	
l2, Clearance Lost Time [s]	2.10	2.10	2.10	2.10	3.00	0.00	
g_i, Effective Green Time [s]	54	54	54	54	16	75	
g / C, Green / Cycle	0.68	0.68	0.68	0.68	0.21	0.94	
(v / s)_i Volume / Saturation Flow Rate	0.17	0.45	0.31	0.63	0.17	0.10	
s, saturation flow rate [veh/h]	5094	1550	5094	941	3459	2813	
c, Capacity [veh/h]	3461	1053	3461	639	715	2637	
d1, Uniform Delay [s]	4.96	7.36	5.91	11.01	30.33	0.17	
k, delay calibration	0.50	0.50	0.50	0.50	0.11	0.50	
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	
d2, Incremental Delay [s]	0.18	3.36	0.42	20.98	2.53	0.08	
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	

Lane Group Results

X, volume / capacity	0.25	0.67	0.45	0.92	0.83	0.11	
d, Delay for Lane Group [s/veh]	5.14	10.72	6.33	31.99	32.87	0.26	
Lane Group LOS	A	B	A	C	C	A	
Critical Lane Group	No	No	No	Yes	Yes	No	
50th-Percentile Queue Length [veh/ln]	1.55	6.31	3.29	10.41	5.52	0.03	
50th-Percentile Queue Length [ft/ln]	38.84	157.75	82.16	260.23	137.91	0.76	
95th-Percentile Queue Length [veh/ln]	2.80	10.43	5.92	15.70	9.37	0.05	
95th-Percentile Queue Length [ft/ln]	69.90	260.74	147.88	392.52	234.21	1.37	

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	0.00	5.14	10.72	0.00	6.33	31.99	32.87	0.00	0.26	0.00	0.00	0.00
Movement LOS		A	B		A	C	C		A			
d_A, Approach Delay [s/veh]	7.62			13.39			22.22			0.00		
Approach LOS	A			B			C			A		
d_I, Intersection Delay [s/veh]	13.10											
Intersection LOS	B											
Intersection V/C	0.998											

Other Modes

g_Walk,mi, Effective Walk Time [s]	20.0	0.0	5.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	22.48	0.00	35.13	0.00
l_p,int, Pedestrian LOS Score for Intersectio	3.053	0.000	2.586	0.000
Crosswalk LOS	C	F	B	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1198	1198	500	0
d_b, Bicycle Delay [s]	6.45	6.43	22.48	39.98
l_b,int, Bicycle LOS Score for Intersection	2.430	2.739	1.560	4.132
Bicycle LOS	B	B	A	D

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 8000: O'Brien Drive/Kavanaugh Drive

Control Type:	All-way stop	Delay (sec / veh):	86.7
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.258

Intersection Setup

Name	O'Brien Drive		O'Brien Drive		Kavanaugh Drive	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	O'Brien Drive		O'Brien Drive		Kavanaugh Drive	
Base Volume Input [veh/h]	404	90	64	662	75	182
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	2	1	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	404	90	64	664	76	182
Peak Hour Factor	0.9340	0.9340	0.9340	0.9340	0.9340	0.9340
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	108	24	17	178	20	49
Total Analysis Volume [veh/h]	433	96	69	711	81	195
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	625	780	556
Degree of Utilization, x	0.85	1.26	0.50

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	9.32	29.83	2.74
95th-Percentile Queue Length [ft]	232.94	745.70	68.51
Approach Delay [s/veh]	32.45	148.62	15.68
Approach LOS	D	F	C
Intersection Delay [s/veh]	86.70		
Intersection LOS	F		

Intersection Level Of Service Report
Intersection 9000: Bayfront Expy (SR 84)/University Ave (SR 109)

Control Type:	Signalized	Delay (sec / veh):	24.0
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.820

Intersection Setup

Name	University Avenue (SR109)		Bayfront Expy (SR84)		Bayfront Expy (SR84)	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	2	0	1	2	0
Entry Pocket Length [ft]	100.00	250.00	100.00	100.00	830.00	100.00
No. of Lanes in Exit Pocket	0	2	0	0	0	0
Exit Pocket Length [ft]	0.00	74.61	0.00	0.00	0.00	0.00
Speed [mph]	35.00		55.00		55.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		No	

Volumes

Name	University Avenue (SR109)		Bayfront Expy (SR84)		Bayfront Expy (SR84)	
Base Volume Input [veh/h]	148	388	1010	81	1077	3348
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	1	0	2	1
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	148	388	1011	81	1079	3349
Peak Hour Factor	0.9240	0.9240	0.9240	0.9240	0.9240	0.9240
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	40	105	274	22	292	906
Total Analysis Volume [veh/h]	160	420	1094	88	1168	3624
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	1		2		0	
v_ci, Inbound Pedestrian Volume crossing mi	2		1		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	4		6		5	

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	180
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	113.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	10.00

Phasing & Timing

Control Type	Permissive	Overlap	Permissive	Permissive	Protected	Permissive
Signal Group	4	4	6	2	5	2
Auxiliary Signal Groups		4,5				
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	12	12	10	10	11	10
Maximum Green [s]	15	15	60	60	30	60
Amber [s]	3.0	3.0	5.0	5.4	3.0	5.4
All red [s]	1.0	1.0	1.0	0.5	0.5	0.5
Split [s]	36	36	54	144	90	144
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	3.0
Walk [s]	4	4	4	0	0	0
Pedestrian Clearance [s]	29	29	35	0	0	0
Delayed Vehicle Green [s]	3.0	3.0	3.0	0.0	0.0	0.0
Rest In Walk	No		No			No
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	2.0	2.0	4.0	3.9	1.5	3.9
Minimum Recall	No	No	No		No	No
Maximum Recall	No	No	No		No	No
Pedestrian Recall	No	No	No		No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	20.0	20.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	R	C	R	L	C
C, Cycle Length [s]	180	180	180	180	180	180
L, Total Lost Time per Cycle [s]	4.00	3.50	6.00	6.00	3.50	5.90
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	0.00	4.00	4.00	1.50	3.90
g_i, Effective Green Time [s]	15	85	86	86	66	155
g / C, Green / Cycle	0.08	0.47	0.48	0.48	0.37	0.86
(v / s)_i Volume / Saturation Flow Rate	0.05	0.10	0.21	0.06	0.34	0.71
s, saturation flow rate [veh/h]	3459	4201	5094	1563	3459	5094
c, Capacity [veh/h]	283	1982	2421	743	1272	4396
d1, Uniform Delay [s]	79.52	27.86	31.55	26.23	54.29	5.84
k, delay calibration	0.11	0.11	0.50	0.50	0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	1.77	0.05	0.61	0.33	3.15	1.88
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.57	0.21	0.45	0.12	0.92	0.82
d, Delay for Lane Group [s/veh]	81.29	27.91	32.16	26.55	57.44	7.72
Lane Group LOS	F	C	C	C	E	A
Critical Lane Group	No	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	3.66	3.63	10.45	2.14	24.87	12.56
50th-Percentile Queue Length [ft/ln]	91.47	90.75	261.33	53.41	621.82	313.99
95th-Percentile Queue Length [veh/ln]	6.59	6.53	15.76	3.85	33.05	18.37
95th-Percentile Queue Length [ft/ln]	164.65	163.35	393.89	96.14	826.29	459.30

Movement, Approach, & Intersection Results

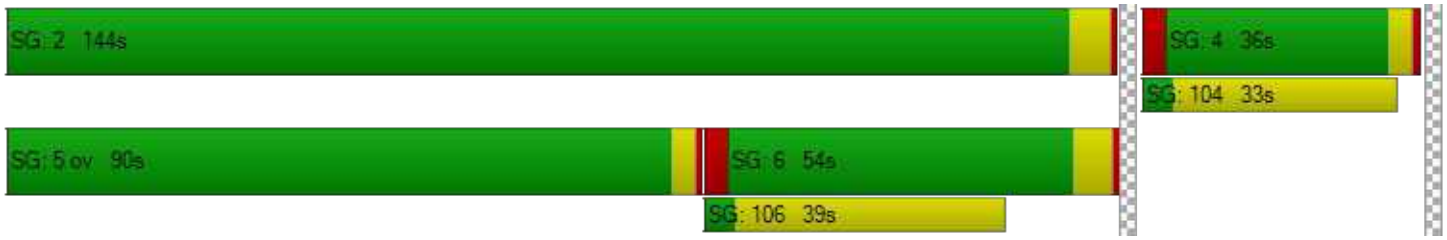
d_M, Delay for Movement [s/veh]	81.29	27.91	32.16	26.55	57.44	7.72
Movement LOS	F	C	C	C	E	A
d_A, Approach Delay [s/veh]	42.63		31.75		19.84	
Approach LOS	D		C		B	
d_I, Intersection Delay [s/veh]	24.00					
Intersection LOS	C					
Intersection V/C	0.820					

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	1341.40	0.00	0.00
d_p, Pedestrian Delay [s]	82.16	82.16	0.00
l_p,int, Pedestrian LOS Score for Intersectio	3.115	3.896	0.000
Crosswalk LOS	C	D	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	322	500	1535
d_b, Bicycle Delay [s]	63.45	50.76	4.88
l_b,int, Bicycle LOS Score for Intersection	1.670	2.210	4.195
Bicycle LOS	A	B	D

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 10000: University Avenue/Adams Drive

Control Type:	Two-way stop	Delay (sec / veh):	77.6
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.299

Intersection Setup

Name	University Avenue		University Avenue (SR109)		Adams Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		No	

Volumes

Name	University Avenue		University Avenue (SR109)		Adams Drive	
Base Volume Input [veh/h]	41	861	976	87	17	5
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	2	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	41	861	978	87	17	5
Peak Hour Factor	0.8610	0.8610	0.8610	0.8610	0.8610	0.8610
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	12	250	284	25	5	1
Total Analysis Volume [veh/h]	48	1000	1136	101	20	6
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.09	0.01	0.01	0.00	0.30	0.01
d_M, Delay for Movement [s/veh]	12.05	0.00	0.00	0.00	77.56	32.00
Movement LOS	B	A	A	A	F	D
95th-Percentile Queue Length [veh/ln]	0.28	0.00	0.00	0.00	1.18	1.18
95th-Percentile Queue Length [ft/ln]	7.02	0.00	0.00	0.00	29.38	29.38
d_A, Approach Delay [s/veh]	0.55		0.00		67.05	
Approach LOS	A		A		F	
d_I, Intersection Delay [s/veh]	1.00					
Intersection LOS	F					

Intersection Level Of Service Report
Intersection 11000: University Ave/O'Brien Dr

Control Type:	Signalized	Delay (sec / veh):	23.4
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.765

Intersection Setup

Name	University Avenue		University Avenue		O'Brien Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	1	0
Entry Pocket Length [ft]	90.00	100.00	100.00	100.00	45.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00		25.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	No		No		No	

Volumes

Name	University Avenue		University Avenue		O'Brien Drive	
Base Volume Input [veh/h]	348	889	834	149	13	99
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	2	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	348	889	834	151	13	99
Peak Hour Factor	0.8540	0.8540	0.8540	0.8540	0.8540	0.8540
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	102	260	244	44	4	29
Total Analysis Volume [veh/h]	407	1041	977	177	15	116
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		2	
Bicycle Volume [bicycles/h]	1		1		1	

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	130
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	48.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	11.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal Group	1	6	2	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	5	5	5	0	5	0
Maximum Green [s]	30	30	30	0	30	0
Amber [s]	3.0	3.0	3.0	0.0	3.0	0.0
All red [s]	1.0	1.0	1.0	0.0	1.0	0.0
Split [s]	67	76	9	0	54	0
Vehicle Extension [s]	3.0	3.0	3.0	0.0	3.0	0.0
Walk [s]	0	5	5	0	5	0
Pedestrian Clearance [s]	0	10	10	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
Minimum Recall	No	No	No		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	L	R
C, Cycle Length [s]	130	130	130	130	130	130
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	35	109	70	70	13	13
g / C, Green / Cycle	0.27	0.84	0.54	0.54	0.10	0.10
(v / s)_i Volume / Saturation Flow Rate	0.25	0.32	0.34	0.36	0.01	0.08
s, saturation flow rate [veh/h]	1603	3204	1683	1585	1603	1410
c, Capacity [veh/h]	434	2697	909	856	155	136
d1, Uniform Delay [s]	46.29	2.41	20.92	21.62	53.51	57.69
k, delay calibration	0.11	0.50	0.50	0.50	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	10.34	0.42	3.37	4.23	0.27	13.51
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.94	0.39	0.63	0.67	0.10	0.85
d, Delay for Lane Group [s/veh]	56.63	2.83	24.29	25.84	53.78	71.20
Lane Group LOS	E	A	C	C	D	E
Critical Lane Group	Yes	No	No	Yes	No	Yes
50th-Percentile Queue Length [veh/ln]	14.15	2.51	13.11	13.67	0.46	4.26
50th-Percentile Queue Length [ft/ln]	353.82	62.85	327.64	341.67	11.54	106.61
95th-Percentile Queue Length [veh/ln]	20.32	4.53	19.04	19.73	0.83	7.65
95th-Percentile Queue Length [ft/ln]	508.06	113.13	476.07	493.24	20.78	191.27

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	56.63	2.83	24.93	25.84	53.78	71.20
Movement LOS	E	A	C	C	D	E
d_A, Approach Delay [s/veh]	17.95		25.07		69.20	
Approach LOS	B		C		E	
d_I, Intersection Delay [s/veh]	23.41					
Intersection LOS	C					
Intersection V/C	0.765					

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	0.000
Crosswalk LOS	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1108	77	769
d_b, Bicycle Delay [s]	12.94	60.11	24.62
l_b,int, Bicycle LOS Score for Intersection	2.754	2.512	1.560
Bicycle LOS	C	B	A

Sequence

Ring 1	1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 12000: University Avenue/Kavanaugh Drive

Control Type:	Signalized	Delay (sec / veh):	22.1
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.494

Intersection Setup

Name	University Avenue		University Avenue		Kavanaugh Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		No		No	

Volumes

Name	University Avenue		University Avenue		Kavanaugh Drive	
Base Volume Input [veh/h]	88	1025	869	45	70	66
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	1	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	89	1025	869	45	70	66
Peak Hour Factor	0.8550	0.8550	0.8550	0.8550	0.8550	0.8550
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	26	300	254	13	20	19
Total Analysis Volume [veh/h]	104	1199	1016	53	82	77
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		1		2	
Bicycle Volume [bicycles/h]	1		3		1	

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fixed time
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal Group	1	6	2	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	5	5	5	0	5	0
Maximum Green [s]	30	30	30	0	30	0
Amber [s]	3.0	3.0	3.0	0.0	3.0	0.0
All red [s]	1.0	1.0	1.0	0.0	1.0	0.0
Split [s]	19	60	41	0	30	0
Vehicle Extension [s]	3.0	3.0	3.0	0.0	3.0	0.0
Walk [s]	0	5	5	0	5	0
Pedestrian Clearance [s]	0	10	10	0	21	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
Minimum Recall	No	No	No		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	C
C, Cycle Length [s]	90	90	90	90	90
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	15	56	37	37	26
g / C, Green / Cycle	0.17	0.62	0.41	0.41	0.29
(v / s)_i Volume / Saturation Flow Rate	0.06	0.37	0.32	0.32	0.10
s, saturation flow rate [veh/h]	1603	3204	1683	1650	1514
c, Capacity [veh/h]	267	1994	692	678	438
d1, Uniform Delay [s]	33.42	10.26	22.87	23.09	25.42
k, delay calibration	0.50	0.50	0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	4.23	1.35	8.18	9.02	2.33
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.39	0.60	0.77	0.79	0.36
d, Delay for Lane Group [s/veh]	37.65	11.61	31.05	32.11	27.75
Lane Group LOS	D	B	C	C	C
Critical Lane Group	Yes	No	No	Yes	Yes
50th-Percentile Queue Length [veh/ln]	2.34	6.88	10.84	11.06	2.93
50th-Percentile Queue Length [ft/ln]	58.38	171.88	271.11	276.49	73.22
95th-Percentile Queue Length [veh/ln]	4.20	11.18	16.25	16.51	5.27
95th-Percentile Queue Length [ft/ln]	105.09	279.38	406.13	412.83	131.80

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	37.65	11.61	31.55	32.11	27.75	27.75
Movement LOS	D	B	C	C	C	C
d_A, Approach Delay [s/veh]	13.69		31.58		27.75	
Approach LOS	B		C		C	
d_I, Intersection Delay [s/veh]	22.13					
Intersection LOS	C					
Intersection V/C	0.494					

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	36.45	0.00	0.00
l_p,int, Pedestrian LOS Score for Intersectio	2.691	0.000	0.000
Crosswalk LOS	B	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1244	822	578
d_b, Bicycle Delay [s]	6.43	15.63	22.77
l_b,int, Bicycle LOS Score for Intersection	2.635	2.442	1.822
Bicycle LOS	B	B	A

Sequence

Ring 1	1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 13000: Willow Road/Driveway A

Control Type:	Two-way stop	Delay (sec / veh):	10.9
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.003

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		Driveway A	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		Driveway A	
Base Volume Input [veh/h]	780	0	0	1059	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	3	0	3	0	2
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	780	3	0	1062	0	2
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	195	1	0	266	0	1
Total Analysis Volume [veh/h]	780	3	0	1062	0	2
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	0.00	0.00	10.95
Movement LOS	A	A		A		B
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.01
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.00	0.25
d_A, Approach Delay [s/veh]	0.00		0.00		10.95	
Approach LOS	A		A		B	
d_I, Intersection Delay [s/veh]	0.01					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 14000: Driveway B/O'Brien Drive

Control Type:	Two-way stop	Delay (sec / veh):	11.3
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.002

Intersection Setup

Name	Driveway B		O'Brien Drive		O'Brien Drive	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Driveway B		O'Brien Drive		O'Brien Drive	
Base Volume Input [veh/h]	0	0	0	628	495	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	1	5	0	1	3
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	1	5	628	496	3
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	1	157	124	1
Total Analysis Volume [veh/h]	0	1	5	628	496	3
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	21.23	11.30	8.39	0.00	0.00	0.00
Movement LOS	C	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.01	0.01	0.01	0.01	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.13	0.13	0.21	0.21	0.00	0.00
d_A, Approach Delay [s/veh]	11.30		0.07		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	0.05					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 15000: Driveway C/O'Brien Drive

Control Type:	Two-way stop	Delay (sec / veh):	0.0
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.006

Intersection Setup

Name	Driveway C		O'Brien Drive		O'Brien Drive	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Driveway C		O'Brien Drive		O'Brien Drive	
Base Volume Input [veh/h]	0	0	0	628	495	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	3	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	628	498	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	157	125	0
Total Analysis Volume [veh/h]	0	0	0	628	498	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	20.89	11.29	8.38	0.00	0.00	0.00
Movement LOS	C	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	16.09		0.00		0.00	
Approach LOS	C		A		A	
d_I, Intersection Delay [s/veh]	0.00					
Intersection LOS	A					

1005 O'Brien Drive and 1320 Willow Road

Vistro File: P:\...\OBrien_Willow_PM_Revised_V3.vistro
Report File: P:\...\NT_PM_v3.pdf

Scenario 17 Near-term PM (2027)
3/18/2025

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1000	Bayfront Expy (SR 84)/Willow Rd (SR 114)	Signalized	HCM 7th Edition	EB Thru	1.136	421.3	F
2000	Willow Rd (SR 114)/Hamilton Ave	Signalized	HCM 7th Edition	SB Left	1.857	433.7	F
3000	Willow Rd (SR 114)/Ivy Dr	Signalized	HCM 7th Edition	NB Left	1.056	46.6	D
4000	Willow Rd (SR 114)/O'Brien Dr	Signalized	HCM 7th Edition	WB Right	1.609	228.9	F
5000	Willow Rd (SR 114) /Newbridge St	Signalized	HCM 7th Edition	SB Right	1.108	175.3	F
6000	Willow Rd/US-101 NB Ramps	Signalized	HCM 7th Edition	WB Left	0.550	8.7	A
7000	Willow Rd/US-101 SB Ramps	Signalized	HCM 7th Edition	EB Left	0.876	11.3	B
8000	O'Brien Drive/Kavanaugh Drive	All-way stop	HCM 7th Edition	SB Thru	0.654	15.2	C
9000	Bayfront Expy (SR 84) /University Ave (SR 109)	Signalized	HCM 7th Edition	NB Right	0.885	69.0	E
10000	University Avenue/Adams Drive	Two-way stop	HCM 7th Edition	EB Left	0.405	38.4	E
11000	University Ave/O'Brien Dr	Signalized	HCM 7th Edition	NB Left	0.673	20.5	C
12000	University Avenue/Kavanaugh Drive	Signalized	HCM 7th Edition	NB Left	0.593	17.9	B
13000	Willow Road/Driveway A	Two-way stop	HCM 7th Edition	WB Right	0.005	14.7	B
14000	Driveway B/O'Brien Drive	Two-way stop	HCM 7th Edition	SB Left	0.009	16.0	C
15000	Driveway C/O'Brien Drive	Two-way stop	HCM 7th Edition	WB Thru	0.005	0.0	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1000: Bayfront Expy (SR 84)/Willow Rd (SR 114)

Control Type:	Signalized	Delay (sec / veh):	421.3
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.136

Intersection Setup

Name	Willow Road (SR 114)			Willow Road			Ba Ex			Ba Ex		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	3	0	1	0	0	0	2	0	1	1	0	1
Entry Pocket Length [ft]	265.00	100.00	200.00	100.00	100.00	100.00	530.00	100.00	630.00	1500.00	100.00	600.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			20.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			No			Yes			No		

Volumes

Name	Willow Road (SR 114)			Willow Road			Ba Ex			Ba Ex		
Base Volume Input [veh/h]	81	31	1333	49	168	87	34	1868	248	402	853	6
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	2	0	2	0	0	0	0	0	1	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	70	0	0	45	0	0	1
Total Hourly Volume [veh/h]	83	31	1335	49	168	17	34	1868	204	402	853	5
Peak Hour Factor	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	22	8	347	13	44	4	9	486	53	105	222	1
Total Analysis Volume [veh/h]	86	32	1389	51	175	18	35	1944	212	418	888	5
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			11			11			0		
v_di, Inbound Pedestrian Volume crossing m	0			11			11			0		
v_co, Outbound Pedestrian Volume crossing	8			0			8			0		
v_ci, Inbound Pedestrian Volume crossing mi	8			0			8			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	1			2			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	200
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	120.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Protecte	Permiss	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	7	4	4	3	8	4	1	6	2	5	2	6
Auxiliary Signal Groups			4,5									
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	13	12	12	15	15	12	6	25	10	11	10	25
Maximum Green [s]	22	15	15	9	9	15	26	40	30	25	30	40
Amber [s]	3.6	3.9	3.9	3.6	3.6	3.9	3.6	5.0	5.0	3.6	5.0	5.0
All red [s]	0.0	0.5	0.5	1.5	1.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0
Split [s]	18	27	27	30	39	27	17	82	126	61	126	82
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Walk [s]	0	0	0	0	4	0	0	4	0	4	0	4
Pedestrian Clearance [s]	0	0	0	0	29	0	0	35	0	11	0	35
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	3.0	0.0	3.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	1.6	2.4	2.4	3.1	3.1	2.4	2.6	4.0	4.0	2.6	4.0	4.0
Minimum Recall	No	No	No	No	No		No	Yes		No	Yes	
Maximum Recall	No	No	No	No	No		No	No		No	No	
Pedestrian Recall	No	No	No	No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
C, Cycle Length [s]	200	200	200	200	200	200	200	200	200	200	200	200
L, Total Lost Time per Cycle [s]	3.60	4.40	4.60	5.10	5.10	5.10	4.60	6.00	6.00	4.60	6.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.60	2.40	0.00	3.10	3.10	3.10	2.60	4.00	4.00	2.60	4.00	4.00
g_i, Effective Green Time [s]	13	101	130	14	103	103	5	40	40	25	60	60
g / C, Green / Cycle	0.06	0.50	0.65	0.07	0.51	0.51	0.03	0.20	0.20	0.13	0.30	0.30
(v / s)_i Volume / Saturation Flow Rate	0.05	0.02	0.33	0.03	0.11	0.01	0.02	0.63	0.22	0.12	0.17	0.00
s, saturation flow rate [veh/h]	1781	1593	4151	1781	1593	1549	2102	3097	966	3459	5094	1589
c, Capacity [veh/h]	115	802	2701	126	818	796	54	620	193	433	1525	476
d1, Uniform Delay [s]	91.86	25.12	18.17	88.86	26.56	23.91	96.41	79.91	79.91	86.99	59.39	49.19
k, delay calibration	0.11	0.50	0.50	0.11	0.43	0.11	0.11	0.46	0.50	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	9.27	0.09	0.70	2.10	0.51	0.01	12.00	965.22	92.55	13.55	0.35	0.01
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.75	0.04	0.51	0.41	0.21	0.02	0.64	3.14	1.10	0.97	0.58	0.01
d, Delay for Lane Group [s/veh]	101.13	25.22	18.87	90.97	27.07	23.92	108.42	1045.13	172.46	100.54	59.75	49.20
Lane Group LOS	F	C	B	F	C	C	F	F	F	F	E	D
Critical Lane Group	No	No	Yes	Yes	No	No	No	Yes	No	Yes	No	No
50th-Percentile Queue Length [veh/ln]	4.69	0.41	11.25	2.66	2.47	0.45	1.00	66.13	15.02	11.68	12.96	0.18
50th-Percentile Queue Length [ft/ln]	117.22	10.15	281.35	66.39	61.82	11.24	25.05	1653.19	375.42	291.98	324.11	4.55
95th-Percentile Queue Length [veh/ln]	8.24	0.73	16.76	4.78	4.45	0.81	1.80	105.37	22.41	17.28	18.87	0.33
95th-Percentile Queue Length [ft/ln]	206.00	18.26	418.90	119.50	111.28	20.24	45.10	2634.24	560.37	432.09	471.73	8.18

Movement, Approach, & Intersection Results

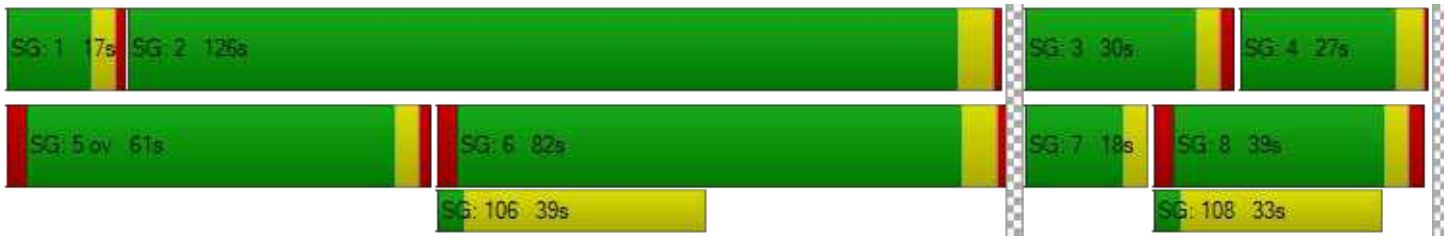
d_M, Delay for Movement [s/veh]	101.13	25.22	18.87	90.97	27.07	23.92	108.42	1045.13	172.46	100.54	59.75	49.20
Movement LOS	F	C	B	F	C	C	F	F	F	F	E	D
d_A, Approach Delay [s/veh]	23.70			40.19			945.73			72.71		
Approach LOS	C			D			F			E		
d_I, Intersection Delay [s/veh]	421.27											
Intersection LOS	F											
Intersection V/C	1.136											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	0.0	8.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	160.84	0.00	178.26	0.00
d_p, Pedestrian Delay [s]	92.12	0.00	92.12	0.00
l_p,int, Pedestrian LOS Score for Intersectio	3.143	0.000	3.256	0.000
Crosswalk LOS	C	F	C	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	226	309	730	1201
d_b, Bicycle Delay [s]	78.67	71.52	40.28	15.97
l_b,int, Bicycle LOS Score for Intersection	2.803	1.819	2.789	2.281
Bicycle LOS	C	A	C	B

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 2000: Willow Rd (SR 114)/Hamilton Ave

Control Type:	Signalized	Delay (sec / veh):	433.7
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.857

Intersection Setup

Name	Willow Road (SR 114)			Willow Road (SR 114)			Hamilton Avenue			Main Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			30.00			25.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Willow Road (SR 114)			Willow Road (SR 114)			Hamilton Avenue			Main Street		
Base Volume Input [veh/h]	124	1307	21	330	723	55	62	9	66	69	16	454
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	4	0	0	1	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	124	1311	21	330	724	55	62	9	66	69	16	454
Peak Hour Factor	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	32	342	5	86	189	14	16	2	17	18	4	119
Total Analysis Volume [veh/h]	130	1370	22	345	757	57	65	9	69	72	17	474
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	1			13			5			1		
v_di, Inbound Pedestrian Volume crossing m	5			1			1			13		
v_co, Outbound Pedestrian Volume crossing	3			5			13			1		
v_ci, Inbound Pedestrian Volume crossing mi	1			13			5			3		
v_ab, Corner Pedestrian Volume [ped/h]	3			13			5			1		
Bicycle Volume [bicycles/h]	1			1			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	20.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	1	6	2	5	2	6	4	8	4	8	4	8
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	Lead	-	-	Lag	-	-	Lag	-	-
Minimum Green [s]	4	10	10	4	10	10	4	4	4	4	4	4
Maximum Green [s]	21	30	30	16	30	30	26	26	26	26	26	26
Amber [s]	3.0	4.4	4.4	3.0	4.4	4.4	3.6	3.7	3.6	3.7	3.6	3.7
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	24	92	85	17	85	92	36	36	36	36	36	36
Vehicle Extension [s]	3.0	4.0	4.0	2.0	4.0	4.0	2.0	3.0	2.0	3.0	2.0	3.0
Walk [s]	0	4	4	0	4	4	4	4	4	4	4	4
Pedestrian Clearance [s]	0	19	15	0	15	19	25	25	25	25	25	25
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	1.0	2.4	2.4	1.0	2.4	2.4	1.6	1.7	1.6	1.7	1.6	1.7
Minimum Recall	No	Yes		No	Yes			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	6.0	6.0	6.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	C	C
C, Cycle Length [s]	145	145	145	145	145	145	145	145
L, Total Lost Time per Cycle [s]	3.00	4.40	4.40	3.00	4.40	4.40	3.70	3.60
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.00
l2, Clearance Lost Time [s]	1.00	2.40	2.40	1.00	2.40	2.40	1.70	0.00
g_i, Effective Green Time [s]	12	88	88	14	89	89	32	32
g / C, Green / Cycle	0.09	0.60	0.60	0.10	0.61	0.61	0.22	0.22
(v / s)_i Volume / Saturation Flow Rate	0.07	0.83	0.84	0.43	0.49	0.50	0.44	0.72
s, saturation flow rate [veh/h]	1781	837	831	797	837	811	322	786
c, Capacity [veh/h]	153	505	502	77	514	499	108	193
d1, Uniform Delay [s]	65.25	28.68	28.68	65.38	21.16	21.30	60.64	56.02
k, delay calibration	0.11	0.50	0.50	0.50	0.50	0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	12.20	183.25	184.69	1593.47	12.37	13.06	196.91	878.42
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.85	1.38	1.38	4.48	0.80	0.81	1.33	2.92
d, Delay for Lane Group [s/veh]	77.46	211.92	213.37	1658.85	33.53	34.37	257.55	934.44
Lane Group LOS	E	F	F	F	C	C	F	F
Critical Lane Group	No	No	Yes	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	5.21	41.78	41.73	36.98	12.01	11.88	9.96	54.34
50th-Percentile Queue Length [ft/ln]	130.22	1044.55	1043.22	924.44	300.25	296.95	248.94	1358.47
95th-Percentile Queue Length [veh/ln]	8.95	65.12	65.11	58.49	17.69	17.53	17.09	88.34
95th-Percentile Queue Length [ft/ln]	223.79	1627.89	1627.76	1462.36	442.33	438.26	427.32	2208.43

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	77.46	212.63	213.37	1658.85	33.91	34.37	257.55	257.55	257.55	934.44	934.44	934.44
Movement LOS	E	F	F	F	C	C	F	F	F	F	F	F
d_A, Approach Delay [s/veh]	201.10			517.63			257.55			934.44		
Approach LOS	F			F			F			F		
d_I, Intersection Delay [s/veh]	433.69											
Intersection LOS	F											
Intersection V/C	1.857											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	241.01	0.00	171.00	1034.60
d_p, Pedestrian Delay [s]	64.67	64.67	64.67	64.67
l_p,int, Pedestrian LOS Score for Intersectio	3.275	3.015	1.880	2.219
Crosswalk LOS	C	C	A	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1168	1071	404	406
d_b, Bicycle Delay [s]	12.55	15.63	46.11	46.03
l_b,int, Bicycle LOS Score for Intersection	2.815	2.516	1.796	2.489
Bicycle LOS	C	B	A	B

Sequence

Ring 1	2	1	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 3000: Willow Rd (SR 114)/Ivy Dr

Control Type:	Signalized	Delay (sec / veh):	46.6
Analysis Method:	HCM 7th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.056

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		Ivy Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	1
Entry Pocket Length [ft]	85.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	1	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	100.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		Ivy Drive	
Base Volume Input [veh/h]	101	1381	801	99	34	79
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	2	4	1	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	103	1385	802	99	34	79
Peak Hour Factor	0.9670	0.9670	0.9670	0.9670	0.9670	0.9670
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	27	358	207	26	9	20
Total Analysis Volume [veh/h]	107	1432	829	102	35	82
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	3		7		2	
v_di, Inbound Pedestrian Volume crossing m	2		6		3	
v_co, Outbound Pedestrian Volume crossing	6		3		3	
v_ci, Inbound Pedestrian Volume crossing mi	7		3		3	
v_ab, Corner Pedestrian Volume [ped/h]	9		10		5	
Bicycle Volume [bicycles/h]	0		4		1	

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	10.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal Group	5	2	6	6	4	4
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	4	10	10	10	11	11
Maximum Green [s]	21	30	30	30	28	28
Amber [s]	3.0	4.4	4.4	4.4	3.0	3.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	22	111	89	89	34	34
Vehicle Extension [s]	2.0	2.0	2.0	2.0	2.0	2.0
Walk [s]	0	0	4	4	4	4
Pedestrian Clearance [s]	0	0	22	22	24	24
Delayed Vehicle Green [s]	0.0	0.0	3.0	3.0	3.0	3.0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	1.0	2.4	2.4	2.4	1.0	1.0
Minimum Recall	No	Yes	Yes		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	L	R
C, Cycle Length [s]	145	145	145	145	145	145
L, Total Lost Time per Cycle [s]	3.00	4.40	4.40	4.40	3.00	3.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.00	2.40	2.40	2.40	1.00	1.00
g_i, Effective Green Time [s]	14	122	105	105	16	16
g / C, Green / Cycle	0.10	0.84	0.72	0.72	0.11	0.11
(v / s)_i Volume / Saturation Flow Rate	0.08	0.90	0.56	0.58	0.04	0.09
s, saturation flow rate [veh/h]	1265	1593	837	802	994	895
c, Capacity [veh/h]	121	1337	605	580	109	98
d1, Uniform Delay [s]	64.69	11.64	12.55	13.26	59.54	63.06
k, delay calibration	0.09	0.50	0.50	0.50	0.04	0.04
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	15.78	46.07	9.15	11.22	0.63	6.88
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.88	1.07	0.77	0.80	0.32	0.84
d, Delay for Lane Group [s/veh]	80.46	57.71	21.70	24.48	60.16	69.94
Lane Group LOS	F	F	C	C	E	E
Critical Lane Group	No	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	4.40	21.60	9.76	10.49	1.21	3.15
50th-Percentile Queue Length [ft/ln]	109.89	539.92	243.95	262.36	30.37	78.87
95th-Percentile Queue Length [veh/ln]	7.83	31.04	14.88	15.81	2.19	5.68
95th-Percentile Queue Length [ft/ln]	195.85	776.08	372.03	395.18	54.66	141.96

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	80.46	57.71	22.92	24.48	60.16	69.94
Movement LOS	F	F	C	C	E	E
d_A, Approach Delay [s/veh]	59.29		23.09		67.02	
Approach LOS	E		C		E	
d_I, Intersection Delay [s/veh]	46.61					
Intersection LOS	D					
Intersection V/C	1.056					

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	869.04	420.42	678.16
d_p, Pedestrian Delay [s]	64.69	64.69	64.69
l_p,int, Pedestrian LOS Score for Intersectio	2.961	2.935	2.235
Crosswalk LOS	C	C	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1471	1126	386
d_b, Bicycle Delay [s]	5.07	13.87	47.20
l_b,int, Bicycle LOS Score for Intersection	2.829	2.328	1.560
Bicycle LOS	C	B	A

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 4000: Willow Rd (SR 114)/O'Brien Dr

Control Type:	Signalized	Delay (sec / veh):	228.9
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.609

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		O'Brien Drive	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	1	0	1	0
Entry Pocket Length [ft]	100.00	60.00	100.00	100.00	50.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	No		No		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		O'Brien Drive	
Base Volume Input [veh/h]	1407	350	28	873	441	17
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	2	2	1	0	4	4
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	1409	352	29	873	445	21
Peak Hour Factor	0.9860	0.9860	0.9860	0.9860	0.9860	0.9860
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	357	89	7	221	113	5
Total Analysis Volume [veh/h]	1429	357	29	885	451	21
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	5		0		5	
v_ci, Inbound Pedestrian Volume crossing mi	5		0		5	
v_ab, Corner Pedestrian Volume [ped/h]	3		0		13	
Bicycle Volume [bicycles/h]	2		0		4	

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	10.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Permissive	Permissive	Protected	Permissive	Permissive	Permissive
Signal Group	2	2	1	6	4	8
Auxiliary Signal Groups						
Lead / Lag	-	-	Lead	-	Lead	-
Minimum Green [s]	10	10	5	10	8	0
Maximum Green [s]	35	35	21	35	21	0
Amber [s]	4.4	4.4	3.0	4.4	3.2	0.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	105	105	15	120	25	0
Vehicle Extension [s]	2.0	2.0	2.0	2.0	2.0	0.0
Walk [s]	4	4	0	0	0	0
Pedestrian Clearance [s]	17	17	0	0	0	0
Delayed Vehicle Green [s]	3.0	3.0	0.0	0.0	0.0	0.0
Rest In Walk	No			No	No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.4	2.4	1.0	2.4	1.2	0.0
Minimum Recall	Yes		No	Yes	No	
Maximum Recall	No		No	No	No	
Pedestrian Recall	No		No	No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	L	C	L	C
C, Cycle Length [s]	145	145	145	145	145	145
L, Total Lost Time per Cycle [s]	4.40	4.40	3.00	4.40	3.20	3.20
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.40	2.40	1.00	2.40	1.20	1.20
g_i, Effective Green Time [s]	108	108	5	116	22	22
g / C, Green / Cycle	0.74	0.74	0.03	0.80	0.15	0.15
(v / s)_i Volume / Saturation Flow Rate	1.10	0.64	0.04	0.68	0.37	0.37
s, saturation flow rate [veh/h]	1302	561	647	1293	647	640
c, Capacity [veh/h]	967	417	22	1031	97	96
d1, Uniform Delay [s]	18.67	12.61	70.01	9.45	61.59	61.59
k, delay calibration	0.50	0.50	0.04	0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	220.69	19.77	165.00	9.25	677.81	678.13
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	1.48	0.86	1.31	0.86	2.44	2.44
d, Delay for Lane Group [s/veh]	239.36	32.37	235.02	18.70	739.40	739.71
Lane Group LOS	F	C	F	B	F	F
Critical Lane Group	Yes	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	42.80	8.85	1.82	8.10	21.90	21.67
50th-Percentile Queue Length [ft/ln]	1069.98	221.27	45.60	202.42	547.44	541.82
95th-Percentile Queue Length [veh/ln]	69.67	13.73	3.28	12.76	37.04	36.70
95th-Percentile Queue Length [ft/ln]	1741.63	343.25	82.08	319.08	926.11	917.58

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	239.36	32.37	235.02	18.70	739.55	739.71
Movement LOS	F	C	F	B	F	F
d_A, Approach Delay [s/veh]	197.98		25.57		739.55	
Approach LOS	F		C		F	
d_I, Intersection Delay [s/veh]	228.89					
Intersection LOS	F					
Intersection V/C	1.609					

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	64.71
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	2.244
Crosswalk LOS	F	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1346	1595	301
d_b, Bicycle Delay [s]	7.75	2.98	52.44
l_b,int, Bicycle LOS Score for Intersection	3.033	2.314	2.338
Bicycle LOS	C	B	B

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 5000: Willow Rd (SR 114)/Newbridge St

Control Type:	Signalized	Delay (sec / veh):	175.3
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.108

Intersection Setup

Name	Willow Road (SR 114)			Willow Road (SR 114)			Newbridge Street			Newbridge Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	1	0	0	1	0	0	0
Entry Pocket Length [ft]	390.00	100.00	100.00	185.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	1	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	49.21	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			25.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Willow Road (SR 114)			Willow Road (SR 114)			Newbridge Street			Newbridge Street		
Base Volume Input [veh/h]	322	1457	434	93	1118	17	44	178	305	282	159	68
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	3	0	0	4	0	0	0	2	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	175	0	0	45
Total Hourly Volume [veh/h]	322	1460	434	93	1122	17	44	178	132	282	159	23
Peak Hour Factor	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	86	388	115	25	298	5	12	47	35	75	42	6
Total Analysis Volume [veh/h]	343	1553	462	99	1194	18	47	189	140	300	169	24
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	3			7			7			3		
v_di, Inbound Pedestrian Volume crossing m	3			7			7			3		
v_co, Outbound Pedestrian Volume crossing	11			20			10			19		
v_ci, Inbound Pedestrian Volume crossing mi	10			19			11			20		
v_ab, Corner Pedestrian Volume [ped/h]	31			48			41			8		
Bicycle Volume [bicycles/h]	5			0			3			1		

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	140.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Split	Split	Split	Split	Split	Split
Signal Group	5	2	2	1	6	6	4	4	4	8	3	8
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lag	-	-	Lag	-	-	-	-	-
Minimum Green [s]	4	12	12	4	12	12	4	4	4	0	4	0
Maximum Green [s]	21	40	40	21	40	40	25	25	25	0	21	0
Amber [s]	3.0	4.4	4.4	3.0	4.4	4.4	3.6	3.6	3.6	0.0	3.0	0.0
All red [s]	0.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0
Split [s]	34	66	66	19	51	51	30	30	30	0	30	0
Vehicle Extension [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walk [s]	0	4	4	0	4	4	4	4	4	0	4	0
Pedestrian Clearance [s]	0	19	19	0	16	16	23	23	23	0	23	0
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	3.0	0.0	3.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	1.0	3.4	3.4	1.0	3.4	3.4	2.6	2.6	2.6	0.0	1.0	0.0
Minimum Recall	No	Yes		No	Yes			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	L	C	R	L	C	R
C, Cycle Length [s]	145	145	145	145	145	145	145	145	145	145	145	145
L, Total Lost Time per Cycle [s]	3.00	5.40	5.40	3.00	5.40	5.40	4.60	4.60	4.60	3.00	3.00	3.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.00	3.40	3.40	1.00	3.40	3.40	2.60	2.60	2.60	1.00	1.00	1.00
g_i, Effective Green Time [s]	31	61	61	16	46	46	29	29	29	24	24	24
g / C, Green / Cycle	0.21	0.42	0.42	0.11	0.31	0.31	0.20	0.20	0.20	0.16	0.16	0.16
(v / s)_i Volume / Saturation Flow Rate	0.27	0.54	0.57	0.11	0.43	0.43	0.03	0.19	0.09	0.09	0.13	0.02
s, saturation flow rate [veh/h]	1265	2530	1155	937	1874	976	1781	984	1516	3459	1329	1457
c, Capacity [veh/h]	270	1056	482	104	590	307	353	195	301	565	217	238
d1, Uniform Delay [s]	57.02	42.22	42.22	64.10	49.65	49.65	47.81	57.62	51.05	55.54	58.11	51.50
k, delay calibration	0.50	0.50	0.50	0.22	0.50	0.50	0.04	0.40	0.04	0.04	0.19	0.04
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	148.29	134.61	179.53	48.26	168.84	178.58	0.06	49.61	0.42	0.29	9.89	0.07
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	1.27	1.28	1.37	0.96	1.35	1.35	0.13	0.97	0.47	0.53	0.78	0.10
d, Delay for Lane Group [s/veh]	205.31	176.83	221.75	112.36	218.49	228.23	47.88	107.23	51.46	55.83	68.00	51.57
Lane Group LOS	F	F	F	F	F	F	D	F	D	E	E	D
Critical Lane Group	Yes	No	No	No	No	Yes	No	Yes	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	20.81	37.96	40.69	5.06	24.57	26.41	1.43	9.57	4.55	5.08	6.56	0.76
50th-Percentile Queue Length [ft/ln]	520.31	949.01	1017.13	126.48	614.15	660.25	35.63	239.22	113.70	127.04	164.00	18.88
95th-Percentile Queue Length [veh/ln]	31.84	56.37	61.93	8.75	38.41	41.00	2.57	14.64	8.05	8.78	10.76	1.36
95th-Percentile Queue Length [ft/ln]	796.01	1409.29	1548.22	218.70	960.18	1024.99	64.14	366.05	201.14	219.46	269.01	33.98

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	205.31	182.58	221.75	112.36	221.73	228.23	47.88	107.23	51.46	55.83	68.00	51.57
Movement LOS	F	F	F	F	F	F	D	F	D	E	E	D
d_A, Approach Delay [s/veh]	193.56			213.56			79.05			59.79		
Approach LOS	F			F			E			E		
d_I, Intersection Delay [s/veh]	175.32											
Intersection LOS	F											
Intersection V/C	1.108											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	181.28	138.71	372.60	0.00
d_p, Pedestrian Delay [s]	64.70	64.70	64.70	64.70
l_p,int, Pedestrian LOS Score for Intersectio	3.392	2.964	2.668	2.640
Crosswalk LOS	C	C	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	795	588	309	331
d_b, Bicycle Delay [s]	26.39	36.14	51.89	50.49
l_b,int, Bicycle LOS Score for Intersection	2.857	2.281	2.469	2.447
Bicycle LOS	C	B	B	B

Sequence

Ring 1	2	1	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 6000: Willow Rd/US-101 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	8.7
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.550

Intersection Setup

Name	Willow Road			Willow Road (SR 114)			US-101 NB Ramps			US-101 NB Ramps		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	1	0	0	0	1	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	200.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No						No		
Crosswalk	No			No			Yes			Yes		

Volumes

Name	Willow Road			Willow Road (SR 114)			US-101 NB Ramps			US-101 NB Ramps		
Base Volume Input [veh/h]	0	1276	628	0	1032	597	0	0	0	196	0	849
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	2.00	2.00	0.00	2.00	2.00	0.00	0.00	0.00	2.00	0.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	1	0	0	1	5	0	0	0	0	0	2
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	1277	628	0	1033	602	0	0	0	196	0	851
Peak Hour Factor	1.0000	0.9330	0.9330	1.0000	0.9330	0.9330	1.0000	1.0000	1.0000	0.9330	1.0000	0.9330
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	342	168	0	277	161	0	0	0	53	0	228
Total Analysis Volume [veh/h]	0	1369	673	0	1107	645	0	0	0	210	0	912
Presence of On-Street Parking	No		No	No		No				No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			6			16		
Bicycle Volume [bicycles/h]	0			7			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	2.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	8.00

Phasing & Timing

Control Type	Permiss	Permiss	Overlap	Permiss	Permiss	Overlap	Permiss	Permiss	Permiss	Permiss	Permiss	Overlap
Signal Group	0	6	6	0	2	2	0	0	0	3	0	4
Auxiliary Signal Groups			3,4,6			2,3,4						2,3,4
Lead / Lag	-	-	-	-	-	-	-	-	-	Lead	-	-
Minimum Green [s]	0	4	4	0	4	4	0	0	0	6	0	5
Maximum Green [s]	0	35	35	0	35	35	0	0	0	24	0	34
Amber [s]	0.0	4.1	4.1	0.0	4.1	4.1	0.0	0.0	0.0	3.0	0.0	3.0
All red [s]	0.0	1.8	1.8	0.0	1.0	1.0	0.0	0.0	0.0	2.0	0.0	0.0
Split [s]	0	89	89	0	89	89	0	0	0	17	0	22
Vehicle Extension [s]	0.0	3.0	3.0	0.0	3.0	3.0	0.0	0.0	0.0	3.0	0.0	3.0
Walk [s]	0	4	4	0	4	4	0	0	0	0	0	0
Pedestrian Clearance [s]	0	29	29	0	7	7	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No					No		
I1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	2.0	2.0	0.0	0.0	0.0	2.0	0.0	2.0
I2, Clearance Lost Time [s]	0.0	3.9	3.9	0.0	3.1	3.1	0.0	0.0	0.0	3.0	0.0	1.0
Minimum Recall		No	No		No	No				No		No
Maximum Recall		No	No		No	No				No		No
Pedestrian Recall		No	No		No	No				No		No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	C	R		L	R
C, Cycle Length [s]	145	145	145	145		145	145
L, Total Lost Time per Cycle [s]	5.90	5.90	5.10	5.00		5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00		0.00	0.00
l2, Clearance Lost Time [s]	3.90	3.00	3.10	0.00		3.00	0.00
g_i, Effective Green Time [s]	106	134	107	135		12	135
g / C, Green / Cycle	0.73	0.92	0.74	0.93		0.08	0.93
(v / s)_i Volume / Saturation Flow Rate	0.46	0.42	0.37	0.42		0.06	0.55
s, saturation flow rate [veh/h]	3003	1589	3003	1553		3459	1658
c, Capacity [veh/h]	2197	1470	2213	1445		282	1543
d1, Uniform Delay [s]	9.59	0.36	7.93	0.30		65.05	0.39
k, delay calibration	0.50	0.50	0.50	0.50		0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00		1.00	1.00
d2, Incremental Delay [s]	1.34	1.03	0.81	1.00		3.90	1.67
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00		0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00		1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00		1.00	1.00

Lane Group Results

X, volume / capacity	0.62	0.46	0.50	0.45		0.74	0.59
d, Delay for Lane Group [s/veh]	10.94	1.39	8.74	1.30		68.94	2.06
Lane Group LOS	B	A	A	A		E	A
Critical Lane Group	Yes	No	No	No		No	Yes
50th-Percentile Queue Length [veh/ln]	6.91	0.42	4.66	0.40		3.96	0.36
50th-Percentile Queue Length [ft/ln]	172.87	10.51	116.61	10.04		99.11	8.96
95th-Percentile Queue Length [veh/ln]	11.23	0.76	8.21	0.72		7.14	0.64
95th-Percentile Queue Length [ft/ln]	280.68	18.92	205.15	18.07		178.39	16.12

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	0.00	10.94	1.39	0.00	8.74	1.30	0.00	0.00	0.00	68.94	0.00	2.06
Movement LOS		B	A		A	A				E		A
d_A, Approach Delay [s/veh]	7.79			6.00			0.00			14.58		
Approach LOS	A			A			A			B		
d_I, Intersection Delay [s/veh]	8.70											
Intersection LOS	A											
Intersection V/C	0.550											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	64.68	64.68
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	2.077	2.674
Crosswalk LOS	F	F	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1105	1116	0	166
d_b, Bicycle Delay [s]	14.50	14.19	72.46	60.96
l_b,int, Bicycle LOS Score for Intersection	2.683	2.523	4.132	1.560
Bicycle LOS	B	B	D	A

Sequence

Ring 1	-	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 7000: Willow Rd/US-101 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	11.3
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.876

Intersection Setup

Name	Willow Road			Willow Road			US-101 SB Ramps			US-101 SB Ramps		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	0	1	0	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No					
Crosswalk	No			No			Yes			Yes		

Volumes

Name	Willow Road			Willow Road			US-101 SB Ramps			US-101 SB Ramps		
Base Volume Input [veh/h]	0	1173	364	0	790	605	285	0	345	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	2.00	2.00	0.00	2.00	2.00	2.00	0.00	2.00	0.00	0.00	0.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	1	0	1	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	1173	364	0	791	605	286	0	345	0	0	0
Peak Hour Factor	1.0000	0.9520	0.9520	1.0000	0.9520	0.9520	0.9520	1.0000	0.9520	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	308	96	0	208	159	75	0	91	0	0	0
Total Analysis Volume [veh/h]	0	1232	382	0	831	636	300	0	362	0	0	0
Presence of On-Street Parking	No		No	No		No	No		No			
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	1			0			7			17		
Bicycle Volume [bicycles/h]	0			3			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	99.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Permiss	Permiss	Overlap	Permiss	Permiss	Overlap	Permiss	Permiss	Overlap	Permiss	Permiss	Permiss
Signal Group	0	6	6	0	2	2	4	0	4	0	0	0
Auxiliary Signal Groups			4,6			2,4			4,6			
Lead / Lag	-	-	-	-	-	-	Lead	-	-	-	-	-
Minimum Green [s]	0	4	4	0	4	4	4	0	4	0	0	0
Maximum Green [s]	0	35	35	0	35	35	30	0	30	0	0	0
Amber [s]	0.0	4.1	4.1	0.0	4.1	4.1	3.0	0.0	3.0	0.0	0.0	0.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	2.0	0.0	0.0	0.0
Split [s]	0	103	103	0	103	103	25	0	25	0	0	0
Vehicle Extension [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	0.0	3.0	0.0	0.0	0.0
Walk [s]	0	4	4	0	4	4	0	0	0	0	0	0
Pedestrian Clearance [s]	0	7	7	0	32	32	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No		No					
l1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	2.0	2.0	2.0	0.0	2.0	0.0	0.0	0.0
l2, Clearance Lost Time [s]	0.0	2.1	2.1	0.0	2.1	2.1	3.0	0.0	3.0	0.0	0.0	0.0
Minimum Recall		No	No		No	No	No		No			
Maximum Recall		No	No		No	No	No		No			
Pedestrian Recall		No	No		No	No	No		No			
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	C	R	L	R	
C, Cycle Length [s]	145	145	145	145	145	145	
L, Total Lost Time per Cycle [s]	4.10	5.00	4.10	5.00	5.00	5.00	
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	
l2, Clearance Lost Time [s]	2.10	0.00	2.10	0.00	3.00	0.00	
g_i, Effective Green Time [s]	116	140	116	140	20	140	
g / C, Green / Cycle	0.80	0.97	0.80	0.97	0.14	0.97	
(v / s)_i Volume / Saturation Flow Rate	0.24	0.24	0.16	0.92	0.09	0.29	
s, saturation flow rate [veh/h]	5094	1589	5094	694	3459	1251	
c, Capacity [veh/h]	4070	1535	4070	670	478	1208	
d1, Uniform Delay [s]	3.86	0.11	3.50	0.86	58.90	0.12	
k, delay calibration	0.50	0.50	0.50	0.50	0.11	0.21	
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	
d2, Incremental Delay [s]	0.19	0.39	0.11	24.30	1.36	0.27	
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	

Lane Group Results

X, volume / capacity	0.30	0.25	0.20	0.95	0.63	0.30	
d, Delay for Lane Group [s/veh]	4.05	0.50	3.61	25.16	60.26	0.39	
Lane Group LOS	A	A	A	C	E	A	
Critical Lane Group	No	No	No	Yes	No	No	
50th-Percentile Queue Length [veh/ln]	2.89	0.17	1.76	4.52	5.32	0.05	
50th-Percentile Queue Length [ft/ln]	72.25	4.14	44.11	113.06	132.90	1.14	
95th-Percentile Queue Length [veh/ln]	5.20	0.30	3.18	8.01	9.10	0.08	
95th-Percentile Queue Length [ft/ln]	130.05	7.45	79.40	200.26	227.43	2.06	

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	0.00	4.05	0.50	0.00	3.61	25.16	60.26	0.00	0.39	0.00	0.00	0.00
Movement LOS		A	A		A	C	E		A			
d_A, Approach Delay [s/veh]	3.21			12.95			27.53			0.00		
Approach LOS	A			B			C			A		
d_I, Intersection Delay [s/veh]	11.33											
Intersection LOS	B											
Intersection V/C	0.876											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	64.69	64.69
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	2.577	1.820
Crosswalk LOS	F	F	B	A
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1323	1323	276	0
d_b, Bicycle Delay [s]	8.29	8.31	53.85	72.47
l_b,int, Bicycle LOS Score for Intersection	2.447	2.366	1.560	4.132
Bicycle LOS	B	B	A	D

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 8000: O'Brien Drive/Kavanaugh Drive

Control Type:	All-way stop	Delay (sec / veh):	15.2
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.654

Intersection Setup

Name	O'Brien Drive		O'Brien Drive		Kavanaugh Drive	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		Yes		No	

Volumes

Name	O'Brien Drive		O'Brien Drive		Kavanaugh Drive	
Base Volume Input [veh/h]	184	153	111	290	45	214
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	3	0	0	1	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	184	156	111	290	46	214
Peak Hour Factor	0.9150	0.9150	0.9150	0.9150	0.9150	0.9150
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	50	43	30	79	13	58
Total Analysis Volume [veh/h]	201	170	121	317	50	234
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	698	669	653
Degree of Utilization, x	0.53	0.65	0.44

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	3.17	4.86	2.21
95th-Percentile Queue Length [ft]	79.17	121.41	55.13
Approach Delay [s/veh]	13.88	17.95	12.69
Approach LOS	B	C	B
Intersection Delay [s/veh]	15.20		
Intersection LOS	C		

Intersection Level Of Service Report
Intersection 9000: Bayfront Expy (SR 84)/University Ave (SR 109)

Control Type:	Signalized	Delay (sec / veh):	69.0
Analysis Method:	HCM 7th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.885

Intersection Setup

Name	University Avenue (SR109)		Bayfront Expressway (SR84)		Bayfront Expressway (SR84)	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	2	0	1	2	0
Entry Pocket Length [ft]	100.00	250.00	100.00	100.00	830.00	100.00
No. of Lanes in Exit Pocket	0	2	0	0	0	0
Exit Pocket Length [ft]	0.00	74.61	0.00	0.00	0.00	0.00
Speed [mph]	35.00		55.00		55.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		No	

Volumes

Name	University Avenue (SR109)		Bayfront Expressway (SR84)		Bayfront Expressway (SR84)	
Base Volume Input [veh/h]	83	1316	3483	95	333	1116
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	2	2	0	1	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	83	1318	3485	95	334	1116
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	21	336	889	24	85	285
Total Analysis Volume [veh/h]	85	1345	3556	97	341	1139
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	1		2		0	
v_ci, Inbound Pedestrian Volume crossing mi	2		1		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	3		5		8	

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	200
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	198.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	10.00

Phasing & Timing

Control Type	Permissive	Overlap	Permissive	Permissive	Protected	Permissive
Signal Group	4	4	6	2	5	2
Auxiliary Signal Groups		4,5				
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	12	12	10	10	11	10
Maximum Green [s]	15	15	60	60	30	60
Amber [s]	3.0	3.0	5.0	5.4	3.0	5.4
All red [s]	1.0	1.0	1.0	0.5	0.5	0.5
Split [s]	36	36	124	154	26	154
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	3.0
Walk [s]	4	4	4	0	0	0
Pedestrian Clearance [s]	29	29	35	0	0	0
Delayed Vehicle Green [s]	3.0	3.0	3.0	0.0	0.0	0.0
Rest In Walk	No		No			No
l1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0
l2, Clearance Lost Time [s]	2.0	2.0	4.0	3.9	1.5	3.9
Minimum Recall	No	No	No		No	No
Maximum Recall	No	No	No		No	No
Pedestrian Recall	No	No	No		No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	20.0	20.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	R	C	R	L	C
C, Cycle Length [s]	200	200	200	200	200	200
L, Total Lost Time per Cycle [s]	4.00	3.50	6.00	6.00	3.50	5.90
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	0.00	4.00	4.00	1.50	3.90
g_i, Effective Green Time [s]	32	58	132	132	23	158
g / C, Green / Cycle	0.16	0.29	0.66	0.66	0.11	0.79
(v / s)_i Volume / Saturation Flow Rate	0.02	0.32	0.70	0.06	0.10	0.22
s, saturation flow rate [veh/h]	3459	4162	5094	1566	3459	5094
c, Capacity [veh/h]	553	1217	3361	1033	390	4027
d1, Uniform Delay [s]	72.29	70.26	33.99	12.31	87.28	5.65
k, delay calibration	0.11	0.21	0.50	0.50	0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.13	53.30	33.65	0.18	6.29	0.18
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.15	1.11	1.06	0.09	0.88	0.28
d, Delay for Lane Group [s/veh]	72.42	123.56	67.64	12.49	93.57	5.82
Lane Group LOS	E	F	F	B	F	A
Critical Lane Group	No	Yes	Yes	No	No	No
50th-Percentile Queue Length [veh/ln]	1.91	26.62	59.44	1.59	8.90	3.79
50th-Percentile Queue Length [ft/ln]	47.67	665.54	1485.92	39.68	222.54	94.71
95th-Percentile Queue Length [veh/ln]	3.43	37.36	75.91	2.86	13.79	6.82
95th-Percentile Queue Length [ft/ln]	85.81	934.06	1897.80	71.43	344.86	170.47

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	72.42	123.56	67.64	12.49	93.57	5.82
Movement LOS	E	F	F	B	F	A
d_A, Approach Delay [s/veh]	120.52		66.18		26.04	
Approach LOS	F		E		C	
d_I, Intersection Delay [s/veh]	68.97					
Intersection LOS	E					
Intersection V/C	0.885					

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	1160.89	0.00	0.00
d_p, Pedestrian Delay [s]	92.12	92.12	0.00
l_p,int, Pedestrian LOS Score for Intersectio	3.124	3.878	0.000
Crosswalk LOS	C	D	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	290	1150	1482
d_b, Bicycle Delay [s]	73.17	18.08	6.74
l_b,int, Bicycle LOS Score for Intersection	1.670	3.569	2.374
Bicycle LOS	A	D	B

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 10000: University Avenue/Adams Drive

Control Type:	Two-way stop	Delay (sec / veh):	38.4
Analysis Method:	HCM 7th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.405

Intersection Setup

Name	University Avenue		University Avenue (SR109)		Adams Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		No	

Volumes

Name	University Avenue		University Avenue (SR109)		Adams Drive	
Base Volume Input [veh/h]	14	1379	386	7	64	16
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	2	1	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	14	1381	387	7	64	16
Peak Hour Factor	0.9160	0.9160	0.9160	0.9160	0.9160	0.9160
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	377	106	2	17	4
Total Analysis Volume [veh/h]	15	1508	422	8	70	17
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.02	0.00	0.00	0.41	0.02
d_M, Delay for Movement [s/veh]	8.24	0.00	0.00	0.00	38.38	22.10
Movement LOS	A	A	A	A	E	C
95th-Percentile Queue Length [veh/ln]	0.04	0.00	0.00	0.00	1.97	1.97
95th-Percentile Queue Length [ft/ln]	1.01	0.00	0.00	0.00	49.21	49.21
d_A, Approach Delay [s/veh]	0.08		0.00		35.20	
Approach LOS	A		A		E	
d_I, Intersection Delay [s/veh]	1.56					
Intersection LOS	E					

Intersection Level Of Service Report
Intersection 11000: University Ave/O'Brien Dr

Control Type:	Signalized	Delay (sec / veh):	20.5
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.673

Intersection Setup

Name	University Avenue		University Avenue		O'Brien Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	1	0
Entry Pocket Length [ft]	90.00	100.00	100.00	100.00	45.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00		25.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	No		No		No	

Volumes

Name	University Avenue		University Avenue		O'Brien Drive	
Base Volume Input [veh/h]	59	1314	394	8	69	314
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	2	1	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	59	1316	395	8	69	314
Peak Hour Factor	0.9250	0.9250	0.9250	0.9250	0.9250	0.9250
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	16	356	107	2	19	85
Total Analysis Volume [veh/h]	64	1423	427	9	75	339
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		1	
Bicycle Volume [bicycles/h]	2		3		1	

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	130
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	48.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	11.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	1	6	2	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	5	5	5	0	5	0
Maximum Green [s]	30	30	30	0	30	0
Amber [s]	3.0	3.0	3.0	0.0	3.0	0.0
All red [s]	1.0	1.0	1.0	0.0	1.0	0.0
Split [s]	67	76	9	0	54	0
Vehicle Extension [s]	3.0	3.0	3.0	0.0	3.0	0.0
Walk [s]	0	5	5	0	5	0
Pedestrian Clearance [s]	0	10	10	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
Minimum Recall	No	No	No		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	L	R
C, Cycle Length [s]	130	130	130	130	130	130
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	6	92	82	82	30	30
g / C, Green / Cycle	0.05	0.71	0.63	0.63	0.23	0.23
(v / s)_i Volume / Saturation Flow Rate	0.04	0.40	0.12	0.12	0.04	0.22
s, saturation flow rate [veh/h]	1781	3560	1870	1854	1781	1569
c, Capacity [veh/h]	84	2517	1176	1166	412	363
d1, Uniform Delay [s]	61.16	9.29	10.12	10.13	40.04	48.75
k, delay calibration	0.11	0.50	0.50	0.50	0.11	0.14
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	13.20	0.93	0.35	0.35	0.21	13.36
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.76	0.57	0.19	0.19	0.18	0.93
d, Delay for Lane Group [s/veh]	74.37	10.22	10.47	10.49	40.25	62.11
Lane Group LOS	E	B	B	B	D	E
Critical Lane Group	No	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	2.42	9.72	2.76	2.77	1.97	12.05
50th-Percentile Queue Length [ft/ln]	60.38	243.08	69.08	69.19	49.23	301.33
95th-Percentile Queue Length [veh/ln]	4.35	14.84	4.97	4.98	3.54	17.75
95th-Percentile Queue Length [ft/ln]	108.69	370.93	124.35	124.53	88.62	443.67

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	74.37	10.22	10.48	10.49	40.25	62.11
Movement LOS	E	B	B	B	D	E
d_A, Approach Delay [s/veh]	12.98		10.48		58.15	
Approach LOS	B		B		E	
d_I, Intersection Delay [s/veh]	20.52					
Intersection LOS	C					
Intersection V/C	0.673					

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	0.000
Crosswalk LOS	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1108	77	770
d_b, Bicycle Delay [s]	12.93	60.16	24.60
l_b,int, Bicycle LOS Score for Intersection	2.786	1.919	1.560
Bicycle LOS	C	A	A

Sequence

Ring 1	1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 12000: University Avenue/Kavanaugh Drive

Control Type:	Signalized	Delay (sec / veh):	17.9
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.593

Intersection Setup

Name	University Avenue		University Avenue		Kavanaugh Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00		25.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		No		No	

Volumes

Name	University Avenue		University Avenue		Kavanaugh Drive	
Base Volume Input [veh/h]	48	1326	552	41	61	151
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	1	2	1
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	48	1326	552	42	63	152
Peak Hour Factor	0.9440	0.9440	0.9440	0.9440	0.9440	0.9440
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	13	351	146	11	17	40
Total Analysis Volume [veh/h]	51	1405	585	44	67	161
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		13		4	
Bicycle Volume [bicycles/h]	1		5		2	

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fixed time
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal Group	1	6	2	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	5	5	5	0	5	0
Maximum Green [s]	30	30	30	0	30	0
Amber [s]	3.0	3.0	3.0	0.0	3.0	0.0
All red [s]	1.0	1.0	1.0	0.0	1.0	0.0
Split [s]	19	60	41	0	30	0
Vehicle Extension [s]	3.0	3.0	3.0	0.0	3.0	0.0
Walk [s]	0	5	5	0	5	0
Pedestrian Clearance [s]	0	10	10	0	21	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
Minimum Recall	No	No	No		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	C
C, Cycle Length [s]	90	90	90	90	90
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	15	56	37	37	26
g / C, Green / Cycle	0.17	0.62	0.41	0.41	0.29
(v / s)_i Volume / Saturation Flow Rate	0.03	0.44	0.19	0.19	0.15
s, saturation flow rate [veh/h]	1603	3204	1683	1636	1477
c, Capacity [veh/h]	267	1994	692	673	427
d1, Uniform Delay [s]	32.28	11.44	19.19	19.32	26.91
k, delay calibration	0.50	0.50	0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	1.58	2.12	2.15	2.33	4.73
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.19	0.70	0.45	0.47	0.53
d, Delay for Lane Group [s/veh]	33.86	13.56	21.34	21.65	31.64
Lane Group LOS	C	B	C	C	C
Critical Lane Group	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	1.07	9.08	5.08	5.13	4.58
50th-Percentile Queue Length [ft/ln]	26.87	226.92	126.98	128.31	114.41
95th-Percentile Queue Length [veh/ln]	1.93	14.02	8.78	8.85	8.08
95th-Percentile Queue Length [ft/ln]	48.37	350.45	219.38	221.19	202.12

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	33.86	13.56	21.48	21.65	31.64	31.64
Movement LOS	C	B	C	C	C	C
d_A, Approach Delay [s/veh]	14.27		21.49		31.64	
Approach LOS	B		C		C	
d_I, Intersection Delay [s/veh]	17.95					
Intersection LOS	B					
Intersection V/C	0.593					

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	36.45	0.00	0.00
l_p,int, Pedestrian LOS Score for Intersectio	2.659	0.000	0.000
Crosswalk LOS	B	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1244	822	578
d_b, Bicycle Delay [s]	6.43	15.64	22.78
l_b,int, Bicycle LOS Score for Intersection	2.761	2.079	1.936
Bicycle LOS	C	B	A

Sequence

Ring 1	1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 13000: Willow Road/Driveway A

Control Type:	Two-way stop	Delay (sec / veh):	14.7
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.005

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		Driveway A	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		Driveway A	
Base Volume Input [veh/h]	1424	0	0	901	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	4	2	0	1	0	2
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	1428	2	0	902	0	2
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	357	1	0	226	0	1
Total Analysis Volume [veh/h]	1428	2	0	902	0	2
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.01	0.00	0.01
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	0.00	0.00	14.70
Movement LOS	A	A		A		B
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.02
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.00	0.40
d_A, Approach Delay [s/veh]	0.00		0.00		14.70	
Approach LOS	A		A		B	
d_I, Intersection Delay [s/veh]	0.01					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 14000: Driveway B/O'Brien Drive

Control Type:	Two-way stop	Delay (sec / veh):	16.0
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.009

Intersection Setup

Name	Driveway B		O'Brien Drive		O'Brien Drive	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Driveway B		O'Brien Drive		O'Brien Drive	
Base Volume Input [veh/h]	0	0	0	378	458	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	3	8	3	0	0	1
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	3	8	3	378	458	1
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	2	1	95	115	0
Total Analysis Volume [veh/h]	3	8	3	378	458	1
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.01	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	15.97	11.14	8.27	0.00	0.00	0.00
Movement LOS	C	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.07	0.07	0.01	0.01	0.00	0.00
95th-Percentile Queue Length [ft/ln]	1.71	1.71	0.13	0.13	0.00	0.00
d_A, Approach Delay [s/veh]	12.46		0.07		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	0.19					
Intersection LOS	C					

Intersection Level Of Service Report
Intersection 15000: Driveway C/O'Brien Drive

Control Type:	Two-way stop	Delay (sec / veh):	0.0
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.005

Intersection Setup

Name	Driveway C		O'Brien Drive		O'Brien Drive	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Driveway C		O'Brien Drive		O'Brien Drive	
Base Volume Input [veh/h]	0	0	0	378	458	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	3	1	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	381	459	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	95	115	0
Total Analysis Volume [veh/h]	0	0	0	381	459	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	15.73	10.98	8.27	0.00	0.00	0.00
Movement LOS	C	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	13.36		0.00		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	0.00					
Intersection LOS	A					

1005 O'Brien Drive and 1320 Willow Road

Vistro File: P:\...\OBrien_Willow_AM_Revised_V3.vistro
Scenario 18 Near-term + Project AM (2027)
Report File: P:\...\NT+P_AM_v3.pdf
3/14/2025

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1000	Bayfront Expy (SR 84)/Willow Rd (SR 114)	Signalized	HCM 7th Edition	EB Left	0.680	59.7	E
2000	Willow Rd (SR 114)/Hamilton Ave	Signalized	HCM 7th Edition	SB Left	1.441	256.9	F
3000	Willow Rd (SR 114)/Ivy Dr	Signalized	HCM 7th Edition	NB Left	0.890	31.6	C
4000	Willow Rd (SR 114)/O'Brien Dr	Signalized	HCM 7th Edition	WB Left	0.888	50.2	D
5000	Willow Rd (SR 114) /Newbridge St	Signalized	HCM 7th Edition	SB Right	1.333	164.1	F
6000	Willow Rd/US-101 NB Ramps	Signalized	HCM 7th Edition	WB Left	0.845	8.8	A
7000	Willow Rd/US-101 SB Ramps	Signalized	HCM 7th Edition	EB Left	1.001	13.3	B
8000	O'Brien Drive/Kavanaugh Drive	All-way stop	HCM 7th Edition	SB Thru	1.284	92.3	F
9000	Bayfront Expy (SR 84) /University Ave (SR 109)	Signalized	HCM 7th Edition	NB Left	0.823	24.1	C
10000	University Avenue/Adams Drive	Two-way stop	HCM 7th Edition	EB Left	0.306	79.6	F
11000	University Ave/O'Brien Dr	Signalized	HCM 7th Edition	EB Right	0.770	23.5	C
12000	University Avenue/Kavanaugh Drive	Signalized	HCM 7th Edition	NB Left	0.499	22.2	C
13000	Willow Road/Driveway A	Two-way stop	HCM 7th Edition	WB Right	0.017	11.1	B
14000	Driveway B/O'Brien Drive	Two-way stop	HCM 7th Edition	SB Right	0.023	11.7	B
15000	Driveway C/O'Brien Drive	Two-way stop	HCM 7th Edition	SB Left	0.053	33.3	D

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1000: Bayfront Expy (SR 84)/Willow Rd (SR 114)

Control Type:	Signalized	Delay (sec / veh):	59.7
Analysis Method:	HCM 7th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.680

Intersection Setup

Name	Willow Road (SR 114)			Willow Road			Bayfront Expy (SR 84)			Bayfront Expy (SR 84)		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	3	0	1	0	0	0	2	0	1	2	0	1
Entry Pocket Length [ft]	265.00	100.00	200.00	100.00	100.00	100.00	530.00	100.00	630.00	1500.00	100.00	600.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			20.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			No			Yes			No		

Volumes

Name	Willow Road (SR 114)			Willow Road			Bayfront Expy (SR 84)			Bayfront Expy (SR 84)		
Base Volume Input [veh/h]	93	208	414	10	28	27	62	733	161	829	2172	41
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	4	0	3	0	0	0	0	0	20	13	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	16	0	0	106	0	0	0
Total Hourly Volume [veh/h]	97	208	417	10	28	11	62	733	75	842	2172	41
Peak Hour Factor	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	26	55	111	3	7	3	17	195	20	224	579	11
Total Analysis Volume [veh/h]	103	222	445	11	30	12	66	781	80	898	2316	44
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			2			3			0		
v_di, Inbound Pedestrian Volume crossing m	0			3			2			0		
v_co, Outbound Pedestrian Volume crossing	4			0			3			0		
v_ci, Inbound Pedestrian Volume crossing mi	3			0			4			0		
v_ab, Corner Pedestrian Volume [ped/h]	12			0			0			1		
Bicycle Volume [bicycles/h]	2			0			0			1		

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	180
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	17.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Protecte	Permiss	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	7	4	4	3	8	4	1	6	2	5	2	6
Auxiliary Signal Groups			4,5									
Lead / Lag	Lag	-	-	Lead	-	-	Lead	-	-	Lag	-	-
Minimum Green [s]	13	12	12	15	15	12	6	25	10	11	10	25
Maximum Green [s]	22	15	15	9	9	15	26	40	30	25	30	40
Amber [s]	3.6	3.9	3.9	3.6	3.6	3.9	3.6	5.0	5.0	3.6	5.0	5.0
All red [s]	0.0	0.5	0.5	1.5	1.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0
Split [s]	20	36	36	17	36	36	23	42	79	59	79	42
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Walk [s]	0	0	0	0	4	0	0	4	0	4	0	4
Pedestrian Clearance [s]	0	0	0	0	29	0	0	35	0	11	0	35
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	3.0	0.0	3.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	1.6	2.4	2.4	3.1	3.1	2.4	2.6	4.0	4.0	2.6	4.0	4.0
Minimum Recall	No	No	No	No	No		No	Yes		No	Yes	
Maximum Recall	No	No	No	No	No		No	No		No	No	
Pedestrian Recall	No	No	No	No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
C, Cycle Length [s]	180	180	180	180	180	180	180	180	180	180	180	180
L, Total Lost Time per Cycle [s]	3.60	4.40	4.40	5.10	5.10	5.10	4.60	6.00	6.00	4.60	6.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.60	2.40	0.00	3.10	3.10	3.10	2.60	4.00	4.00	2.60	4.00	4.00
g_i, Effective Green Time [s]	60	62	137	6	9	9	9	32	32	59	82	82
g / C, Green / Cycle	0.34	0.35	0.76	0.04	0.05	0.05	0.05	0.18	0.18	0.33	0.46	0.46
(v / s)_i Volume / Saturation Flow Rate	0.13	0.10	0.11	0.01	0.01	0.01	0.04	0.15	0.05	0.32	0.45	0.03
s, saturation flow rate [veh/h]	797	2249	4179	945	3560	1542	1547	5094	1589	2821	5094	1570
c, Capacity [veh/h]	267	777	3190	63	178	77	80	912	284	927	2322	715
d1, Uniform Delay [s]	45.66	42.75	5.64	86.71	81.88	81.81	84.50	71.63	63.86	59.49	48.86	27.40
k, delay calibration	0.49	0.50	0.50	0.11	0.11	0.11	0.11	0.11	0.11	0.50	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	4.08	0.92	0.09	1.31	0.44	0.93	18.52	2.46	0.53	22.89	8.13	0.04
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.39	0.29	0.14	0.18	0.17	0.16	0.82	0.86	0.28	0.97	1.00	0.06
d, Delay for Lane Group [s/veh]	49.74	43.67	5.73	88.02	82.32	82.74	103.02	74.09	64.40	82.38	56.99	27.44
Lane Group LOS	D	D	A	F	F	F	F	E	E	F	E	C
Critical Lane Group	Yes	No	No	No	Yes	No	Yes	No	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	3.84	3.72	1.44	0.54	0.69	0.56	1.74	11.94	3.26	23.15	36.17	1.11
50th-Percentile Queue Length [ft/ln]	95.99	92.97	35.92	13.47	17.31	14.12	43.51	298.48	81.41	578.81	904.22	27.68
95th-Percentile Queue Length [veh/ln]	6.91	6.69	2.59	0.97	1.25	1.02	3.13	17.61	5.86	31.04	46.03	1.99
95th-Percentile Queue Length [ft/ln]	172.78	167.34	64.66	24.25	31.16	25.41	78.32	440.15	146.54	776.08	1150.79	49.83

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	49.74	43.67	5.73	88.02	82.32	82.74	103.02	74.09	64.40	82.38	56.99	27.44
Movement LOS	D	D	A	F	F	F	F	E	E	F	E	C
d_A, Approach Delay [s/veh]	22.56			83.60			75.31			63.59		
Approach LOS	C			F			E			E		
d_I, Intersection Delay [s/veh]	59.66											
Intersection LOS	E											
Intersection V/C	0.680											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	0.0	8.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	583.53	0.00	891.45	0.00
d_p, Pedestrian Delay [s]	82.16	0.00	82.16	0.00
l_p,int, Pedestrian LOS Score for Intersectio	3.101	0.000	3.345	0.000
Crosswalk LOS	C	F	C	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	351	310	367	811
d_b, Bicycle Delay [s]	61.22	64.25	60.01	31.80
l_b,int, Bicycle LOS Score for Intersection	2.195	1.617	2.128	3.352
Bicycle LOS	B	A	B	C

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 2000: Willow Rd (SR 114)/Hamilton Ave

Control Type:	Signalized	Delay (sec / veh):	256.9
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.441

Intersection Setup

Name	Willow Road (SR 114)			Willow Road (SR 114)			Hamilton Avenue			Hamilton Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			30.00			25.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Willow Road (SR 114)			Willow Road (SR 114)			Hamilton Avenue			Hamilton Avenue		
Base Volume Input [veh/h]	125	690	74	495	784	18	59	16	73	16	6	155
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	1	7	0	0	33	0	0	0	3	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	126	697	74	495	817	18	59	16	76	16	6	155
Peak Hour Factor	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	32	179	19	127	209	5	15	4	19	4	2	40
Total Analysis Volume [veh/h]	129	714	76	507	837	18	60	16	78	16	6	159
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	6			57			5			57		
v_di, Inbound Pedestrian Volume crossing m	5			57			6			57		
v_co, Outbound Pedestrian Volume crossing	5			18			18			6		
v_ci, Inbound Pedestrian Volume crossing mi	6			18			18			5		
v_ab, Corner Pedestrian Volume [ped/h]	5			6			13			5		
Bicycle Volume [bicycles/h]	1			1			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	48
Active Pattern	Free Running
Coordination Type	*Free Running*
Actuation Type	*Fully actuated*
Offset [s]	8.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	1	6	2	5	2	6	4	8	4	8	4	8
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	Lead	-	-	Lag	-	-	Lag	-	-
Minimum Green [s]	4	10	10	4	10	10	4	4	4	4	4	4
Maximum Green [s]	21	30	30	16	30	30	26	26	26	26	26	26
Amber [s]	3.0	4.4	4.4	3.0	4.4	4.4	3.6	3.7	3.6	3.7	3.6	3.7
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	0	30	0	0	0	30	30	0	30	0	30	0
Vehicle Extension [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walk [s]	0	4	4	0	4	4	4	4	4	4	4	4
Pedestrian Clearance [s]	0	19	15	0	15	19	25	25	25	25	25	25
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Rest In Walk		No			No			No			No	
l1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
l2, Clearance Lost Time [s]	1.0	2.4	2.4	1.0	2.4	2.4	1.6	1.7	1.6	1.7	1.6	1.7
Minimum Recall	No	Yes		No	Yes			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	6.0	6.0	6.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	C	C
C, Cycle Length [s]	80	80	80	80	80	80	80	80
L, Total Lost Time per Cycle [s]	3.00	4.40	4.40	3.00	4.40	4.40	3.70	3.60
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.00
l2, Clearance Lost Time [s]	1.00	2.40	2.40	1.00	2.40	2.40	1.70	0.00
g_i, Effective Green Time [s]	16	30	30	16	30	30	23	23
g / C, Green / Cycle	0.20	0.38	0.38	0.20	0.38	0.38	0.28	0.29
(v / s)_i Volume / Saturation Flow Rate	0.16	0.48	0.48	0.54	0.44	0.44	0.25	0.19
s, saturation flow rate [veh/h]	797	837	802	937	984	973	606	957
c, Capacity [veh/h]	160	314	301	188	369	365	236	299
d1, Uniform Delay [s]	30.48	24.94	24.94	31.95	24.95	24.95	28.31	25.57
k, delay calibration	0.12	0.50	0.50	0.50	0.50	0.50	0.25	0.08
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	10.24	147.50	152.61	780.57	98.18	100.49	7.02	1.55
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.81	1.28	1.29	2.70	1.16	1.17	0.65	0.61
d, Delay for Lane Group [s/veh]	40.72	172.44	177.55	812.53	123.14	125.44	35.33	27.12
Lane Group LOS	D	F	F	F	F	F	D	C
Critical Lane Group	No	No	Yes	Yes	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	2.67	18.17	17.85	44.18	16.57	16.62	3.28	3.06
50th-Percentile Queue Length [ft/ln]	66.78	454.19	446.18	1104.51	414.15	415.47	82.07	76.41
95th-Percentile Queue Length [veh/ln]	4.81	28.95	28.60	72.06	25.47	25.60	5.91	5.50
95th-Percentile Queue Length [ft/ln]	120.20	723.73	715.11	1801.41	636.67	640.05	147.73	137.53

Movement, Approach, & Intersection Results

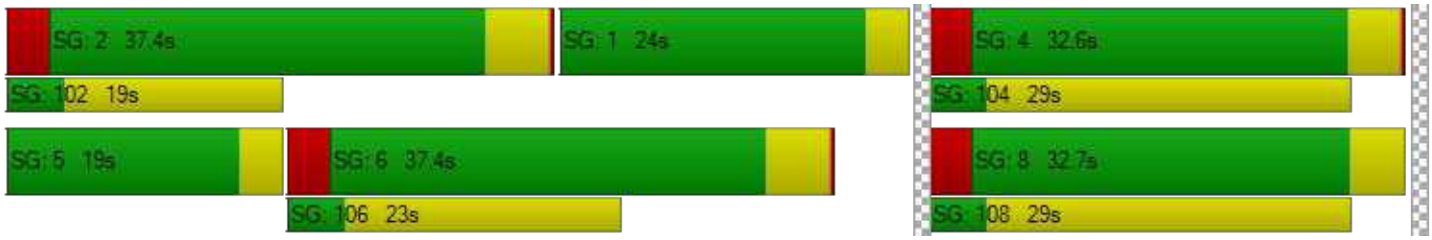
d_M, Delay for Movement [s/veh]	40.72	174.68	177.55	812.53	124.26	125.44	35.33	35.33	35.33	27.12	27.12	27.12
Movement LOS	D	F	F	F	F	F	D	D	D	C	C	C
d_A, Approach Delay [s/veh]	156.11			380.48			35.33			27.12		
Approach LOS	F			F			D			C		
d_I, Intersection Delay [s/veh]	256.89											
Intersection LOS	F											
Intersection V/C	1.441											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	558.35	63.93	229.02	693.05
d_p, Pedestrian Delay [s]	32.33	32.33	32.33	32.33
l_p,int, Pedestrian LOS Score for Intersectio	3.028	2.829	1.836	2.028
Crosswalk LOS	C	C	A	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	751	751	651	651
d_b, Bicycle Delay [s]	15.58	15.58	18.17	18.17
l_b,int, Bicycle LOS Score for Intersection	2.318	2.683	1.814	1.858
Bicycle LOS	B	B	A	A

Sequence

Ring 1	2	1	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 3000: Willow Rd (SR 114)/Ivy Dr

Control Type:	Signalized	Delay (sec / veh):	31.6
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.890

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		Ivy Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	1	0
Entry Pocket Length [ft]	85.00	100.00	100.00	100.00	135.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	1	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	100.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		Ivy Drive	
Base Volume Input [veh/h]	73	674	919	49	56	83
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	8	36	0	0	5
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	73	682	955	49	56	88
Peak Hour Factor	0.9670	0.9670	0.9670	0.9670	0.9670	0.9670
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	19	176	247	13	14	23
Total Analysis Volume [veh/h]	75	705	988	51	58	91
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	4		9		3	
v_di, Inbound Pedestrian Volume crossing m	3		9		4	
v_co, Outbound Pedestrian Volume crossing	9		2		2	
v_ci, Inbound Pedestrian Volume crossing mi	9		2		2	
v_ab, Corner Pedestrian Volume [ped/h]	3		6		7	
Bicycle Volume [bicycles/h]	1		3		1	

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	160
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	90.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal Group	5	2	6	6	4	4
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	4	10	10	10	11	11
Maximum Green [s]	21	30	30	30	29	29
Amber [s]	3.0	4.4	4.4	4.4	3.0	3.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	17	125	107	107	35	35
Vehicle Extension [s]	2.0	2.0	2.0	2.0	2.0	2.0
Walk [s]	0	0	4	4	4	4
Pedestrian Clearance [s]	0	0	22	22	24	24
Delayed Vehicle Green [s]	0.0	0.0	3.0	3.0	3.0	3.0
Rest In Walk		No	No		No	
l1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0
l2, Clearance Lost Time [s]	1.0	2.4	2.4	2.4	1.0	1.0
Minimum Recall	No	Yes	Yes		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	L	R
C, Cycle Length [s]	160	160	160	160	160	160
L, Total Lost Time per Cycle [s]	3.00	4.40	4.40	4.40	3.00	3.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.00	2.40	2.40	2.40	1.00	1.00
g_i, Effective Green Time [s]	14	132	115	115	21	21
g / C, Green / Cycle	0.09	0.83	0.72	0.72	0.13	0.13
(v / s)_i Volume / Saturation Flow Rate	0.09	0.44	0.62	0.63	0.03	0.11
s, saturation flow rate [veh/h]	797	1593	837	821	1706	804
c, Capacity [veh/h]	70	1315	601	590	219	103
d1, Uniform Delay [s]	72.93	4.38	16.66	17.20	62.86	68.22
k, delay calibration	0.21	0.50	0.50	0.50	0.04	0.08
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	90.91	1.57	15.20	17.03	0.24	16.80
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	1.07	0.54	0.86	0.88	0.26	0.88
d, Delay for Lane Group [s/veh]	163.83	5.95	31.86	34.22	63.10	85.02
Lane Group LOS	F	A	C	C	E	F
Critical Lane Group	Yes	No	No	Yes	No	Yes
50th-Percentile Queue Length [veh/ln]	4.61	3.09	15.09	15.74	2.17	4.14
50th-Percentile Queue Length [ft/ln]	115.22	77.21	377.14	393.52	54.14	103.61
95th-Percentile Queue Length [veh/ln]	8.30	5.56	21.46	22.25	3.90	7.46
95th-Percentile Queue Length [ft/ln]	207.39	138.97	536.38	556.19	97.46	186.50

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	163.83	5.95	32.98	34.22	63.10	85.02
Movement LOS	F	A	C	C	E	F
d_A, Approach Delay [s/veh]	21.13		33.04		76.49	
Approach LOS	C		C		E	
d_I, Intersection Delay [s/veh]	31.61					
Intersection LOS	C					
Intersection V/C	0.890					

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	529.42	274.76	1065.00
d_p, Pedestrian Delay [s]	72.17	72.17	72.17
l_p,int, Pedestrian LOS Score for Intersectio	2.812	2.746	2.227
Crosswalk LOS	C	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1508	1246	363
d_b, Bicycle Delay [s]	4.84	11.40	53.62
l_b,int, Bicycle LOS Score for Intersection	2.203	2.417	1.560
Bicycle LOS	B	B	A

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 4000: Willow Rd (SR 114)/O'Brien Dr

Control Type:	Signalized	Delay (sec / veh):	50.2
Analysis Method:	HCM 7th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.888

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		O'Brien Drive	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	1	0	1	0
Entry Pocket Length [ft]	100.00	60.00	100.00	100.00	50.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	No		No		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		O'Brien Drive	
Base Volume Input [veh/h]	731	580	48	1011	446	49
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	11	42	40	0	11	5
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	742	622	88	1011	457	54
Peak Hour Factor	0.9510	0.9510	0.9510	0.9510	0.9510	0.9510
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	195	164	23	266	120	14
Total Analysis Volume [veh/h]	780	654	93	1063	481	57
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	13		0		14	
v_ci, Inbound Pedestrian Volume crossing mi	14		0		13	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	1		6		2	

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	160
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	93.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Permissive	Permissive	Protected	Permissive	Permissive	Permissive
Signal Group	2	2	1	6	4	8
Auxiliary Signal Groups						
Lead / Lag	-	-	Lead	-	Lead	-
Minimum Green [s]	10	10	5	10	8	0
Maximum Green [s]	35	35	21	35	21	0
Amber [s]	4.4	4.4	3.0	4.4	3.2	0.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	116	116	19	135	25	0
Vehicle Extension [s]	2.0	2.0	2.0	2.0	2.0	0.0
Walk [s]	4	4	0	0	0	0
Pedestrian Clearance [s]	17	17	0	0	0	0
Delayed Vehicle Green [s]	3.0	3.0	0.0	0.0	0.0	0.0
Rest In Walk	No			No	No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.4	2.4	1.0	2.4	1.2	0.0
Minimum Recall	Yes		No	Yes	No	
Maximum Recall	No		No	No	No	
Pedestrian Recall	No		No	No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	L	C	L	C
C, Cycle Length [s]	160	160	160	160	160	160
L, Total Lost Time per Cycle [s]	4.40	4.40	3.00	4.40	3.20	3.20
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.40	2.40	1.00	2.40	1.20	1.20
g_i, Effective Green Time [s]	117	117	10	131	22	22
g / C, Green / Cycle	0.73	0.73	0.06	0.82	0.14	0.14
(v / s)_i Volume / Saturation Flow Rate	0.49	0.43	0.05	0.67	0.17	0.17
s, saturation flow rate [veh/h]	1593	1528	1781	1593	1406	1741
c, Capacity [veh/h]	1170	1122	112	1300	192	237
d1, Uniform Delay [s]	11.06	9.59	74.03	8.13	69.03	69.03
k, delay calibration	0.50	0.50	0.04	0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	3.02	2.21	5.76	5.80	149.55	143.99
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.67	0.58	0.83	0.82	1.25	1.25
d, Delay for Lane Group [s/veh]	14.08	11.81	79.79	13.93	218.58	213.02
Lane Group LOS	B	B	E	B	F	F
Critical Lane Group	No	No	No	Yes	No	Yes
50th-Percentile Queue Length [veh/ln]	6.96	10.10	3.94	8.76	15.84	19.25
50th-Percentile Queue Length [ft/ln]	174.05	252.50	98.40	219.08	396.05	481.18
95th-Percentile Queue Length [veh/ln]	11.29	15.31	7.08	13.62	24.58	29.13
95th-Percentile Queue Length [ft/ln]	282.24	382.80	177.12	340.45	614.39	728.13

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	14.08	11.81	79.79	13.93	215.83	213.02
Movement LOS	B	B	E	B	F	F
d_A, Approach Delay [s/veh]	13.04		19.23		215.50	
Approach LOS	B		B		F	
d_I, Intersection Delay [s/veh]	50.15					
Intersection LOS	D					
Intersection V/C	0.888					

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	72.16
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	2.387
Crosswalk LOS	F	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1358	1633	273
d_b, Bicycle Delay [s]	8.24	2.70	59.71
l_b,int, Bicycle LOS Score for Intersection	2.743	2.513	2.447
Bicycle LOS	B	B	B

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 5000: Willow Rd (SR 114)/Newbridge St

Control Type:	Signalized	Delay (sec / veh):	164.1
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.333

Intersection Setup

Name	Willow Road (SR 114)			Willow Road (SR 114)			Newbridge Street			Newbridge Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	1	0	0	1	0	0	0
Entry Pocket Length [ft]	390.00	100.00	100.00	185.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	1	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	49.21	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			25.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Willow Road (SR 114)			Willow Road (SR 114)			Newbridge Street			Newbridge Street		
Base Volume Input [veh/h]	175	1035	276	66	1358	20	22	136	364	349	97	123
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	51	0	1	10	0	-1	0	-1	0	0	3
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	44	0	0	34
Total Hourly Volume [veh/h]	175	1086	276	67	1368	20	21	136	319	349	97	92
Peak Hour Factor	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	47	294	75	18	371	5	6	37	86	95	26	25
Total Analysis Volume [veh/h]	190	1178	299	73	1484	22	23	148	346	379	105	100
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	2			2			3			3		
v_di, Inbound Pedestrian Volume crossing m	3			3			2			2		
v_co, Outbound Pedestrian Volume crossing	8			12			7			11		
v_ci, Inbound Pedestrian Volume crossing mi	7			11			8			12		
v_ab, Corner Pedestrian Volume [ped/h]	16			65			10			12		
Bicycle Volume [bicycles/h]	10			2			0			8		

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	160
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	97.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Split	Split	Split	Split	Split	Split
Signal Group	5	2	2	1	6	6	4	4	4	8	3	8
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lag	-	-	Lag	-	-	-	-	-
Minimum Green [s]	4	12	12	4	12	12	4	4	4	0	4	0
Maximum Green [s]	21	40	40	21	40	40	25	25	25	0	21	0
Amber [s]	3.0	4.4	4.4	3.0	4.4	4.4	3.6	3.6	3.6	0.0	3.0	0.0
All red [s]	0.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0
Split [s]	16	76	76	10	70	70	38	38	38	0	36	0
Vehicle Extension [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walk [s]	0	4	4	0	4	4	4	4	4	0	4	0
Pedestrian Clearance [s]	0	19	19	0	16	16	23	23	23	0	23	0
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	3.0	0.0	3.0	0.0
Rest In Walk		No			No			No			No	
l1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	0.0
l2, Clearance Lost Time [s]	1.0	3.4	3.4	1.0	3.4	3.4	2.6	2.6	2.6	0.0	1.0	0.0
Minimum Recall	No	Yes		No	Yes			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	L	C	R	L	C	R
C, Cycle Length [s]	160	160	160	160	160	160	160	160	160	160	160	160
L, Total Lost Time per Cycle [s]	3.00	5.40	5.40	3.00	5.40	5.40	4.60	4.60	4.60	3.00	3.00	3.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.00	3.40	3.40	1.00	3.40	3.40	2.60	2.60	2.60	1.00	1.00	1.00
g_i, Effective Green Time [s]	13	71	71	7	65	65	34	34	34	33	33	33
g / C, Green / Cycle	0.08	0.44	0.44	0.04	0.40	0.40	0.21	0.21	0.21	0.21	0.21	0.21
(v / s)_i Volume / Saturation Flow Rate	0.11	0.28	0.29	0.04	0.62	0.62	0.02	0.09	0.26	0.24	0.13	0.15
s, saturation flow rate [veh/h]	1781	3560	1644	1781	1593	829	1528	1604	1334	1547	837	673
c, Capacity [veh/h]	145	1568	724	78	642	334	321	337	280	319	172	139
d1, Uniform Delay [s]	73.50	34.87	35.22	76.28	47.77	47.77	50.71	55.03	62.86	63.52	57.67	58.68
k, delay calibration	0.29	0.50	0.50	0.04	0.50	0.50	0.04	0.04	0.50	0.11	0.12	0.22
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	166.77	2.01	4.59	17.12	251.91	259.64	0.03	0.34	133.01	92.18	3.93	13.48
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	1.31	0.64	0.66	0.94	1.54	1.54	0.07	0.44	1.24	1.19	0.61	0.72
d, Delay for Lane Group [s/veh]	240.27	36.88	39.82	93.40	299.68	307.41	50.75	55.36	195.86	155.70	61.59	72.16
Lane Group LOS	F	D	D	F	F	F	D	E	F	F	E	E
Critical Lane Group	Yes	No	No	No	No	Yes	No	No	Yes	Yes	No	No
50th-Percentile Queue Length [veh/ln]	12.61	15.45	15.29	3.40	35.28	37.44	0.76	5.29	21.71	10.59	4.08	4.29
50th-Percentile Queue Length [ft/ln]	315.22	386.18	382.14	85.08	881.91	936.07	18.91	132.25	542.68	264.66	101.95	107.23
95th-Percentile Queue Length [veh/ln]	20.16	21.89	21.70	6.13	56.71	59.92	1.36	9.06	32.64	17.26	7.34	7.69
95th-Percentile Queue Length [ft/ln]	504.09	547.32	542.43	153.14	1417.80	1498.00	34.03	226.55	816.01	431.46	183.52	192.15

Movement, Approach, & Intersection Results

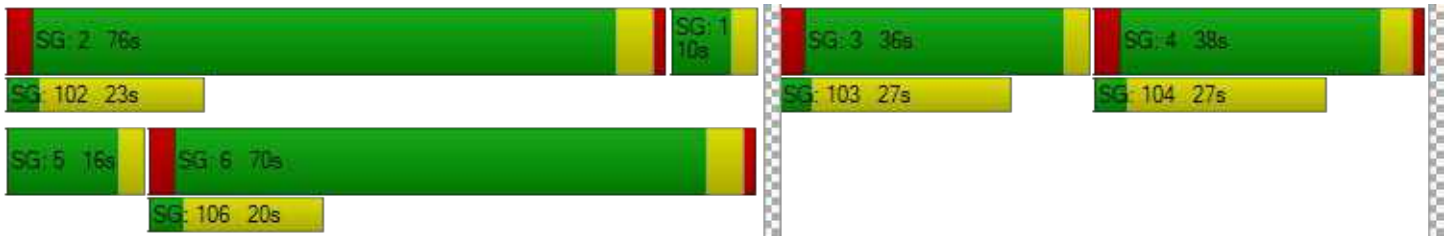
d_M, Delay for Movement [s/veh]	240.27	37.32	39.82	93.40	302.25	307.41	50.75	55.36	195.86	155.70	61.59	72.16
Movement LOS	F	D	D	F	F	F	D	E	F	F	E	E
d_A, Approach Delay [s/veh]	60.90			292.67			149.19			124.47		
Approach LOS	E			F			F			F		
d_I, Intersection Delay [s/veh]	164.13											
Intersection LOS	F											
Intersection V/C	1.333											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	48.81	178.25	931.23	168.06
d_p, Pedestrian Delay [s]	72.20	72.20	72.20	72.20
l_p,int, Pedestrian LOS Score for Intersectio	3.351	2.961	2.437	2.599
Crosswalk LOS	C	C	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	845	770	380	375
d_b, Bicycle Delay [s]	26.81	30.29	52.49	53.02
l_b,int, Bicycle LOS Score for Intersection	2.476	2.428	2.485	2.579
Bicycle LOS	B	B	B	B

Sequence

Ring 1	2	1	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 6000: Willow Rd/US-101 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	8.8
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.845

Intersection Setup

Name	Willow Road			Willow Road (SR 114)			US-101 NB Ramps			US-101 NB Ramps		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	1	0	0	0	1	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	200.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No						No		
Crosswalk	No			Yes			No			Yes		

Volumes

Name	Willow Road			Willow Road (SR 114)			US-101 NB Ramps			US-101 NB Ramps		
Base Volume Input [veh/h]	0	994	336	0	1533	446	0	0	0	364	0	606
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	2.00	2.00	0.00	2.00	2.00	0.00	0.00	0.00	2.00	0.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	18	0	0	2	7	0	0	0	0	0	33
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	1012	336	0	1535	453	0	0	0	364	0	639
Peak Hour Factor	1.0000	0.9580	0.9580	1.0000	0.9580	0.9580	1.0000	1.0000	1.0000	0.9580	1.0000	0.9580
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	264	88	0	401	118	0	0	0	95	0	167
Total Analysis Volume [veh/h]	0	1056	351	0	1602	473	0	0	0	380	0	667
Presence of On-Street Parking	No		No	No		No				No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			3			27		
Bicycle Volume [bicycles/h]	5			3			0			1		

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	80
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	38.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Overlap
Signal Group	0	2	5	0	6	1	0	0	0	8	0	8
Auxiliary Signal Groups												6,8
Lead / Lag	-	-	-	-	-	-	-	-	-	Lead	-	-
Minimum Green [s]	0	4	6	0	4	5	0	0	0	5	0	5
Maximum Green [s]	0	35	6	0	35	5	0	0	0	35	0	35
Amber [s]	0.0	4.1	3.0	0.0	4.1	3.0	0.0	0.0	0.0	3.0	0.0	3.0
All red [s]	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	2.0	0.0	2.0
Split [s]	0	45	9	0	45	9	0	0	0	35	0	35
Vehicle Extension [s]	0.0	3.0	3.0	0.0	3.0	3.0	0.0	0.0	0.0	3.0	0.0	3.0
Walk [s]	0	1	0	0	1	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	30	0	0	7	0	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	3.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No					No		
I1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	2.0	2.0	0.0	0.0	0.0	2.0	0.0	2.0
I2, Clearance Lost Time [s]	0.0	2.1	1.0	0.0	2.1	2.0	0.0	0.0	0.0	3.0	0.0	3.0
Minimum Recall		No			No					No		No
Maximum Recall		No			No					No		No
Pedestrian Recall		No			No					No		No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	C	R		L	R
C, Cycle Length [s]	80	80	80	80		80	80
L, Total Lost Time per Cycle [s]	4.10	4.10	4.10	4.10		5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00		0.00	0.00
l2, Clearance Lost Time [s]	2.10	2.10	2.10	2.10		3.00	0.00
g_i, Effective Green Time [s]	57	57	57	57		14	75
g / C, Green / Cycle	0.71	0.71	0.71	0.71		0.17	0.94
(v / s)_i Volume / Saturation Flow Rate	0.21	0.23	0.57	0.30		0.11	0.43
s, saturation flow rate [veh/h]	5094	1554	2828	1555		3459	1543
c, Capacity [veh/h]	3619	1104	2010	1105		608	1447
d1, Uniform Delay [s]	4.23	4.30	7.73	4.77		30.53	0.27
k, delay calibration	0.50	0.50	0.50	0.50		0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00		1.00	1.00
d2, Incremental Delay [s]	0.20	0.76	3.39	1.21		1.06	1.06
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00		0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00		1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00		1.00	1.00

Lane Group Results

X, volume / capacity	0.29	0.32	0.80	0.43		0.63	0.46
d, Delay for Lane Group [s/veh]	4.43	5.06	11.12	5.98		31.59	1.33
Lane Group LOS	A	A	B	A		C	A
Critical Lane Group	No	No	Yes	No		Yes	No
50th-Percentile Queue Length [veh/ln]	1.63	1.82	4.97	2.74		3.39	0.21
50th-Percentile Queue Length [ft/ln]	40.82	45.49	124.24	68.61		84.72	5.32
95th-Percentile Queue Length [veh/ln]	2.94	3.27	8.63	4.94		6.10	0.38
95th-Percentile Queue Length [ft/ln]	73.48	81.87	215.64	123.51		152.50	9.58

Movement, Approach, & Intersection Results

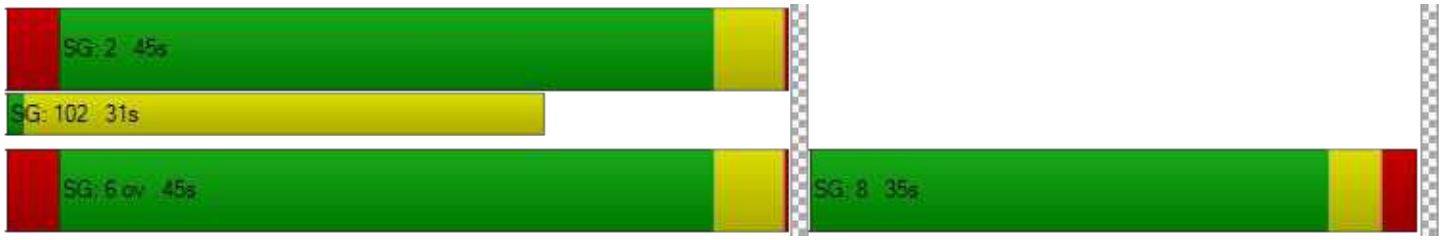
d_M, Delay for Movement [s/veh]	0.00	4.43	5.06	0.00	11.12	5.98	0.00	0.00	0.00	31.59	0.00	1.33
Movement LOS		A	A		B	A				C		A
d_A, Approach Delay [s/veh]	4.59			9.95			0.00			12.32		
Approach LOS	A			A			A			B		
d_I, Intersection Delay [s/veh]	8.83											
Intersection LOS	A											
Intersection V/C	0.845											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	30.0	0.0	5.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	15.62	0.00	35.15
l_p,int, Pedestrian LOS Score for Intersectio	0.000	3.090	0.000	2.573
Crosswalk LOS	F	C	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	948	948	0	750
d_b, Bicycle Delay [s]	11.10	11.09	40.00	15.63
l_b,int, Bicycle LOS Score for Intersection	2.333	2.701	4.132	1.560
Bicycle LOS	B	B	D	A

Sequence

Ring 1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 7000: Willow Rd/US-101 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	13.3
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.001

Intersection Setup

Name	Willow Road			Willow Road			US-101 SB Ramps			US-101 SB Ramps		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	0	1	0	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No					
Crosswalk	Yes			No			Yes			No		

Volumes

Name	Willow Road			Willow Road			US-101 SB Ramps			US-101 SB Ramps		
Base Volume Input [veh/h]	0	807	646	0	1428	542	543	0	264	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	2.00	2.00	0.00	2.00	2.00	2.00	0.00	2.00	0.00	0.00	0.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	9	0	0	2	0	9	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	816	646	0	1430	542	552	0	264	0	0	0
Peak Hour Factor	1.0000	0.9190	0.9190	1.0000	0.9190	0.9190	0.9190	1.0000	0.9190	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	222	176	0	389	147	150	0	72	0	0	0
Total Analysis Volume [veh/h]	0	888	703	0	1556	590	601	0	287	0	0	0
Presence of On-Street Parking	No		No	No		No	No		No			
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			29		
Bicycle Volume [bicycles/h]	9			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	80
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	54.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Overlap	Permiss	Permiss	Permiss
Signal Group	0	2	0	0	6	0	4	0	4	0	0	0
Auxiliary Signal Groups									2,4			
Lead / Lag	-	-	-	-	-	-	Lead	-	-	-	-	-
Minimum Green [s]	0	4	0	0	4	0	4	0	4	0	0	0
Maximum Green [s]	0	35	0	0	35	0	30	0	30	0	0	0
Amber [s]	0.0	4.1	0.0	0.0	4.1	0.0	3.0	0.0	3.0	0.0	0.0	0.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	2.0	0.0	0.0	0.0
Split [s]	0	55	0	0	55	0	25	0	25	0	0	0
Vehicle Extension [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	0.0	3.0	0.0	0.0	0.0
Walk [s]	0	1	0	0	1	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	7	0	0	32	0	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	3.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No		No					
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	0.0	2.0	0.0	0.0	0.0
I2, Clearance Lost Time [s]	0.0	2.1	0.0	0.0	2.1	0.0	3.0	0.0	3.0	0.0	0.0	0.0
Minimum Recall		No			No		No		No			
Maximum Recall		No			No		No		No			
Pedestrian Recall		No			No		No		No			
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	C	R	L	R	
C, Cycle Length [s]	80	80	80	80	80	80	
L, Total Lost Time per Cycle [s]	4.10	4.10	4.10	4.10	5.00	5.00	
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	
l2, Clearance Lost Time [s]	2.10	2.10	2.10	2.10	3.00	0.00	
g_i, Effective Green Time [s]	54	54	54	54	17	75	
g / C, Green / Cycle	0.68	0.68	0.68	0.68	0.21	0.94	
(v / s)_i Volume / Saturation Flow Rate	0.17	0.45	0.31	0.63	0.17	0.10	
s, saturation flow rate [veh/h]	5094	1550	5094	941	3459	2813	
c, Capacity [veh/h]	3449	1049	3449	637	723	2637	
d1, Uniform Delay [s]	5.04	7.47	6.00	11.16	30.26	0.17	
k, delay calibration	0.50	0.50	0.50	0.50	0.11	0.50	
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	
d2, Incremental Delay [s]	0.18	3.40	0.43	21.45	2.57	0.08	
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	

Lane Group Results

X, volume / capacity	0.26	0.67	0.45	0.93	0.83	0.11	
d, Delay for Lane Group [s/veh]	5.22	10.87	6.42	32.62	32.83	0.26	
Lane Group LOS	A	B	A	C	C	A	
Critical Lane Group	No	No	No	Yes	Yes	No	
50th-Percentile Queue Length [veh/ln]	1.59	6.38	3.33	10.56	5.60	0.03	
50th-Percentile Queue Length [ft/ln]	39.77	159.55	83.25	264.00	140.04	0.76	
95th-Percentile Queue Length [veh/ln]	2.86	10.53	5.99	15.89	9.48	0.05	
95th-Percentile Queue Length [ft/ln]	71.58	263.13	149.86	397.24	237.08	1.37	

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	0.00	5.22	10.87	0.00	6.42	32.62	32.83	0.00	0.26	0.00	0.00	0.00
Movement LOS		A	B		A	C	C		A			
d_A, Approach Delay [s/veh]	7.72			13.63			22.30			0.00		
Approach LOS	A			B			C			A		
d_I, Intersection Delay [s/veh]	13.26											
Intersection LOS	B											
Intersection V/C	1.001											

Other Modes

g_Walk,mi, Effective Walk Time [s]	20.0	0.0	5.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	22.48	0.00	35.13	0.00
l_p,int, Pedestrian LOS Score for Intersectio	3.054	0.000	2.588	0.000
Crosswalk LOS	C	F	B	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1198	1198	500	0
d_b, Bicycle Delay [s]	6.45	6.43	22.48	39.98
l_b,int, Bicycle LOS Score for Intersection	2.435	2.740	1.560	4.132
Bicycle LOS	B	B	A	D

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 8000: O'Brien Drive/Kavanaugh Drive

Control Type:	All-way stop	Delay (sec / veh):	92.3
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.284

Intersection Setup

Name	O'Brien Drive		O'Brien Drive		Kavanaugh Drive	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	O'Brien Drive		O'Brien Drive		Kavanaugh Drive	
Base Volume Input [veh/h]	404	90	64	662	75	182
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	3	0	12	5	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	404	93	64	674	80	182
Peak Hour Factor	0.9340	0.9340	0.9340	0.9340	0.9340	0.9340
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	108	25	17	180	21	49
Total Analysis Volume [veh/h]	433	100	69	722	86	195
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	622	791	555
Degree of Utilization, x	0.86	1.28	0.51

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	9.61	31.32	2.85
95th-Percentile Queue Length [ft]	240.26	783.12	71.16
Approach Delay [s/veh]	33.66	159.01	15.98
Approach LOS	D	F	C
Intersection Delay [s/veh]	92.34		
Intersection LOS	F		

Intersection Level Of Service Report
Intersection 9000: Bayfront Expy (SR 84)/University Ave (SR 109)

Control Type:	Signalized	Delay (sec / veh):	24.1
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.823

Intersection Setup

Name	University Avenue (SR109)		Bayfront Expy (SR84)		Bayfront Expy (SR84)	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	2	0	1	2	0
Entry Pocket Length [ft]	100.00	250.00	100.00	100.00	830.00	100.00
No. of Lanes in Exit Pocket	0	2	0	0	0	0
Exit Pocket Length [ft]	0.00	74.61	0.00	0.00	0.00	0.00
Speed [mph]	35.00		55.00		55.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		No	

Volumes

Name	University Avenue (SR109)		Bayfront Expy (SR84)		Bayfront Expy (SR84)	
Base Volume Input [veh/h]	148	388	1010	81	1077	3348
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	2	3	0	12	13
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	148	390	1013	81	1089	3361
Peak Hour Factor	0.9240	0.9240	0.9240	0.9240	0.9240	0.9240
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	40	106	274	22	295	909
Total Analysis Volume [veh/h]	160	422	1096	88	1179	3637
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	1		2		0	
v_ci, Inbound Pedestrian Volume crossing mi	2		1		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	4		6		5	

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	180
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	113.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	10.00

Phasing & Timing

Control Type	Permissive	Overlap	Permissive	Permissive	Protected	Permissive
Signal Group	4	4	6	2	5	2
Auxiliary Signal Groups		4,5				
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	12	12	10	10	11	10
Maximum Green [s]	15	15	60	60	30	60
Amber [s]	3.0	3.0	5.0	5.4	3.0	5.4
All red [s]	1.0	1.0	1.0	0.5	0.5	0.5
Split [s]	36	36	54	144	90	144
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	3.0
Walk [s]	4	4	4	0	0	0
Pedestrian Clearance [s]	29	29	35	0	0	0
Delayed Vehicle Green [s]	3.0	3.0	3.0	0.0	0.0	0.0
Rest In Walk	No		No			No
l1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0
l2, Clearance Lost Time [s]	2.0	2.0	4.0	3.9	1.5	3.9
Minimum Recall	No	No	No		No	No
Maximum Recall	No	No	No		No	No
Pedestrian Recall	No	No	No		No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	20.0	20.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	R	C	R	L	C
C, Cycle Length [s]	180	180	180	180	180	180
L, Total Lost Time per Cycle [s]	4.00	3.50	6.00	6.00	3.50	5.90
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	0.00	4.00	4.00	1.50	3.90
g_i, Effective Green Time [s]	15	86	85	85	67	155
g / C, Green / Cycle	0.08	0.48	0.47	0.47	0.37	0.86
(v / s)_i Volume / Saturation Flow Rate	0.05	0.10	0.22	0.06	0.34	0.71
s, saturation flow rate [veh/h]	3459	4201	5094	1563	3459	5094
c, Capacity [veh/h]	283	1995	2404	738	1283	4396
d1, Uniform Delay [s]	79.52	27.53	31.96	26.55	53.99	5.90
k, delay calibration	0.11	0.11	0.50	0.50	0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	1.77	0.05	0.63	0.33	3.15	1.91
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.56	0.21	0.46	0.12	0.92	0.83
d, Delay for Lane Group [s/veh]	81.28	27.59	32.58	26.88	57.15	7.81
Lane Group LOS	F	C	C	C	E	A
Critical Lane Group	No	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	3.66	3.62	10.55	2.15	25.08	12.72
50th-Percentile Queue Length [ft/ln]	91.47	90.60	263.86	53.80	627.02	318.10
95th-Percentile Queue Length [veh/ln]	6.59	6.52	15.88	3.87	33.29	18.57
95th-Percentile Queue Length [ft/ln]	164.65	163.08	397.06	96.84	832.35	464.35

Movement, Approach, & Intersection Results

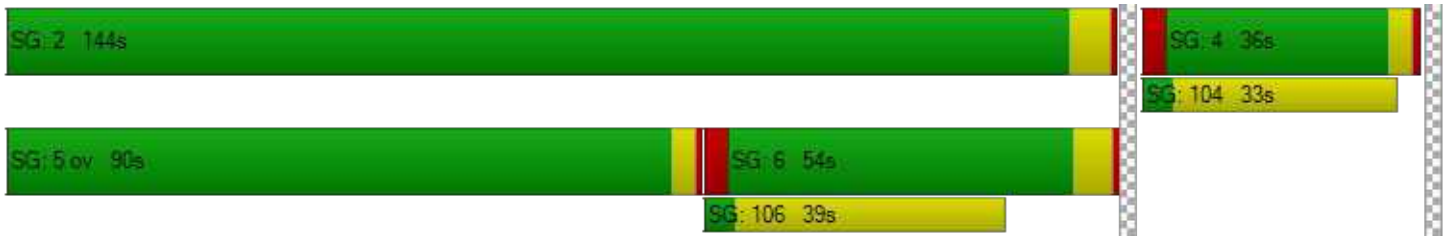
d_M, Delay for Movement [s/veh]	81.28	27.59	32.58	26.88	57.15	7.81
Movement LOS	F	C	C	C	E	A
d_A, Approach Delay [s/veh]	42.35		32.16		19.89	
Approach LOS	D		C		B	
d_I, Intersection Delay [s/veh]	24.08					
Intersection LOS	C					
Intersection V/C	0.823					

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	1341.40	0.00	0.00
d_p, Pedestrian Delay [s]	82.16	82.16	0.00
l_p,int, Pedestrian LOS Score for Intersectio	3.117	3.900	0.000
Crosswalk LOS	C	D	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	322	500	1535
d_b, Bicycle Delay [s]	63.45	50.76	4.88
l_b,int, Bicycle LOS Score for Intersection	1.670	2.211	4.208
Bicycle LOS	A	B	D

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 10000: University Avenue/Adams Drive

Control Type:	Two-way stop	Delay (sec / veh):	79.6
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.306

Intersection Setup

Name	University Avenue		University Avenue (SR109)		Adams Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		No	

Volumes

Name	University Avenue		University Avenue (SR109)		Adams Drive	
Base Volume Input [veh/h]	41	861	976	87	17	5
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	2	12	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	41	863	988	87	17	5
Peak Hour Factor	0.8610	0.8610	0.8610	0.8610	0.8610	0.8610
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	12	251	287	25	5	1
Total Analysis Volume [veh/h]	48	1002	1148	101	20	6
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.09	0.01	0.01	0.00	0.31	0.01
d_M, Delay for Movement [s/veh]	12.13	0.00	0.00	0.00	79.62	32.99
Movement LOS	B	A	A	A	F	D
95th-Percentile Queue Length [veh/ln]	0.28	0.00	0.00	0.00	1.20	1.20
95th-Percentile Queue Length [ft/ln]	7.10	0.00	0.00	0.00	30.04	30.04
d_A, Approach Delay [s/veh]	0.55		0.00		68.86	
Approach LOS	A		A		F	
d_I, Intersection Delay [s/veh]	1.02					
Intersection LOS	F					

Intersection Level Of Service Report
Intersection 11000: University Ave/O'Brien Dr

Control Type:	Signalized	Delay (sec / veh):	23.5
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.770

Intersection Setup

Name	University Avenue		University Avenue		O'Brien Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	1	0
Entry Pocket Length [ft]	90.00	100.00	100.00	100.00	45.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00		25.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	No		No		No	

Volumes

Name	University Avenue		University Avenue		O'Brien Drive	
Base Volume Input [veh/h]	348	889	834	149	13	99
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	2	0	12	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	348	891	834	161	13	99
Peak Hour Factor	0.8540	0.8540	0.8540	0.8540	0.8540	0.8540
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	102	261	244	47	4	29
Total Analysis Volume [veh/h]	407	1043	977	189	15	116
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		2	
Bicycle Volume [bicycles/h]	1		1		1	

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	130
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	48.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	11.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal Group	1	6	2	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	5	5	5	0	5	0
Maximum Green [s]	30	30	30	0	30	0
Amber [s]	3.0	3.0	3.0	0.0	3.0	0.0
All red [s]	1.0	1.0	1.0	0.0	1.0	0.0
Split [s]	67	76	9	0	54	0
Vehicle Extension [s]	3.0	3.0	3.0	0.0	3.0	0.0
Walk [s]	0	5	5	0	5	0
Pedestrian Clearance [s]	0	10	10	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
Minimum Recall	No	No	No		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	L	R
C, Cycle Length [s]	130	130	130	130	130	130
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	35	109	70	70	13	13
g / C, Green / Cycle	0.27	0.84	0.54	0.54	0.10	0.10
(v / s)_i Volume / Saturation Flow Rate	0.25	0.33	0.35	0.37	0.01	0.08
s, saturation flow rate [veh/h]	1603	3204	1683	1580	1603	1410
c, Capacity [veh/h]	434	2697	909	853	155	136
d1, Uniform Delay [s]	46.29	2.41	21.03	21.79	53.51	57.69
k, delay calibration	0.11	0.50	0.50	0.50	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	10.34	0.42	3.47	4.42	0.27	13.51
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.94	0.39	0.64	0.68	0.10	0.85
d, Delay for Lane Group [s/veh]	56.63	2.83	24.50	26.20	53.78	71.20
Lane Group LOS	E	A	C	C	D	E
Critical Lane Group	Yes	No	No	Yes	No	Yes
50th-Percentile Queue Length [veh/ln]	14.15	2.52	13.32	13.94	0.46	4.26
50th-Percentile Queue Length [ft/ln]	353.82	63.03	333.11	348.53	11.54	106.61
95th-Percentile Queue Length [veh/ln]	20.32	4.54	19.31	20.06	0.83	7.65
95th-Percentile Queue Length [ft/ln]	508.06	113.45	482.77	501.62	20.78	191.27

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	56.63	2.83	25.19	26.20	53.78	71.20
Movement LOS	E	A	C	C	D	E
d_A, Approach Delay [s/veh]	17.93		25.35		69.20	
Approach LOS	B		C		E	
d_I, Intersection Delay [s/veh]	23.53					
Intersection LOS	C					
Intersection V/C	0.770					

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	0.000
Crosswalk LOS	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1108	77	769
d_b, Bicycle Delay [s]	12.94	60.11	24.62
l_b,int, Bicycle LOS Score for Intersection	2.756	2.522	1.560
Bicycle LOS	C	B	A

Sequence

Ring 1	1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 12000: University Avenue/Kavanaugh Drive

Control Type:	Signalized	Delay (sec / veh):	22.2
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.499

Intersection Setup

Name	University Avenue		University Avenue		Kavanaugh Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		No		No	

Volumes

Name	University Avenue		University Avenue		Kavanaugh Drive	
Base Volume Input [veh/h]	88	1025	869	45	70	66
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	5	0	0	0	2	1
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	93	1025	869	45	72	67
Peak Hour Factor	0.8550	0.8550	0.8550	0.8550	0.8550	0.8550
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	27	300	254	13	21	20
Total Analysis Volume [veh/h]	109	1199	1016	53	84	78
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		1		2	
Bicycle Volume [bicycles/h]	1		3		1	

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fixed time
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal Group	1	6	2	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	5	5	5	0	5	0
Maximum Green [s]	30	30	30	0	30	0
Amber [s]	3.0	3.0	3.0	0.0	3.0	0.0
All red [s]	1.0	1.0	1.0	0.0	1.0	0.0
Split [s]	19	60	41	0	30	0
Vehicle Extension [s]	3.0	3.0	3.0	0.0	3.0	0.0
Walk [s]	0	5	5	0	5	0
Pedestrian Clearance [s]	0	10	10	0	21	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
Minimum Recall	No	No	No		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	C
C, Cycle Length [s]	90	90	90	90	90
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	15	56	37	37	26
g / C, Green / Cycle	0.17	0.62	0.41	0.41	0.29
(v / s)_i Volume / Saturation Flow Rate	0.07	0.37	0.32	0.32	0.11
s, saturation flow rate [veh/h]	1603	3204	1683	1650	1515
c, Capacity [veh/h]	267	1994	692	678	438
d1, Uniform Delay [s]	33.53	10.26	22.87	23.09	25.48
k, delay calibration	0.50	0.50	0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	4.57	1.35	8.18	9.02	2.40
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.41	0.60	0.77	0.79	0.37
d, Delay for Lane Group [s/veh]	38.10	11.61	31.05	32.11	27.88
Lane Group LOS	D	B	C	C	C
Critical Lane Group	Yes	No	No	Yes	Yes
50th-Percentile Queue Length [veh/ln]	2.46	6.88	10.84	11.06	2.99
50th-Percentile Queue Length [ft/ln]	61.61	171.88	271.11	276.49	74.83
95th-Percentile Queue Length [veh/ln]	4.44	11.18	16.25	16.51	5.39
95th-Percentile Queue Length [ft/ln]	110.90	279.38	406.13	412.83	134.69

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	38.10	11.61	31.55	32.11	27.88	27.88
Movement LOS	D	B	C	C	C	C
d_A, Approach Delay [s/veh]	13.82		31.58		27.88	
Approach LOS	B		C		C	
d_I, Intersection Delay [s/veh]	22.19					
Intersection LOS	C					
Intersection V/C	0.499					

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	36.45	0.00	0.00
l_p,int, Pedestrian LOS Score for Intersectio	2.692	0.000	0.000
Crosswalk LOS	B	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1244	822	578
d_b, Bicycle Delay [s]	6.43	15.63	22.77
l_b,int, Bicycle LOS Score for Intersection	2.639	2.442	1.827
Bicycle LOS	B	B	A

Sequence

Ring 1	1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 13000: Willow Road/Driveway A

Control Type:	Two-way stop	Delay (sec / veh):	11.1
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.017

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		Driveway A	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		Driveway A	
Base Volume Input [veh/h]	770	16	0	1106	0	5
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	6	10	0	40	0	3
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	1	5	0	5	0	2
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	777	31	0	1151	0	10
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	194	8	0	288	0	3
Total Analysis Volume [veh/h]	777	31	0	1151	0	10
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.01	0.00	0.02
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	0.00	0.00	11.14
Movement LOS	A	A		A		B
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.05
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.00	1.28
d_A, Approach Delay [s/veh]	0.00		0.00		11.14	
Approach LOS	A		A		B	
d_I, Intersection Delay [s/veh]	0.06					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 14000: Driveway B/O'Brien Drive

Control Type:	Two-way stop	Delay (sec / veh):	11.7
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.023

Intersection Setup

Name	Driveway B		O'Brien Drive		O'Brien Drive	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Driveway B		O'Brien Drive		O'Brien Drive	
Base Volume Input [veh/h]	0	0	31	695	515	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	10	34	48	6	-1
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	3	9	0	1	3
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	13	74	743	522	2
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	3	19	186	131	1
Total Analysis Volume [veh/h]	0	13	74	743	522	2
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.02	0.07	0.01	0.01	0.00
d_M, Delay for Movement [s/veh]	32.15	11.66	8.54	0.00	0.00	0.00
Movement LOS	D	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.07	0.07	0.13	0.13	0.00	0.00
95th-Percentile Queue Length [ft/ln]	1.80	1.80	3.21	3.21	0.00	0.00
d_A, Approach Delay [s/veh]	11.66		0.77		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	0.58					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 15000: Driveway C/O'Brien Drive

Control Type:	Two-way stop	Delay (sec / veh):	33.3
Analysis Method:	HCM 7th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.053

Intersection Setup

Name	Driveway C		O'Brien Drive		O'Brien Drive	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Driveway C		O'Brien Drive		O'Brien Drive	
Base Volume Input [veh/h]	5	21	67	628	491	26
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	2	7	48	0	-2	19
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	4	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	7	28	115	628	493	45
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	7	29	157	123	11
Total Analysis Volume [veh/h]	7	28	115	628	493	45
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.05	0.05	0.11	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	33.27	12.64	8.63	0.00	0.00	0.00
Movement LOS	D	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.34	0.34	0.20	0.20	0.00	0.00
95th-Percentile Queue Length [ft/ln]	8.51	8.51	5.11	5.11	0.00	0.00
d_A, Approach Delay [s/veh]	16.77		1.34		0.00	
Approach LOS	C		A		A	
d_I, Intersection Delay [s/veh]	1.20					
Intersection LOS	D					

1005 O'Brien Drive and 1320 Willow Road

Vistro File: P:\...\OBrien_Willow_PM_Revised_V3.vistro
Scenario 18 Near-term + Project PM (2027)
Report File: P:\...\NT+P_PM_v3.pdf
3/18/2025

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1000	Bayfront Expy (SR 84)/Willow Rd (SR 114)	Signalized	HCM 7th Edition	EB Thru	1.141	419.0	F
2000	Willow Rd (SR 114)/Hamilton Ave	Signalized	HCM 7th Edition	SB Left	1.879	437.1	F
3000	Willow Rd (SR 114)/Ivy Dr	Signalized	HCM 7th Edition	NB Left	1.082	52.9	D
4000	Willow Rd (SR 114)/O'Brien Dr	Signalized	HCM 7th Edition	WB Right	1.677	271.1	F
5000	Willow Rd (SR 114) /Newbridge St	Signalized	HCM 7th Edition	SB Right	1.126	182.8	F
6000	Willow Rd/US-101 NB Ramps	Signalized	HCM 7th Edition	WB Left	0.552	8.0	A
7000	Willow Rd/US-101 SB Ramps	Signalized	HCM 7th Edition	EB Left	0.876	11.3	B
8000	O'Brien Drive/Kavanaugh Drive	All-way stop	HCM 7th Edition	SB Thru	0.660	15.4	C
9000	Bayfront Expy (SR 84) /University Ave (SR 109)	Signalized	HCM 7th Edition	NB Right	0.890	70.2	E
10000	University Avenue/Adams Drive	Two-way stop	HCM 7th Edition	EB Left	0.408	38.7	E
11000	University Ave/O'Brien Dr	Signalized	HCM 7th Edition	NB Left	0.674	20.5	C
12000	University Avenue/Kavanaugh Drive	Signalized	HCM 7th Edition	NB Left	0.598	18.0	B
13000	Willow Road/Driveway A	Two-way stop	HCM 7th Edition	WB Right	0.131	16.5	C
14000	Driveway B/O'Brien Drive	Two-way stop	HCM 7th Edition	SB Left	0.011	19.0	C
15000	Driveway C/O'Brien Drive	Two-way stop	HCM 7th Edition	SB Left	0.103	19.4	C

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1000: Bayfront Expy (SR 84)/Willow Rd (SR 114)

Control Type:	Signalized	Delay (sec / veh):	419.0
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.141

Intersection Setup

Name	Willow Road (SR 114)			Willow Road			Ba Ex			Ba Ex		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	3	0	1	0	0	0	2	0	1	1	0	1
Entry Pocket Length [ft]	265.00	100.00	200.00	100.00	100.00	100.00	530.00	100.00	630.00	1500.00	100.00	600.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			20.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			No			Yes			No		

Volumes

Name	Willow Road (SR 114)			Willow Road			Ba Ex			Ba Ex		
Base Volume Input [veh/h]	81	31	1333	49	168	87	34	1868	248	402	853	6
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	21	0	18	0	0	0	0	0	3	2	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	70	0	0	45	0	0	1
Total Hourly Volume [veh/h]	102	31	1351	49	168	17	34	1868	206	404	853	5
Peak Hour Factor	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	27	8	351	13	44	4	9	486	54	105	222	1
Total Analysis Volume [veh/h]	106	32	1406	51	175	18	35	1944	214	420	888	5
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			11			11			0		
v_di, Inbound Pedestrian Volume crossing m	0			11			11			0		
v_co, Outbound Pedestrian Volume crossing	8			0			8			0		
v_ci, Inbound Pedestrian Volume crossing mi	8			0			8			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	1			2			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	200
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	120.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Protecte	Permiss	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	7	4	4	3	8	4	1	6	2	5	2	6
Auxiliary Signal Groups			4,5									
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	13	12	12	15	15	12	6	25	10	11	10	25
Maximum Green [s]	22	15	15	9	9	15	26	40	30	25	30	40
Amber [s]	3.6	3.9	3.9	3.6	3.6	3.9	3.6	5.0	5.0	3.6	5.0	5.0
All red [s]	0.0	0.5	0.5	1.5	1.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0
Split [s]	18	27	27	30	39	27	17	82	126	61	126	82
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Walk [s]	0	0	0	0	4	0	0	4	0	4	0	4
Pedestrian Clearance [s]	0	0	0	0	29	0	0	35	0	11	0	35
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	3.0	0.0	3.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	1.6	2.4	2.4	3.1	3.1	2.4	2.6	4.0	4.0	2.6	4.0	4.0
Minimum Recall	No	No	No	No	No		No	Yes		No	Yes	
Maximum Recall	No	No	No	No	No		No	No		No	No	
Pedestrian Recall	No	No	No	No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
C, Cycle Length [s]	200	200	200	200	200	200	200	200	200	200	200	200
L, Total Lost Time per Cycle [s]	3.60	4.40	4.60	5.10	5.10	5.10	4.60	6.00	6.00	4.60	6.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.60	2.40	0.00	3.10	3.10	3.10	2.60	4.00	4.00	2.60	4.00	4.00
g_i, Effective Green Time [s]	14	101	130	14	102	102	5	40	40	25	60	60
g / C, Green / Cycle	0.07	0.50	0.65	0.07	0.51	0.51	0.03	0.20	0.20	0.13	0.30	0.30
(v / s)_i Volume / Saturation Flow Rate	0.06	0.02	0.34	0.03	0.11	0.01	0.02	0.63	0.22	0.12	0.17	0.00
s, saturation flow rate [veh/h]	1781	1593	4151	1781	1593	1549	2102	3097	966	3459	5094	1589
c, Capacity [veh/h]	123	802	2701	126	811	789	54	620	193	433	1525	476
d1, Uniform Delay [s]	92.07	25.12	18.28	88.86	27.05	24.35	96.41	79.91	79.91	87.05	59.39	49.19
k, delay calibration	0.11	0.50	0.50	0.11	0.43	0.11	0.11	0.46	0.50	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	16.15	0.09	0.72	2.10	0.52	0.01	12.00	965.22	96.10	14.28	0.35	0.01
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.86	0.04	0.52	0.41	0.22	0.02	0.64	3.14	1.11	0.97	0.58	0.01
d, Delay for Lane Group [s/veh]	108.22	25.22	19.00	90.97	27.57	24.37	108.42	1045.13	176.01	101.32	59.75	49.20
Lane Group LOS	F	C	B	F	C	C	F	F	F	F	E	D
Critical Lane Group	No	No	Yes	Yes	No	No	No	Yes	No	Yes	No	No
50th-Percentile Queue Length [veh/ln]	6.00	0.41	11.46	2.66	2.50	0.45	1.00	66.13	15.21	11.78	12.96	0.18
50th-Percentile Queue Length [ft/ln]	150.04	10.15	286.55	66.39	62.47	11.36	25.05	1653.19	380.19	294.56	324.11	4.55
95th-Percentile Queue Length [veh/ln]	10.02	0.73	17.01	4.78	4.50	0.82	1.80	105.37	22.76	17.41	18.87	0.33
95th-Percentile Queue Length [ft/ln]	250.48	18.26	425.36	119.50	112.44	20.45	45.10	2634.24	569.03	435.29	471.73	8.18

Movement, Approach, & Intersection Results

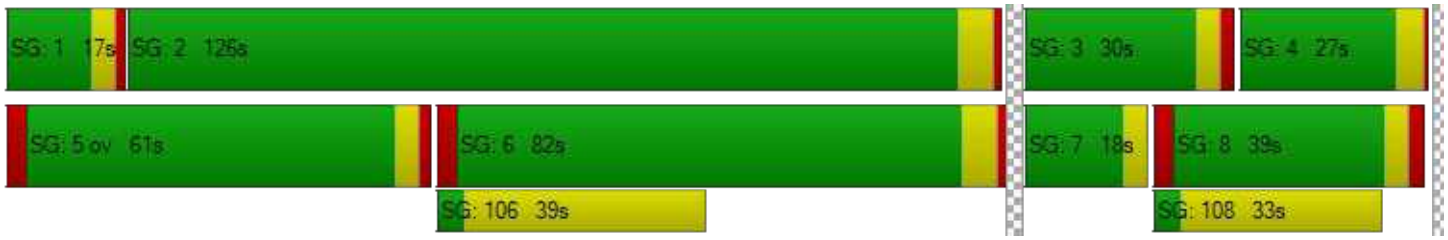
d_M, Delay for Movement [s/veh]	108.22	25.22	19.00	90.97	27.57	24.37	108.42	1045.13	176.01	101.32	59.75	49.20
Movement LOS	F	C	B	F	C	C	F	F	F	F	E	D
d_A, Approach Delay [s/veh]	25.25			40.59			945.37			73.01		
Approach LOS	C			D			F			E		
d_I, Intersection Delay [s/veh]	418.95											
Intersection LOS	F											
Intersection V/C	1.141											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	0.0	8.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	159.86	0.00	178.26	0.00
d_p, Pedestrian Delay [s]	92.12	0.00	92.12	0.00
l_p,int, Pedestrian LOS Score for Intersectio	3.146	0.000	3.257	0.000
Crosswalk LOS	C	F	C	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	226	309	730	1201
d_b, Bicycle Delay [s]	78.67	71.52	40.28	15.97
l_b,int, Bicycle LOS Score for Intersection	2.833	1.819	2.791	2.282
Bicycle LOS	C	A	C	B

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 2000: Willow Rd (SR 114)/Hamilton Ave

Control Type:	Signalized	Delay (sec / veh):	437.1
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.879

Intersection Setup

Name	Willow Road (SR 114)			Willow Road (SR 114)			Hamilton Avenue			Main Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			30.00			25.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Willow Road (SR 114)			Willow Road (SR 114)			Hamilton Avenue			Main Street		
Base Volume Input [veh/h]	124	1307	21	330	723	55	62	9	66	69	16	454
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	2	38	0	0	5	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	126	1345	21	330	728	55	62	9	66	69	16	454
Peak Hour Factor	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	33	351	5	86	190	14	16	2	17	18	4	119
Total Analysis Volume [veh/h]	132	1405	22	345	761	57	65	9	69	72	17	474
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	1			13			5			1		
v_di, Inbound Pedestrian Volume crossing m	5			1			1			13		
v_co, Outbound Pedestrian Volume crossing	3			5			13			1		
v_ci, Inbound Pedestrian Volume crossing mi	1			13			5			3		
v_ab, Corner Pedestrian Volume [ped/h]	3			13			5			1		
Bicycle Volume [bicycles/h]	1			1			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	20.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	1	6	2	5	2	6	4	8	4	8	4	8
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	Lead	-	-	Lag	-	-	Lag	-	-
Minimum Green [s]	4	10	10	4	10	10	4	4	4	4	4	4
Maximum Green [s]	21	30	30	16	30	30	26	26	26	26	26	26
Amber [s]	3.0	4.4	4.4	3.0	4.4	4.4	3.6	3.7	3.6	3.7	3.6	3.7
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	24	92	85	17	85	92	36	36	36	36	36	36
Vehicle Extension [s]	3.0	4.0	4.0	2.0	4.0	4.0	2.0	3.0	2.0	3.0	2.0	3.0
Walk [s]	0	4	4	0	4	4	4	4	4	4	4	4
Pedestrian Clearance [s]	0	19	15	0	15	19	25	25	25	25	25	25
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	1.0	2.4	2.4	1.0	2.4	2.4	1.6	1.7	1.6	1.7	1.6	1.7
Minimum Recall	No	Yes		No	Yes			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	6.0	6.0	6.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	C	C
C, Cycle Length [s]	145	145	145	145	145	145	145	145
L, Total Lost Time per Cycle [s]	3.00	4.40	4.40	3.00	4.40	4.40	3.70	3.60
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.00
l2, Clearance Lost Time [s]	1.00	2.40	2.40	1.00	2.40	2.40	1.70	0.00
g_i, Effective Green Time [s]	13	88	88	14	89	89	32	32
g / C, Green / Cycle	0.09	0.60	0.60	0.10	0.61	0.61	0.22	0.22
(v / s)_i Volume / Saturation Flow Rate	0.07	0.85	0.86	0.43	0.49	0.50	0.44	0.72
s, saturation flow rate [veh/h]	1781	837	832	797	837	811	322	786
c, Capacity [veh/h]	155	505	502	77	513	498	108	193
d1, Uniform Delay [s]	65.17	28.68	28.68	65.38	21.39	21.53	60.64	56.02
k, delay calibration	0.11	0.50	0.50	0.50	0.50	0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	12.20	198.13	199.73	1593.47	12.73	13.45	196.91	878.42
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.85	1.41	1.42	4.48	0.81	0.81	1.33	2.92
d, Delay for Lane Group [s/veh]	77.37	226.81	228.40	1658.85	34.12	34.98	257.55	934.44
Lane Group LOS	E	F	F	F	C	C	F	F
Critical Lane Group	No	No	Yes	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	5.29	43.87	43.83	36.98	12.19	12.06	9.96	54.34
50th-Percentile Queue Length [ft/ln]	132.17	1096.77	1095.81	924.44	304.84	301.60	248.94	1358.47
95th-Percentile Queue Length [veh/ln]	9.06	68.88	68.91	58.49	17.92	17.76	17.09	88.34
95th-Percentile Queue Length [ft/ln]	226.44	1722.09	1722.63	1462.36	448.01	444.00	427.32	2208.43

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	77.37	227.59	228.40	1658.85	34.51	34.98	257.55	257.55	257.55	934.44	934.44	934.44
Movement LOS	E	F	F	F	C	C	F	F	F	F	F	F
d_A, Approach Delay [s/veh]	214.88			516.39			257.55			934.44		
Approach LOS	F			F			F			F		
d_I, Intersection Delay [s/veh]	437.13											
Intersection LOS	F											
Intersection V/C	1.879											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	241.01	0.00	171.00	1034.60
d_p, Pedestrian Delay [s]	64.67	64.67	64.67	64.67
l_p,int, Pedestrian LOS Score for Intersectio	3.284	3.023	1.881	2.219
Crosswalk LOS	C	C	A	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1168	1071	404	406
d_b, Bicycle Delay [s]	12.55	15.63	46.11	46.03
l_b,int, Bicycle LOS Score for Intersection	2.846	2.519	1.796	2.489
Bicycle LOS	C	B	A	B

Sequence

Ring 1	2	1	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 3000: Willow Rd (SR 114)/Ivy Dr

Control Type:	Signalized	Delay (sec / veh):	52.9
Analysis Method:	HCM 7th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.082

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		Ivy Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	1
Entry Pocket Length [ft]	85.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	1	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	100.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		Ivy Drive	
Base Volume Input [veh/h]	101	1381	801	99	34	79
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	2	40	5	0	0	1
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	103	1421	806	99	34	80
Peak Hour Factor	0.9670	0.9670	0.9670	0.9670	0.9670	0.9670
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	27	367	208	26	9	21
Total Analysis Volume [veh/h]	107	1469	834	102	35	83
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	3		7		2	
v_di, Inbound Pedestrian Volume crossing m	2		6		3	
v_co, Outbound Pedestrian Volume crossing	6		3		3	
v_ci, Inbound Pedestrian Volume crossing mi	7		3		3	
v_ab, Corner Pedestrian Volume [ped/h]	9		10		5	
Bicycle Volume [bicycles/h]	0		4		1	

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	10.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal Group	5	2	6	6	4	4
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	4	10	10	10	11	11
Maximum Green [s]	21	30	30	30	28	28
Amber [s]	3.0	4.4	4.4	4.4	3.0	3.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	22	111	89	89	34	34
Vehicle Extension [s]	2.0	2.0	2.0	2.0	2.0	2.0
Walk [s]	0	0	4	4	4	4
Pedestrian Clearance [s]	0	0	22	22	24	24
Delayed Vehicle Green [s]	0.0	0.0	3.0	3.0	3.0	3.0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	1.0	2.4	2.4	2.4	1.0	1.0
Minimum Recall	No	Yes	Yes		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	L	R
C, Cycle Length [s]	145	145	145	145	145	145
L, Total Lost Time per Cycle [s]	3.00	4.40	4.40	4.40	3.00	3.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.00	2.40	2.40	2.40	1.00	1.00
g_i, Effective Green Time [s]	14	122	105	105	16	16
g / C, Green / Cycle	0.10	0.84	0.72	0.72	0.11	0.11
(v / s)_i Volume / Saturation Flow Rate	0.08	0.92	0.56	0.58	0.04	0.09
s, saturation flow rate [veh/h]	1265	1593	837	802	995	895
c, Capacity [veh/h]	121	1335	604	579	110	99
d1, Uniform Delay [s]	64.69	11.71	12.73	13.46	59.40	63.00
k, delay calibration	0.09	0.50	0.50	0.50	0.04	0.04
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	15.78	56.77	9.40	11.54	0.61	6.93
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.88	1.10	0.78	0.81	0.32	0.84
d, Delay for Lane Group [s/veh]	80.46	68.48	22.13	25.00	60.02	69.93
Lane Group LOS	F	F	C	C	E	E
Critical Lane Group	No	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	4.40	23.64	9.94	10.70	1.21	3.19
50th-Percentile Queue Length [ft/ln]	109.89	591.05	248.51	267.46	30.33	79.85
95th-Percentile Queue Length [veh/ln]	7.83	34.35	15.11	16.06	2.18	5.75
95th-Percentile Queue Length [ft/ln]	195.85	858.73	377.78	401.56	54.59	143.73

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	80.46	68.48	23.39	25.00	60.02	69.93
Movement LOS	F	F	C	C	E	E
d_A, Approach Delay [s/veh]	69.30		23.56		66.99	
Approach LOS	E		C		E	
d_I, Intersection Delay [s/veh]	52.92					
Intersection LOS	D					
Intersection V/C	1.082					

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	866.29	420.42	678.16
d_p, Pedestrian Delay [s]	64.69	64.69	64.69
l_p,int, Pedestrian LOS Score for Intersectio	2.973	2.949	2.235
Crosswalk LOS	C	C	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1471	1126	386
d_b, Bicycle Delay [s]	5.07	13.87	47.20
l_b,int, Bicycle LOS Score for Intersection	2.860	2.332	1.560
Bicycle LOS	C	B	A

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 4000: Willow Rd (SR 114)/O'Brien Dr

Control Type:	Signalized	Delay (sec / veh):	271.1
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.677

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		O'Brien Drive	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	1	0	1	0
Entry Pocket Length [ft]	100.00	60.00	100.00	100.00	50.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	No		No		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		O'Brien Drive	
Base Volume Input [veh/h]	1407	350	28	873	441	17
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	3	5	6	0	51	24
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	1410	355	34	873	492	41
Peak Hour Factor	0.9860	0.9860	0.9860	0.9860	0.9860	0.9860
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	358	90	9	221	125	10
Total Analysis Volume [veh/h]	1430	360	34	885	499	42
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	5		0		5	
v_ci, Inbound Pedestrian Volume crossing mi	5		0		5	
v_ab, Corner Pedestrian Volume [ped/h]	3		0		13	
Bicycle Volume [bicycles/h]	2		0		4	

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	10.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Permissive	Permissive	Protected	Permissive	Permissive	Permissive
Signal Group	2	2	1	6	4	8
Auxiliary Signal Groups						
Lead / Lag	-	-	Lead	-	Lead	-
Minimum Green [s]	10	10	5	10	8	0
Maximum Green [s]	35	35	21	35	21	0
Amber [s]	4.4	4.4	3.0	4.4	3.2	0.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	105	105	15	120	25	0
Vehicle Extension [s]	2.0	2.0	2.0	2.0	2.0	0.0
Walk [s]	4	4	0	0	0	0
Pedestrian Clearance [s]	17	17	0	0	0	0
Delayed Vehicle Green [s]	3.0	3.0	0.0	0.0	0.0	0.0
Rest In Walk	No			No	No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.4	2.4	1.0	2.4	1.2	0.0
Minimum Recall	Yes		No	Yes	No	
Maximum Recall	No		No	No	No	
Pedestrian Recall	No		No	No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	L	C	L	C
C, Cycle Length [s]	145	145	145	145	145	145
L, Total Lost Time per Cycle [s]	4.40	4.40	3.00	4.40	3.20	3.20
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.40	2.40	1.00	2.40	1.20	1.20
g_i, Effective Green Time [s]	106	106	6	116	22	22
g / C, Green / Cycle	0.73	0.73	0.04	0.80	0.15	0.15
(v / s)_i Volume / Saturation Flow Rate	1.10	0.64	0.05	0.68	0.42	0.42
s, saturation flow rate [veh/h]	1302	561	647	1293	647	635
c, Capacity [veh/h]	954	411	28	1031	97	95
d1, Uniform Delay [s]	19.39	13.79	69.29	9.45	61.59	61.59
k, delay calibration	0.50	0.50	0.04	0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	230.11	22.11	111.34	9.25	840.98	841.77
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	1.50	0.88	1.19	0.86	2.81	2.81
d, Delay for Lane Group [s/veh]	249.51	35.90	180.63	18.70	902.57	903.35
Lane Group LOS	F	D	F	B	F	F
Critical Lane Group	Yes	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	43.71	9.62	1.93	8.10	26.31	25.84
50th-Percentile Queue Length [ft/ln]	1092.82	240.54	48.25	202.42	657.65	645.98
95th-Percentile Queue Length [veh/ln]	71.39	14.71	3.47	12.76	43.97	43.27
95th-Percentile Queue Length [ft/ln]	1784.68	367.72	86.85	319.08	1099.30	1081.67

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	249.51	35.90	180.63	18.70	902.92	903.35
Movement LOS	F	D	F	B	F	F
d_A, Approach Delay [s/veh]	206.55		24.69		902.96	
Approach LOS	F		C		F	
d_I, Intersection Delay [s/veh]	271.05					
Intersection LOS	F					
Intersection V/C	1.677					

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	64.71
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	2.269
Crosswalk LOS	F	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1346	1595	301
d_b, Bicycle Delay [s]	7.75	2.98	52.44
l_b,int, Bicycle LOS Score for Intersection	3.036	2.318	2.452
Bicycle LOS	C	B	B

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 5000: Willow Rd (SR 114)/Newbridge St

Control Type:	Signalized	Delay (sec / veh):	182.8
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.126

Intersection Setup

Name	Willow Road (SR 114)			Willow Road (SR 114)			Newbridge Street			Newbridge Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	1	0	0	1	0	0	0
Entry Pocket Length [ft]	390.00	100.00	100.00	185.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	1	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	49.21	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			25.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Willow Road (SR 114)			Willow Road (SR 114)			Newbridge Street			Newbridge Street		
Base Volume Input [veh/h]	322	1457	434	93	1118	17	44	178	305	282	159	68
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	8	0	2	49	0	0	0	-2	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	175	0	0	45
Total Hourly Volume [veh/h]	322	1465	434	95	1167	17	44	178	128	282	159	23
Peak Hour Factor	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	86	390	115	25	310	5	12	47	34	75	42	6
Total Analysis Volume [veh/h]	343	1559	462	101	1241	18	47	189	136	300	169	24
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	3			7			7			3		
v_di, Inbound Pedestrian Volume crossing m	3			7			7			3		
v_co, Outbound Pedestrian Volume crossing	11			20			10			19		
v_ci, Inbound Pedestrian Volume crossing mi	10			19			11			20		
v_ab, Corner Pedestrian Volume [ped/h]	31			48			41			8		
Bicycle Volume [bicycles/h]	5			0			3			1		

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	140.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Split	Split	Split	Split	Split	Split
Signal Group	5	2	2	1	6	6	4	4	4	8	3	8
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lag	-	-	Lag	-	-	-	-	-
Minimum Green [s]	4	12	12	4	12	12	4	4	4	0	4	0
Maximum Green [s]	21	40	40	21	40	40	25	25	25	0	21	0
Amber [s]	3.0	4.4	4.4	3.0	4.4	4.4	3.6	3.6	3.6	0.0	3.0	0.0
All red [s]	0.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0
Split [s]	34	66	66	19	51	51	30	30	30	0	30	0
Vehicle Extension [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walk [s]	0	4	4	0	4	4	4	4	4	0	4	0
Pedestrian Clearance [s]	0	19	19	0	16	16	23	23	23	0	23	0
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	3.0	0.0	3.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	1.0	3.4	3.4	1.0	3.4	3.4	2.6	2.6	2.6	0.0	1.0	0.0
Minimum Recall	No	Yes		No	Yes			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	L	C	R	L	C	R
C, Cycle Length [s]	145	145	145	145	145	145	145	145	145	145	145	145
L, Total Lost Time per Cycle [s]	3.00	5.40	5.40	3.00	5.40	5.40	4.60	4.60	4.60	3.00	3.00	3.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.00	3.40	3.40	1.00	3.40	3.40	2.60	2.60	2.60	1.00	1.00	1.00
g_i, Effective Green Time [s]	31	61	61	16	46	46	29	29	29	24	24	24
g / C, Green / Cycle	0.21	0.42	0.42	0.11	0.31	0.31	0.20	0.20	0.20	0.16	0.16	0.16
(v / s)_i Volume / Saturation Flow Rate	0.27	0.54	0.57	0.11	0.44	0.44	0.03	0.19	0.09	0.09	0.13	0.02
s, saturation flow rate [veh/h]	1265	2530	1156	937	1874	976	1781	984	1516	3459	1329	1457
c, Capacity [veh/h]	270	1056	482	104	590	307	353	195	301	565	217	238
d1, Uniform Delay [s]	57.02	42.22	42.22	64.25	49.65	49.65	47.82	57.63	50.92	55.54	58.11	51.50
k, delay calibration	0.50	0.50	0.50	0.23	0.50	0.50	0.04	0.40	0.04	0.04	0.19	0.04
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	148.29	136.02	181.24	54.23	191.27	200.40	0.06	49.73	0.39	0.29	9.90	0.07
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	1.27	1.29	1.37	0.97	1.40	1.40	0.13	0.97	0.45	0.53	0.78	0.10
d, Delay for Lane Group [s/veh]	205.31	178.24	223.46	118.48	240.92	250.05	47.89	107.35	51.31	55.83	68.01	51.57
Lane Group LOS	F	F	F	F	F	F	D	F	D	E	E	D
Critical Lane Group	Yes	No	No	No	No	Yes	No	Yes	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	20.81	38.17	40.94	5.31	26.41	28.29	1.43	9.57	4.41	5.08	6.56	0.76
50th-Percentile Queue Length [ft/ln]	520.31	954.35	1023.50	132.85	660.28	707.21	35.64	239.36	110.14	127.04	164.01	18.88
95th-Percentile Queue Length [veh/ln]	31.84	56.73	62.36	9.09	41.58	44.25	2.57	14.65	7.85	8.78	10.76	1.36
95th-Percentile Queue Length [ft/ln]	796.01	1418.30	1559.07	227.37	1039.43	1106.16	64.14	366.22	196.20	219.46	269.02	33.98

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	205.31	184.07	223.46	118.48	243.96	250.05	47.89	107.35	51.31	55.83	68.01	51.57
Movement LOS	F	F	F	F	F	F	D	F	D	E	E	D
d_A, Approach Delay [s/veh]	194.85			234.72			79.35			59.80		
Approach LOS	F			F			E			E		
d_I, Intersection Delay [s/veh]	182.79											
Intersection LOS	F											
Intersection V/C	1.126											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	183.64	138.71	372.60	0.00
d_p, Pedestrian Delay [s]	64.70	64.70	64.70	64.70
l_p,int, Pedestrian LOS Score for Intersectio	3.401	2.971	2.667	2.640
Crosswalk LOS	C	C	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	795	588	309	331
d_b, Bicycle Delay [s]	26.39	36.14	51.89	50.49
l_b,int, Bicycle LOS Score for Intersection	2.860	2.308	2.462	2.447
Bicycle LOS	C	B	B	B

Sequence

Ring 1	2	1	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 6000: Willow Rd/US-101 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	8.0
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.552

Intersection Setup

Name	Willow Road			Willow Road (SR 114)			US-101 NB Ramps			US-101 NB Ramps		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	1	0	0	0	1	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	200.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No						No		
Crosswalk	No			No			Yes			Yes		

Volumes

Name	Willow Road			Willow Road (SR 114)			US-101 NB Ramps			US-101 NB Ramps		
Base Volume Input [veh/h]	0	1276	628	0	1032	597	0	0	0	196	0	849
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	2.00	2.00	0.00	2.00	2.00	0.00	0.00	0.00	2.00	0.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	3	0	0	9	37	0	0	0	0	0	5
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	1279	628	0	1041	634	0	0	0	196	0	854
Peak Hour Factor	1.0000	0.9330	0.9330	1.0000	0.9330	0.9330	1.0000	1.0000	1.0000	0.9330	1.0000	0.9330
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	343	168	0	279	170	0	0	0	53	0	229
Total Analysis Volume [veh/h]	0	1371	673	0	1116	680	0	0	0	210	0	915
Presence of On-Street Parking	No		No	No		No				No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			6			16		
Bicycle Volume [bicycles/h]	0			7			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	2.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	8.00

Phasing & Timing

Control Type	Permiss	Permiss	Overlap	Permiss	Permiss	Overlap	Permiss	Permiss	Permiss	Permiss	Permiss	Overlap
Signal Group	0	6	6	0	2	2	0	0	0	3	0	4
Auxiliary Signal Groups			2,6			2,3						2,3,4
Lead / Lag	-	-	-	-	-	-	-	-	-	Lead	-	-
Minimum Green [s]	0	4	4	0	4	4	0	0	0	6	0	5
Maximum Green [s]	0	35	35	0	35	35	0	0	0	24	0	34
Amber [s]	0.0	4.1	4.1	0.0	4.1	4.1	0.0	0.0	0.0	3.0	0.0	3.0
All red [s]	0.0	1.8	1.8	0.0	1.0	1.0	0.0	0.0	0.0	2.0	0.0	0.0
Split [s]	0	89	89	0	89	89	0	0	0	17	0	22
Vehicle Extension [s]	0.0	3.0	3.0	0.0	3.0	3.0	0.0	0.0	0.0	3.0	0.0	3.0
Walk [s]	0	4	4	0	4	4	0	0	0	0	0	0
Pedestrian Clearance [s]	0	29	29	0	7	7	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No					No		
l1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	2.0	2.0	0.0	0.0	0.0	2.0	0.0	2.0
l2, Clearance Lost Time [s]	0.0	3.9	3.9	0.0	3.1	3.1	0.0	0.0	0.0	3.0	0.0	1.0
Minimum Recall		No	No		No	No				No		No
Maximum Recall		No	No		No	No				No		No
Pedestrian Recall		No	No		No	No				No		No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	C	R		L	R
C, Cycle Length [s]	145	145	145	145		145	145
L, Total Lost Time per Cycle [s]	5.90	5.50	5.10	5.00		5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00		0.00	0.00
l2, Clearance Lost Time [s]	3.90	0.00	3.10	0.00		3.00	0.00
g_i, Effective Green Time [s]	113	114	114	131		12	135
g / C, Green / Cycle	0.78	0.79	0.79	0.91		0.08	0.93
(v / s)_i Volume / Saturation Flow Rate	0.46	0.42	0.37	0.44		0.06	0.55
s, saturation flow rate [veh/h]	3003	1589	3003	1553		3459	1658
c, Capacity [veh/h]	2346	1251	2362	1405		287	1543
d1, Uniform Delay [s]	6.38	5.72	5.25	1.15		64.88	0.39
k, delay calibration	0.50	0.50	0.50	0.50		0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00		1.00	1.00
d2, Incremental Delay [s]	1.07	1.66	0.68	1.19		3.59	1.68
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00		0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00		1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00		1.00	1.00

Lane Group Results

X, volume / capacity	0.58	0.54	0.47	0.48		0.73	0.59
d, Delay for Lane Group [s/veh]	7.46	7.38	5.93	2.34		68.47	2.08
Lane Group LOS	A	A	A	A		E	A
Critical Lane Group	Yes	No	No	No		No	Yes
50th-Percentile Queue Length [veh/ln]	5.21	7.22	3.52	1.58		3.95	0.36
50th-Percentile Queue Length [ft/ln]	130.17	180.54	87.97	39.54		98.73	9.03
95th-Percentile Queue Length [veh/ln]	8.95	11.63	6.33	2.85		7.11	0.65
95th-Percentile Queue Length [ft/ln]	223.72	290.72	158.34	71.18		177.71	16.25

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	0.00	7.46	7.38	0.00	5.93	2.34	0.00	0.00	0.00	68.47	0.00	2.08
Movement LOS		A	A		A	A				E		A
d_A, Approach Delay [s/veh]	7.43			4.57			0.00			14.47		
Approach LOS	A			A			A			B		
d_I, Intersection Delay [s/veh]	7.99											
Intersection LOS	A											
Intersection V/C	0.552											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	64.70	64.70
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	2.111	2.675
Crosswalk LOS	F	F	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1105	1116	0	166
d_b, Bicycle Delay [s]	14.51	14.21	72.48	60.98
l_b,int, Bicycle LOS Score for Intersection	2.684	2.547	4.132	1.560
Bicycle LOS	B	B	D	A

Sequence

Ring 1	-	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 7000: Willow Rd/US-101 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	11.3
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.876

Intersection Setup

Name	Willow Road			Willow Road			US-101 SB Ramps			US-101 SB Ramps		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	0	1	0	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No					
Crosswalk	No			No			Yes			Yes		

Volumes

Name	Willow Road			Willow Road			US-101 SB Ramps			US-101 SB Ramps		
Base Volume Input [veh/h]	0	1173	364	0	790	605	285	0	345	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	2.00	2.00	0.00	2.00	2.00	2.00	0.00	2.00	0.00	0.00	0.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	2	0	0	9	0	1	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	1175	364	0	799	605	286	0	345	0	0	0
Peak Hour Factor	1.0000	0.9520	0.9520	1.0000	0.9520	0.9520	0.9520	1.0000	0.9520	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	309	96	0	210	159	75	0	91	0	0	0
Total Analysis Volume [veh/h]	0	1234	382	0	839	636	300	0	362	0	0	0
Presence of On-Street Parking	No		No	No		No	No		No			
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	1			0			7			17		
Bicycle Volume [bicycles/h]	0			3			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	99.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Permiss	Permiss	Overlap	Permiss	Permiss	Overlap	Permiss	Permiss	Overlap	Permiss	Permiss	Permiss
Signal Group	0	6	6	0	2	2	4	0	4	0	0	0
Auxiliary Signal Groups			4,6			2,4			4,6			
Lead / Lag	-	-	-	-	-	-	Lead	-	-	-	-	-
Minimum Green [s]	0	4	4	0	4	4	4	0	4	0	0	0
Maximum Green [s]	0	35	35	0	35	35	30	0	30	0	0	0
Amber [s]	0.0	4.1	4.1	0.0	4.1	4.1	3.0	0.0	3.0	0.0	0.0	0.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	2.0	0.0	0.0	0.0
Split [s]	0	103	103	0	103	103	25	0	25	0	0	0
Vehicle Extension [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	0.0	3.0	0.0	0.0	0.0
Walk [s]	0	4	4	0	4	4	0	0	0	0	0	0
Pedestrian Clearance [s]	0	7	7	0	32	32	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No		No					
l1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	2.0	2.0	2.0	0.0	2.0	0.0	0.0	0.0
l2, Clearance Lost Time [s]	0.0	2.1	2.1	0.0	2.1	2.1	3.0	0.0	3.0	0.0	0.0	0.0
Minimum Recall		No	No		No	No	No		No			
Maximum Recall		No	No		No	No	No		No			
Pedestrian Recall		No	No		No	No	No		No			
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	C	R	L	R	
C, Cycle Length [s]	145	145	145	145	145	145	
L, Total Lost Time per Cycle [s]	4.10	5.00	4.10	5.00	5.00	5.00	
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	
l2, Clearance Lost Time [s]	2.10	0.00	2.10	0.00	3.00	0.00	
g_i, Effective Green Time [s]	116	140	116	140	20	140	
g / C, Green / Cycle	0.80	0.97	0.80	0.97	0.14	0.97	
(v / s)_i Volume / Saturation Flow Rate	0.24	0.24	0.16	0.92	0.09	0.29	
s, saturation flow rate [veh/h]	5094	1589	5094	694	3459	1251	
c, Capacity [veh/h]	4070	1535	4070	670	478	1208	
d1, Uniform Delay [s]	3.86	0.11	3.50	0.86	58.90	0.12	
k, delay calibration	0.50	0.50	0.50	0.50	0.11	0.21	
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	
d2, Incremental Delay [s]	0.19	0.39	0.11	24.30	1.36	0.27	
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	

Lane Group Results

X, volume / capacity	0.30	0.25	0.21	0.95	0.63	0.30	
d, Delay for Lane Group [s/veh]	4.05	0.50	3.62	25.16	60.26	0.39	
Lane Group LOS	A	A	A	C	E	A	
Critical Lane Group	No	No	No	Yes	No	No	
50th-Percentile Queue Length [veh/ln]	2.90	0.17	1.78	4.52	5.32	0.05	
50th-Percentile Queue Length [ft/ln]	72.41	4.14	44.62	113.06	132.90	1.14	
95th-Percentile Queue Length [veh/ln]	5.21	0.30	3.21	8.01	9.10	0.08	
95th-Percentile Queue Length [ft/ln]	130.33	7.45	80.32	200.26	227.43	2.06	

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	0.00	4.05	0.50	0.00	3.62	25.16	60.26	0.00	0.39	0.00	0.00	0.00
Movement LOS		A	A		A	C	E		A			
d_A, Approach Delay [s/veh]	3.21			12.91			27.53			0.00		
Approach LOS	A			B			C			A		
d_I, Intersection Delay [s/veh]	11.31											
Intersection LOS	B											
Intersection V/C	0.876											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	64.69	64.69
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	2.577	1.820
Crosswalk LOS	F	F	B	A
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1323	1323	276	0
d_b, Bicycle Delay [s]	8.29	8.31	53.85	72.47
l_b,int, Bicycle LOS Score for Intersection	2.448	2.371	1.560	4.132
Bicycle LOS	B	B	A	D

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 8000: O'Brien Drive/Kavanaugh Drive

Control Type:	All-way stop	Delay (sec / veh):	15.4
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.660

Intersection Setup

Name	O'Brien Drive		O'Brien Drive		Kavanaugh Drive	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		Yes		No	

Volumes

Name	O'Brien Drive		O'Brien Drive		Kavanaugh Drive	
Base Volume Input [veh/h]	184	153	111	290	45	214
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	11	0	3	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	184	164	111	293	45	214
Peak Hour Factor	0.9150	0.9150	0.9150	0.9150	0.9150	0.9150
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	50	45	30	80	12	58
Total Analysis Volume [veh/h]	201	179	121	320	49	234
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	697	668	650
Degree of Utilization, x	0.55	0.66	0.44

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	3.32	4.96	2.21
95th-Percentile Queue Length [ft]	82.90	124.00	55.23
Approach Delay [s/veh]	14.17	18.22	12.75
Approach LOS	B	C	B
Intersection Delay [s/veh]	15.43		
Intersection LOS	C		

Intersection Level Of Service Report
Intersection 9000: Bayfront Expy (SR 84)/University Ave (SR 109)

Control Type:	Signalized	Delay (sec / veh):	70.2
Analysis Method:	HCM 7th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.890

Intersection Setup

Name	University Avenue (SR109)		Bayfront Expressway (SR84)		Bayfront Expressway (SR84)	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	2	0	1	2	0
Entry Pocket Length [ft]	100.00	250.00	100.00	100.00	830.00	100.00
No. of Lanes in Exit Pocket	0	2	0	0	0	0
Exit Pocket Length [ft]	0.00	74.61	0.00	0.00	0.00	0.00
Speed [mph]	35.00		55.00		55.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		No	

Volumes

Name	University Avenue (SR109)		Bayfront Expressway (SR84)		Bayfront Expressway (SR84)	
Base Volume Input [veh/h]	83	1316	3483	95	333	1116
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	6	18	0	2	2
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	83	1322	3501	95	335	1118
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	21	337	893	24	85	285
Total Analysis Volume [veh/h]	85	1349	3572	97	342	1141
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	1		2		0	
v_ci, Inbound Pedestrian Volume crossing mi	2		1		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	3		5		8	

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	200
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	198.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	10.00

Phasing & Timing

Control Type	Permissive	Overlap	Permissive	Permissive	Protected	Permissive
Signal Group	4	4	6	2	5	2
Auxiliary Signal Groups		4,5				
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	12	12	10	10	11	10
Maximum Green [s]	15	15	60	60	30	60
Amber [s]	3.0	3.0	5.0	5.4	3.0	5.4
All red [s]	1.0	1.0	1.0	0.5	0.5	0.5
Split [s]	36	36	124	154	26	154
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	3.0
Walk [s]	4	4	4	0	0	0
Pedestrian Clearance [s]	29	29	35	0	0	0
Delayed Vehicle Green [s]	3.0	3.0	3.0	0.0	0.0	0.0
Rest In Walk	No		No			No
l1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0
l2, Clearance Lost Time [s]	2.0	2.0	4.0	3.9	1.5	3.9
Minimum Recall	No	No	No		No	No
Maximum Recall	No	No	No		No	No
Pedestrian Recall	No	No	No		No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	20.0	20.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	R	C	R	L	C
C, Cycle Length [s]	200	200	200	200	200	200
L, Total Lost Time per Cycle [s]	4.00	3.50	6.00	6.00	3.50	5.90
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	0.00	4.00	4.00	1.50	3.90
g_i, Effective Green Time [s]	32	58	132	132	23	158
g / C, Green / Cycle	0.16	0.29	0.66	0.66	0.11	0.79
(v / s)_i Volume / Saturation Flow Rate	0.02	0.32	0.70	0.06	0.10	0.22
s, saturation flow rate [veh/h]	3459	4162	5094	1566	3459	5094
c, Capacity [veh/h]	553	1217	3361	1033	390	4027
d1, Uniform Delay [s]	72.29	70.26	33.99	12.31	87.31	5.65
k, delay calibration	0.11	0.21	0.50	0.50	0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.13	54.69	35.45	0.18	6.42	0.18
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.15	1.11	1.06	0.09	0.88	0.28
d, Delay for Lane Group [s/veh]	72.42	124.95	69.43	12.49	93.72	5.83
Lane Group LOS	E	F	F	B	F	A
Critical Lane Group	No	Yes	Yes	No	No	No
50th-Percentile Queue Length [veh/ln]	1.91	26.78	59.99	1.59	8.94	3.80
50th-Percentile Queue Length [ft/ln]	47.67	669.45	1499.86	39.68	223.40	94.92
95th-Percentile Queue Length [veh/ln]	3.43	37.62	76.86	2.86	13.84	6.83
95th-Percentile Queue Length [ft/ln]	85.81	940.52	1921.58	71.43	345.96	170.86

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	72.42	124.95	69.43	12.49	93.72	5.83
Movement LOS	E	F	F	B	F	A
d_A, Approach Delay [s/veh]	121.83		67.93		26.10	
Approach LOS	F		E		C	
d_I, Intersection Delay [s/veh]	70.25					
Intersection LOS	E					
Intersection V/C	0.890					

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	1160.89	0.00	0.00
d_p, Pedestrian Delay [s]	92.12	92.12	0.00
l_p,int, Pedestrian LOS Score for Intersectio	3.125	3.883	0.000
Crosswalk LOS	C	D	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	290	1150	1482
d_b, Bicycle Delay [s]	73.17	18.08	6.74
l_b,int, Bicycle LOS Score for Intersection	1.670	3.578	2.375
Bicycle LOS	A	D	B

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 10000: University Avenue/Adams Drive

Control Type:	Two-way stop	Delay (sec / veh):	38.7
Analysis Method:	HCM 7th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.408

Intersection Setup

Name	University Avenue		University Avenue (SR109)		Adams Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		No	

Volumes

Name	University Avenue		University Avenue (SR109)		Adams Drive	
Base Volume Input [veh/h]	14	1379	386	7	64	16
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	6	2	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	14	1385	388	7	64	16
Peak Hour Factor	0.9160	0.9160	0.9160	0.9160	0.9160	0.9160
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	378	106	2	17	4
Total Analysis Volume [veh/h]	15	1512	424	8	70	17
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.02	0.00	0.00	0.41	0.02
d_M, Delay for Movement [s/veh]	8.25	0.00	0.00	0.00	38.70	22.29
Movement LOS	A	A	A	A	E	C
95th-Percentile Queue Length [veh/ln]	0.04	0.00	0.00	0.00	1.98	1.98
95th-Percentile Queue Length [ft/ln]	1.01	0.00	0.00	0.00	49.60	49.60
d_A, Approach Delay [s/veh]	0.08		0.00		35.49	
Approach LOS	A		A		E	
d_I, Intersection Delay [s/veh]	1.57					
Intersection LOS	E					

Intersection Level Of Service Report
Intersection 11000: University Ave/O'Brien Dr

Control Type:	Signalized	Delay (sec / veh):	20.5
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.674

Intersection Setup

Name	University Avenue		University Avenue		O'Brien Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	1	0
Entry Pocket Length [ft]	90.00	100.00	100.00	100.00	45.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00		25.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	No		No		No	

Volumes

Name	University Avenue		University Avenue		O'Brien Drive	
Base Volume Input [veh/h]	59	1314	394	8	69	314
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	6	-1	3	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	59	1320	393	11	69	314
Peak Hour Factor	0.9250	0.9250	0.9250	0.9250	0.9250	0.9250
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	16	357	106	3	19	85
Total Analysis Volume [veh/h]	64	1427	425	12	75	339
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		1	
Bicycle Volume [bicycles/h]	2		3		1	

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	130
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	48.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	11.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	1	6	2	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	5	5	5	0	5	0
Maximum Green [s]	30	30	30	0	30	0
Amber [s]	3.0	3.0	3.0	0.0	3.0	0.0
All red [s]	1.0	1.0	1.0	0.0	1.0	0.0
Split [s]	67	76	9	0	54	0
Vehicle Extension [s]	3.0	3.0	3.0	0.0	3.0	0.0
Walk [s]	0	5	5	0	5	0
Pedestrian Clearance [s]	0	10	10	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
Minimum Recall	No	No	No		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	L	R
C, Cycle Length [s]	130	130	130	130	130	130
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	6	92	82	82	30	30
g / C, Green / Cycle	0.05	0.71	0.63	0.63	0.23	0.23
(v / s)_i Volume / Saturation Flow Rate	0.04	0.40	0.12	0.12	0.04	0.22
s, saturation flow rate [veh/h]	1781	3560	1870	1849	1781	1569
c, Capacity [veh/h]	84	2517	1176	1163	412	363
d1, Uniform Delay [s]	61.16	9.31	10.13	10.14	40.04	48.75
k, delay calibration	0.11	0.50	0.50	0.50	0.11	0.14
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	13.20	0.93	0.35	0.36	0.21	13.36
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.76	0.57	0.19	0.19	0.18	0.93
d, Delay for Lane Group [s/veh]	74.37	10.24	10.47	10.50	40.25	62.11
Lane Group LOS	E	B	B	B	D	E
Critical Lane Group	No	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	2.42	9.77	2.77	2.78	1.97	12.05
50th-Percentile Queue Length [ft/ln]	60.38	244.24	69.26	69.40	49.23	301.33
95th-Percentile Queue Length [veh/ln]	4.35	14.90	4.99	5.00	3.54	17.75
95th-Percentile Queue Length [ft/ln]	108.69	372.39	124.67	124.92	88.62	443.67

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	74.37	10.24	10.49	10.50	40.25	62.11
Movement LOS	E	B	B	B	D	E
d_A, Approach Delay [s/veh]	13.00		10.49		58.15	
Approach LOS	B		B		E	
d_I, Intersection Delay [s/veh]	20.51					
Intersection LOS	C					
Intersection V/C	0.674					

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	0.000
Crosswalk LOS	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1108	77	770
d_b, Bicycle Delay [s]	12.93	60.16	24.60
l_b,int, Bicycle LOS Score for Intersection	2.790	1.920	1.560
Bicycle LOS	C	A	A

Sequence

Ring 1	1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 12000: University Avenue/Kavanaugh Drive

Control Type:	Signalized	Delay (sec / veh):	18.0
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.598

Intersection Setup

Name	University Avenue		University Avenue		Kavanaugh Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00		25.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		No		No	

Volumes

Name	University Avenue		University Avenue		Kavanaugh Drive	
Base Volume Input [veh/h]	48	1326	552	41	61	151
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	1	0	0	-1	6	5
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	49	1326	552	40	67	156
Peak Hour Factor	0.9440	0.9440	0.9440	0.9440	0.9440	0.9440
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	13	351	146	11	18	41
Total Analysis Volume [veh/h]	52	1405	585	42	71	165
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		13		4	
Bicycle Volume [bicycles/h]	1		5		2	

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fixed time
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal Group	1	6	2	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	5	5	5	0	5	0
Maximum Green [s]	30	30	30	0	30	0
Amber [s]	3.0	3.0	3.0	0.0	3.0	0.0
All red [s]	1.0	1.0	1.0	0.0	1.0	0.0
Split [s]	19	60	41	0	30	0
Vehicle Extension [s]	3.0	3.0	3.0	0.0	3.0	0.0
Walk [s]	0	5	5	0	5	0
Pedestrian Clearance [s]	0	10	10	0	21	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
Minimum Recall	No	No	No		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	C
C, Cycle Length [s]	90	90	90	90	90
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	15	56	37	37	26
g / C, Green / Cycle	0.17	0.62	0.41	0.41	0.29
(v / s)_i Volume / Saturation Flow Rate	0.03	0.44	0.19	0.19	0.16
s, saturation flow rate [veh/h]	1603	3204	1683	1638	1478
c, Capacity [veh/h]	267	1994	692	673	427
d1, Uniform Delay [s]	32.30	11.44	19.18	19.30	27.08
k, delay calibration	0.50	0.50	0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	1.62	2.12	2.14	2.31	5.08
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.19	0.70	0.45	0.47	0.55
d, Delay for Lane Group [s/veh]	33.92	13.56	21.31	21.61	32.16
Lane Group LOS	C	B	C	C	C
Critical Lane Group	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	1.10	9.08	5.06	5.11	4.78
50th-Percentile Queue Length [ft/ln]	27.43	226.92	126.46	127.72	119.62
95th-Percentile Queue Length [veh/ln]	1.97	14.02	8.75	8.82	8.37
95th-Percentile Queue Length [ft/ln]	49.37	350.45	218.68	220.40	209.31

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	33.92	13.56	21.45	21.61	32.16	32.16
Movement LOS	C	B	C	C	C	C
d_A, Approach Delay [s/veh]	14.28		21.46		32.16	
Approach LOS	B		C		C	
d_I, Intersection Delay [s/veh]	18.04					
Intersection LOS	B					
Intersection V/C	0.598					

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	36.45	0.00	0.00
l_p,int, Pedestrian LOS Score for Intersectio	2.660	0.000	0.000
Crosswalk LOS	B	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1244	822	578
d_b, Bicycle Delay [s]	6.43	15.64	22.78
l_b,int, Bicycle LOS Score for Intersection	2.762	2.077	1.949
Bicycle LOS	C	B	A

Sequence

Ring 1	1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 13000: Willow Road/Driveway A

Control Type:	Two-way stop	Delay (sec / veh):	16.5
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.131

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		Driveway A	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		Driveway A	
Base Volume Input [veh/h]	1444	3	0	909	0	27
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	24	3	0	6	0	17
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	6	2	0	1	0	3
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	1474	8	0	916	0	47
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	369	2	0	229	0	12
Total Analysis Volume [veh/h]	1474	8	0	916	0	47
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.01	0.00	0.13
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	0.00	0.00	16.54
Movement LOS	A	A		A		C
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.45
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.00	11.18
d_A, Approach Delay [s/veh]	0.00		0.00		16.54	
Approach LOS	A		A		C	
d_I, Intersection Delay [s/veh]	0.32					
Intersection LOS	C					

Intersection Level Of Service Report
Intersection 14000: Driveway B/O'Brien Drive

Control Type:	Two-way stop	Delay (sec / veh):	19.0
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.011

Intersection Setup

Name	Driveway B		O'Brien Drive		O'Brien Drive	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Driveway B		O'Brien Drive		O'Brien Drive	
Base Volume Input [veh/h]	0	0	0	374	556	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	44	0	11	31	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	3	12	3	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	3	56	3	385	587	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	14	1	96	147	0
Total Analysis Volume [veh/h]	3	56	3	385	587	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.11	0.00	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	19.02	13.07	8.65	0.00	0.00	0.00
Movement LOS	C	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.41	0.41	0.01	0.01	0.00	0.00
95th-Percentile Queue Length [ft/ln]	10.22	10.22	0.13	0.13	0.00	0.00
d_A, Approach Delay [s/veh]	13.38		0.07		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	0.79					
Intersection LOS	C					

Intersection Level Of Service Report
Intersection 15000: Driveway C/O'Brien Drive

Control Type:	Two-way stop	Delay (sec / veh):	19.4
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.103

Intersection Setup

Name	Driveway C		O'Brien Drive		O'Brien Drive	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Driveway C		O'Brien Drive		O'Brien Drive	
Base Volume Input [veh/h]	22	98	15	356	438	4
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	11	31	11	0	-1	4
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	3	1	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	33	129	26	359	438	8
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	8	32	7	90	110	2
Total Analysis Volume [veh/h]	33	129	26	359	438	8
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.10	0.21	0.02	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	19.38	13.98	8.26	0.00	0.00	0.00
Movement LOS	C	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	1.33	1.33	0.04	0.04	0.00	0.00
95th-Percentile Queue Length [ft/ln]	33.14	33.14	1.10	1.10	0.00	0.00
d_A, Approach Delay [s/veh]	15.08		0.56		0.00	
Approach LOS	C		A		A	
d_I, Intersection Delay [s/veh]	2.68					
Intersection LOS	C					

1005 O'Brien Drive and 1320 Willow Road

Vistro File: P:\...\OBrien_Willow_AM_Revised_V3.vistro
Report File: P:\...\2040_AM_v3.pdf

Scenario 19 2040 AM
3/14/2025

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1000	Bayfront Expy (SR 84)/Willow Rd (SR 114)	Signalized	HCM 7th Edition	WB Thru	0.762	82.8	F
2000	Willow Rd (SR 114)/Hamilton Ave	Signalized	HCM 7th Edition	SB Left	1.483	262.8	F
3000	Willow Rd (SR 114)/Ivy Dr	Signalized	HCM 7th Edition	NB Left	0.976	77.5	E
4000	Willow Rd (SR 114)/O'Brien Dr	Signalized	HCM 7th Edition	WB Left	0.917	65.7	E
5000	Willow Rd (SR 114) /Newbridge St	Signalized	HCM 7th Edition	SB Right	1.425	181.3	F
6000	Willow Rd/US-101 NB Ramps	Signalized	HCM 7th Edition	WB Left	0.853	8.7	A
7000	Willow Rd/US-101 SB Ramps	Signalized	HCM 7th Edition	EB Left	1.152	29.3	C
8000	O'Brien Drive/Kavanaugh Drive	All-way stop	HCM 7th Edition	NB Thru	1.650	250.0	F
9000	Bayfront Expy (SR 84) /University Ave (SR 109)	Signalized	HCM 7th Edition	NB Left	0.845	24.8	C
10000	University Avenue/Adams Drive	Two-way stop	HCM 7th Edition	EB Left	0.345	82.1	F
11000	University Ave/O'Brien Dr	Signalized	HCM 7th Edition	SB Right	1.119	149.9	F
12000	University Avenue/Kavanaugh Drive	Signalized	HCM 7th Edition	EB Left	0.718	30.8	C
13000	Willow Road/Driveway A	Two-way stop	HCM 7th Edition	SB Thru	0.010	0.0	A
14000	Driveway B/O'Brien Drive	Two-way stop	HCM 7th Edition	SB Right	0.006	10.3	B
15000	Driveway C/O'Brien Drive	Two-way stop	HCM 7th Edition	WB Thru	0.004	0.0	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1000: Bayfront Expy (SR 84)/Willow Rd (SR 114)

Control Type:	Signalized	Delay (sec / veh):	82.8
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.762

Intersection Setup

Name	Willow Road (SR 114)			Willow Road			Bayfront Expy (SR 84)			Bayfront Expy (SR 84)		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	3	0	1	0	0	0	2	0	1	2	0	1
Entry Pocket Length [ft]	265.00	100.00	200.00	100.00	100.00	100.00	530.00	100.00	630.00	1500.00	100.00	600.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			20.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			No			Yes			No		

Volumes

Name	Willow Road (SR 114)			Willow Road			Bayfront Expy (SR 84)			Bayfront Expy (SR 84)		
Base Volume Input [veh/h]	114	248	414	10	31	27	60	754	248	806	2459	41
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	-5	0	-3	0	0	0	0	0	-22	-15	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	16	0	0	106	0	0	0
Total Hourly Volume [veh/h]	109	248	411	10	31	11	60	754	120	791	2459	41
Peak Hour Factor	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	29	66	110	3	8	3	16	201	32	211	655	11
Total Analysis Volume [veh/h]	116	264	438	11	33	12	64	804	128	843	2622	44
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			2			3			0		
v_di, Inbound Pedestrian Volume crossing m	0			3			2			0		
v_co, Outbound Pedestrian Volume crossing	4			0			3			0		
v_ci, Inbound Pedestrian Volume crossing mi	3			0			4			0		
v_ab, Corner Pedestrian Volume [ped/h]	12			0			0			1		
Bicycle Volume [bicycles/h]	2			0			0			1		

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	180
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	17.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Protecte	Permiss	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	7	4	4	3	8	4	1	6	2	5	2	6
Auxiliary Signal Groups			4,5									
Lead / Lag	Lag	-	-	Lead	-	-	Lead	-	-	Lag	-	-
Minimum Green [s]	13	12	12	15	15	12	6	25	10	11	10	25
Maximum Green [s]	22	15	15	9	9	15	26	40	30	25	30	40
Amber [s]	3.6	3.9	3.9	3.6	3.6	3.9	3.6	5.0	5.0	3.6	5.0	5.0
All red [s]	0.0	0.5	0.5	1.5	1.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0
Split [s]	20	36	36	17	36	36	23	42	79	59	79	42
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Walk [s]	0	0	0	0	4	0	0	4	0	4	0	4
Pedestrian Clearance [s]	0	0	0	0	29	0	0	35	0	11	0	35
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	3.0	0.0	3.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	1.6	2.4	2.4	3.1	3.1	2.4	2.6	4.0	4.0	2.6	4.0	4.0
Minimum Recall	No	No	No	No	No		No	Yes		No	Yes	
Maximum Recall	No	No	No	No	No		No	No		No	No	
Pedestrian Recall	No	No	No	No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
C, Cycle Length [s]	180	180	180	180	180	180	180	180	180	180	180	180
L, Total Lost Time per Cycle [s]	3.60	4.40	4.40	5.10	5.10	5.10	4.60	6.00	6.00	4.60	6.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.60	2.40	0.00	3.10	3.10	3.10	2.60	4.00	4.00	2.60	4.00	4.00
g_i, Effective Green Time [s]	60	62	137	6	9	9	9	33	33	58	82	82
g / C, Green / Cycle	0.34	0.35	0.76	0.04	0.05	0.05	0.05	0.18	0.18	0.32	0.46	0.46
(v / s)_i Volume / Saturation Flow Rate	0.15	0.12	0.10	0.01	0.01	0.01	0.04	0.16	0.08	0.30	0.51	0.03
s, saturation flow rate [veh/h]	797	2249	4178	951	3560	1542	1547	5094	1589	2821	5094	1570
c, Capacity [veh/h]	268	778	3171	63	178	77	78	934	292	913	2326	717
d1, Uniform Delay [s]	46.47	43.60	5.84	86.71	81.98	81.84	84.67	71.25	65.26	58.73	48.90	27.33
k, delay calibration	0.50	0.50	0.50	0.11	0.11	0.11	0.11	0.11	0.11	0.48	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	5.05	1.18	0.09	1.30	0.50	0.93	18.66	2.47	1.04	15.69	58.70	0.04
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.43	0.34	0.14	0.17	0.19	0.16	0.82	0.86	0.44	0.92	1.13	0.06
d, Delay for Lane Group [s/veh]	51.52	44.79	5.93	88.01	82.48	82.77	103.32	73.72	66.30	74.42	107.60	27.36
Lane Group LOS	D	D	A	F	F	F	F	E	E	E	F	C
Critical Lane Group	Yes	No	No	No	Yes	No	Yes	No	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	4.43	4.52	1.45	0.54	0.76	0.56	1.69	12.29	5.37	20.57	47.27	1.11
50th-Percentile Queue Length [ft/ln]	110.84	113.04	36.20	13.47	19.07	14.12	42.26	307.21	134.16	514.36	1181.65	27.63
95th-Percentile Queue Length [veh/ln]	7.89	8.01	2.61	0.97	1.37	1.02	3.04	18.04	9.17	28.01	64.08	1.99
95th-Percentile Queue Length [ft/ln]	197.17	200.22	65.15	24.24	34.33	25.42	76.08	450.93	229.14	700.33	1602.05	49.73

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	51.52	44.79	5.93	88.01	82.48	82.77	103.32	73.72	66.30	74.42	107.60	27.36
Movement LOS	D	D	A	F	F	F	F	E	E	E	F	C
d_A, Approach Delay [s/veh]	24.94			83.63			74.67			98.62		
Approach LOS	C			F			E			F		
d_I, Intersection Delay [s/veh]	82.83											
Intersection LOS	F											
Intersection V/C	0.762											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	0.0	8.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	529.55	0.00	891.27	0.00
d_p, Pedestrian Delay [s]	82.18	0.00	82.18	0.00
l_p,int, Pedestrian LOS Score for Intersectio	3.105	0.000	3.358	0.000
Crosswalk LOS	C	F	C	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	351	310	367	811
d_b, Bicycle Delay [s]	61.24	64.26	60.02	31.82
l_b,int, Bicycle LOS Score for Intersection	2.234	1.619	2.166	3.490
Bicycle LOS	B	A	B	C

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 2000: Willow Rd (SR 114)/Hamilton Ave

Control Type:	Signalized	Delay (sec / veh):	262.8
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.483

Intersection Setup

Name	Willow Road (SR 114)			Willow Road (SR 114)			Hamilton Avenue			Hamilton Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			30.00			25.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Willow Road (SR 114)			Willow Road (SR 114)			Hamilton Avenue			Hamilton Avenue		
Base Volume Input [veh/h]	116	764	74	495	784	19	59	16	79	16	6	155
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	-1	-8	0	0	-37	0	0	0	-2	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	115	756	74	495	747	19	59	16	77	16	6	155
Peak Hour Factor	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	29	194	19	127	191	5	15	4	20	4	2	40
Total Analysis Volume [veh/h]	118	775	76	507	765	19	60	16	79	16	6	159
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	6			57			5			57		
v_di, Inbound Pedestrian Volume crossing m	5			57			6			57		
v_co, Outbound Pedestrian Volume crossing	5			18			18			6		
v_ci, Inbound Pedestrian Volume crossing mi	6			18			18			5		
v_ab, Corner Pedestrian Volume [ped/h]	5			6			13			5		
Bicycle Volume [bicycles/h]	1			1			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	48
Active Pattern	Free Running
Coordination Type	*Free Running*
Actuation Type	*Fully actuated*
Offset [s]	8.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	1	6	2	5	2	6	4	8	4	8	4	8
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	Lead	-	-	Lag	-	-	Lag	-	-
Minimum Green [s]	4	10	10	4	10	10	4	4	4	4	4	4
Maximum Green [s]	21	30	30	16	30	30	26	26	26	26	26	26
Amber [s]	3.0	4.4	4.4	3.0	4.4	4.4	3.6	3.7	3.6	3.7	3.6	3.7
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	0	30	0	0	0	30	30	0	30	0	30	0
Vehicle Extension [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walk [s]	0	4	4	0	4	4	4	4	4	4	4	4
Pedestrian Clearance [s]	0	19	15	0	15	19	25	25	25	25	25	25
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	1.0	2.4	2.4	1.0	2.4	2.4	1.6	1.7	1.6	1.7	1.6	1.7
Minimum Recall	No	Yes		No	Yes			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	6.0	6.0	6.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	C	C
C, Cycle Length [s]	80	80	80	80	80	80	80	80
L, Total Lost Time per Cycle [s]	3.00	4.40	4.40	3.00	4.40	4.40	3.70	3.60
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.00
l2, Clearance Lost Time [s]	1.00	2.40	2.40	1.00	2.40	2.40	1.70	0.00
g_i, Effective Green Time [s]	16	30	30	16	30	30	23	23
g / C, Green / Cycle	0.20	0.38	0.38	0.20	0.38	0.38	0.29	0.29
(v / s)_i Volume / Saturation Flow Rate	0.15	0.52	0.52	0.54	0.40	0.40	0.25	0.19
s, saturation flow rate [veh/h]	797	837	805	937	984	972	608	956
c, Capacity [veh/h]	160	314	302	187	369	364	236	299
d1, Uniform Delay [s]	30.03	24.99	24.99	32.00	25.00	25.00	28.31	25.55
k, delay calibration	0.08	0.50	0.50	0.50	0.49	0.49	0.26	0.08
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	4.65	188.41	193.48	781.93	64.94	67.15	7.14	1.54
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.74	1.38	1.39	2.70	1.07	1.07	0.66	0.60
d, Delay for Lane Group [s/veh]	34.68	213.40	218.47	813.93	89.94	92.15	35.45	27.09
Lane Group LOS	C	F	F	F	F	F	D	C
Critical Lane Group	No	No	Yes	Yes	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	2.20	21.72	21.32	44.21	13.15	13.21	3.31	3.06
50th-Percentile Queue Length [ft/ln]	55.11	543.09	532.92	1105.16	328.74	330.18	82.83	76.41
95th-Percentile Queue Length [veh/ln]	3.97	34.99	34.51	72.09	19.89	20.03	5.96	5.50
95th-Percentile Queue Length [ft/ln]	99.19	874.74	862.68	1802.34	497.34	500.70	149.09	137.54

Movement, Approach, & Intersection Results

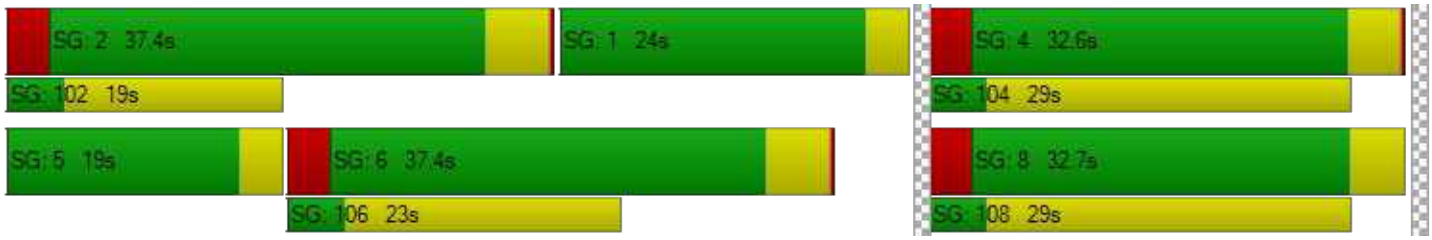
d_M, Delay for Movement [s/veh]	34.68	215.64	218.47	813.93	91.01	92.15	35.45	35.45	35.45	27.09	27.09	27.09
Movement LOS	C	F	F	F	F	F	D	D	D	C	C	C
d_A, Approach Delay [s/veh]	193.83			374.93			35.45			27.09		
Approach LOS	F			F			D			C		
d_I, Intersection Delay [s/veh]	262.81											
Intersection LOS	F											
Intersection V/C	1.483											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	556.05	63.84	228.09	692.14
d_p, Pedestrian Delay [s]	32.38	32.38	32.38	32.38
l_p,int, Pedestrian LOS Score for Intersectio	3.023	2.828	1.833	2.028
Crosswalk LOS	C	C	A	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	750	750	650	650
d_b, Bicycle Delay [s]	15.61	15.61	18.21	18.21
l_b,int, Bicycle LOS Score for Intersection	2.359	2.625	1.815	1.858
Bicycle LOS	B	B	A	A

Sequence

Ring 1	2	1	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 3000: Willow Rd (SR 114)/Ivy Dr

Control Type:	Signalized	Delay (sec / veh):	77.5
Analysis Method:	HCM 7th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.976

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		Ivy Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	1	0
Entry Pocket Length [ft]	85.00	100.00	100.00	100.00	135.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	1	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	100.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		Ivy Drive	
Base Volume Input [veh/h]	155	674	919	82	174	83
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	-9	-39	0	0	-6
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	155	665	880	82	174	77
Peak Hour Factor	0.9670	0.9670	0.9670	0.9670	0.9670	0.9670
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	40	172	228	21	45	20
Total Analysis Volume [veh/h]	160	688	910	85	180	80
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	4		9		3	
v_di, Inbound Pedestrian Volume crossing m	3		9		4	
v_co, Outbound Pedestrian Volume crossing	9		2		2	
v_ci, Inbound Pedestrian Volume crossing mi	9		2		2	
v_ab, Corner Pedestrian Volume [ped/h]	3		6		7	
Bicycle Volume [bicycles/h]	1		3		1	

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	160
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	90.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal Group	5	2	6	6	4	4
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	4	10	10	10	11	11
Maximum Green [s]	21	30	30	30	29	29
Amber [s]	3.0	4.4	4.4	4.4	3.0	3.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	17	125	107	107	35	35
Vehicle Extension [s]	2.0	2.0	2.0	2.0	2.0	2.0
Walk [s]	0	0	4	4	4	4
Pedestrian Clearance [s]	0	0	22	22	24	24
Delayed Vehicle Green [s]	0.0	0.0	3.0	3.0	3.0	3.0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	1.0	2.4	2.4	2.4	1.0	1.0
Minimum Recall	No	Yes	Yes		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	L	R
C, Cycle Length [s]	160	160	160	160	160	160
L, Total Lost Time per Cycle [s]	3.00	4.40	4.40	4.40	3.00	3.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.00	2.40	2.40	2.40	1.00	1.00
g_i, Effective Green Time [s]	14	132	115	115	20	20
g / C, Green / Cycle	0.09	0.83	0.72	0.72	0.13	0.13
(v / s)_i Volume / Saturation Flow Rate	0.20	0.43	0.59	0.61	0.11	0.10
s, saturation flow rate [veh/h]	797	1593	837	810	1704	803
c, Capacity [veh/h]	70	1319	604	584	214	101
d1, Uniform Delay [s]	72.93	4.15	15.26	16.04	68.35	67.67
k, delay calibration	0.50	0.50	0.50	0.50	0.05	0.04
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	623.52	1.48	12.10	14.48	4.29	5.22
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	2.29	0.52	0.82	0.85	0.84	0.79
d, Delay for Lane Group [s/veh]	696.44	5.63	27.36	30.52	72.64	72.89
Lane Group LOS	F	A	C	C	E	E
Critical Lane Group	Yes	No	No	Yes	Yes	No
50th-Percentile Queue Length [veh/ln]	14.94	2.87	13.10	13.99	7.49	3.33
50th-Percentile Queue Length [ft/ln]	373.60	71.85	327.62	349.81	187.31	83.27
95th-Percentile Queue Length [veh/ln]	25.46	5.17	19.04	20.13	11.98	6.00
95th-Percentile Queue Length [ft/ln]	636.56	129.33	476.04	503.17	299.53	149.88

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	696.44	5.63	28.79	30.52	72.64	72.89
Movement LOS	F	A	C	C	E	E
d_A, Approach Delay [s/veh]	135.97		28.94		72.72	
Approach LOS	F		C		E	
d_I, Intersection Delay [s/veh]	77.51					
Intersection LOS	E					
Intersection V/C	0.976					

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	551.06	274.76	947.87
d_p, Pedestrian Delay [s]	72.17	72.17	72.17
l_p,int, Pedestrian LOS Score for Intersectio	2.807	2.765	2.283
Crosswalk LOS	C	C	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1508	1246	363
d_b, Bicycle Delay [s]	4.84	11.40	53.62
l_b,int, Bicycle LOS Score for Intersection	2.259	2.380	1.560
Bicycle LOS	B	B	A

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 4000: Willow Rd (SR 114)/O'Brien Dr

Control Type:	Signalized	Delay (sec / veh):	65.7
Analysis Method:	HCM 7th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.917

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		O'Brien Drive	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	1	0	1	0
Entry Pocket Length [ft]	100.00	60.00	100.00	100.00	50.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	No		No		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		O'Brien Drive	
Base Volume Input [veh/h]	773	949	94	1011	525	80
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	-14	-46	-45	0	-11	-4
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	759	903	49	1011	514	76
Peak Hour Factor	0.9510	0.9510	0.9510	0.9510	0.9510	0.9510
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	200	237	13	266	135	20
Total Analysis Volume [veh/h]	798	950	52	1063	540	80
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	13		0		14	
v_ci, Inbound Pedestrian Volume crossing mi	14		0		13	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	1		6		2	

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	160
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	93.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Permissive	Permissive	Protected	Permissive	Permissive	Permissive
Signal Group	2	2	1	6	4	8
Auxiliary Signal Groups						
Lead / Lag	-	-	Lead	-	Lead	-
Minimum Green [s]	10	10	5	10	8	0
Maximum Green [s]	35	35	21	35	21	0
Amber [s]	4.4	4.4	3.0	4.4	3.2	0.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	116	116	19	135	25	0
Vehicle Extension [s]	2.0	2.0	2.0	2.0	2.0	0.0
Walk [s]	4	4	0	0	0	0
Pedestrian Clearance [s]	17	17	0	0	0	0
Delayed Vehicle Green [s]	3.0	3.0	0.0	0.0	0.0	0.0
Rest In Walk	No			No	No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.4	2.4	1.0	2.4	1.2	0.0
Minimum Recall	Yes		No	Yes	No	
Maximum Recall	No		No	No	No	
Pedestrian Recall	No		No	No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	L	C	L	C
C, Cycle Length [s]	160	160	160	160	160	160
L, Total Lost Time per Cycle [s]	4.40	4.40	3.00	4.40	3.20	3.20
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.40	2.40	1.00	2.40	1.20	1.20
g_i, Effective Green Time [s]	122	122	6	131	22	22
g / C, Green / Cycle	0.76	0.76	0.04	0.82	0.14	0.14
(v / s)_i Volume / Saturation Flow Rate	0.50	0.62	0.03	0.67	0.20	0.20
s, saturation flow rate [veh/h]	1593	1529	1781	1593	1406	1732
c, Capacity [veh/h]	1210	1162	67	1300	192	236
d1, Uniform Delay [s]	9.23	11.45	76.29	8.13	69.03	69.03
k, delay calibration	0.50	0.50	0.04	0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	2.82	6.43	7.21	5.80	228.08	224.69
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.66	0.82	0.78	0.82	1.45	1.45
d, Delay for Lane Group [s/veh]	12.06	17.88	83.50	13.93	297.11	293.72
Lane Group LOS	B	B	F	B	F	F
Critical Lane Group	No	No	No	Yes	No	Yes
50th-Percentile Queue Length [veh/ln]	6.33	19.37	2.25	8.76	20.02	24.45
50th-Percentile Queue Length [ft/ln]	158.27	484.24	56.13	219.08	500.60	611.19
95th-Percentile Queue Length [veh/ln]	10.46	26.59	4.04	13.62	31.51	37.64
95th-Percentile Queue Length [ft/ln]	261.43	664.68	101.03	340.45	787.67	940.88

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	12.06	17.88	83.50	13.93	295.49	293.72
Movement LOS	B	B	F	B	F	F
d_A, Approach Delay [s/veh]	15.22		17.17		295.23	
Approach LOS	B		B		F	
d_I, Intersection Delay [s/veh]	65.69					
Intersection LOS	E					
Intersection V/C	0.917					

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	72.16
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	2.496
Crosswalk LOS	F	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1358	1633	273
d_b, Bicycle Delay [s]	8.24	2.70	59.71
l_b,int, Bicycle LOS Score for Intersection	3.002	2.479	2.583
Bicycle LOS	C	B	B

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 5000: Willow Rd (SR 114)/Newbridge St

Control Type:	Signalized	Delay (sec / veh):	181.3
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.425

Intersection Setup

Name	Willow Road (SR 114)			Willow Road (SR 114)			Newbridge Street			Newbridge Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	1	0	0	1	0	0	0
Entry Pocket Length [ft]	390.00	100.00	100.00	185.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	1	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	49.21	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			25.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Willow Road (SR 114)			Willow Road (SR 114)			Newbridge Street			Newbridge Street		
Base Volume Input [veh/h]	175	1208	448	66	1398	20	22	126	390	402	132	221
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	-58	0	-1	-10	0	1	0	1	0	0	-2
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	44	0	0	34
Total Hourly Volume [veh/h]	175	1150	448	65	1388	20	23	126	347	402	132	185
Peak Hour Factor	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	47	312	121	18	376	5	6	34	94	109	36	50
Total Analysis Volume [veh/h]	190	1247	486	70	1505	22	25	137	376	436	143	201
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	2			2			3			3		
v_di, Inbound Pedestrian Volume crossing m	3			3			2			2		
v_co, Outbound Pedestrian Volume crossing	8			12			7			11		
v_ci, Inbound Pedestrian Volume crossing mi	7			11			8			12		
v_ab, Corner Pedestrian Volume [ped/h]	16			65			10			12		
Bicycle Volume [bicycles/h]	10			2			0			8		

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	160
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	97.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Split	Split	Split	Split	Split	Split
Signal Group	5	2	2	1	6	6	4	4	4	8	3	8
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lag	-	-	Lag	-	-	-	-	-
Minimum Green [s]	4	12	12	4	12	12	4	4	4	0	4	0
Maximum Green [s]	21	40	40	21	40	40	25	25	25	0	21	0
Amber [s]	3.0	4.4	4.4	3.0	4.4	4.4	3.6	3.6	3.6	0.0	3.0	0.0
All red [s]	0.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0
Split [s]	16	76	76	10	70	70	38	38	38	0	36	0
Vehicle Extension [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walk [s]	0	4	4	0	4	4	4	4	4	0	4	0
Pedestrian Clearance [s]	0	19	19	0	16	16	23	23	23	0	23	0
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	3.0	0.0	3.0	0.0
Rest In Walk		No			No			No			No	
l1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	0.0
l2, Clearance Lost Time [s]	1.0	3.4	3.4	1.0	3.4	3.4	2.6	2.6	2.6	0.0	1.0	0.0
Minimum Recall	No	Yes		No	Yes			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	L	C	R	L	C	R
C, Cycle Length [s]	160	160	160	160	160	160	160	160	160	160	160	160
L, Total Lost Time per Cycle [s]	3.00	5.40	5.40	3.00	5.40	5.40	4.60	4.60	4.60	3.00	3.00	3.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.00	3.40	3.40	1.00	3.40	3.40	2.60	2.60	2.60	1.00	1.00	1.00
g_i, Effective Green Time [s]	13	71	71	7	65	65	33	33	33	33	33	33
g / C, Green / Cycle	0.08	0.44	0.44	0.04	0.40	0.40	0.21	0.21	0.21	0.21	0.21	0.21
(v / s)_i Volume / Saturation Flow Rate	0.11	0.33	0.35	0.04	0.63	0.63	0.02	0.09	0.28	0.28	0.17	0.30
s, saturation flow rate [veh/h]	1781	3560	1566	1781	1593	829	1528	1604	1334	1547	837	673
c, Capacity [veh/h]	145	1568	690	78	642	334	320	337	280	319	172	139
d1, Uniform Delay [s]	73.50	37.58	38.46	76.15	47.77	47.77	50.79	54.62	62.86	63.52	60.82	62.65
k, delay calibration	0.29	0.50	0.50	0.04	0.50	0.50	0.04	0.04	0.50	0.19	0.32	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	166.77	3.46	9.05	12.77	261.32	268.92	0.04	0.29	176.51	173.01	24.62	237.43
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	1.31	0.76	0.79	0.90	1.56	1.57	0.08	0.41	1.34	1.37	0.83	1.45
d, Delay for Lane Group [s/veh]	240.27	41.04	47.51	88.92	309.08	316.69	50.83	54.92	239.37	236.53	85.45	300.08
Lane Group LOS	F	D	D	F	F	F	D	D	F	F	F	F
Critical Lane Group	Yes	No	No	No	No	Yes	No	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	12.61	19.91	19.78	3.18	36.12	38.31	0.82	4.86	25.08	14.17	6.77	14.74
50th-Percentile Queue Length [ft/ln]	315.22	497.69	494.48	79.49	902.96	957.82	20.58	121.48	627.11	354.16	169.18	368.44
95th-Percentile Queue Length [veh/ln]	20.16	27.22	27.07	5.72	58.20	61.46	1.48	8.47	38.32	23.30	11.03	24.54
95th-Percentile Queue Length [ft/ln]	504.09	680.62	676.82	143.07	1455.09	1536.62	37.04	211.85	958.08	582.44	275.84	613.39

Movement, Approach, & Intersection Results

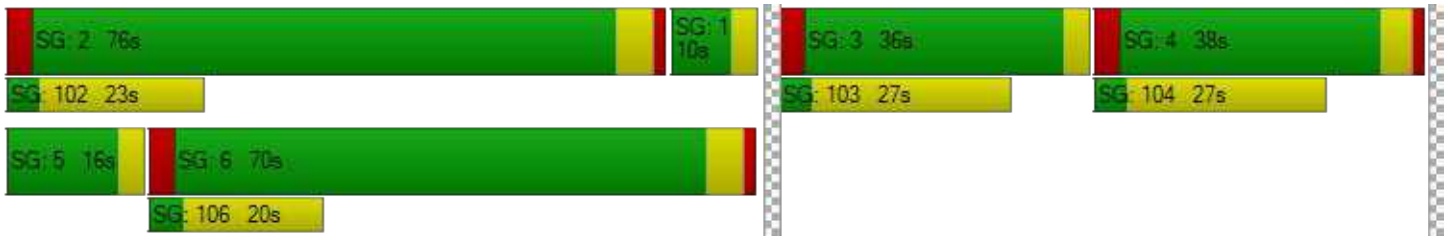
d_M, Delay for Movement [s/veh]	240.27	41.35	47.51	88.92	311.62	316.69	50.83	54.92	239.37	236.53	85.45	300.08
Movement LOS	F	D	D	F	F	F	D	D	F	F	F	F
d_A, Approach Delay [s/veh]	62.56			301.92			183.64			225.21		
Approach LOS	E			F			F			F		
d_I, Intersection Delay [s/veh]	181.26											
Intersection LOS	F											
Intersection V/C	1.425											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	23.99	132.67	931.23	0.00
d_p, Pedestrian Delay [s]	72.20	72.20	72.20	72.20
l_p,int, Pedestrian LOS Score for Intersectio	3.418	2.983	2.451	2.671
Crosswalk LOS	C	C	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	845	770	380	375
d_b, Bicycle Delay [s]	26.81	30.29	52.49	53.02
l_b,int, Bicycle LOS Score for Intersection	2.617	2.438	2.520	2.903
Bicycle LOS	B	B	B	C

Sequence

Ring 1	2	1	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 6000: Willow Rd/US-101 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	8.7
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.853

Intersection Setup

Name	Willow Road			Willow Road (SR 114)			US-101 NB Ramps			US-101 NB Ramps		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	1	0	0	0	1	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	200.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No						No		
Crosswalk	No			Yes			No			Yes		

Volumes

Name	Willow Road			Willow Road (SR 114)			US-101 NB Ramps			US-101 NB Ramps		
Base Volume Input [veh/h]	0	1458	493	0	1553	534	0	0	0	364	0	606
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	2.00	2.00	0.00	2.00	2.00	0.00	0.00	0.00	2.00	0.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	-21	0	0	-2	-7	0	0	0	0	0	-37
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	1437	493	0	1551	527	0	0	0	364	0	569
Peak Hour Factor	1.0000	0.9580	0.9580	1.0000	0.9580	0.9580	1.0000	1.0000	1.0000	0.9580	1.0000	0.9580
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	375	129	0	405	138	0	0	0	95	0	148
Total Analysis Volume [veh/h]	0	1500	515	0	1619	550	0	0	0	380	0	594
Presence of On-Street Parking	No		No	No		No				No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			3			27		
Bicycle Volume [bicycles/h]	5			3			0			1		

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	80
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	38.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Overlap
Signal Group	0	2	5	0	6	1	0	0	0	8	0	8
Auxiliary Signal Groups												6,8
Lead / Lag	-	-	-	-	-	-	-	-	-	Lead	-	-
Minimum Green [s]	0	4	6	0	4	5	0	0	0	5	0	5
Maximum Green [s]	0	35	6	0	35	5	0	0	0	35	0	35
Amber [s]	0.0	4.1	3.0	0.0	4.1	3.0	0.0	0.0	0.0	3.0	0.0	3.0
All red [s]	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	2.0	0.0	2.0
Split [s]	0	45	9	0	45	9	0	0	0	35	0	35
Vehicle Extension [s]	0.0	3.0	3.0	0.0	3.0	3.0	0.0	0.0	0.0	3.0	0.0	3.0
Walk [s]	0	1	0	0	1	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	30	0	0	7	0	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	3.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No					No		
l1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	2.0	2.0	0.0	0.0	0.0	2.0	0.0	2.0
l2, Clearance Lost Time [s]	0.0	2.1	1.0	0.0	2.1	2.0	0.0	0.0	0.0	3.0	0.0	3.0
Minimum Recall		No			No					No		No
Maximum Recall		No			No					No		No
Pedestrian Recall		No			No					No		No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	C	R		L	R
C, Cycle Length [s]	80	80	80	80		80	80
L, Total Lost Time per Cycle [s]	4.10	4.10	4.10	4.10		5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00		0.00	0.00
l2, Clearance Lost Time [s]	2.10	2.10	2.10	2.10		3.00	0.00
g_i, Effective Green Time [s]	57	57	57	57		14	75
g / C, Green / Cycle	0.72	0.72	0.72	0.72		0.17	0.94
(v / s)_i Volume / Saturation Flow Rate	0.29	0.33	0.57	0.35		0.11	0.38
s, saturation flow rate [veh/h]	5094	1554	2828	1555		3459	1543
c, Capacity [veh/h]	3642	1111	2022	1112		592	1447
d1, Uniform Delay [s]	4.61	4.81	7.60	4.97		30.86	0.25
k, delay calibration	0.50	0.50	0.50	0.50		0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00		1.00	1.00
d2, Incremental Delay [s]	0.35	1.39	3.44	1.57		1.17	0.86
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00		0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00		1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00		1.00	1.00

Lane Group Results

X, volume / capacity	0.41	0.46	0.80	0.49		0.64	0.41
d, Delay for Lane Group [s/veh]	4.95	6.20	11.04	6.54		32.03	1.12
Lane Group LOS	A	A	B	A		C	A
Critical Lane Group	No	No	Yes	No		Yes	No
50th-Percentile Queue Length [veh/ln]	2.54	3.04	4.97	3.37		3.42	0.17
50th-Percentile Queue Length [ft/ln]	63.58	75.96	124.16	84.15		85.41	4.34
95th-Percentile Queue Length [veh/ln]	4.58	5.47	8.62	6.06		6.15	0.31
95th-Percentile Queue Length [ft/ln]	114.45	136.73	215.52	151.46		153.73	7.81

Movement, Approach, & Intersection Results

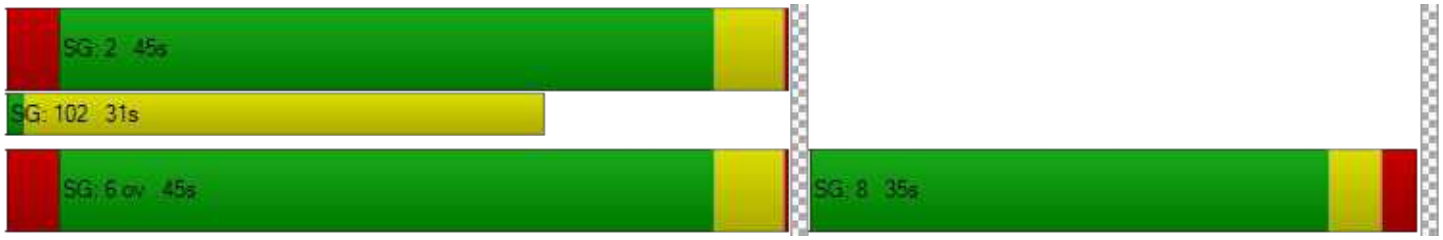
d_M, Delay for Movement [s/veh]	0.00	4.95	6.20	0.00	11.04	6.54	0.00	0.00	0.00	32.03	0.00	1.12
Movement LOS		A	A		B	A				C		A
d_A, Approach Delay [s/veh]	5.27			9.90			0.00			13.18		
Approach LOS	A			A			A			B		
d_I, Intersection Delay [s/veh]	8.71											
Intersection LOS	A											
Intersection V/C	0.853											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	30.0	0.0	5.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	15.62	0.00	35.15
l_p,int, Pedestrian LOS Score for Intersectio	0.000	3.155	0.000	2.590
Crosswalk LOS	F	C	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	948	948	0	750
d_b, Bicycle Delay [s]	11.10	11.09	40.00	15.63
l_b,int, Bicycle LOS Score for Intersection	2.668	2.753	4.132	1.560
Bicycle LOS	B	C	D	A

Sequence

Ring 1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 7000: Willow Rd/US-101 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	29.3
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.152

Intersection Setup

Name	Willow Road			Willow Road			US-101 SB Ramps			US-101 SB Ramps		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	0	1	0	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No					
Crosswalk	Yes			No			Yes			No		

Volumes

Name	Willow Road			Willow Road			US-101 SB Ramps			US-101 SB Ramps		
Base Volume Input [veh/h]	0	1070	646	0	1417	550	922	0	360	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	2.00	2.00	0.00	2.00	2.00	2.00	0.00	2.00	0.00	0.00	0.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	-10	0	0	-2	0	-11	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	1060	646	0	1415	550	911	0	360	0	0	0
Peak Hour Factor	1.0000	0.9190	0.9190	1.0000	0.9190	0.9190	0.9190	1.0000	0.9190	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	288	176	0	385	150	248	0	98	0	0	0
Total Analysis Volume [veh/h]	0	1153	703	0	1540	598	991	0	392	0	0	0
Presence of On-Street Parking	No		No	No		No	No		No			
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			29		
Bicycle Volume [bicycles/h]	9			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	80
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	54.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Overlap	Permiss	Permiss	Permiss
Signal Group	0	2	0	0	6	0	4	0	4	0	0	0
Auxiliary Signal Groups									2,4			
Lead / Lag	-	-	-	-	-	-	Lead	-	-	-	-	-
Minimum Green [s]	0	4	0	0	4	0	4	0	4	0	0	0
Maximum Green [s]	0	35	0	0	35	0	30	0	30	0	0	0
Amber [s]	0.0	4.1	0.0	0.0	4.1	0.0	3.0	0.0	3.0	0.0	0.0	0.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	2.0	0.0	0.0	0.0
Split [s]	0	55	0	0	55	0	25	0	25	0	0	0
Vehicle Extension [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	0.0	3.0	0.0	0.0	0.0
Walk [s]	0	1	0	0	1	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	7	0	0	32	0	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	3.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No		No					
l1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	0.0	2.0	0.0	0.0	0.0
l2, Clearance Lost Time [s]	0.0	2.1	0.0	0.0	2.1	0.0	3.0	0.0	3.0	0.0	0.0	0.0
Minimum Recall		No			No		No		No			
Maximum Recall		No			No		No		No			
Pedestrian Recall		No			No		No		No			
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	C	R	L	R	
C, Cycle Length [s]	80	80	80	80	80	80	
L, Total Lost Time per Cycle [s]	4.10	4.10	4.10	4.10	5.00	5.00	
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	
l2, Clearance Lost Time [s]	2.10	2.10	2.10	2.10	3.00	0.00	
g_i, Effective Green Time [s]	51	51	51	51	20	75	
g / C, Green / Cycle	0.64	0.64	0.64	0.64	0.25	0.94	
(v / s)_i Volume / Saturation Flow Rate	0.23	0.45	0.30	0.64	0.29	0.14	
s, saturation flow rate [veh/h]	5094	1549	5094	941	3459	2813	
c, Capacity [veh/h]	3235	984	3235	598	869	2637	
d1, Uniform Delay [s]	6.88	9.55	7.63	14.59	29.94	0.18	
k, delay calibration	0.50	0.50	0.50	0.50	0.11	0.50	
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	
d2, Incremental Delay [s]	0.31	4.43	0.50	36.94	66.90	0.12	
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	

Lane Group Results

X, volume / capacity	0.36	0.71	0.48	1.00	1.14	0.15	
d, Delay for Lane Group [s/veh]	7.19	13.97	8.14	51.53	96.83	0.30	
Lane Group LOS	A	B	A	F	F	A	
Critical Lane Group	No	No	No	Yes	Yes	No	
50th-Percentile Queue Length [veh/ln]	2.68	7.78	3.98	14.67	16.05	0.04	
50th-Percentile Queue Length [ft/ln]	67.01	194.42	99.61	366.65	401.29	1.09	
95th-Percentile Queue Length [veh/ln]	4.82	12.35	7.17	20.96	24.31	0.08	
95th-Percentile Queue Length [ft/ln]	120.62	308.75	179.30	523.89	607.76	1.96	

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	0.00	7.19	13.97	0.00	8.14	51.53	96.83	0.00	0.30	0.00	0.00	0.00
Movement LOS		A	B		A	F	F		A			
d_A, Approach Delay [s/veh]	9.76			20.27			69.47			0.00		
Approach LOS	A			C			E			A		
d_I, Intersection Delay [s/veh]	29.30											
Intersection LOS	C											
Intersection V/C	1.152											

Other Modes

g_Walk,mi, Effective Walk Time [s]	20.0	0.0	5.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	22.49	0.00	35.14	0.00
l_p,int, Pedestrian LOS Score for Intersectio	3.104	0.000	2.686	0.000
Crosswalk LOS	C	F	B	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1198	1198	500	0
d_b, Bicycle Delay [s]	6.46	6.43	22.49	39.99
l_b,int, Bicycle LOS Score for Intersection	2.580	2.736	1.560	4.132
Bicycle LOS	B	B	A	D

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 8000: O'Brien Drive/Kavanaugh Drive

Control Type:	All-way stop	Delay (sec / veh):	250.0
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.650

Intersection Setup

Name	O'Brien Drive		O'Brien Drive		Kavanaugh Drive	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	O'Brien Drive		O'Brien Drive		Kavanaugh Drive	
Base Volume Input [veh/h]	487	358	101	692	194	271
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	-5	0	-13	-7	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	487	353	101	679	187	271
Peak Hour Factor	0.9340	0.9340	0.9340	0.9340	0.9340	0.9340
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	130	94	27	182	50	73
Total Analysis Volume [veh/h]	521	378	108	727	200	290
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	899	835	534
Degree of Utilization, x	1.65	1.60	0.92

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	50.88	45.85	11.10
95th-Percentile Queue Length [ft]	1271.98	1146.14	277.43
Approach Delay [s/veh]	317.84	295.81	47.24
Approach LOS	F	F	E
Intersection Delay [s/veh]	249.95		
Intersection LOS	F		

Intersection Level Of Service Report
Intersection 9000: Bayfront Expy (SR 84)/University Ave (SR 109)

Control Type:	Signalized	Delay (sec / veh):	24.8
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.845

Intersection Setup

Name	University Avenue (SR109)		Bayfront Expy (SR84)		Bayfront Expy (SR84)	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	2	0	1	2	0
Entry Pocket Length [ft]	100.00	250.00	100.00	100.00	830.00	100.00
No. of Lanes in Exit Pocket	0	2	0	0	0	0
Exit Pocket Length [ft]	0.00	74.61	0.00	0.00	0.00	0.00
Speed [mph]	35.00		55.00		55.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		No	

Volumes

Name	University Avenue (SR109)		Bayfront Expy (SR84)		Bayfront Expy (SR84)	
Base Volume Input [veh/h]	159	388	1030	81	1211	3493
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	-3	-3	0	-13	-15
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	159	385	1027	81	1198	3478
Peak Hour Factor	0.9240	0.9240	0.9240	0.9240	0.9240	0.9240
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	43	104	278	22	324	941
Total Analysis Volume [veh/h]	172	417	1111	88	1297	3764
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	1		2		0	
v_ci, Inbound Pedestrian Volume crossing mi	2		1		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	4		6		5	

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	180
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	113.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	10.00

Phasing & Timing

Control Type	Permissive	Overlap	Permissive	Permissive	Protected	Permissive
Signal Group	4	4	6	2	5	2
Auxiliary Signal Groups		4,5				
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	12	12	10	10	11	10
Maximum Green [s]	15	15	60	60	30	60
Amber [s]	3.0	3.0	5.0	5.4	3.0	5.4
All red [s]	1.0	1.0	1.0	0.5	0.5	0.5
Split [s]	36	36	54	144	90	144
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	3.0
Walk [s]	4	4	4	0	0	0
Pedestrian Clearance [s]	29	29	35	0	0	0
Delayed Vehicle Green [s]	3.0	3.0	3.0	0.0	0.0	0.0
Rest In Walk	No		No			No
l1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0
l2, Clearance Lost Time [s]	2.0	2.0	4.0	3.9	1.5	3.9
Minimum Recall	No	No	No		No	No
Maximum Recall	No	No	No		No	No
Pedestrian Recall	No	No	No		No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	20.0	20.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	R	C	R	L	C
C, Cycle Length [s]	180	180	180	180	180	180
L, Total Lost Time per Cycle [s]	4.00	3.50	6.00	6.00	3.50	5.90
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	0.00	4.00	4.00	1.50	3.90
g_i, Effective Green Time [s]	14	91	80	80	73	156
g / C, Green / Cycle	0.08	0.50	0.44	0.44	0.40	0.87
(v / s)_i Volume / Saturation Flow Rate	0.05	0.10	0.22	0.06	0.38	0.74
s, saturation flow rate [veh/h]	3459	4203	5094	1562	3459	5094
c, Capacity [veh/h]	270	2120	2254	692	1398	4415
d1, Uniform Delay [s]	80.46	24.50	35.75	29.59	51.10	6.11
k, delay calibration	0.11	0.11	0.50	0.50	0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	2.48	0.04	0.77	0.38	3.25	2.28
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.64	0.20	0.49	0.13	0.93	0.85
d, Delay for Lane Group [s/veh]	82.93	24.54	36.53	29.97	54.34	8.39
Lane Group LOS	F	C	D	C	D	A
Critical Lane Group	No	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	3.98	3.35	11.46	2.29	27.36	13.57
50th-Percentile Queue Length [ft/ln]	99.57	83.72	286.38	57.35	683.90	339.34
95th-Percentile Queue Length [veh/ln]	7.17	6.03	17.01	4.13	35.93	19.62
95th-Percentile Queue Length [ft/ln]	179.22	150.70	425.14	103.24	898.35	490.39

Movement, Approach, & Intersection Results

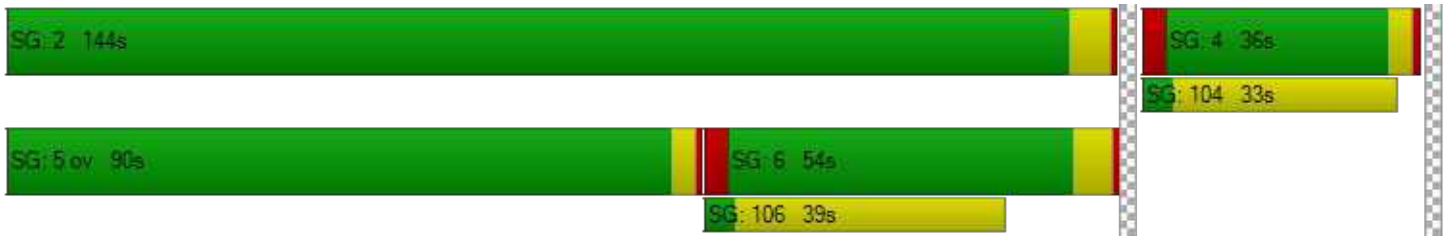
d_M, Delay for Movement [s/veh]	82.93	24.54	36.53	29.97	54.34	8.39
Movement LOS	F	C	D	C	D	A
d_A, Approach Delay [s/veh]	41.60		36.05		20.17	
Approach LOS	D		D		C	
d_I, Intersection Delay [s/veh]	24.79					
Intersection LOS	C					
Intersection V/C	0.845					

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	1341.40	0.00	0.00
d_p, Pedestrian Delay [s]	82.16	82.16	0.00
l_p,int, Pedestrian LOS Score for Intersectio	3.133	3.939	0.000
Crosswalk LOS	C	D	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	322	500	1535
d_b, Bicycle Delay [s]	63.45	50.76	4.88
l_b,int, Bicycle LOS Score for Intersection	1.670	2.219	4.343
Bicycle LOS	A	B	E

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 10000: University Avenue/Adams Drive

Control Type:	Two-way stop	Delay (sec / veh):	82.1
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.345

Intersection Setup

Name	University Avenue		University Avenue (SR109)		Adams Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		No	

Volumes

Name	University Avenue		University Avenue (SR109)		Adams Drive	
Base Volume Input [veh/h]	45	861	976	101	20	5
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	-3	-13	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	45	858	963	101	20	5
Peak Hour Factor	0.8610	0.8610	0.8610	0.8610	0.8610	0.8610
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	13	249	280	29	6	1
Total Analysis Volume [veh/h]	52	997	1118	117	23	6
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.09	0.01	0.01	0.00	0.35	0.01
d_M, Delay for Movement [s/veh]	12.09	0.00	0.00	0.00	82.13	36.43
Movement LOS	B	A	A	A	F	E
95th-Percentile Queue Length [veh/ln]	0.31	0.00	0.00	0.00	1.38	1.38
95th-Percentile Queue Length [ft/ln]	7.64	0.00	0.00	0.00	34.60	34.60
d_A, Approach Delay [s/veh]	0.60		0.00		72.67	
Approach LOS	A		A		F	
d_I, Intersection Delay [s/veh]	1.18					
Intersection LOS	F					

Intersection Level Of Service Report
Intersection 11000: University Ave/O'Brien Dr

Control Type:	Signalized	Delay (sec / veh):	149.9
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.119

Intersection Setup

Name	University Avenue		University Avenue		O'Brien Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	1	0
Entry Pocket Length [ft]	90.00	100.00	100.00	100.00	45.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00		25.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	No		No		No	

Volumes

Name	University Avenue		University Avenue		O'Brien Drive	
Base Volume Input [veh/h]	507	889	834	149	18	359
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	-3	0	-13	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	507	886	834	136	18	359
Peak Hour Factor	0.8540	0.8540	0.8540	0.8540	0.8540	0.8540
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	148	259	244	40	5	105
Total Analysis Volume [veh/h]	594	1037	977	159	21	420
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		2	
Bicycle Volume [bicycles/h]	1		1		1	

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	130
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	48.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	11.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal Group	1	6	2	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	5	5	5	0	5	0
Maximum Green [s]	30	30	30	0	30	0
Amber [s]	3.0	3.0	3.0	0.0	3.0	0.0
All red [s]	1.0	1.0	1.0	0.0	1.0	0.0
Split [s]	67	76	9	0	54	0
Vehicle Extension [s]	3.0	3.0	3.0	0.0	3.0	0.0
Walk [s]	0	5	5	0	5	0
Pedestrian Clearance [s]	0	10	10	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
Minimum Recall	No	No	No		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	L	R
C, Cycle Length [s]	130	130	130	130	130	130
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	50	82	27	27	40	40
g / C, Green / Cycle	0.39	0.63	0.21	0.21	0.31	0.31
(v / s)_i Volume / Saturation Flow Rate	0.37	0.32	0.34	0.36	0.01	0.30
s, saturation flow rate [veh/h]	1603	3204	1683	1593	1603	1412
c, Capacity [veh/h]	620	2014	355	336	497	438
d1, Uniform Delay [s]	38.83	13.25	51.27	51.27	31.36	43.82
k, delay calibration	0.30	0.50	0.50	0.50	0.11	0.30
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	19.46	0.94	282.30	322.81	0.03	24.76
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.96	0.51	1.60	1.69	0.04	0.96
d, Delay for Lane Group [s/veh]	58.30	14.20	333.57	374.07	31.40	68.58
Lane Group LOS	E	B	F	F	C	E
Critical Lane Group	Yes	No	No	Yes	No	Yes
50th-Percentile Queue Length [veh/ln]	21.73	8.51	39.50	41.16	0.47	16.11
50th-Percentile Queue Length [ft/ln]	543.14	212.72	987.55	1029.11	11.84	402.73
95th-Percentile Queue Length [veh/ln]	29.37	13.29	60.95	64.13	0.85	22.69
95th-Percentile Queue Length [ft/ln]	734.25	332.32	1523.76	1603.24	21.31	567.29

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	58.30	14.20	350.53	374.07	31.40	68.58
Movement LOS	E	B	F	F	C	E
d_A, Approach Delay [s/veh]	30.26		353.82		66.81	
Approach LOS	C		F		E	
d_I, Intersection Delay [s/veh]	149.86					
Intersection LOS	F					
Intersection V/C	1.119					

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	0.000
Crosswalk LOS	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1108	77	769
d_b, Bicycle Delay [s]	12.94	60.12	24.62
l_b,int, Bicycle LOS Score for Intersection	2.905	2.497	1.560
Bicycle LOS	C	B	A

Sequence

Ring 1	1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 12000: University Avenue/Kavanaugh Drive

Control Type:	Signalized	Delay (sec / veh):	30.8
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.718

Intersection Setup

Name	University Avenue		University Avenue		Kavanaugh Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		No		No	

Volumes

Name	University Avenue		University Avenue		Kavanaugh Drive	
Base Volume Input [veh/h]	152	999	869	45	254	130
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	-7	0	0	0	-3	-2
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	145	999	869	45	251	128
Peak Hour Factor	0.8550	0.8550	0.8550	0.8550	0.8550	0.8550
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	42	292	254	13	73	37
Total Analysis Volume [veh/h]	170	1168	1016	53	294	150
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		1		2	
Bicycle Volume [bicycles/h]	1		3		1	

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fixed time
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal Group	1	6	2	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	5	5	5	0	5	0
Maximum Green [s]	30	30	30	0	30	0
Amber [s]	3.0	3.0	3.0	0.0	3.0	0.0
All red [s]	1.0	1.0	1.0	0.0	1.0	0.0
Split [s]	19	60	41	0	30	0
Vehicle Extension [s]	3.0	3.0	3.0	0.0	3.0	0.0
Walk [s]	0	5	5	0	5	0
Pedestrian Clearance [s]	0	10	10	0	21	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
Minimum Recall	No	No	No		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	C
C, Cycle Length [s]	90	90	90	90	90
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	15	56	37	37	26
g / C, Green / Cycle	0.17	0.62	0.41	0.41	0.29
(v / s)_i Volume / Saturation Flow Rate	0.11	0.36	0.32	0.32	0.29
s, saturation flow rate [veh/h]	1603	3204	1683	1650	1540
c, Capacity [veh/h]	267	1994	692	678	445
d1, Uniform Delay [s]	34.96	10.11	22.87	23.09	31.97
k, delay calibration	0.50	0.50	0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	11.05	1.27	8.18	9.02	42.15
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.64	0.59	0.77	0.79	1.00
d, Delay for Lane Group [s/veh]	46.00	11.37	31.05	32.11	74.12
Lane Group LOS	D	B	C	C	E
Critical Lane Group	Yes	No	No	Yes	Yes
50th-Percentile Queue Length [veh/ln]	4.28	6.59	10.84	11.06	14.50
50th-Percentile Queue Length [ft/ln]	106.90	164.69	271.11	276.49	362.52
95th-Percentile Queue Length [veh/ln]	7.67	10.80	16.25	16.51	20.75
95th-Percentile Queue Length [ft/ln]	191.68	269.92	406.13	412.83	518.65

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	46.00	11.37	31.55	32.11	74.12	74.12
Movement LOS	D	B	C	C	E	E
d_A, Approach Delay [s/veh]	15.77		31.58		74.12	
Approach LOS	B		C		E	
d_I, Intersection Delay [s/veh]	30.79					
Intersection LOS	C					
Intersection V/C	0.718					

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	36.45	0.00	0.00
l_p,int, Pedestrian LOS Score for Intersectio	2.708	0.000	0.000
Crosswalk LOS	B	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1244	822	578
d_b, Bicycle Delay [s]	6.43	15.63	22.77
l_b,int, Bicycle LOS Score for Intersection	2.663	2.442	2.292
Bicycle LOS	B	B	B

Sequence

Ring 1	1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 13000: Willow Road/Driveway A

Control Type:	Two-way stop	Delay (sec / veh):	0.0
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.010

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		Driveway A	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		Driveway A	
Base Volume Input [veh/h]	780	0	0	1059	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	-6	-12	0	-45	0	-3
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	774	0	0	1014	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	194	0	0	254	0	0
Total Analysis Volume [veh/h]	774	0	0	1014	0	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	0.00	0.00	10.89
Movement LOS	A	A		A		B
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.00		0.00		10.89	
Approach LOS	A		A		B	
d_I, Intersection Delay [s/veh]	0.00					
Intersection LOS	A					

Intersection Level Of Service Report
Intersection 14000: Driveway B/O'Brien Drive

Control Type:	Two-way stop	Delay (sec / veh):	10.3
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.006

Intersection Setup

Name	Driveway B		O'Brien Drive		O'Brien Drive	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Driveway B		O'Brien Drive		O'Brien Drive	
Base Volume Input [veh/h]	0	0	0	327	380	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	4	-24	-67	-20	5
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	4	0	260	360	5
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	1	0	65	90	1
Total Analysis Volume [veh/h]	0	4	0	260	360	5
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.01	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	13.03	10.31	8.02	0.00	0.00	0.00
Movement LOS	B	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.02	0.02	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.44	0.44	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	10.31		0.00		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	0.07					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 15000: Driveway C/O'Brien Drive

Control Type:	Two-way stop	Delay (sec / veh):	0.0
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.004

Intersection Setup

Name	Driveway C		O'Brien Drive		O'Brien Drive	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Driveway C		O'Brien Drive		O'Brien Drive	
Base Volume Input [veh/h]	0	0	0	327	380	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	-5	-21	-67	0	6	-25
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	327	386	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	82	97	0
Total Analysis Volume [veh/h]	0	0	0	327	386	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	14.04	10.44	8.07	0.00	0.00	0.00
Movement LOS	B	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	12.24		0.00		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	0.00					
Intersection LOS	A					

1005 O'Brien Drive and 1320 Willow Road

Vistro File: P:\...\OBrien_Willow_PM_Revised_V3.vistro
Report File: P:\...\2040_PM_v3.pdf

Scenario 19 2040 PM
3/18/2025

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1000	Bayfront Expy (SR 84)/Willow Rd (SR 114)	Signalized	HCM 7th Edition	EB Thru	1.225	526.0	F
2000	Willow Rd (SR 114)/Hamilton Ave	Signalized	HCM 7th Edition	SB Left	1.828	426.2	F
3000	Willow Rd (SR 114)/Ivy Dr	Signalized	HCM 7th Edition	NB Left	1.024	54.7	D
4000	Willow Rd (SR 114)/O'Brien Dr	Signalized	HCM 7th Edition	WB Right	1.863	400.2	F
5000	Willow Rd (SR 114) /Newbridge St	Signalized	HCM 7th Edition	SB Right	1.211	192.8	F
6000	Willow Rd/US-101 NB Ramps	Signalized	HCM 7th Edition	WB Left	0.601	7.8	A
7000	Willow Rd/US-101 SB Ramps	Signalized	HCM 7th Edition	SB Right	0.930	28.4	C
8000	O'Brien Drive/Kavanaugh Drive	All-way stop	HCM 7th Edition	SB Thru	1.162	76.7	F
9000	Bayfront Expy (SR 84) /University Ave (SR 109)	Signalized	HCM 7th Edition	NB Right	0.956	91.9	F
10000	University Avenue/Adams Drive	Two-way stop	HCM 7th Edition	EB Left	0.390	37.1	E
11000	University Ave/O'Brien Dr	Signalized	HCM 7th Edition	EB Right	0.751	32.0	C
12000	University Avenue/Kavanaugh Drive	Signalized	HCM 7th Edition	NB Left	0.606	20.3	C
13000	Willow Road/Driveway A	Two-way stop	HCM 7th Edition	NB Thru	0.014	0.0	A
14000	Driveway B/O'Brien Drive	Two-way stop	HCM 7th Edition	SB Left	0.010	11.0	B
15000	Driveway C/O'Brien Drive	Two-way stop	HCM 7th Edition	WB Thru	0.003	0.0	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1000: Bayfront Expy (SR 84)/Willow Rd (SR 114)

Control Type:	Signalized	Delay (sec / veh):	526.0
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.225

Intersection Setup

Name	Willow Road (SR 114)			Willow Road			Ba Ex			Ba Ex		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	3	0	1	0	0	0	2	0	1	1	0	1
Entry Pocket Length [ft]	265.00	100.00	200.00	100.00	100.00	100.00	530.00	100.00	630.00	1500.00	100.00	600.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			20.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			No			Yes			No		

Volumes

Name	Willow Road (SR 114)			Willow Road			Ba Ex			Ba Ex		
Base Volume Input [veh/h]	116	27	1399	49	194	82	32	2089	490	402	977	6
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	-23	0	-17	0	0	0	0	0	-4	-2	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	70	0	0	45	0	0	1
Total Hourly Volume [veh/h]	93	27	1382	49	194	12	32	2089	441	400	977	5
Peak Hour Factor	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	24	7	360	13	50	3	8	543	115	104	254	1
Total Analysis Volume [veh/h]	97	28	1438	51	202	12	33	2174	459	416	1017	5
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			11			11			0		
v_di, Inbound Pedestrian Volume crossing m	0			11			11			0		
v_co, Outbound Pedestrian Volume crossing	8			0			8			0		
v_ci, Inbound Pedestrian Volume crossing mi	8			0			8			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	1			2			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	200
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	120.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Protecte	Permiss	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	7	4	4	3	8	4	1	6	2	5	2	6
Auxiliary Signal Groups			4,5									
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	13	12	12	15	15	12	6	25	10	11	10	25
Maximum Green [s]	22	15	15	9	9	15	26	40	30	25	30	40
Amber [s]	3.6	3.9	3.9	3.6	3.6	3.9	3.6	5.0	5.0	3.6	5.0	5.0
All red [s]	0.0	0.5	0.5	1.5	1.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0
Split [s]	18	27	27	30	39	27	17	82	126	61	126	82
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Walk [s]	0	0	0	0	4	0	0	4	0	4	0	4
Pedestrian Clearance [s]	0	0	0	0	29	0	0	35	0	11	0	35
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	3.0	0.0	3.0
Rest In Walk		No			No			No			No	
l1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
l2, Clearance Lost Time [s]	1.6	2.4	2.4	3.1	3.1	2.4	2.6	4.0	4.0	2.6	4.0	4.0
Minimum Recall	No	No	No	No	No		No	Yes		No	Yes	
Maximum Recall	No	No	No	No	No		No	No		No	No	
Pedestrian Recall	No	No	No	No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
C, Cycle Length [s]	200	200	200	200	200	200	200	200	200	200	200	200
L, Total Lost Time per Cycle [s]	3.60	4.40	4.60	5.10	5.10	5.10	4.60	6.00	6.00	4.60	6.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.60	2.40	0.00	3.10	3.10	3.10	2.60	4.00	4.00	2.60	4.00	4.00
g_i, Effective Green Time [s]	13	101	130	14	103	103	5	40	40	25	60	60
g / C, Green / Cycle	0.06	0.50	0.65	0.07	0.51	0.51	0.03	0.20	0.20	0.13	0.30	0.30
(v / s)_i Volume / Saturation Flow Rate	0.05	0.02	0.35	0.03	0.13	0.01	0.02	0.70	0.48	0.12	0.20	0.00
s, saturation flow rate [veh/h]	1781	1593	4151	1781	1593	1549	2102	3097	966	3459	5094	1589
c, Capacity [veh/h]	115	802	2701	126	818	795	53	620	193	433	1528	477
d1, Uniform Delay [s]	92.41	25.06	18.49	88.86	27.11	23.85	96.42	79.91	79.91	86.93	61.18	49.12
k, delay calibration	0.11	0.50	0.50	0.11	0.50	0.11	0.11	0.50	0.50	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	14.69	0.08	0.76	2.10	0.72	0.01	11.12	1132.33	633.57	12.86	0.51	0.01
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.84	0.03	0.53	0.41	0.25	0.02	0.62	3.51	2.37	0.96	0.67	0.01
d, Delay for Lane Group [s/veh]	107.10	25.14	19.24	90.97	27.83	23.86	107.54	1212.24	713.48	99.79	61.69	49.13
Lane Group LOS	F	C	B	F	C	C	F	F	F	F	E	D
Critical Lane Group	No	No	Yes	Yes	No	No	No	Yes	No	Yes	No	No
50th-Percentile Queue Length [veh/ln]	5.46	0.35	11.86	2.66	2.93	0.30	0.94	75.72	44.08	11.58	15.32	0.18
50th-Percentile Queue Length [ft/ln]	136.42	8.85	296.50	66.39	73.13	7.47	23.53	1892.96	1102.12	289.47	382.94	4.54
95th-Percentile Queue Length [veh/ln]	9.29	0.64	17.51	4.78	5.27	0.54	1.69	119.87	71.36	17.16	21.74	0.33
95th-Percentile Queue Length [ft/ln]	232.19	15.94	437.70	119.50	131.63	13.45	42.36	2996.80	1784.12	428.98	543.41	8.18

Movement, Approach, & Intersection Results

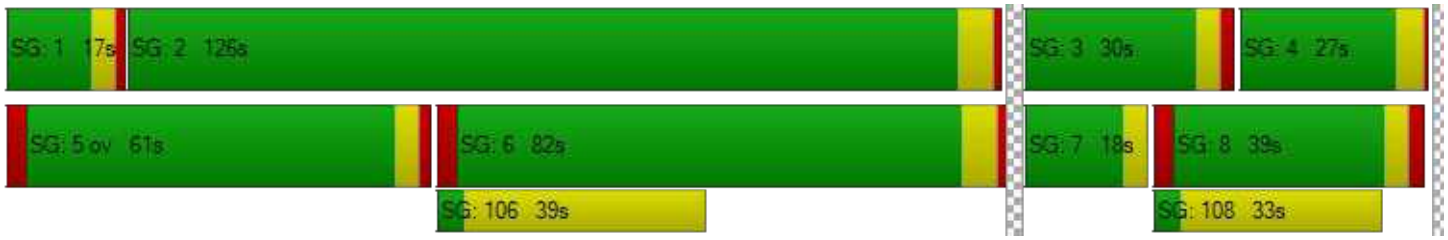
d_M, Delay for Movement [s/veh]	107.10	25.14	19.24	90.97	27.83	23.86	107.54	1212.24	713.48	99.79	61.69	49.13
Movement LOS	F	C	B	F	C	C	F	F	F	F	E	D
d_A, Approach Delay [s/veh]	24.80			39.80			1112.69			72.67		
Approach LOS	C			D			F			E		
d_I, Intersection Delay [s/veh]	526.00											
Intersection LOS	F											
Intersection V/C	1.225											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	0.0	8.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	39.81	0.00	181.09	0.00
d_p, Pedestrian Delay [s]	92.12	0.00	92.12	0.00
l_p,int, Pedestrian LOS Score for Intersectio	3.168	0.000	3.277	0.000
Crosswalk LOS	C	F	C	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	226	309	730	1201
d_b, Bicycle Delay [s]	78.67	71.52	40.28	15.97
l_b,int, Bicycle LOS Score for Intersection	2.849	1.836	3.051	2.351
Bicycle LOS	C	A	C	B

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 2000: Willow Rd (SR 114)/Hamilton Ave

Control Type:	Signalized	Delay (sec / veh):	426.2
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.828

Intersection Setup

Name	Willow Road (SR 114)			Willow Road (SR 114)			Hamilton Avenue			Main Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			30.00			25.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Willow Road (SR 114)			Willow Road (SR 114)			Hamilton Avenue			Main Street		
Base Volume Input [veh/h]	144	1307	21	330	709	104	62	9	70	69	16	454
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	-2	-40	0	0	-6	0	0	0	-1	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	142	1267	21	330	703	104	62	9	69	69	16	454
Peak Hour Factor	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	37	331	5	86	184	27	16	2	18	18	4	119
Total Analysis Volume [veh/h]	148	1324	22	345	735	109	65	9	72	72	17	474
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	1			13			5			1		
v_di, Inbound Pedestrian Volume crossing m	5			1			1			13		
v_co, Outbound Pedestrian Volume crossing	3			5			13			1		
v_ci, Inbound Pedestrian Volume crossing mi	1			13			5			3		
v_ab, Corner Pedestrian Volume [ped/h]	3			13			5			1		
Bicycle Volume [bicycles/h]	1			1			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	20.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	1	6	2	5	2	6	4	8	4	8	4	8
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	Lead	-	-	Lag	-	-	Lag	-	-
Minimum Green [s]	4	10	10	4	10	10	4	4	4	4	4	4
Maximum Green [s]	21	30	30	16	30	30	26	26	26	26	26	26
Amber [s]	3.0	4.4	4.4	3.0	4.4	4.4	3.6	3.7	3.6	3.7	3.6	3.7
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	24	92	85	17	85	92	36	36	36	36	36	36
Vehicle Extension [s]	3.0	4.0	4.0	2.0	4.0	4.0	2.0	3.0	2.0	3.0	2.0	3.0
Walk [s]	0	4	4	0	4	4	4	4	4	4	4	4
Pedestrian Clearance [s]	0	19	15	0	15	19	25	25	25	25	25	25
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	1.0	2.4	2.4	1.0	2.4	2.4	1.6	1.7	1.6	1.7	1.6	1.7
Minimum Recall	No	Yes		No	Yes			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	6.0	6.0	6.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	C	C
C, Cycle Length [s]	145	145	145	145	145	145	145	145
L, Total Lost Time per Cycle [s]	3.00	4.40	4.40	3.00	4.40	4.40	3.70	3.60
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.00
l2, Clearance Lost Time [s]	1.00	2.40	2.40	1.00	2.40	2.40	1.70	0.00
g_i, Effective Green Time [s]	14	88	88	14	88	88	32	32
g / C, Green / Cycle	0.10	0.60	0.60	0.10	0.60	0.60	0.22	0.22
(v / s)_i Volume / Saturation Flow Rate	0.08	0.81	0.81	0.43	0.52	0.52	0.45	0.72
s, saturation flow rate [veh/h]	1781	837	831	797	837	791	327	783
c, Capacity [veh/h]	171	505	502	77	506	478	109	192
d1, Uniform Delay [s]	64.52	28.68	28.68	65.38	23.35	23.68	60.55	55.97
k, delay calibration	0.14	0.50	0.50	0.50	0.50	0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	15.60	163.81	165.14	1593.47	16.47	18.35	202.94	883.03
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.87	1.33	1.34	4.48	0.85	0.86	1.34	2.93
d, Delay for Lane Group [s/veh]	80.12	192.49	193.82	1658.85	39.82	42.03	263.49	939.00
Lane Group LOS	F	F	F	F	D	D	F	F
Critical Lane Group	No	No	Yes	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	6.07	39.05	38.99	36.98	13.91	13.70	10.23	54.39
50th-Percentile Queue Length [ft/ln]	151.84	976.35	974.84	924.44	347.80	342.46	255.63	1359.69
95th-Percentile Queue Length [veh/ln]	10.12	60.21	60.19	58.49	20.03	19.77	17.55	88.42
95th-Percentile Queue Length [ft/ln]	252.88	1505.29	1504.84	1462.36	500.72	494.21	438.82	2210.52

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	80.12	193.14	193.82	1658.85	40.73	42.03	263.49	263.49	263.49	939.00	939.00	939.00
Movement LOS	F	F	F	F	D	D	F	F	F	F	F	F
d_A, Approach Delay [s/veh]	181.95			510.37			263.49			939.00		
Approach LOS	F			F			F			F		
d_I, Intersection Delay [s/veh]	426.24											
Intersection LOS	F											
Intersection V/C	1.828											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	235.98	0.00	108.28	1034.60
d_p, Pedestrian Delay [s]	64.67	64.67	64.67	64.67
l_p,int, Pedestrian LOS Score for Intersectio	3.264	3.012	1.910	2.219
Crosswalk LOS	C	C	A	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1168	1071	404	406
d_b, Bicycle Delay [s]	12.55	15.63	46.11	46.03
l_b,int, Bicycle LOS Score for Intersection	2.792	2.541	1.801	2.489
Bicycle LOS	C	B	A	B

Sequence

Ring 1	2	1	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 3000: Willow Rd (SR 114)/Ivy Dr

Control Type:	Signalized	Delay (sec / veh):	54.7
Analysis Method:	HCM 7th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.024

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		Ivy Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	1
Entry Pocket Length [ft]	85.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	1	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	100.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		Ivy Drive	
Base Volume Input [veh/h]	133	1381	801	281	64	79
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	-2	-42	-7	0	0	-1
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	131	1339	794	281	64	78
Peak Hour Factor	0.9670	0.9670	0.9670	0.9670	0.9670	0.9670
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	34	346	205	73	17	20
Total Analysis Volume [veh/h]	135	1385	821	291	66	81
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	3		7		2	
v_di, Inbound Pedestrian Volume crossing m	2		6		3	
v_co, Outbound Pedestrian Volume crossing	6		3		3	
v_ci, Inbound Pedestrian Volume crossing mi	7		3		3	
v_ab, Corner Pedestrian Volume [ped/h]	9		10		5	
Bicycle Volume [bicycles/h]	0		4		1	

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	10.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal Group	5	2	6	6	4	4
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	4	10	10	10	11	11
Maximum Green [s]	21	30	30	30	28	28
Amber [s]	3.0	4.4	4.4	4.4	3.0	3.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	22	111	89	89	34	34
Vehicle Extension [s]	2.0	2.0	2.0	2.0	2.0	2.0
Walk [s]	0	0	4	4	4	4
Pedestrian Clearance [s]	0	0	22	22	24	24
Delayed Vehicle Green [s]	0.0	0.0	3.0	3.0	3.0	3.0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	1.0	2.4	2.4	2.4	1.0	1.0
Minimum Recall	No	Yes	Yes		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	L	R
C, Cycle Length [s]	145	145	145	145	145	145
L, Total Lost Time per Cycle [s]	3.00	4.40	4.40	4.40	3.00	3.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.00	2.40	2.40	2.40	1.00	1.00
g_i, Effective Green Time [s]	17	122	102	102	16	16
g / C, Green / Cycle	0.12	0.84	0.70	0.70	0.11	0.11
(v / s)_i Volume / Saturation Flow Rate	0.11	0.87	0.66	0.73	0.07	0.09
s, saturation flow rate [veh/h]	1265	1593	837	759	994	895
c, Capacity [veh/h]	150	1337	586	532	109	98
d1, Uniform Delay [s]	63.05	11.62	19.36	21.69	61.56	63.02
k, delay calibration	0.23	0.50	0.50	0.50	0.04	0.04
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	29.87	34.32	26.45	51.47	2.03	6.55
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.90	1.04	0.95	1.05	0.61	0.83
d, Delay for Lane Group [s/veh]	92.91	45.94	45.81	73.16	63.59	69.56
Lane Group LOS	F	F	D	F	E	E
Critical Lane Group	No	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	6.10	19.40	18.77	23.10	2.39	3.11
50th-Percentile Queue Length [ft/ln]	152.53	484.97	469.37	577.58	59.80	77.66
95th-Percentile Queue Length [veh/ln]	10.15	27.47	25.88	32.20	4.31	5.59
95th-Percentile Queue Length [ft/ln]	253.80	686.82	647.02	804.90	107.65	139.79

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	92.91	45.94	54.64	73.16	63.59	69.56
Movement LOS	F	F	D	E	E	E
d_A, Approach Delay [s/veh]	50.11		59.49		66.88	
Approach LOS	D		E		E	
d_I, Intersection Delay [s/veh]	54.75					
Intersection LOS	D					
Intersection V/C	1.024					

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	871.80	420.42	244.25
d_p, Pedestrian Delay [s]	64.69	64.69	64.69
l_p,int, Pedestrian LOS Score for Intersectio	2.954	2.989	2.295
Crosswalk LOS	C	C	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1471	1126	386
d_b, Bicycle Delay [s]	5.07	13.87	47.20
l_b,int, Bicycle LOS Score for Intersection	2.814	2.477	1.560
Bicycle LOS	C	B	A

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 4000: Willow Rd (SR 114)/O'Brien Dr

Control Type:	Signalized	Delay (sec / veh):	400.2
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.863

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		O'Brien Drive	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	1	0	1	0
Entry Pocket Length [ft]	100.00	60.00	100.00	100.00	50.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	No		No		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		O'Brien Drive	
Base Volume Input [veh/h]	1407	420	68	873	705	77
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	-3	-6	-7	0	-60	-19
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	1404	414	61	873	645	58
Peak Hour Factor	0.9860	0.9860	0.9860	0.9860	0.9860	0.9860
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	356	105	15	221	164	15
Total Analysis Volume [veh/h]	1424	420	62	885	654	59
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	5		0		5	
v_ci, Inbound Pedestrian Volume crossing mi	5		0		5	
v_ab, Corner Pedestrian Volume [ped/h]	3		0		13	
Bicycle Volume [bicycles/h]	2		0		4	

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	10.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Permissive	Permissive	Protected	Permissive	Permissive	Permissive
Signal Group	2	2	1	6	4	8
Auxiliary Signal Groups						
Lead / Lag	-	-	Lead	-	Lead	-
Minimum Green [s]	10	10	5	10	8	0
Maximum Green [s]	35	35	21	35	21	0
Amber [s]	4.4	4.4	3.0	4.4	3.2	0.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	105	105	15	120	25	0
Vehicle Extension [s]	2.0	2.0	2.0	2.0	2.0	0.0
Walk [s]	4	4	0	0	0	0
Pedestrian Clearance [s]	17	17	0	0	0	0
Delayed Vehicle Green [s]	3.0	3.0	0.0	0.0	0.0	0.0
Rest In Walk	No			No	No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.4	2.4	1.0	2.4	1.2	0.0
Minimum Recall	Yes		No	Yes	No	
Maximum Recall	No		No	No	No	
Pedestrian Recall	No		No	No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	L	C	L	C
C, Cycle Length [s]	145	145	145	145	145	145
L, Total Lost Time per Cycle [s]	4.40	4.40	3.00	4.40	3.20	3.20
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.40	2.40	1.00	2.40	1.20	1.20
g_i, Effective Green Time [s]	101	101	12	116	22	22
g / C, Green / Cycle	0.69	0.69	0.08	0.80	0.15	0.15
(v / s)_i Volume / Saturation Flow Rate	1.09	0.75	0.10	0.68	0.56	0.56
s, saturation flow rate [veh/h]	1302	561	647	1293	647	634
c, Capacity [veh/h]	903	389	54	1031	97	95
d1, Uniform Delay [s]	22.21	20.88	66.44	9.45	61.54	61.54
k, delay calibration	0.50	0.50	0.16	0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	264.85	68.59	117.93	9.26	1236.54	1243.85
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	1.58	1.08	1.16	0.86	3.69	3.71
d, Delay for Lane Group [s/veh]	287.05	89.46	184.37	18.71	1298.08	1305.40
Lane Group LOS	F	F	F	B	F	F
Critical Lane Group	Yes	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	46.48	18.15	3.72	8.10	37.01	36.48
50th-Percentile Queue Length [ft/ln]	1161.93	453.70	93.02	202.44	925.26	911.88
95th-Percentile Queue Length [veh/ln]	76.71	26.73	6.70	12.76	60.31	59.51
95th-Percentile Queue Length [ft/ln]	1917.64	668.34	167.44	319.10	1507.71	1487.75

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	287.05	89.46	184.37	18.71	1301.38	1305.40
Movement LOS	F	F	F	B	F	F
d_A, Approach Delay [s/veh]	242.05		29.56		1301.71	
Approach LOS	F		C		F	
d_I, Intersection Delay [s/veh]	400.24					
Intersection LOS	F					
Intersection V/C	1.863					

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	64.69
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	2.353
Crosswalk LOS	F	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1347	1595	301
d_b, Bicycle Delay [s]	7.74	2.97	52.42
l_b,int, Bicycle LOS Score for Intersection	3.081	2.341	2.736
Bicycle LOS	C	B	B

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 5000: Willow Rd (SR 114)/Newbridge St

Control Type:	Signalized	Delay (sec / veh):	192.8
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.211

Intersection Setup

Name	Willow Road (SR 114)			Willow Road (SR 114)			Newbridge Street			Newbridge Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	1	0	0	1	0	0	0
Entry Pocket Length [ft]	390.00	100.00	100.00	185.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	1	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	49.21	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			25.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Willow Road (SR 114)			Willow Road (SR 114)			Newbridge Street			Newbridge Street		
Base Volume Input [veh/h]	322	1429	522	93	1222	17	44	177	526	487	178	55
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	-7	0	-2	-58	0	0	0	3	0	0	-1
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	175	0	0	45
Total Hourly Volume [veh/h]	322	1422	522	91	1164	17	44	177	354	487	178	9
Peak Hour Factor	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	86	378	139	24	310	5	12	47	94	130	47	2
Total Analysis Volume [veh/h]	343	1513	555	97	1238	18	47	188	377	518	189	10
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	3			7			7			3		
v_di, Inbound Pedestrian Volume crossing m	3			7			7			3		
v_co, Outbound Pedestrian Volume crossing	11			20			10			19		
v_ci, Inbound Pedestrian Volume crossing mi	10			19			11			20		
v_ab, Corner Pedestrian Volume [ped/h]	31			48			41			8		
Bicycle Volume [bicycles/h]	5			0			3			1		

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	140.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Split	Split	Split	Split	Split	Split
Signal Group	5	2	2	1	6	6	4	4	4	8	3	8
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lag	-	-	Lag	-	-	-	-	-
Minimum Green [s]	4	12	12	4	12	12	4	4	4	0	4	0
Maximum Green [s]	21	40	40	21	40	40	25	25	25	0	21	0
Amber [s]	3.0	4.4	4.4	3.0	4.4	4.4	3.6	3.6	3.6	0.0	3.0	0.0
All red [s]	0.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0
Split [s]	34	66	66	19	51	51	30	30	30	0	30	0
Vehicle Extension [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walk [s]	0	4	4	0	4	4	4	4	4	0	4	0
Pedestrian Clearance [s]	0	19	19	0	16	16	23	23	23	0	23	0
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	3.0	0.0	3.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	1.0	3.4	3.4	1.0	3.4	3.4	2.6	2.6	2.6	0.0	1.0	0.0
Minimum Recall	No	Yes		No	Yes			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	L	C	R	L	C	R
C, Cycle Length [s]	145	145	145	145	145	145	145	145	145	145	145	145
L, Total Lost Time per Cycle [s]	3.00	5.40	5.40	3.00	5.40	5.40	4.60	4.60	4.60	3.00	3.00	3.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.00	3.40	3.40	1.00	3.40	3.40	2.60	2.60	2.60	1.00	1.00	1.00
g_i, Effective Green Time [s]	31	60	60	16	46	46	27	27	27	25	25	25
g / C, Green / Cycle	0.21	0.42	0.42	0.11	0.31	0.31	0.19	0.19	0.19	0.17	0.17	0.17
(v / s)_i Volume / Saturation Flow Rate	0.27	0.55	0.60	0.10	0.44	0.44	0.03	0.19	0.25	0.15	0.14	0.01
s, saturation flow rate [veh/h]	1265	2530	1129	937	1874	976	1781	984	1513	3459	1329	1464
c, Capacity [veh/h]	270	1054	470	104	588	306	336	186	285	601	231	255
d1, Uniform Delay [s]	57.02	42.28	42.28	63.95	49.71	49.71	48.99	58.79	58.14	58.16	57.65	49.76
k, delay calibration	0.50	0.50	0.50	0.21	0.50	0.50	0.04	0.43	0.50	0.04	0.26	0.04
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	148.29	151.50	207.79	42.69	191.57	200.72	0.07	64.73	166.71	1.45	15.21	0.02
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	1.27	1.32	1.44	0.94	1.40	1.40	0.14	1.01	1.32	0.86	0.82	0.04
d, Delay for Lane Group [s/veh]	205.31	193.78	250.07	106.64	241.28	250.43	49.06	123.52	224.85	59.61	72.86	49.78
Lane Group LOS	F	F	F	F	F	F	D	F	F	E	E	D
Critical Lane Group	Yes	No	No	No	No	Yes	No	No	Yes	Yes	No	No
50th-Percentile Queue Length [veh/ln]	20.81	40.35	43.39	4.82	26.36	28.23	1.45	10.16	23.59	9.37	7.67	0.31
50th-Percentile Queue Length [ft/ln]	520.31	1008.85	1084.64	120.39	658.89	705.74	36.14	254.04	589.84	234.34	191.72	7.68
95th-Percentile Queue Length [veh/ln]	31.84	60.47	66.96	8.41	41.50	44.17	2.60	15.49	35.91	14.39	12.21	0.55
95th-Percentile Queue Length [ft/ln]	796.01	1511.68	1673.92	210.37	1037.55	1104.18	65.04	387.16	897.66	359.87	305.26	13.83

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	205.31	198.25	250.07	106.64	244.33	250.43	49.06	123.52	224.85	59.61	72.86	49.78
Movement LOS	F	F	F	F	F	F	D	F	F	E	E	D
d_A, Approach Delay [s/veh]	211.18			234.54			180.22			62.96		
Approach LOS	F			F			F			E		
d_I, Intersection Delay [s/veh]	192.80											
Intersection LOS	F											
Intersection V/C	1.211											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	41.35	142.42	372.60	0.00
d_p, Pedestrian Delay [s]	64.70	64.70	64.70	64.70
l_p,int, Pedestrian LOS Score for Intersectio	3.495	2.963	2.730	2.701
Crosswalk LOS	C	C	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	795	588	309	331
d_b, Bicycle Delay [s]	26.39	36.14	51.89	50.49
l_b,int, Bicycle LOS Score for Intersection	2.886	2.304	2.858	2.817
Bicycle LOS	C	B	C	C

Sequence

Ring 1	2	1	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 6000: Willow Rd/US-101 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	7.8
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.601

Intersection Setup

Name	Willow Road			Willow Road (SR 114)			US-101 NB Ramps			US-101 NB Ramps		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	1	0	0	0	1	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	200.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No						No		
Crosswalk	No			No			Yes			Yes		

Volumes

Name	Willow Road			Willow Road (SR 114)			US-101 NB Ramps			US-101 NB Ramps		
Base Volume Input [veh/h]	0	1408	729	0	1327	852	0	0	0	196	0	849
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	2.00	2.00	0.00	2.00	2.00	0.00	0.00	0.00	2.00	0.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	-2	0	0	-10	-44	0	0	0	0	0	-5
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	1406	729	0	1317	808	0	0	0	196	0	844
Peak Hour Factor	1.0000	0.9330	0.9330	1.0000	0.9330	0.9330	1.0000	1.0000	1.0000	0.9330	1.0000	0.9330
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	377	195	0	353	217	0	0	0	53	0	226
Total Analysis Volume [veh/h]	0	1507	781	0	1412	866	0	0	0	210	0	905
Presence of On-Street Parking	No		No	No		No				No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			6			16		
Bicycle Volume [bicycles/h]	0			7			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	2.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	8.00

Phasing & Timing

Control Type	Permiss	Permiss	Overlap	Permiss	Permiss	Overlap	Permiss	Permiss	Permiss	Permiss	Permiss	Overlap
Signal Group	0	6	6	0	2	2	0	0	0	3	0	4
Auxiliary Signal Groups			3,6			2,3						2,3,4
Lead / Lag	-	-	-	-	-	-	-	-	-	Lead	-	-
Minimum Green [s]	0	4	4	0	4	4	0	0	0	6	0	4
Maximum Green [s]	0	35	35	0	35	35	0	0	0	24	0	34
Amber [s]	0.0	4.1	4.1	0.0	4.1	4.1	0.0	0.0	0.0	3.0	0.0	3.0
All red [s]	0.0	1.8	1.8	0.0	1.0	1.0	0.0	0.0	0.0	2.0	0.0	0.0
Split [s]	0	89	89	0	89	89	0	0	0	17	0	22
Vehicle Extension [s]	0.0	3.0	3.0	0.0	3.0	3.0	0.0	0.0	0.0	3.0	0.0	3.0
Walk [s]	0	4	4	0	4	4	0	0	0	0	0	0
Pedestrian Clearance [s]	0	29	29	0	7	7	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No					No		
l1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	2.0	2.0	0.0	0.0	0.0	2.0	0.0	2.0
l2, Clearance Lost Time [s]	0.0	3.9	3.9	0.0	3.1	3.1	0.0	0.0	0.0	3.0	0.0	1.0
Minimum Recall		No	No		No	No				No		No
Maximum Recall		No	No		No	No				No		No
Pedestrian Recall		No	No		No	No				No		No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	C	R		L	R
C, Cycle Length [s]	145	145	145	145		145	145
L, Total Lost Time per Cycle [s]	5.90	5.00	5.10	5.00		5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00		0.00	0.00
l2, Clearance Lost Time [s]	3.90	0.00	3.10	0.00		3.00	0.00
g_i, Effective Green Time [s]	113	131	114	131		12	135
g / C, Green / Cycle	0.78	0.91	0.79	0.91		0.08	0.93
(v / s)_i Volume / Saturation Flow Rate	0.50	0.49	0.47	0.56		0.06	0.55
s, saturation flow rate [veh/h]	3003	1589	3003	1553		3459	1658
c, Capacity [veh/h]	2347	1439	2364	1406		287	1543
d1, Uniform Delay [s]	6.93	1.28	6.19	1.43		64.88	0.39
k, delay calibration	0.50	0.50	0.50	0.50		0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00		1.00	1.00
d2, Incremental Delay [s]	1.36	1.47	1.12	2.03		3.59	1.64
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00		0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00		1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00		1.00	1.00

Lane Group Results

X, volume / capacity	0.64	0.54	0.60	0.62		0.73	0.59
d, Delay for Lane Group [s/veh]	8.30	2.75	7.32	3.45		68.47	2.03
Lane Group LOS	A	A	A	A		E	A
Critical Lane Group	No	No	No	Yes		No	Yes
50th-Percentile Queue Length [veh/ln]	6.24	2.00	5.29	2.54		3.95	0.35
50th-Percentile Queue Length [ft/ln]	156.04	50.03	132.15	63.55		98.73	8.79
95th-Percentile Queue Length [veh/ln]	10.34	3.60	9.06	4.58		7.11	0.63
95th-Percentile Queue Length [ft/ln]	258.47	90.06	226.41	114.39		177.71	15.82

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	0.00	8.30	2.75	0.00	7.32	3.45	0.00	0.00	0.00	68.47	0.00	2.03
Movement LOS		A	A		A	A				E		A
d_A, Approach Delay [s/veh]	6.40			5.85			0.00			14.54		
Approach LOS	A			A			A			B		
d_I, Intersection Delay [s/veh]	7.78											
Intersection LOS	A											
Intersection V/C	0.601											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	64.70	64.70
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	2.292	2.694
Crosswalk LOS	F	F	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1105	1116	0	166
d_b, Bicycle Delay [s]	14.51	14.21	72.48	60.98
l_b,int, Bicycle LOS Score for Intersection	2.818	2.813	4.132	1.560
Bicycle LOS	C	C	D	A

Sequence

Ring 1	-	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 7000: Willow Rd/US-101 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	28.4
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.930

Intersection Setup

Name	Willow Road			Willow Road			US-101 SB Ramps			US-101 SB Ramps		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	0	1	0	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No					
Crosswalk	No			No			Yes			Yes		

Volumes

Name	Willow Road			Willow Road			US-101 SB Ramps			US-101 SB Ramps		
Base Volume Input [veh/h]	0	1296	364	0	1068	782	285	0	357	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	2.00	2.00	0.00	2.00	2.00	2.00	0.00	2.00	0.00	0.00	0.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	-1	0	0	-10	0	-1	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	1295	364	0	1058	782	284	0	357	0	0	0
Peak Hour Factor	1.0000	0.9520	0.9520	1.0000	0.9520	0.9520	0.9520	1.0000	0.9520	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	340	96	0	278	205	75	0	94	0	0	0
Total Analysis Volume [veh/h]	0	1360	382	0	1111	821	298	0	375	0	0	0
Presence of On-Street Parking	No		No	No		No	No		No			
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	1			0			7			17		
Bicycle Volume [bicycles/h]	0			3			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	99.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Permiss	Permiss	Overlap	Permiss	Permiss	Overlap	Permiss	Permiss	Overlap	Permiss	Permiss	Permiss
Signal Group	0	6	6	0	2	2	4	0	4	0	0	0
Auxiliary Signal Groups			4,6			2,4			4,6			
Lead / Lag	-	-	-	-	-	-	Lead	-	-	-	-	-
Minimum Green [s]	0	4	4	0	4	4	4	0	4	0	0	0
Maximum Green [s]	0	35	35	0	35	35	30	0	30	0	0	0
Amber [s]	0.0	4.1	4.1	0.0	4.1	4.1	3.0	0.0	3.0	0.0	0.0	0.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	2.0	0.0	0.0	0.0
Split [s]	0	103	103	0	103	103	25	0	25	0	0	0
Vehicle Extension [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	0.0	3.0	0.0	0.0	0.0
Walk [s]	0	4	4	0	4	4	0	0	0	0	0	0
Pedestrian Clearance [s]	0	7	7	0	32	32	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No		No					
l1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	2.0	2.0	2.0	0.0	2.0	0.0	0.0	0.0
l2, Clearance Lost Time [s]	0.0	2.1	2.1	0.0	2.1	2.1	3.0	0.0	3.0	0.0	0.0	0.0
Minimum Recall		No	No		No	No	No		No			
Maximum Recall		No	No		No	No	No		No			
Pedestrian Recall		No	No		No	No	No		No			
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	C	R	L	R	
C, Cycle Length [s]	145	145	145	145	145	145	
L, Total Lost Time per Cycle [s]	4.10	5.00	4.10	5.00	5.00	5.00	
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	
l2, Clearance Lost Time [s]	2.10	0.00	2.10	0.00	3.00	0.00	
g_i, Effective Green Time [s]	116	140	116	140	20	140	
g / C, Green / Cycle	0.80	0.97	0.80	0.97	0.14	0.97	
(v / s)_i Volume / Saturation Flow Rate	0.27	0.24	0.22	1.18	0.09	0.30	
s, saturation flow rate [veh/h]	5094	1589	5094	694	3459	1251	
c, Capacity [veh/h]	4070	1535	4070	670	478	1208	
d1, Uniform Delay [s]	3.99	0.11	3.74	1.66	58.87	0.12	
k, delay calibration	0.50	0.50	0.50	0.50	0.11	0.23	
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	
d2, Incremental Delay [s]	0.22	0.39	0.17	114.27	1.34	0.31	
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	

Lane Group Results

X, volume / capacity	0.33	0.25	0.27	1.23	0.62	0.31	
d, Delay for Lane Group [s/veh]	4.21	0.50	3.91	115.93	60.20	0.43	
Lane Group LOS	A	A	A	F	E	A	
Critical Lane Group	No	No	No	Yes	No	No	
50th-Percentile Queue Length [veh/ln]	3.30	0.17	2.53	21.27	5.28	0.05	
50th-Percentile Queue Length [ft/ln]	82.52	4.14	63.16	531.77	131.91	1.30	
95th-Percentile Queue Length [veh/ln]	5.94	0.30	4.55	33.98	9.04	0.09	
95th-Percentile Queue Length [ft/ln]	148.53	7.45	113.69	849.61	226.09	2.35	

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	0.00	4.21	0.50	0.00	3.91	115.93	60.20	0.00	0.43	0.00	0.00	0.00
Movement LOS		A	A		A	F	E		A			
d_A, Approach Delay [s/veh]	3.40			51.51			26.90			0.00		
Approach LOS	A			D			C			A		
d_I, Intersection Delay [s/veh]	28.42											
Intersection LOS	C											
Intersection V/C	0.930											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	64.69	64.69
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	2.616	1.820
Crosswalk LOS	F	F	B	A
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1323	1323	276	0
d_b, Bicycle Delay [s]	8.29	8.31	53.85	72.47
l_b,int, Bicycle LOS Score for Intersection	2.518	2.622	1.560	4.132
Bicycle LOS	B	B	A	D

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 8000: O'Brien Drive/Kavanaugh Drive

Control Type:	All-way stop	Delay (sec / veh):	76.7
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.162

Intersection Setup

Name	O'Brien Drive		O'Brien Drive		Kavanaugh Drive	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		Yes		No	

Volumes

Name	O'Brien Drive		O'Brien Drive		Kavanaugh Drive	
Base Volume Input [veh/h]	210	286	111	437	183	282
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	-16	0	-3	1	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	210	270	111	434	184	282
Peak Hour Factor	0.9150	0.9150	0.9150	0.9150	0.9150	0.9150
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	57	74	30	119	50	77
Total Analysis Volume [veh/h]	230	295	121	474	201	308
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	547	595	538
Degree of Utilization, x	0.96	1.16	0.95

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	12.72	20.99	12.12
95th-Percentile Queue Length [ft]	317.99	524.74	303.02
Approach Delay [s/veh]	54.58	117.16	52.29
Approach LOS	F	F	F
Intersection Delay [s/veh]	76.72		
Intersection LOS	F		

Intersection Level Of Service Report
Intersection 9000: Bayfront Expy (SR 84)/University Ave (SR 109)

Control Type:	Signalized	Delay (sec / veh):	91.9
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.956

Intersection Setup

Name	University Avenue (SR109)		Bayfront Expressway (SR84)		Bayfront Expressway (SR84)	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	2	0	1	2	0
Entry Pocket Length [ft]	100.00	250.00	100.00	100.00	830.00	100.00
No. of Lanes in Exit Pocket	0	2	0	0	0	0
Exit Pocket Length [ft]	0.00	74.61	0.00	0.00	0.00	0.00
Speed [mph]	35.00		55.00		55.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		No	

Volumes

Name	University Avenue (SR109)		Bayfront Expressway (SR84)		Bayfront Expressway (SR84)	
Base Volume Input [veh/h]	87	1378	3777	95	333	1116
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	-10	-17	0	-2	-2
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	87	1368	3760	95	331	1114
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	22	349	959	24	84	284
Total Analysis Volume [veh/h]	89	1396	3837	97	338	1137
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	1		2		0	
v_ci, Inbound Pedestrian Volume crossing mi	2		1		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	3		5		8	

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	200
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	198.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	10.00

Phasing & Timing

Control Type	Permissive	Overlap	Permissive	Permissive	Protected	Permissive
Signal Group	4	4	6	2	5	2
Auxiliary Signal Groups		4,5				
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	12	12	10	10	11	10
Maximum Green [s]	15	15	60	60	30	60
Amber [s]	3.0	3.0	5.0	5.4	3.0	5.4
All red [s]	1.0	1.0	1.0	0.5	0.5	0.5
Split [s]	36	36	124	154	26	154
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	3.0
Walk [s]	4	4	4	0	0	0
Pedestrian Clearance [s]	29	29	35	0	0	0
Delayed Vehicle Green [s]	3.0	3.0	3.0	0.0	0.0	0.0
Rest In Walk	No		No			No
l1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0
l2, Clearance Lost Time [s]	2.0	2.0	4.0	3.9	1.5	3.9
Minimum Recall	No	No	No		No	No
Maximum Recall	No	No	No		No	No
Pedestrian Recall	No	No	No		No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	20.0	20.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	R	C	R	L	C
C, Cycle Length [s]	200	200	200	200	200	200
L, Total Lost Time per Cycle [s]	4.00	3.50	6.00	6.00	3.50	5.90
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	0.00	4.00	4.00	1.50	3.90
g_i, Effective Green Time [s]	32	58	132	132	23	158
g / C, Green / Cycle	0.16	0.29	0.66	0.66	0.11	0.79
(v / s)_i Volume / Saturation Flow Rate	0.03	0.34	0.75	0.06	0.10	0.22
s, saturation flow rate [veh/h]	3459	4162	5094	1566	3459	5094
c, Capacity [veh/h]	553	1217	3361	1033	390	4027
d1, Uniform Delay [s]	72.38	70.26	33.99	12.31	87.20	5.64
k, delay calibration	0.11	0.23	0.50	0.50	0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.13	71.25	67.76	0.18	5.94	0.18
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.16	1.15	1.14	0.09	0.87	0.28
d, Delay for Lane Group [s/veh]	72.51	141.51	101.75	12.49	93.14	5.82
Lane Group LOS	E	F	F	B	F	A
Critical Lane Group	No	Yes	Yes	No	No	No
50th-Percentile Queue Length [veh/ln]	2.00	28.64	70.05	1.59	8.80	3.78
50th-Percentile Queue Length [ft/ln]	49.98	716.10	1751.28	39.68	219.97	94.49
95th-Percentile Queue Length [veh/ln]	3.60	40.71	93.95	2.86	13.66	6.80
95th-Percentile Queue Length [ft/ln]	89.96	1017.83	2348.80	71.43	341.59	170.09

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	72.51	141.51	101.75	12.49	93.14	5.82
Movement LOS	E	F	F	B	F	A
d_A, Approach Delay [s/veh]	137.37		99.55		25.83	
Approach LOS	F		F		C	
d_I, Intersection Delay [s/veh]	91.92					
Intersection LOS	F					
Intersection V/C	0.956					

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	1160.89	0.00	0.00
d_p, Pedestrian Delay [s]	92.12	92.12	0.00
l_p,int, Pedestrian LOS Score for Intersectio	3.131	3.950	0.000
Crosswalk LOS	C	D	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	290	1150	1482
d_b, Bicycle Delay [s]	73.17	18.08	6.74
l_b,int, Bicycle LOS Score for Intersection	1.670	3.723	2.371
Bicycle LOS	A	D	B

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 10000: University Avenue/Adams Drive

Control Type:	Two-way stop	Delay (sec / veh):	37.1
Analysis Method:	HCM 7th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.390

Intersection Setup

Name	University Avenue		University Avenue (SR109)		Adams Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		No	

Volumes

Name	University Avenue		University Avenue (SR109)		Adams Drive	
Base Volume Input [veh/h]	15	1379	386	7	62	19
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	-10	-2	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	15	1369	384	7	62	19
Peak Hour Factor	0.9160	0.9160	0.9160	0.9160	0.9160	0.9160
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	374	105	2	17	5
Total Analysis Volume [veh/h]	16	1495	419	8	68	21
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.01	0.00	0.00	0.39	0.03
d_M, Delay for Movement [s/veh]	8.24	0.00	0.00	0.00	37.12	21.04
Movement LOS	A	A	A	A	E	C
95th-Percentile Queue Length [veh/ln]	0.04	0.00	0.00	0.00	1.91	1.91
95th-Percentile Queue Length [ft/ln]	1.08	0.00	0.00	0.00	47.64	47.64
d_A, Approach Delay [s/veh]	0.09		0.00		33.33	
Approach LOS	A		A		D	
d_I, Intersection Delay [s/veh]	1.53					
Intersection LOS	E					

Intersection Level Of Service Report
Intersection 11000: University Ave/O'Brien Dr

Control Type:	Signalized	Delay (sec / veh):	32.0
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.751

Intersection Setup

Name	University Avenue		University Avenue		O'Brien Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	1	0
Entry Pocket Length [ft]	90.00	100.00	100.00	100.00	45.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00		25.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	No		No		No	

Volumes

Name	University Avenue		University Avenue		O'Brien Drive	
Base Volume Input [veh/h]	300	1314	394	9	73	424
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	-10	1	-3	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	300	1304	395	6	73	424
Peak Hour Factor	0.9250	0.9250	0.9250	0.9250	0.9250	0.9250
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	81	352	107	2	20	115
Total Analysis Volume [veh/h]	324	1410	427	6	79	458
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		1	
Bicycle Volume [bicycles/h]	2		3		1	

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	130
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	48.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	11.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	1	6	2	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	5	5	5	0	5	0
Maximum Green [s]	30	30	30	0	30	0
Amber [s]	3.0	3.0	3.0	0.0	3.0	0.0
All red [s]	1.0	1.0	1.0	0.0	1.0	0.0
Split [s]	67	76	9	0	54	0
Vehicle Extension [s]	3.0	3.0	3.0	0.0	3.0	0.0
Walk [s]	0	5	5	0	5	0
Pedestrian Clearance [s]	0	10	10	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
Minimum Recall	No	No	No		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	L	R
C, Cycle Length [s]	130	130	130	130	130	130
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	26	82	52	52	40	40
g / C, Green / Cycle	0.20	0.63	0.40	0.40	0.31	0.31
(v / s)_i Volume / Saturation Flow Rate	0.18	0.40	0.12	0.12	0.04	0.29
s, saturation flow rate [veh/h]	1781	3560	1870	1859	1781	1569
c, Capacity [veh/h]	354	2253	754	750	544	479
d1, Uniform Delay [s]	50.94	14.49	26.17	26.19	32.78	44.00
k, delay calibration	0.11	0.50	0.50	0.50	0.11	0.29
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	9.42	1.33	0.96	0.97	0.12	22.03
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.91	0.63	0.29	0.29	0.15	0.96
d, Delay for Lane Group [s/veh]	60.36	15.82	27.13	27.16	32.90	66.03
Lane Group LOS	E	B	C	C	C	E
Critical Lane Group	No	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	11.32	12.79	4.83	4.84	1.85	17.20
50th-Percentile Queue Length [ft/ln]	283.04	319.84	120.76	120.88	46.28	429.95
95th-Percentile Queue Length [veh/ln]	16.84	18.66	8.43	8.44	3.33	24.00
95th-Percentile Queue Length [ft/ln]	421.00	466.49	210.87	211.04	83.30	599.98

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	60.36	15.82	27.14	27.16	32.90	66.03
Movement LOS	E	B	C	C	C	E
d_A, Approach Delay [s/veh]	24.14		27.14		61.16	
Approach LOS	C		C		E	
d_I, Intersection Delay [s/veh]	31.97					
Intersection LOS	C					
Intersection V/C	0.751					

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	0.000
Crosswalk LOS	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1108	77	770
d_b, Bicycle Delay [s]	12.93	60.16	24.60
l_b,int, Bicycle LOS Score for Intersection	2.990	1.917	1.560
Bicycle LOS	C	A	A

Sequence

Ring 1	1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 12000: University Avenue/Kavanaugh Drive

Control Type:	Signalized	Delay (sec / veh):	20.3
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.606

Intersection Setup

Name	University Avenue		University Avenue		Kavanaugh Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00		25.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		No		No	

Volumes

Name	University Avenue		University Avenue		Kavanaugh Drive	
Base Volume Input [veh/h]	174	1326	489	112	97	155
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	1	-10	-6
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	174	1326	489	113	87	149
Peak Hour Factor	0.9440	0.9440	0.9440	0.9440	0.9440	0.9440
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	46	351	130	30	23	39
Total Analysis Volume [veh/h]	184	1405	518	120	92	158
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		13		4	
Bicycle Volume [bicycles/h]	1		5		2	

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fixed time
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal Group	1	6	2	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	5	5	5	0	5	0
Maximum Green [s]	30	30	30	0	30	0
Amber [s]	3.0	3.0	3.0	0.0	3.0	0.0
All red [s]	1.0	1.0	1.0	0.0	1.0	0.0
Split [s]	19	60	41	0	30	0
Vehicle Extension [s]	3.0	3.0	3.0	0.0	3.0	0.0
Walk [s]	0	5	5	0	5	0
Pedestrian Clearance [s]	0	10	10	0	21	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
Minimum Recall	No	No	No		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	C
C, Cycle Length [s]	90	90	90	90	90
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	15	56	37	37	26
g / C, Green / Cycle	0.17	0.62	0.41	0.41	0.29
(v / s)_i Volume / Saturation Flow Rate	0.11	0.44	0.19	0.20	0.17
s, saturation flow rate [veh/h]	1603	3204	1683	1562	1489
c, Capacity [veh/h]	267	1994	692	642	430
d1, Uniform Delay [s]	35.30	11.44	19.26	19.61	27.35
k, delay calibration	0.50	0.50	0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	13.59	2.12	2.21	2.73	5.63
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.69	0.70	0.46	0.50	0.58
d, Delay for Lane Group [s/veh]	48.90	13.56	21.46	22.35	32.98
Lane Group LOS	D	B	C	C	C
Critical Lane Group	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	4.79	9.08	5.17	5.32	5.15
50th-Percentile Queue Length [ft/ln]	119.66	226.92	129.31	133.10	128.69
95th-Percentile Queue Length [veh/ln]	8.37	14.02	8.90	9.11	8.87
95th-Percentile Queue Length [ft/ln]	209.37	350.45	222.55	227.70	221.71

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	48.90	13.56	21.80	22.35	32.98	32.98
Movement LOS	D	B	C	C	C	C
d_A, Approach Delay [s/veh]	17.65		21.90		32.98	
Approach LOS	B		C		C	
d_I, Intersection Delay [s/veh]	20.29					
Intersection LOS	C					
Intersection V/C	0.606					

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	36.45	0.00	0.00
l_p,int, Pedestrian LOS Score for Intersectio	2.669	0.000	0.000
Crosswalk LOS	B	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1244	822	578
d_b, Bicycle Delay [s]	6.43	15.64	22.78
l_b,int, Bicycle LOS Score for Intersection	2.871	2.086	1.972
Bicycle LOS	C	B	A

Sequence

Ring 1	1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 13000: Willow Road/Driveway A

Control Type:	Two-way stop	Delay (sec / veh):	0.0
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.014

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		Driveway A	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		Driveway A	
Base Volume Input [veh/h]	1424	0	0	901	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	-19	-2	-1	-7	0	-25
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	1405	0	0	894	0	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	351	0	0	224	0	0
Total Analysis Volume [veh/h]	1405	0	0	894	0	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	0.00	0.00	14.47
Movement LOS	A	A		A		B
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.00		0.00		14.47	
Approach LOS	A		A		B	
d_I, Intersection Delay [s/veh]	0.00					
Intersection LOS	A					

Intersection Level Of Service Report
Intersection 14000: Driveway B/O'Brien Drive

Control Type:	Two-way stop	Delay (sec / veh):	11.0
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.010

Intersection Setup

Name	Driveway B		O'Brien Drive		O'Brien Drive	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Driveway B		O'Brien Drive		O'Brien Drive	
Base Volume Input [veh/h]	0	0	0	227	265	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	6	20	2	-15	-98	2
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	6	20	2	212	167	2
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	5	1	53	42	1
Total Analysis Volume [veh/h]	6	20	2	212	167	2
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.02	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.98	9.26	7.56	0.00	0.00	0.00
Movement LOS	B	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.10	0.10	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	2.52	2.52	0.08	0.08	0.00	0.00
d_A, Approach Delay [s/veh]	9.66		0.07		0.00	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	0.65					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 15000: Driveway C/O'Brien Drive

Control Type:	Two-way stop	Delay (sec / veh):	0.0
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.003

Intersection Setup

Name	Driveway C		O'Brien Drive		O'Brien Drive	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Driveway C		O'Brien Drive		O'Brien Drive	
Base Volume Input [veh/h]	0	0	0	227	265	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	-22	-98	-15	6	2	-4
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	233	267	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	58	67	0
Total Analysis Volume [veh/h]	0	0	0	233	267	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	11.79	9.67	7.78	0.00	0.00	0.00
Movement LOS	B	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	10.73		0.00		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	0.00					
Intersection LOS	A					

1005 O'Brien Drive and 1320 Willow Road

Vistro File: P:\...\OBrien_Willow_AM_Revised_V3.vistro
Report File: P:\...\2040+P_AM_v3.pdf

Scenario 20 2040 + Project AM
3/14/2025

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1000	Bayfront Expy (SR 84)/Willow Rd (SR 114)	Signalized	HCM 7th Edition	WB Thru	0.767	83.2	F
2000	Willow Rd (SR 114)/Hamilton Ave	Signalized	HCM 7th Edition	SB Left	1.488	266.9	F
3000	Willow Rd (SR 114)/Ivy Dr	Signalized	HCM 7th Edition	NB Left	0.996	78.1	E
4000	Willow Rd (SR 114)/O'Brien Dr	Signalized	HCM 7th Edition	WB Left	0.949	70.1	E
5000	Willow Rd (SR 114) /Newbridge St	Signalized	HCM 7th Edition	SB Right	1.429	181.5	F
6000	Willow Rd/US-101 NB Ramps	Signalized	HCM 7th Edition	WB Left	0.854	8.7	A
7000	Willow Rd/US-101 SB Ramps	Signalized	HCM 7th Edition	EB Left	1.156	30.3	C
8000	O'Brien Drive/Kavanaugh Drive	All-way stop	HCM 7th Edition	NB Thru	1.667	258.0	F
9000	Bayfront Expy (SR 84) /University Ave (SR 109)	Signalized	HCM 7th Edition	NB Left	0.848	24.9	C
10000	University Avenue/Adams Drive	Two-way stop	HCM 7th Edition	EB Left	0.353	84.5	F
11000	University Ave/O'Brien Dr	Signalized	HCM 7th Edition	SB Right	1.125	153.6	F
12000	University Avenue/Kavanaugh Drive	Signalized	HCM 7th Edition	EB Left	0.726	31.4	C
13000	Willow Road/Driveway A	Two-way stop	HCM 7th Edition	WB Right	0.009	11.3	B
14000	Driveway B/O'Brien Drive	Two-way stop	HCM 7th Edition	SB Left	0.010	41.1	E
15000	Driveway C/O'Brien Drive	Two-way stop	HCM 7th Edition	SB Left	0.037	39.3	E

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1000: Bayfront Expy (SR 84)/Willow Rd (SR 114)

Control Type:	Signalized	Delay (sec / veh):	83.2
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.767

Intersection Setup

Name	Willow Road (SR 114)			Willow Road			Bayfront Expy (SR 84)			Bayfront Expy (SR 84)		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	3	0	1	0	0	0	2	0	1	2	0	1
Entry Pocket Length [ft]	265.00	100.00	200.00	100.00	100.00	100.00	530.00	100.00	630.00	1500.00	100.00	600.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			20.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			No			Yes			No		

Volumes

Name	Willow Road (SR 114)			Willow Road			Bayfront Expy (SR 84)			Bayfront Expy (SR 84)		
Base Volume Input [veh/h]	114	248	414	10	31	27	60	754	248	806	2459	41
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	-1	0	-1	0	0	0	0	0	-5	-3	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	16	0	0	106	0	0	0
Total Hourly Volume [veh/h]	113	248	413	10	31	11	60	754	137	803	2459	41
Peak Hour Factor	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	30	66	110	3	8	3	16	201	37	214	655	11
Total Analysis Volume [veh/h]	120	264	440	11	33	12	64	804	146	856	2622	44
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			2			3			0		
v_di, Inbound Pedestrian Volume crossing m	0			3			2			0		
v_co, Outbound Pedestrian Volume crossing	4			0			3			0		
v_ci, Inbound Pedestrian Volume crossing mi	3			0			4			0		
v_ab, Corner Pedestrian Volume [ped/h]	12			0			0			1		
Bicycle Volume [bicycles/h]	2			0			0			1		

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	180
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	17.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Protecte	Permiss	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	7	4	4	3	8	4	1	6	2	5	2	6
Auxiliary Signal Groups			4,5									
Lead / Lag	Lag	-	-	Lead	-	-	Lead	-	-	Lag	-	-
Minimum Green [s]	13	12	12	15	15	12	6	25	10	11	10	25
Maximum Green [s]	22	15	15	9	9	15	26	40	30	25	30	40
Amber [s]	3.6	3.9	3.9	3.6	3.6	3.9	3.6	5.0	5.0	3.6	5.0	5.0
All red [s]	0.0	0.5	0.5	1.5	1.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0
Split [s]	20	36	36	17	36	36	23	42	79	59	79	42
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Walk [s]	0	0	0	0	4	0	0	4	0	4	0	4
Pedestrian Clearance [s]	0	0	0	0	29	0	0	35	0	11	0	35
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	3.0	0.0	3.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	1.6	2.4	2.4	3.1	3.1	2.4	2.6	4.0	4.0	2.6	4.0	4.0
Minimum Recall	No	No	No	No	No		No	Yes		No	Yes	
Maximum Recall	No	No	No	No	No		No	No		No	No	
Pedestrian Recall	No	No	No	No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
C, Cycle Length [s]	180	180	180	180	180	180	180	180	180	180	180	180
L, Total Lost Time per Cycle [s]	3.60	4.40	4.40	5.10	5.10	5.10	4.60	6.00	6.00	4.60	6.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.60	2.40	0.00	3.10	3.10	3.10	2.60	4.00	4.00	2.60	4.00	4.00
g_i, Effective Green Time [s]	60	62	137	6	9	9	9	33	33	58	82	82
g / C, Green / Cycle	0.34	0.35	0.76	0.04	0.05	0.05	0.05	0.18	0.18	0.32	0.46	0.46
(v / s)_i Volume / Saturation Flow Rate	0.15	0.12	0.11	0.01	0.01	0.01	0.04	0.16	0.09	0.30	0.51	0.03
s, saturation flow rate [veh/h]	797	2249	4178	949	3560	1542	1547	5094	1589	2821	5094	1570
c, Capacity [veh/h]	268	778	3171	63	178	77	78	935	292	912	2326	717
d1, Uniform Delay [s]	46.75	43.60	5.86	86.71	81.98	81.84	84.67	71.22	66.05	59.15	48.90	27.33
k, delay calibration	0.50	0.50	0.50	0.11	0.11	0.11	0.11	0.11	0.11	0.49	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	5.36	1.18	0.09	1.31	0.50	0.93	18.66	2.45	1.33	17.92	58.70	0.04
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.45	0.34	0.14	0.17	0.19	0.16	0.82	0.86	0.50	0.94	1.13	0.06
d, Delay for Lane Group [s/veh]	52.10	44.79	5.95	88.02	82.48	82.77	103.32	73.67	67.37	77.07	107.60	27.36
Lane Group LOS	D	D	A	F	F	F	F	E	E	E	F	C
Critical Lane Group	Yes	No	No	No	Yes	No	Yes	No	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	4.62	4.52	1.46	0.54	0.76	0.56	1.69	12.28	6.21	21.27	47.27	1.11
50th-Percentile Queue Length [ft/ln]	115.53	113.04	36.42	13.47	19.07	14.12	42.26	307.10	155.15	531.82	1181.65	27.63
95th-Percentile Queue Length [veh/ln]	8.15	8.01	2.62	0.97	1.37	1.02	3.04	18.03	10.29	28.84	64.08	1.99
95th-Percentile Queue Length [ft/ln]	203.67	200.22	65.55	24.24	34.33	25.42	76.08	450.80	257.29	720.93	1602.05	49.73

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	52.10	44.79	5.95	88.02	82.48	82.77	103.32	73.67	67.37	77.07	107.60	27.36
Movement LOS	D	D	A	F	F	F	F	E	E	E	F	C
d_A, Approach Delay [s/veh]	25.11			83.63			74.64			99.18		
Approach LOS	C			F			E			F		
d_I, Intersection Delay [s/veh]	83.15											
Intersection LOS	F											
Intersection V/C	0.767											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	0.0	8.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	509.36	0.00	891.27	0.00
d_p, Pedestrian Delay [s]	82.18	0.00	82.18	0.00
l_p,int, Pedestrian LOS Score for Intersectio	3.108	0.000	3.358	0.000
Crosswalk LOS	C	F	C	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	351	310	367	811
d_b, Bicycle Delay [s]	61.24	64.26	60.02	31.82
l_b,int, Bicycle LOS Score for Intersection	2.239	1.619	2.176	3.497
Bicycle LOS	B	A	B	C

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 2000: Willow Rd (SR 114)/Hamilton Ave

Control Type:	Signalized	Delay (sec / veh):	266.9
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.488

Intersection Setup

Name	Willow Road (SR 114)			Willow Road (SR 114)			Hamilton Avenue			Hamilton Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			30.00			25.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Willow Road (SR 114)			Willow Road (SR 114)			Hamilton Avenue			Hamilton Avenue		
Base Volume Input [veh/h]	116	764	74	495	784	19	59	16	79	16	6	155
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	-2	0	0	-8	0	0	0	-1	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	116	762	74	495	776	19	59	16	78	16	6	155
Peak Hour Factor	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	30	195	19	127	199	5	15	4	20	4	2	40
Total Analysis Volume [veh/h]	119	781	76	507	795	19	60	16	80	16	6	159
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	6			57			5			57		
v_di, Inbound Pedestrian Volume crossing m	5			57			6			57		
v_co, Outbound Pedestrian Volume crossing	5			18			18			6		
v_ci, Inbound Pedestrian Volume crossing mi	6			18			18			5		
v_ab, Corner Pedestrian Volume [ped/h]	5			6			13			5		
Bicycle Volume [bicycles/h]	1			1			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	48
Active Pattern	Free Running
Coordination Type	*Free Running*
Actuation Type	*Fully actuated*
Offset [s]	8.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	1	6	2	5	2	6	4	8	4	8	4	8
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	Lead	-	-	Lag	-	-	Lag	-	-
Minimum Green [s]	4	10	10	4	10	10	4	4	4	4	4	4
Maximum Green [s]	21	30	30	16	30	30	26	26	26	26	26	26
Amber [s]	3.0	4.4	4.4	3.0	4.4	4.4	3.6	3.7	3.6	3.7	3.6	3.7
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	0	30	0	0	0	30	30	0	30	0	30	0
Vehicle Extension [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walk [s]	0	4	4	0	4	4	4	4	4	4	4	4
Pedestrian Clearance [s]	0	19	15	0	15	19	25	25	25	25	25	25
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	1.0	2.4	2.4	1.0	2.4	2.4	1.6	1.7	1.6	1.7	1.6	1.7
Minimum Recall	No	Yes		No	Yes			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	6.0	6.0	6.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	C	C
C, Cycle Length [s]	80	80	80	80	80	80	80	80
L, Total Lost Time per Cycle [s]	3.00	4.40	4.40	3.00	4.40	4.40	3.70	3.60
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.00
l2, Clearance Lost Time [s]	1.00	2.40	2.40	1.00	2.40	2.40	1.70	0.00
g_i, Effective Green Time [s]	16	30	30	16	30	30	23	23
g / C, Green / Cycle	0.20	0.37	0.37	0.20	0.37	0.37	0.29	0.29
(v / s)_i Volume / Saturation Flow Rate	0.15	0.52	0.52	0.54	0.42	0.42	0.26	0.19
s, saturation flow rate [veh/h]	797	837	805	937	984	972	610	956
c, Capacity [veh/h]	159	314	302	187	369	364	237	300
d1, Uniform Delay [s]	30.13	25.03	25.03	32.04	25.04	25.04	28.31	25.52
k, delay calibration	0.08	0.50	0.50	0.50	0.50	0.50	0.26	0.09
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	5.11	193.11	198.19	783.29	79.27	81.48	7.26	1.54
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.75	1.39	1.40	2.71	1.11	1.11	0.66	0.60
d, Delay for Lane Group [s/veh]	35.24	218.14	223.23	815.34	104.32	106.52	35.57	27.06
Lane Group LOS	D	F	F	F	F	F	D	C
Critical Lane Group	No	No	Yes	Yes	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	2.25	22.12	21.70	44.23	14.61	14.66	3.34	3.06
50th-Percentile Queue Length [ft/ln]	56.19	552.94	542.55	1105.82	365.31	366.45	83.59	76.42
95th-Percentile Queue Length [veh/ln]	4.05	35.66	35.17	72.13	22.27	22.39	6.02	5.50
95th-Percentile Queue Length [ft/ln]	101.15	891.61	879.18	1803.27	556.70	559.80	150.46	137.56

Movement, Approach, & Intersection Results

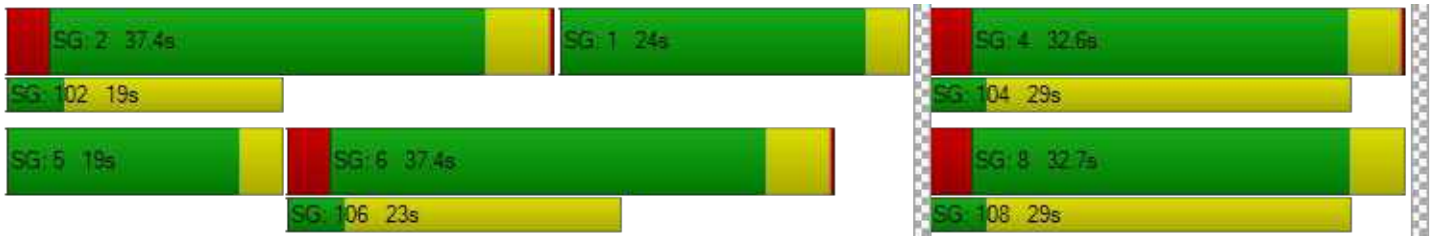
d_M, Delay for Movement [s/veh]	35.24	220.39	223.23	815.34	105.39	106.52	35.57	35.57	35.57	27.06	27.06	27.06
Movement LOS	D	F	F	F	F	F	D	D	D	C	C	C
d_A, Approach Delay [s/veh]	198.04			377.88			35.57			27.06		
Approach LOS	F			F			D			C		
d_I, Intersection Delay [s/veh]	266.86											
Intersection LOS	F											
Intersection V/C	1.488											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	553.74	63.74	227.82	691.23
d_p, Pedestrian Delay [s]	32.42	32.42	32.42	32.42
l_p,int, Pedestrian LOS Score for Intersectio	3.033	2.835	1.834	2.029
Crosswalk LOS	C	C	A	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	750	750	650	650
d_b, Bicycle Delay [s]	15.65	15.65	18.24	18.24
l_b,int, Bicycle LOS Score for Intersection	2.365	2.649	1.817	1.858
Bicycle LOS	B	B	A	A

Sequence

Ring 1	2	1	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 3000: Willow Rd (SR 114)/Ivy Dr

Control Type:	Signalized	Delay (sec / veh):	78.1
Analysis Method:	HCM 7th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.996

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		Ivy Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	1	0
Entry Pocket Length [ft]	85.00	100.00	100.00	100.00	135.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	1	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	100.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		Ivy Drive	
Base Volume Input [veh/h]	155	674	919	82	174	83
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	-2	-9	0	0	-1
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	155	672	910	82	174	82
Peak Hour Factor	0.9670	0.9670	0.9670	0.9670	0.9670	0.9670
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	40	174	235	21	45	21
Total Analysis Volume [veh/h]	160	695	941	85	180	85
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	4		9		3	
v_di, Inbound Pedestrian Volume crossing m	3		9		4	
v_co, Outbound Pedestrian Volume crossing	9		2		2	
v_ci, Inbound Pedestrian Volume crossing mi	9		2		2	
v_ab, Corner Pedestrian Volume [ped/h]	3		6		7	
Bicycle Volume [bicycles/h]	1		3		1	

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	160
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	90.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal Group	5	2	6	6	4	4
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	4	10	10	10	11	11
Maximum Green [s]	21	30	30	30	29	29
Amber [s]	3.0	4.4	4.4	4.4	3.0	3.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	17	125	107	107	35	35
Vehicle Extension [s]	2.0	2.0	2.0	2.0	2.0	2.0
Walk [s]	0	0	4	4	4	4
Pedestrian Clearance [s]	0	0	22	22	24	24
Delayed Vehicle Green [s]	0.0	0.0	3.0	3.0	3.0	3.0
Rest In Walk		No	No		No	
l1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0
l2, Clearance Lost Time [s]	1.0	2.4	2.4	2.4	1.0	1.0
Minimum Recall	No	Yes	Yes		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	L	R
C, Cycle Length [s]	160	160	160	160	160	160
L, Total Lost Time per Cycle [s]	3.00	4.40	4.40	4.40	3.00	3.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.00	2.40	2.40	2.40	1.00	1.00
g_i, Effective Green Time [s]	14	132	115	115	20	20
g / C, Green / Cycle	0.09	0.83	0.72	0.72	0.13	0.13
(v / s)_i Volume / Saturation Flow Rate	0.20	0.44	0.61	0.63	0.11	0.11
s, saturation flow rate [veh/h]	797	1593	837	811	1704	803
c, Capacity [veh/h]	70	1319	604	585	214	101
d1, Uniform Delay [s]	72.93	4.19	16.00	16.86	68.34	68.12
k, delay calibration	0.50	0.50	0.50	0.50	0.05	0.05
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	623.52	1.51	13.96	16.81	4.28	8.82
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	2.29	0.53	0.85	0.88	0.84	0.84
d, Delay for Lane Group [s/veh]	696.44	5.69	29.96	33.67	72.63	76.94
Lane Group LOS	F	A	C	C	E	E
Critical Lane Group	Yes	No	No	Yes	No	Yes
50th-Percentile Queue Length [veh/ln]	14.94	2.93	14.31	15.34	7.49	3.65
50th-Percentile Queue Length [ft/ln]	373.60	73.19	357.78	383.61	187.28	91.33
95th-Percentile Queue Length [veh/ln]	25.46	5.27	20.52	21.77	11.98	6.58
95th-Percentile Queue Length [ft/ln]	636.56	131.75	512.89	544.21	299.50	164.39

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	696.44	5.69	31.65	33.67	72.63	76.94
Movement LOS	F	A	C	C	E	E
d_A, Approach Delay [s/veh]	134.96		31.81		74.01	
Approach LOS	F		C		E	
d_I, Intersection Delay [s/veh]	78.12					
Intersection LOS	E					
Intersection V/C	0.996					

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	541.22	274.76	947.87
d_p, Pedestrian Delay [s]	72.17	72.17	72.17
l_p,int, Pedestrian LOS Score for Intersectio	2.818	2.778	2.284
Crosswalk LOS	C	C	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1508	1246	363
d_b, Bicycle Delay [s]	4.84	11.40	53.62
l_b,int, Bicycle LOS Score for Intersection	2.265	2.406	1.560
Bicycle LOS	B	B	A

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 4000: Willow Rd (SR 114)/O'Brien Dr

Control Type:	Signalized	Delay (sec / veh):	70.1
Analysis Method:	HCM 7th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.949

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		O'Brien Drive	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	1	0	1	0
Entry Pocket Length [ft]	100.00	60.00	100.00	100.00	50.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	No		No		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		O'Brien Drive	
Base Volume Input [veh/h]	773	949	94	1011	525	80
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	-4	-11	-10	0	-4	-1
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	769	938	84	1011	521	79
Peak Hour Factor	0.9510	0.9510	0.9510	0.9510	0.9510	0.9510
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	202	247	22	266	137	21
Total Analysis Volume [veh/h]	809	986	88	1063	548	83
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	13		0		14	
v_ci, Inbound Pedestrian Volume crossing mi	14		0		13	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	1		6		2	

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	160
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	93.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Permissive	Permissive	Protected	Permissive	Permissive	Permissive
Signal Group	2	2	1	6	4	8
Auxiliary Signal Groups						
Lead / Lag	-	-	Lead	-	Lead	-
Minimum Green [s]	10	10	5	10	8	0
Maximum Green [s]	35	35	21	35	21	0
Amber [s]	4.4	4.4	3.0	4.4	3.2	0.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	116	116	19	135	25	0
Vehicle Extension [s]	2.0	2.0	2.0	2.0	2.0	0.0
Walk [s]	4	4	0	0	0	0
Pedestrian Clearance [s]	17	17	0	0	0	0
Delayed Vehicle Green [s]	3.0	3.0	0.0	0.0	0.0	0.0
Rest In Walk	No			No	No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.4	2.4	1.0	2.4	1.2	0.0
Minimum Recall	Yes		No	Yes	No	
Maximum Recall	No		No	No	No	
Pedestrian Recall	No		No	No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	L	C	L	C
C, Cycle Length [s]	160	160	160	160	160	160
L, Total Lost Time per Cycle [s]	4.40	4.40	3.00	4.40	3.20	3.20
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.40	2.40	1.00	2.40	1.20	1.20
g_i, Effective Green Time [s]	118	118	10	131	22	22
g / C, Green / Cycle	0.74	0.74	0.06	0.82	0.14	0.14
(v / s)_i Volume / Saturation Flow Rate	0.51	0.65	0.05	0.67	0.20	0.20
s, saturation flow rate [veh/h]	1593	1528	1781	1593	1406	1731
c, Capacity [veh/h]	1174	1127	107	1300	192	236
d1, Uniform Delay [s]	11.22	14.54	74.28	8.13	69.03	69.03
k, delay calibration	0.50	0.50	0.04	0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	3.32	9.56	5.80	5.80	238.93	235.92
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.69	0.88	0.82	0.82	1.47	1.48
d, Delay for Lane Group [s/veh]	14.53	24.10	80.08	13.93	307.96	304.95
Lane Group LOS	B	C	F	B	F	F
Critical Lane Group	No	Yes	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	7.39	24.64	3.73	8.76	20.60	25.17
50th-Percentile Queue Length [ft/ln]	184.83	616.06	93.22	219.08	515.05	629.27
95th-Percentile Queue Length [veh/ln]	11.85	32.78	6.71	13.62	32.46	38.81
95th-Percentile Queue Length [ft/ln]	296.31	819.58	167.79	340.45	811.43	970.31

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	14.53	24.10	80.08	13.93	306.52	304.95
Movement LOS	B	C	F	B	F	F
d_A, Approach Delay [s/veh]	19.79		18.99		306.29	
Approach LOS	B		B		F	
d_I, Intersection Delay [s/veh]	70.07					
Intersection LOS	E					
Intersection V/C	0.949					

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	72.16
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	2.523
Crosswalk LOS	F	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1358	1633	273
d_b, Bicycle Delay [s]	8.24	2.70	59.71
l_b,int, Bicycle LOS Score for Intersection	3.040	2.509	2.601
Bicycle LOS	C	B	B

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 5000: Willow Rd (SR 114)/Newbridge St

Control Type:	Signalized	Delay (sec / veh):	181.5
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.429

Intersection Setup

Name	Willow Road (SR 114)			Willow Road (SR 114)			Newbridge Street			Newbridge Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	1	0	0	1	0	0	0
Entry Pocket Length [ft]	390.00	100.00	100.00	185.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	1	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	49.21	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			25.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Willow Road (SR 114)			Willow Road (SR 114)			Newbridge Street			Newbridge Street		
Base Volume Input [veh/h]	175	1208	448	66	1398	20	22	126	390	402	132	221
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	-13	0	0	-4	0	0	0	0	0	0	-1
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	44	0	0	34
Total Hourly Volume [veh/h]	175	1195	448	66	1394	20	22	126	346	402	132	186
Peak Hour Factor	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	47	324	121	18	378	5	6	34	94	109	36	50
Total Analysis Volume [veh/h]	190	1296	486	72	1512	22	24	137	375	436	143	202
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	2			2			3			3		
v_di, Inbound Pedestrian Volume crossing m	3			3			2			2		
v_co, Outbound Pedestrian Volume crossing	8			12			7			11		
v_ci, Inbound Pedestrian Volume crossing mi	7			11			8			12		
v_ab, Corner Pedestrian Volume [ped/h]	16			65			10			12		
Bicycle Volume [bicycles/h]	10			2			0			8		

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	160
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	97.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Split	Split	Split	Split	Split	Split
Signal Group	5	2	2	1	6	6	4	4	4	8	3	8
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lag	-	-	Lag	-	-	-	-	-
Minimum Green [s]	4	12	12	4	12	12	4	4	4	0	4	0
Maximum Green [s]	21	40	40	21	40	40	25	25	25	0	21	0
Amber [s]	3.0	4.4	4.4	3.0	4.4	4.4	3.6	3.6	3.6	0.0	3.0	0.0
All red [s]	0.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0
Split [s]	16	76	76	10	70	70	38	38	38	0	36	0
Vehicle Extension [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walk [s]	0	4	4	0	4	4	4	4	4	0	4	0
Pedestrian Clearance [s]	0	19	19	0	16	16	23	23	23	0	23	0
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	3.0	0.0	3.0	0.0
Rest In Walk		No			No			No			No	
l1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	0.0
l2, Clearance Lost Time [s]	1.0	3.4	3.4	1.0	3.4	3.4	2.6	2.6	2.6	0.0	1.0	0.0
Minimum Recall	No	Yes		No	Yes			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	L	C	R	L	C	R
C, Cycle Length [s]	160	160	160	160	160	160	160	160	160	160	160	160
L, Total Lost Time per Cycle [s]	3.00	5.40	5.40	3.00	5.40	5.40	4.60	4.60	4.60	3.00	3.00	3.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.00	3.40	3.40	1.00	3.40	3.40	2.60	2.60	2.60	1.00	1.00	1.00
g_i, Effective Green Time [s]	13	71	71	7	65	65	33	33	33	33	33	33
g / C, Green / Cycle	0.08	0.44	0.44	0.04	0.40	0.40	0.21	0.21	0.21	0.21	0.21	0.21
(v / s)_i Volume / Saturation Flow Rate	0.11	0.34	0.36	0.04	0.63	0.63	0.02	0.09	0.28	0.28	0.17	0.30
s, saturation flow rate [veh/h]	1781	3560	1575	1781	1593	829	1528	1604	1334	1547	837	673
c, Capacity [veh/h]	145	1568	694	78	642	334	320	337	280	319	172	139
d1, Uniform Delay [s]	73.50	38.07	39.04	76.23	47.77	47.77	50.75	54.62	62.86	63.52	60.82	62.65
k, delay calibration	0.29	0.50	0.50	0.04	0.50	0.50	0.04	0.04	0.50	0.19	0.32	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	166.77	3.84	10.12	15.48	264.48	272.04	0.04	0.29	175.03	173.01	24.62	240.41
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	1.31	0.78	0.81	0.92	1.57	1.57	0.07	0.41	1.34	1.37	0.83	1.46
d, Delay for Lane Group [s/veh]	240.27	41.91	49.16	91.71	312.24	319.81	50.79	54.92	237.89	236.53	85.45	303.06
Lane Group LOS	F	D	D	F	F	F	D	D	F	F	F	F
Critical Lane Group	Yes	No	No	No	No	Yes	No	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	12.61	20.75	20.88	3.32	36.40	38.60	0.79	4.86	24.97	14.17	6.77	14.85
50th-Percentile Queue Length [ft/ln]	315.22	518.67	521.90	83.11	910.00	965.11	19.74	121.48	624.23	354.16	169.18	371.31
95th-Percentile Queue Length [veh/ln]	20.16	28.22	28.37	5.98	58.70	61.98	1.42	8.47	38.13	23.30	11.03	24.74
95th-Percentile Queue Length [ft/ln]	504.09	705.42	709.23	149.60	1467.57	1549.55	35.54	211.85	953.25	582.44	275.84	618.42

Movement, Approach, & Intersection Results

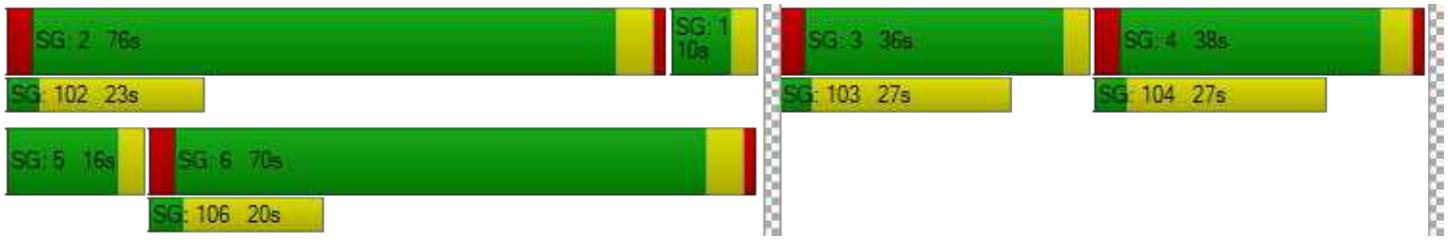
d_M, Delay for Movement [s/veh]	240.27	42.35	49.16	91.71	314.76	319.81	50.79	54.92	237.89	236.53	85.45	303.06
Movement LOS	F	D	D	F	F	F	D	D	F	F	F	F
d_A, Approach Delay [s/veh]	63.10			304.83			182.74			226.07		
Approach LOS	E			F			F			F		
d_I, Intersection Delay [s/veh]	181.51											
Intersection LOS	F											
Intersection V/C	1.429											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	24.82	132.22	931.23	0.00
d_p, Pedestrian Delay [s]	72.20	72.20	72.20	72.20
l_p,int, Pedestrian LOS Score for Intersectio	3.429	2.990	2.450	2.672
Crosswalk LOS	C	C	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	845	770	380	375
d_b, Bicycle Delay [s]	26.81	30.29	52.49	53.02
l_b,int, Bicycle LOS Score for Intersection	2.644	2.443	2.517	2.904
Bicycle LOS	B	B	B	C

Sequence

Ring 1	2	1	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 6000: Willow Rd/US-101 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	8.7
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.854

Intersection Setup

Name	Willow Road			Willow Road (SR 114)			US-101 NB Ramps			US-101 NB Ramps		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	1	0	0	0	1	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	200.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No						No		
Crosswalk	No			Yes			No			Yes		

Volumes

Name	Willow Road			Willow Road (SR 114)			US-101 NB Ramps			US-101 NB Ramps		
Base Volume Input [veh/h]	0	1458	493	0	1553	534	0	0	0	364	0	606
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	2.00	2.00	0.00	2.00	2.00	0.00	0.00	0.00	2.00	0.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	-4	0	0	0	-4	0	0	0	0	0	-9
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	1454	493	0	1553	530	0	0	0	364	0	597
Peak Hour Factor	1.0000	0.9580	0.9580	1.0000	0.9580	0.9580	1.0000	1.0000	1.0000	0.9580	1.0000	0.9580
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	379	129	0	405	138	0	0	0	95	0	156
Total Analysis Volume [veh/h]	0	1518	515	0	1621	553	0	0	0	380	0	623
Presence of On-Street Parking	No		No	No		No				No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			3			27		
Bicycle Volume [bicycles/h]	5			3			0			1		

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	80
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	38.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Overlap
Signal Group	0	2	5	0	6	1	0	0	0	8	0	8
Auxiliary Signal Groups												6,8
Lead / Lag	-	-	-	-	-	-	-	-	-	Lead	-	-
Minimum Green [s]	0	4	6	0	4	5	0	0	0	5	0	5
Maximum Green [s]	0	35	6	0	35	5	0	0	0	35	0	35
Amber [s]	0.0	4.1	3.0	0.0	4.1	3.0	0.0	0.0	0.0	3.0	0.0	3.0
All red [s]	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	2.0	0.0	2.0
Split [s]	0	45	9	0	45	9	0	0	0	35	0	35
Vehicle Extension [s]	0.0	3.0	3.0	0.0	3.0	3.0	0.0	0.0	0.0	3.0	0.0	3.0
Walk [s]	0	1	0	0	1	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	30	0	0	7	0	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	3.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No					No		
l1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	2.0	2.0	0.0	0.0	0.0	2.0	0.0	2.0
l2, Clearance Lost Time [s]	0.0	2.1	1.0	0.0	2.1	2.0	0.0	0.0	0.0	3.0	0.0	3.0
Minimum Recall		No			No					No		No
Maximum Recall		No			No					No		No
Pedestrian Recall		No			No					No		No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	C	R		L	R
C, Cycle Length [s]	80	80	80	80		80	80
L, Total Lost Time per Cycle [s]	4.10	4.10	4.10	4.10		5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00		0.00	0.00
l2, Clearance Lost Time [s]	2.10	2.10	2.10	2.10		3.00	0.00
g_i, Effective Green Time [s]	57	57	57	57		14	75
g / C, Green / Cycle	0.71	0.71	0.71	0.71		0.17	0.94
(v / s)_i Volume / Saturation Flow Rate	0.30	0.33	0.57	0.36		0.11	0.40
s, saturation flow rate [veh/h]	5094	1554	2828	1555		3459	1543
c, Capacity [veh/h]	3633	1108	2017	1109		598	1447
d1, Uniform Delay [s]	4.68	4.86	7.70	5.04		30.73	0.26
k, delay calibration	0.50	0.50	0.50	0.50		0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00		1.00	1.00
d2, Incremental Delay [s]	0.36	1.40	3.51	1.60		1.12	0.94
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00		0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00		1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00		1.00	1.00

Lane Group Results

X, volume / capacity	0.42	0.46	0.80	0.50		0.64	0.43
d, Delay for Lane Group [s/veh]	5.04	6.27	11.21	6.64		31.86	1.20
Lane Group LOS	A	A	B	A		C	A
Critical Lane Group	No	No	Yes	No		Yes	No
50th-Percentile Queue Length [veh/ln]	2.62	3.07	5.04	3.43		3.41	0.19
50th-Percentile Queue Length [ft/ln]	65.38	76.73	125.95	85.74		85.14	4.71
95th-Percentile Queue Length [veh/ln]	4.71	5.52	8.72	6.17		6.13	0.34
95th-Percentile Queue Length [ft/ln]	117.68	138.12	217.97	154.34		153.25	8.48

Movement, Approach, & Intersection Results

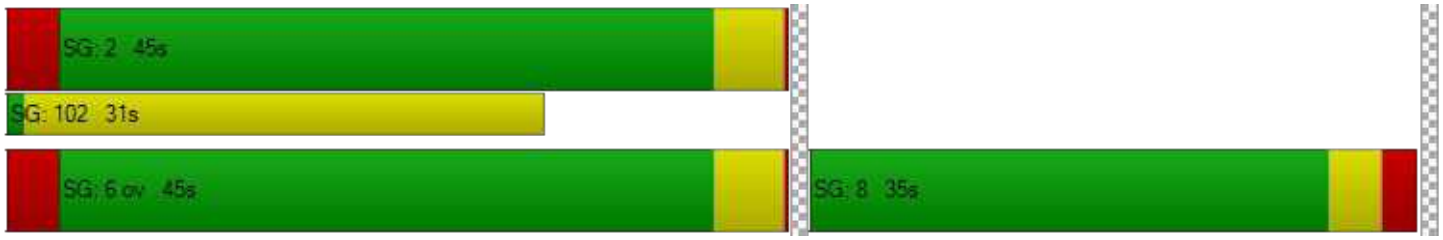
d_M, Delay for Movement [s/veh]	0.00	5.04	6.27	0.00	11.21	6.64	0.00	0.00	0.00	31.86	0.00	1.20
Movement LOS		A	A		B	A				C		A
d_A, Approach Delay [s/veh]	5.35			10.05			0.00			12.81		
Approach LOS	A			B			A			B		
d_I, Intersection Delay [s/veh]	8.75											
Intersection LOS	A											
Intersection V/C	0.854											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	30.0	0.0	5.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	15.62	0.00	35.15
l_p,int, Pedestrian LOS Score for Intersectio	0.000	3.162	0.000	2.596
Crosswalk LOS	F	C	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	948	948	0	750
d_b, Bicycle Delay [s]	11.10	11.09	40.00	15.63
l_b,int, Bicycle LOS Score for Intersection	2.678	2.755	4.132	1.560
Bicycle LOS	B	C	D	A

Sequence

Ring 1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 7000: Willow Rd/US-101 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	30.3
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.156

Intersection Setup

Name	Willow Road			Willow Road			US-101 SB Ramps			US-101 SB Ramps		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	0	1	0	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No					
Crosswalk	Yes			No			Yes			No		

Volumes

Name	Willow Road			Willow Road			US-101 SB Ramps			US-101 SB Ramps		
Base Volume Input [veh/h]	0	1070	646	0	1417	550	922	0	360	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	2.00	2.00	0.00	2.00	2.00	2.00	0.00	2.00	0.00	0.00	0.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	-2	0	0	0	0	-2	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	1068	646	0	1417	550	920	0	360	0	0	0
Peak Hour Factor	1.0000	0.9190	0.9190	1.0000	0.9190	0.9190	0.9190	1.0000	0.9190	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	291	176	0	385	150	250	0	98	0	0	0
Total Analysis Volume [veh/h]	0	1162	703	0	1542	598	1001	0	392	0	0	0
Presence of On-Street Parking	No		No	No		No	No		No			
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			29		
Bicycle Volume [bicycles/h]	9			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	80
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	54.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Overlap	Permiss	Permiss	Permiss
Signal Group	0	2	0	0	6	0	4	0	4	0	0	0
Auxiliary Signal Groups									2,4			
Lead / Lag	-	-	-	-	-	-	Lead	-	-	-	-	-
Minimum Green [s]	0	4	0	0	4	0	4	0	4	0	0	0
Maximum Green [s]	0	35	0	0	35	0	30	0	30	0	0	0
Amber [s]	0.0	4.1	0.0	0.0	4.1	0.0	3.0	0.0	3.0	0.0	0.0	0.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	2.0	0.0	0.0	0.0
Split [s]	0	55	0	0	55	0	25	0	25	0	0	0
Vehicle Extension [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	0.0	3.0	0.0	0.0	0.0
Walk [s]	0	1	0	0	1	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	7	0	0	32	0	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	3.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No		No					
l1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	0.0	2.0	0.0	0.0	0.0
l2, Clearance Lost Time [s]	0.0	2.1	0.0	0.0	2.1	0.0	3.0	0.0	3.0	0.0	0.0	0.0
Minimum Recall		No			No		No		No			
Maximum Recall		No			No		No		No			
Pedestrian Recall		No			No		No		No			
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	C	R	L	R	
C, Cycle Length [s]	80	80	80	80	80	80	
L, Total Lost Time per Cycle [s]	4.10	4.10	4.10	4.10	5.00	5.00	
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	
l2, Clearance Lost Time [s]	2.10	2.10	2.10	2.10	3.00	0.00	
g_i, Effective Green Time [s]	51	51	51	51	20	75	
g / C, Green / Cycle	0.64	0.64	0.64	0.64	0.25	0.94	
(v / s)_i Volume / Saturation Flow Rate	0.23	0.45	0.30	0.64	0.29	0.14	
s, saturation flow rate [veh/h]	5094	1549	5094	941	3459	2813	
c, Capacity [veh/h]	3235	984	3235	598	869	2637	
d1, Uniform Delay [s]	6.90	9.55	7.64	14.59	29.94	0.18	
k, delay calibration	0.50	0.50	0.50	0.50	0.11	0.50	
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	
d2, Incremental Delay [s]	0.31	4.43	0.51	36.94	71.87	0.12	
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	

Lane Group Results

X, volume / capacity	0.36	0.71	0.48	1.00	1.15	0.15	
d, Delay for Lane Group [s/veh]	7.21	13.97	8.14	51.53	101.81	0.30	
Lane Group LOS	A	B	A	F	F	A	
Critical Lane Group	No	No	No	Yes	Yes	No	
50th-Percentile Queue Length [veh/ln]	2.71	7.78	3.99	14.67	16.65	0.04	
50th-Percentile Queue Length [ft/ln]	67.69	194.42	99.80	366.65	416.30	1.09	
95th-Percentile Queue Length [veh/ln]	4.87	12.35	7.19	20.96	25.22	0.08	
95th-Percentile Queue Length [ft/ln]	121.85	308.75	179.64	523.89	630.44	1.96	

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	0.00	7.21	13.97	0.00	8.14	51.53	101.81	0.00	0.30	0.00	0.00	0.00
Movement LOS		A	B		A	F	F		A			
d_A, Approach Delay [s/veh]	9.76			20.27			73.24			0.00		
Approach LOS	A			C			E			A		
d_I, Intersection Delay [s/veh]	30.31											
Intersection LOS	C											
Intersection V/C	1.156											

Other Modes

g_Walk,mi, Effective Walk Time [s]	20.0	0.0	5.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	22.49	0.00	35.14	0.00
l_p,int, Pedestrian LOS Score for Intersectio	3.105	0.000	2.688	0.000
Crosswalk LOS	C	F	B	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1198	1198	500	0
d_b, Bicycle Delay [s]	6.46	6.43	22.49	39.99
l_b,int, Bicycle LOS Score for Intersection	2.585	2.737	1.560	4.132
Bicycle LOS	B	B	A	D

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 8000: O'Brien Drive/Kavanaugh Drive

Control Type:	All-way stop	Delay (sec / veh):	258.0
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.667

Intersection Setup

Name	O'Brien Drive		O'Brien Drive		Kavanaugh Drive	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	O'Brien Drive		O'Brien Drive		Kavanaugh Drive	
Base Volume Input [veh/h]	487	358	101	692	194	271
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	-3	-1	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	487	358	101	689	193	271
Peak Hour Factor	0.9340	0.9340	0.9340	0.9340	0.9340	0.9340
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	130	96	27	184	52	73
Total Analysis Volume [veh/h]	521	383	108	738	207	290
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	904	846	533
Degree of Utilization, x	1.67	1.63	0.93

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	51.75	47.39	11.58
95th-Percentile Queue Length [ft]	1293.63	1184.78	289.44
Approach Delay [s/veh]	325.33	308.39	49.86
Approach LOS	F	F	E
Intersection Delay [s/veh]	258.02		
Intersection LOS	F		

Intersection Level Of Service Report
Intersection 9000: Bayfront Expy (SR 84)/University Ave (SR 109)

Control Type:	Signalized	Delay (sec / veh):	24.9
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.848

Intersection Setup

Name	University Avenue (SR109)		Bayfront Expy (SR84)		Bayfront Expy (SR84)	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	2	0	1	2	0
Entry Pocket Length [ft]	100.00	250.00	100.00	100.00	830.00	100.00
No. of Lanes in Exit Pocket	0	2	0	0	0	0
Exit Pocket Length [ft]	0.00	74.61	0.00	0.00	0.00	0.00
Speed [mph]	35.00		55.00		55.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		No	

Volumes

Name	University Avenue (SR109)		Bayfront Expy (SR84)		Bayfront Expy (SR84)	
Base Volume Input [veh/h]	159	388	1030	81	1211	3493
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	-1	0	-3	-3
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	159	388	1029	81	1208	3490
Peak Hour Factor	0.9240	0.9240	0.9240	0.9240	0.9240	0.9240
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	43	105	278	22	327	944
Total Analysis Volume [veh/h]	172	420	1114	88	1307	3777
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	1		2		0	
v_ci, Inbound Pedestrian Volume crossing mi	2		1		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	4		6		5	

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	180
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	113.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	10.00

Phasing & Timing

Control Type	Permissive	Overlap	Permissive	Permissive	Protected	Permissive
Signal Group	4	4	6	2	5	2
Auxiliary Signal Groups		4,5				
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	12	12	10	10	11	10
Maximum Green [s]	15	15	60	60	30	60
Amber [s]	3.0	3.0	5.0	5.4	3.0	5.4
All red [s]	1.0	1.0	1.0	0.5	0.5	0.5
Split [s]	36	36	54	144	90	144
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	3.0
Walk [s]	4	4	4	0	0	0
Pedestrian Clearance [s]	29	29	35	0	0	0
Delayed Vehicle Green [s]	3.0	3.0	3.0	0.0	0.0	0.0
Rest In Walk	No		No			No
l1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0
l2, Clearance Lost Time [s]	2.0	2.0	4.0	3.9	1.5	3.9
Minimum Recall	No	No	No		No	No
Maximum Recall	No	No	No		No	No
Pedestrian Recall	No	No	No		No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	20.0	20.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	R	C	R	L	C
C, Cycle Length [s]	180	180	180	180	180	180
L, Total Lost Time per Cycle [s]	4.00	3.50	6.00	6.00	3.50	5.90
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	0.00	4.00	4.00	1.50	3.90
g_i, Effective Green Time [s]	14	91	79	79	73	156
g / C, Green / Cycle	0.08	0.51	0.44	0.44	0.41	0.87
(v / s)_i Volume / Saturation Flow Rate	0.05	0.10	0.22	0.06	0.38	0.74
s, saturation flow rate [veh/h]	3459	4203	5094	1562	3459	5094
c, Capacity [veh/h]	271	2132	2239	687	1408	4414
d1, Uniform Delay [s]	80.42	24.22	36.16	29.91	50.85	6.19
k, delay calibration	0.11	0.11	0.50	0.50	0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	2.46	0.04	0.79	0.38	3.25	2.33
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.63	0.20	0.50	0.13	0.93	0.86
d, Delay for Lane Group [s/veh]	82.88	24.27	36.96	30.30	54.11	8.52
Lane Group LOS	F	C	D	C	D	A
Critical Lane Group	No	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	3.98	3.35	11.57	2.31	27.55	13.81
50th-Percentile Queue Length [ft/ln]	99.53	83.81	289.20	57.72	688.65	345.21
95th-Percentile Queue Length [veh/ln]	7.17	6.03	17.15	4.16	36.15	19.90
95th-Percentile Queue Length [ft/ln]	179.16	150.85	428.65	103.89	903.84	497.57

Movement, Approach, & Intersection Results

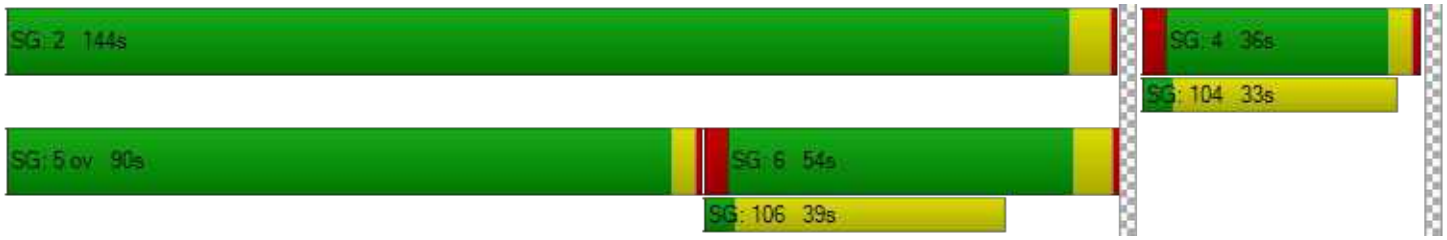
d_M, Delay for Movement [s/veh]	82.88	24.27	36.96	30.30	54.11	8.52
Movement LOS	F	C	D	C	D	A
d_A, Approach Delay [s/veh]	41.30		36.47		20.24	
Approach LOS	D		D		C	
d_I, Intersection Delay [s/veh]	24.89					
Intersection LOS	C					
Intersection V/C	0.848					

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	1341.40	0.00	0.00
d_p, Pedestrian Delay [s]	82.16	82.16	0.00
l_p,int, Pedestrian LOS Score for Intersectio	3.134	3.943	0.000
Crosswalk LOS	C	D	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	322	500	1535
d_b, Bicycle Delay [s]	63.45	50.76	4.88
l_b,int, Bicycle LOS Score for Intersection	1.670	2.221	4.356
Bicycle LOS	A	B	E

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 10000: University Avenue/Adams Drive

Control Type:	Two-way stop	Delay (sec / veh):	84.5
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.353

Intersection Setup

Name	University Avenue		University Avenue (SR109)		Adams Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		No	

Volumes

Name	University Avenue		University Avenue (SR109)		Adams Drive	
Base Volume Input [veh/h]	45	861	976	101	20	5
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	-3	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	45	861	973	101	20	5
Peak Hour Factor	0.8610	0.8610	0.8610	0.8610	0.8610	0.8610
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	13	250	283	29	6	1
Total Analysis Volume [veh/h]	52	1000	1130	117	23	6
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.09	0.01	0.01	0.00	0.35	0.01
d_M, Delay for Movement [s/veh]	12.17	0.00	0.00	0.00	84.52	37.70
Movement LOS	B	A	A	A	F	E
95th-Percentile Queue Length [veh/ln]	0.31	0.00	0.00	0.00	1.42	1.42
95th-Percentile Queue Length [ft/ln]	7.73	0.00	0.00	0.00	35.42	35.42
d_A, Approach Delay [s/veh]	0.60		0.00		74.84	
Approach LOS	A		A		F	
d_I, Intersection Delay [s/veh]	1.20					
Intersection LOS	F					

Intersection Level Of Service Report
Intersection 11000: University Ave/O'Brien Dr

Control Type:	Signalized	Delay (sec / veh):	153.6
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.125

Intersection Setup

Name	University Avenue		University Avenue		O'Brien Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	1	0
Entry Pocket Length [ft]	90.00	100.00	100.00	100.00	45.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00		25.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	No		No		No	

Volumes

Name	University Avenue		University Avenue		O'Brien Drive	
Base Volume Input [veh/h]	507	889	834	149	18	359
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	-3	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	507	889	834	146	18	359
Peak Hour Factor	0.8540	0.8540	0.8540	0.8540	0.8540	0.8540
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	148	260	244	43	5	105
Total Analysis Volume [veh/h]	594	1041	977	171	21	420
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		2	
Bicycle Volume [bicycles/h]	1		1		1	

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	130
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	48.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	11.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal Group	1	6	2	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	5	5	5	0	5	0
Maximum Green [s]	30	30	30	0	30	0
Amber [s]	3.0	3.0	3.0	0.0	3.0	0.0
All red [s]	1.0	1.0	1.0	0.0	1.0	0.0
Split [s]	67	76	9	0	54	0
Vehicle Extension [s]	3.0	3.0	3.0	0.0	3.0	0.0
Walk [s]	0	5	5	0	5	0
Pedestrian Clearance [s]	0	10	10	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
Minimum Recall	No	No	No		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	L	R
C, Cycle Length [s]	130	130	130	130	130	130
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	50	82	27	27	40	40
g / C, Green / Cycle	0.39	0.63	0.21	0.21	0.31	0.31
(v / s)_i Volume / Saturation Flow Rate	0.37	0.32	0.34	0.36	0.01	0.30
s, saturation flow rate [veh/h]	1603	3204	1683	1587	1603	1412
c, Capacity [veh/h]	620	2014	355	335	497	438
d1, Uniform Delay [s]	38.83	13.28	51.27	51.27	31.36	43.82
k, delay calibration	0.30	0.50	0.50	0.50	0.11	0.30
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	19.46	0.95	289.71	333.30	0.03	24.76
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.96	0.52	1.62	1.71	0.04	0.96
d, Delay for Lane Group [s/veh]	58.30	14.23	340.97	384.57	31.40	68.58
Lane Group LOS	E	B	F	F	C	E
Critical Lane Group	Yes	No	No	Yes	No	Yes
50th-Percentile Queue Length [veh/ln]	21.73	8.56	40.23	42.00	0.47	16.11
50th-Percentile Queue Length [ft/ln]	543.14	213.95	1005.81	1050.00	11.84	402.73
95th-Percentile Queue Length [veh/ln]	29.37	13.36	62.14	65.52	0.85	22.69
95th-Percentile Queue Length [ft/ln]	734.25	333.89	1553.62	1638.05	21.31	567.29

Movement, Approach, & Intersection Results

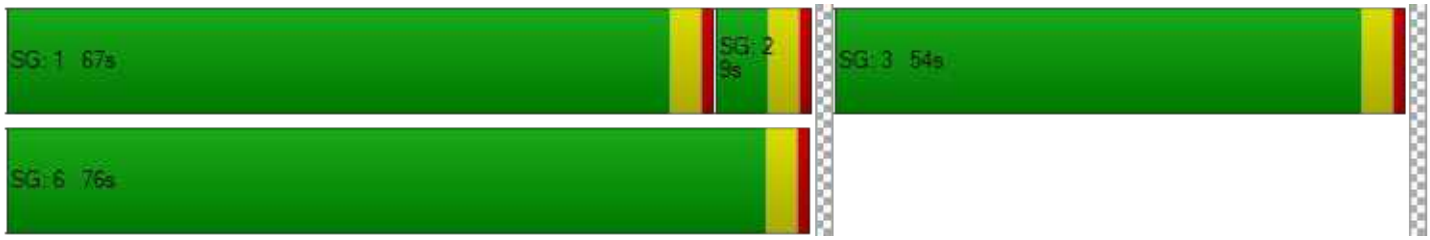
d_M, Delay for Movement [s/veh]	58.30	14.23	358.96	384.57	31.40	68.58
Movement LOS	E	B	F	F	C	E
d_A, Approach Delay [s/veh]	30.24		362.77		66.81	
Approach LOS	C		F		E	
d_I, Intersection Delay [s/veh]	153.65					
Intersection LOS	F					
Intersection V/C	1.125					

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	0.000
Crosswalk LOS	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1108	77	769
d_b, Bicycle Delay [s]	12.94	60.12	24.62
l_b,int, Bicycle LOS Score for Intersection	2.908	2.507	1.560
Bicycle LOS	C	B	A

Sequence

Ring 1	1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 12000: University Avenue/Kavanaugh Drive

Control Type:	Signalized	Delay (sec / veh):	31.4
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.726

Intersection Setup

Name	University Avenue		University Avenue		Kavanaugh Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		No		No	

Volumes

Name	University Avenue		University Avenue		Kavanaugh Drive	
Base Volume Input [veh/h]	152	999	869	45	254	130
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	-1	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	151	999	869	45	254	130
Peak Hour Factor	0.8550	0.8550	0.8550	0.8550	0.8550	0.8550
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	44	292	254	13	74	38
Total Analysis Volume [veh/h]	177	1168	1016	53	297	152
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		1		2	
Bicycle Volume [bicycles/h]	1		3		1	

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fixed time
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal Group	1	6	2	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	5	5	5	0	5	0
Maximum Green [s]	30	30	30	0	30	0
Amber [s]	3.0	3.0	3.0	0.0	3.0	0.0
All red [s]	1.0	1.0	1.0	0.0	1.0	0.0
Split [s]	19	60	41	0	30	0
Vehicle Extension [s]	3.0	3.0	3.0	0.0	3.0	0.0
Walk [s]	0	5	5	0	5	0
Pedestrian Clearance [s]	0	10	10	0	21	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
Minimum Recall	No	No	No		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	C
C, Cycle Length [s]	90	90	90	90	90
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	15	56	37	37	26
g / C, Green / Cycle	0.17	0.62	0.41	0.41	0.29
(v / s)_i Volume / Saturation Flow Rate	0.11	0.36	0.32	0.32	0.29
s, saturation flow rate [veh/h]	1603	3204	1683	1650	1540
c, Capacity [veh/h]	267	1994	692	678	445
d1, Uniform Delay [s]	35.13	10.11	22.87	23.09	32.00
k, delay calibration	0.50	0.50	0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	12.24	1.27	8.18	9.02	44.99
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.66	0.59	0.77	0.79	1.01
d, Delay for Lane Group [s/veh]	47.37	11.37	31.05	32.11	76.99
Lane Group LOS	D	B	C	C	F
Critical Lane Group	Yes	No	No	Yes	Yes
50th-Percentile Queue Length [veh/ln]	4.52	6.59	10.84	11.06	14.88
50th-Percentile Queue Length [ft/ln]	113.12	164.69	271.11	276.49	371.95
95th-Percentile Queue Length [veh/ln]	8.01	10.80	16.25	16.51	21.33
95th-Percentile Queue Length [ft/ln]	200.34	269.92	406.13	412.83	533.13

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	47.37	11.37	31.55	32.11	76.99	76.99
Movement LOS	D	B	C	C	E	E
d_A, Approach Delay [s/veh]	16.11		31.58		76.99	
Approach LOS	B		C		E	
d_I, Intersection Delay [s/veh]	31.43					
Intersection LOS	C					
Intersection V/C	0.726					

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	36.45	0.00	0.00
l_p,int, Pedestrian LOS Score for Intersectio	2.710	0.000	0.000
Crosswalk LOS	B	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1244	822	578
d_b, Bicycle Delay [s]	6.43	15.63	22.77
l_b,int, Bicycle LOS Score for Intersection	2.669	2.442	2.300
Bicycle LOS	B	B	B

Sequence

Ring 1	1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 13000: Willow Road/Driveway A

Control Type:	Two-way stop	Delay (sec / veh):	11.3
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.009

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		Driveway A	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		Driveway A	
Base Volume Input [veh/h]	840	18	0	1105	0	6
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	-1	-4	0	-10	0	-1
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	839	14	0	1095	0	5
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	210	4	0	274	0	1
Total Analysis Volume [veh/h]	839	14	0	1095	0	5
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.01	0.00	0.01
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	0.00	0.00	11.30
Movement LOS	A	A		A		B
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.03
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.00	0.66
d_A, Approach Delay [s/veh]	0.00		0.00		11.30	
Approach LOS	A		A		B	
d_I, Intersection Delay [s/veh]	0.03					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 14000: Driveway B/O'Brien Drive

Control Type:	Two-way stop	Delay (sec / veh):	41.1
Analysis Method:	HCM 7th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.010

Intersection Setup

Name	Driveway B		O'Brien Drive		O'Brien Drive	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Driveway B		O'Brien Drive		O'Brien Drive	
Base Volume Input [veh/h]	1	15	52	1000	562	2
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	-8	-13	-5	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	1	15	44	987	557	2
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	4	11	247	139	1
Total Analysis Volume [veh/h]	1	15	44	987	557	2
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.03	0.04	0.01	0.01	0.00
d_M, Delay for Movement [s/veh]	41.12	12.15	8.61	0.00	0.00	0.00
Movement LOS	E	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.12	0.12	0.08	0.08	0.00	0.00
95th-Percentile Queue Length [ft/ln]	2.98	2.98	1.88	1.88	0.00	0.00
d_A, Approach Delay [s/veh]	13.96		0.37		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	0.37					
Intersection LOS	E					

Intersection Level Of Service Report
Intersection 15000: Driveway C/O'Brien Drive

Control Type:	Two-way stop	Delay (sec / veh):	39.3
Analysis Method:	HCM 7th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.037

Intersection Setup

Name	Driveway C		O'Brien Drive		O'Brien Drive	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Driveway C		O'Brien Drive		O'Brien Drive	
Base Volume Input [veh/h]	4	8	58	961	523	24
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	-5	-13	0	0	-4
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	4	3	45	961	523	20
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	1	11	240	131	5
Total Analysis Volume [veh/h]	4	3	45	961	523	20
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.01	0.04	0.01	0.01	0.00
d_M, Delay for Movement [s/veh]	39.26	12.55	8.56	0.00	0.00	0.00
Movement LOS	E	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.13	0.13	0.08	0.08	0.00	0.00
95th-Percentile Queue Length [ft/ln]	3.31	3.31	1.92	1.92	0.00	0.00
d_A, Approach Delay [s/veh]	27.82		0.38		0.00	
Approach LOS	D		A		A	
d_I, Intersection Delay [s/veh]	0.37					
Intersection LOS	E					

1005 O'Brien Drive and 1320 Willow Road

Vistro File: P:\...\OBrien_Willow_PM_Revised_V3.vistro
Report File: P:\...\2040+P_PM_v3.pdf

Scenario 20 2040+ Project PM
3/18/2025

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1000	Bayfront Expy (SR 84)/Willow Rd (SR 114)	Signalized	HCM 7th Edition	EB Thru	1.229	524.2	F
2000	Willow Rd (SR 114)/Hamilton Ave	Signalized	HCM 7th Edition	SB Left	1.849	429.4	F
3000	Willow Rd (SR 114)/Ivy Dr	Signalized	HCM 7th Edition	NB Left	1.047	59.9	E
4000	Willow Rd (SR 114)/O'Brien Dr	Signalized	HCM 7th Edition	WB Right	1.927	447.9	F
5000	Willow Rd (SR 114) /Newbridge St	Signalized	HCM 7th Edition	SB Right	1.227	199.1	F
6000	Willow Rd/US-101 NB Ramps	Signalized	HCM 7th Edition	WB Left	0.599	8.7	A
7000	Willow Rd/US-101 SB Ramps	Signalized	HCM 7th Edition	SB Right	1.431	46.9	D
8000	O'Brien Drive/Kavanaugh Drive	All-way stop	HCM 7th Edition	SB Thru	1.176	80.6	F
9000	Bayfront Expy (SR 84) /University Ave (SR 109)	Signalized	HCM 7th Edition	NB Right	0.961	93.5	F
10000	University Avenue/Adams Drive	Two-way stop	HCM 7th Edition	EB Left	0.393	37.6	E
11000	University Ave/O'Brien Dr	Signalized	HCM 7th Edition	EB Right	0.754	32.0	C
12000	University Avenue/Kavanaugh Drive	Signalized	HCM 7th Edition	NB Left	0.615	20.5	C
13000	Willow Road/Driveway A	Two-way stop	HCM 7th Edition	WB Right	0.056	15.6	C
14000	Driveway B/O'Brien Drive	Two-way stop	HCM 7th Edition	SB Left	0.021	26.3	D
15000	Driveway C/O'Brien Drive	Two-way stop	HCM 7th Edition	SB Left	0.065	26.1	D

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1000: Bayfront Expy (SR 84)/Willow Rd (SR 114)

Control Type:	Signalized	Delay (sec / veh):	524.2
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.229

Intersection Setup

Name	Willow Road (SR 114)			Willow Road			Ba Ex			Ba Ex		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	3	0	1	0	0	0	2	0	1	1	0	1
Entry Pocket Length [ft]	265.00	100.00	200.00	100.00	100.00	100.00	530.00	100.00	630.00	1500.00	100.00	600.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			20.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			No			Yes			No		

Volumes

Name	Willow Road (SR 114)			Willow Road			Ba Ex			Ba Ex		
Base Volume Input [veh/h]	116	27	1399	49	194	82	32	2089	490	402	977	6
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	-5	0	-4	0	0	0	0	0	-1	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	70	0	0	45	0	0	1
Total Hourly Volume [veh/h]	111	27	1395	49	194	12	32	2089	444	402	977	5
Peak Hour Factor	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610	0.9610
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	29	7	363	13	50	3	8	543	116	105	254	1
Total Analysis Volume [veh/h]	116	28	1452	51	202	12	33	2174	462	418	1017	5
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			11			11			0		
v_di, Inbound Pedestrian Volume crossing m	0			11			11			0		
v_co, Outbound Pedestrian Volume crossing	8			0			8			0		
v_ci, Inbound Pedestrian Volume crossing mi	8			0			8			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	1			2			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	200
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	120.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Protecte	Permiss	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	7	4	4	3	8	4	1	6	2	5	2	6
Auxiliary Signal Groups			4,5									
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	13	12	12	15	15	12	6	25	10	11	10	25
Maximum Green [s]	22	15	15	9	9	15	26	40	30	25	30	40
Amber [s]	3.6	3.9	3.9	3.6	3.6	3.9	3.6	5.0	5.0	3.6	5.0	5.0
All red [s]	0.0	0.5	0.5	1.5	1.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0
Split [s]	18	27	27	30	39	27	17	82	126	61	126	82
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Walk [s]	0	0	0	0	4	0	0	4	0	4	0	4
Pedestrian Clearance [s]	0	0	0	0	29	0	0	35	0	11	0	35
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	3.0	0.0	3.0
Rest In Walk		No			No			No			No	
l1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
l2, Clearance Lost Time [s]	1.6	2.4	2.4	3.1	3.1	2.4	2.6	4.0	4.0	2.6	4.0	4.0
Minimum Recall	No	No	No	No	No		No	Yes		No	Yes	
Maximum Recall	No	No	No	No	No		No	No		No	No	
Pedestrian Recall	No	No	No	No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
C, Cycle Length [s]	200	200	200	200	200	200	200	200	200	200	200	200
L, Total Lost Time per Cycle [s]	3.60	4.40	4.60	5.10	5.10	5.10	4.60	6.00	6.00	4.60	6.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.60	2.40	0.00	3.10	3.10	3.10	2.60	4.00	4.00	2.60	4.00	4.00
g_i, Effective Green Time [s]	15	101	130	14	101	101	5	40	40	25	60	60
g / C, Green / Cycle	0.07	0.50	0.65	0.07	0.50	0.50	0.03	0.20	0.20	0.13	0.30	0.30
(v / s)_i Volume / Saturation Flow Rate	0.07	0.02	0.35	0.03	0.13	0.01	0.02	0.70	0.48	0.12	0.20	0.00
s, saturation flow rate [veh/h]	1781	1593	4151	1781	1593	1549	2102	3097	966	3459	5094	1589
c, Capacity [veh/h]	133	802	2701	126	802	780	53	620	193	433	1528	477
d1, Uniform Delay [s]	91.52	25.06	18.58	88.86	28.21	24.82	96.42	79.91	79.91	86.99	61.18	49.12
k, delay calibration	0.15	0.50	0.50	0.11	0.50	0.11	0.11	0.50	0.50	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	20.36	0.08	0.77	2.10	0.75	0.01	11.12	1132.33	640.48	13.55	0.51	0.01
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.87	0.03	0.54	0.41	0.25	0.02	0.62	3.51	2.39	0.97	0.67	0.01
d, Delay for Lane Group [s/veh]	111.88	25.14	19.35	90.97	28.96	24.82	107.54	1212.24	720.40	100.54	61.69	49.13
Lane Group LOS	F	C	B	F	C	C	F	F	F	F	E	D
Critical Lane Group	No	No	Yes	Yes	No	No	No	Yes	No	Yes	No	No
50th-Percentile Queue Length [veh/ln]	6.71	0.35	12.04	2.66	2.99	0.31	0.94	75.72	44.46	11.68	15.32	0.18
50th-Percentile Queue Length [ft/ln]	167.82	8.85	300.93	66.39	74.78	7.64	23.53	1892.96	1111.40	291.98	382.94	4.54
95th-Percentile Queue Length [veh/ln]	10.96	0.64	17.73	4.78	5.38	0.55	1.69	119.87	71.95	17.28	21.74	0.33
95th-Percentile Queue Length [ft/ln]	274.05	15.94	443.18	119.50	134.60	13.75	42.36	2996.80	1798.86	432.09	543.41	8.18

Movement, Approach, & Intersection Results

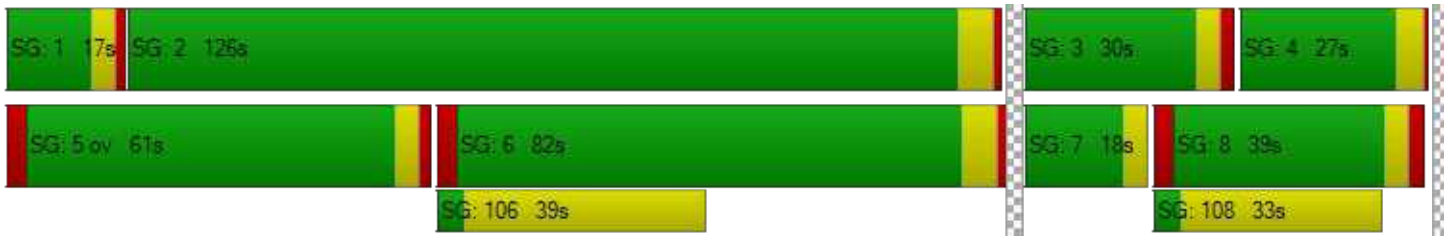
d_M, Delay for Movement [s/veh]	111.88	25.14	19.35	90.97	28.96	24.82	107.54	1212.24	720.40	100.54	61.69	49.13
Movement LOS	F	C	B	F	C	C	F	F	F	F	E	D
d_A, Approach Delay [s/veh]	26.18			40.71			1113.44			72.92		
Approach LOS	C			D			F			E		
d_I, Intersection Delay [s/veh]	524.18											
Intersection LOS	F											
Intersection V/C	1.229											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	0.0	8.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	38.34	0.00	181.09	0.00
d_p, Pedestrian Delay [s]	92.12	0.00	92.12	0.00
l_p,int, Pedestrian LOS Score for Intersectio	3.171	0.000	3.277	0.000
Crosswalk LOS	C	F	C	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	226	309	730	1201
d_b, Bicycle Delay [s]	78.67	71.52	40.28	15.97
l_b,int, Bicycle LOS Score for Intersection	2.876	1.836	3.052	2.352
Bicycle LOS	C	A	C	B

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 2000: Willow Rd (SR 114)/Hamilton Ave

Control Type:	Signalized	Delay (sec / veh):	429.4
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.849

Intersection Setup

Name	Willow Road (SR 114)			Willow Road (SR 114)			Hamilton Avenue			Main Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			30.00			25.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Willow Road (SR 114)			Willow Road (SR 114)			Hamilton Avenue			Main Street		
Base Volume Input [veh/h]	144	1307	21	330	709	104	62	9	70	69	16	454
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	-1	-9	0	0	-2	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	143	1298	21	330	707	104	62	9	70	69	16	454
Peak Hour Factor	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570	0.9570
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	37	339	5	86	185	27	16	2	18	18	4	119
Total Analysis Volume [veh/h]	149	1356	22	345	739	109	65	9	73	72	17	474
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	1			13			5			1		
v_di, Inbound Pedestrian Volume crossing m	5			1			1			13		
v_co, Outbound Pedestrian Volume crossing	3			5			13			1		
v_ci, Inbound Pedestrian Volume crossing mi	1			13			5			3		
v_ab, Corner Pedestrian Volume [ped/h]	3			13			5			1		
Bicycle Volume [bicycles/h]	1			1			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	20.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	1	6	2	5	2	6	4	8	4	8	4	8
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	Lead	-	-	Lag	-	-	Lag	-	-
Minimum Green [s]	4	10	10	4	10	10	4	4	4	4	4	4
Maximum Green [s]	21	30	30	16	30	30	26	26	26	26	26	26
Amber [s]	3.0	4.4	4.4	3.0	4.4	4.4	3.6	3.7	3.6	3.7	3.6	3.7
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	24	92	85	17	85	92	36	36	36	36	36	36
Vehicle Extension [s]	3.0	4.0	4.0	2.0	4.0	4.0	2.0	3.0	2.0	3.0	2.0	3.0
Walk [s]	0	4	4	0	4	4	4	4	4	4	4	4
Pedestrian Clearance [s]	0	19	15	0	15	19	25	25	25	25	25	25
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	1.0	2.4	2.4	1.0	2.4	2.4	1.6	1.7	1.6	1.7	1.6	1.7
Minimum Recall	No	Yes		No	Yes			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	6.0	6.0	6.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	C	C
C, Cycle Length [s]	145	145	145	145	145	145	145	145
L, Total Lost Time per Cycle [s]	3.00	4.40	4.40	3.00	4.40	4.40	3.70	3.60
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.00
l2, Clearance Lost Time [s]	1.00	2.40	2.40	1.00	2.40	2.40	1.70	0.00
g_i, Effective Green Time [s]	14	88	88	14	87	87	32	32
g / C, Green / Cycle	0.10	0.60	0.60	0.10	0.60	0.60	0.22	0.22
(v / s)_i Volume / Saturation Flow Rate	0.08	0.83	0.83	0.43	0.52	0.52	0.45	0.72
s, saturation flow rate [veh/h]	1781	837	831	797	837	791	329	782
c, Capacity [veh/h]	172	505	502	77	505	478	109	192
d1, Uniform Delay [s]	64.48	28.68	28.68	65.38	23.53	23.87	60.51	55.95
k, delay calibration	0.15	0.50	0.50	0.50	0.50	0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	15.86	177.29	178.75	1593.47	16.92	18.85	204.95	884.56
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.87	1.37	1.37	4.48	0.86	0.87	1.35	2.93
d, Delay for Lane Group [s/veh]	80.34	205.97	207.43	1658.85	40.45	42.72	265.46	940.51
Lane Group LOS	F	F	F	F	D	D	F	F
Critical Lane Group	No	No	Yes	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	6.13	40.95	40.90	36.98	14.10	13.90	10.31	54.40
50th-Percentile Queue Length [ft/ln]	153.15	1023.64	1022.43	924.44	352.59	347.40	257.87	1360.10
95th-Percentile Queue Length [veh/ln]	10.18	63.61	63.61	58.49	20.26	20.01	17.71	88.45
95th-Percentile Queue Length [ft/ln]	254.62	1590.24	1590.33	1462.36	506.56	500.24	442.67	2211.21

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	80.34	206.68	207.43	1658.85	41.39	42.72	265.46	265.46	265.46	940.51	940.51	940.51
Movement LOS	F	F	F	F	D	D	F	F	F	F	F	F
d_A, Approach Delay [s/veh]	194.37			509.26			265.46			940.51		
Approach LOS	F			F			F			F		
d_I, Intersection Delay [s/veh]	429.41											
Intersection LOS	F											
Intersection V/C	1.849											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	234.30	0.00	108.28	1034.60
d_p, Pedestrian Delay [s]	64.67	64.67	64.67	64.67
l_p,int, Pedestrian LOS Score for Intersectio	3.272	3.019	1.911	2.219
Crosswalk LOS	C	C	A	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1168	1071	404	406
d_b, Bicycle Delay [s]	12.55	15.63	46.11	46.03
l_b,int, Bicycle LOS Score for Intersection	2.819	2.544	1.802	2.489
Bicycle LOS	C	B	A	B

Sequence

Ring 1	2	1	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 3000: Willow Rd (SR 114)/Ivy Dr

Control Type:	Signalized	Delay (sec / veh):	59.9
Analysis Method:	HCM 7th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.047

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		Ivy Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	1
Entry Pocket Length [ft]	85.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	1	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	100.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		Ivy Drive	
Base Volume Input [veh/h]	133	1381	801	281	64	79
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	-1	-10	-2	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	132	1371	799	281	64	79
Peak Hour Factor	0.9670	0.9670	0.9670	0.9670	0.9670	0.9670
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	34	354	207	73	17	20
Total Analysis Volume [veh/h]	137	1418	826	291	66	82
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	3		7		2	
v_di, Inbound Pedestrian Volume crossing m	2		6		3	
v_co, Outbound Pedestrian Volume crossing	6		3		3	
v_ci, Inbound Pedestrian Volume crossing mi	7		3		3	
v_ab, Corner Pedestrian Volume [ped/h]	9		10		5	
Bicycle Volume [bicycles/h]	0		4		1	

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	10.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal Group	5	2	6	6	4	4
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	4	10	10	10	11	11
Maximum Green [s]	21	30	30	30	28	28
Amber [s]	3.0	4.4	4.4	4.4	3.0	3.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	22	111	89	89	34	34
Vehicle Extension [s]	2.0	2.0	2.0	2.0	2.0	2.0
Walk [s]	0	0	4	4	4	4
Pedestrian Clearance [s]	0	0	22	22	24	24
Delayed Vehicle Green [s]	0.0	0.0	3.0	3.0	3.0	3.0
Rest In Walk		No	No		No	
l1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0
l2, Clearance Lost Time [s]	1.0	2.4	2.4	2.4	1.0	1.0
Minimum Recall	No	Yes	Yes		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	L	R
C, Cycle Length [s]	145	145	145	145	145	145
L, Total Lost Time per Cycle [s]	3.00	4.40	4.40	4.40	3.00	3.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.00	2.40	2.40	2.40	1.00	1.00
g_i, Effective Green Time [s]	17	122	101	101	16	16
g / C, Green / Cycle	0.12	0.84	0.70	0.70	0.11	0.11
(v / s)_i Volume / Saturation Flow Rate	0.11	0.89	0.67	0.74	0.07	0.09
s, saturation flow rate [veh/h]	1265	1593	837	759	995	895
c, Capacity [veh/h]	152	1336	584	530	110	99
d1, Uniform Delay [s]	62.93	11.69	19.87	21.87	61.42	62.96
k, delay calibration	0.24	0.50	0.50	0.50	0.04	0.04
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	30.68	42.75	27.91	54.00	1.97	6.60
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.90	1.06	0.96	1.05	0.60	0.83
d, Delay for Lane Group [s/veh]	93.61	54.44	47.78	75.87	63.39	69.56
Lane Group LOS	F	F	D	F	E	E
Critical Lane Group	No	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	6.22	21.03	19.36	23.45	2.39	3.15
50th-Percentile Queue Length [ft/ln]	155.58	525.63	484.09	586.26	59.70	78.64
95th-Percentile Queue Length [veh/ln]	10.31	30.10	26.58	32.83	4.30	5.66
95th-Percentile Queue Length [ft/ln]	257.85	752.44	664.50	820.64	107.46	141.55

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	93.61	54.44	56.88	75.87	63.39	69.56
Movement LOS	F	F	E	E	E	E
d_A, Approach Delay [s/veh]	57.89		61.82		66.80	
Approach LOS	E		E		E	
d_I, Intersection Delay [s/veh]	59.92					
Intersection LOS	E					
Intersection V/C	1.047					

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	869.04	420.42	244.25
d_p, Pedestrian Delay [s]	64.69	64.69	64.69
l_p,int, Pedestrian LOS Score for Intersectio	2.965	3.001	2.296
Crosswalk LOS	C	C	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1471	1126	386
d_b, Bicycle Delay [s]	5.07	13.87	47.20
l_b,int, Bicycle LOS Score for Intersection	2.842	2.481	1.560
Bicycle LOS	C	B	A

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 4000: Willow Rd (SR 114)/O'Brien Dr

Control Type:	Signalized	Delay (sec / veh):	447.9
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.927

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		O'Brien Drive	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	1	0	1	0
Entry Pocket Length [ft]	100.00	60.00	100.00	100.00	50.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	No		No		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		O'Brien Drive	
Base Volume Input [veh/h]	1407	420	68	873	705	77
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	-1	-2	-1	0	-14	-5
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	1406	418	67	873	691	72
Peak Hour Factor	0.9860	0.9860	0.9860	0.9860	0.9860	0.9860
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	356	106	17	221	175	18
Total Analysis Volume [veh/h]	1426	424	68	885	701	73
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	5		0		5	
v_ci, Inbound Pedestrian Volume crossing mi	5		0		5	
v_ab, Corner Pedestrian Volume [ped/h]	3		0		13	
Bicycle Volume [bicycles/h]	2		0		4	

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	10.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Permissive	Permissive	Protected	Permissive	Permissive	Permissive
Signal Group	2	2	1	6	4	8
Auxiliary Signal Groups						
Lead / Lag	-	-	Lead	-	Lead	-
Minimum Green [s]	10	10	5	10	8	0
Maximum Green [s]	35	35	21	35	21	0
Amber [s]	4.4	4.4	3.0	4.4	3.2	0.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	105	105	15	120	25	0
Vehicle Extension [s]	2.0	2.0	2.0	2.0	2.0	0.0
Walk [s]	4	4	0	0	0	0
Pedestrian Clearance [s]	17	17	0	0	0	0
Delayed Vehicle Green [s]	3.0	3.0	0.0	0.0	0.0	0.0
Rest In Walk	No			No	No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.4	2.4	1.0	2.4	1.2	0.0
Minimum Recall	Yes		No	Yes	No	
Maximum Recall	No		No	No	No	
Pedestrian Recall	No		No	No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	L	C	L	C
C, Cycle Length [s]	145	145	145	145	145	145
L, Total Lost Time per Cycle [s]	4.40	4.40	3.00	4.40	3.20	3.20
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.40	2.40	1.00	2.40	1.20	1.20
g_i, Effective Green Time [s]	101	101	12	116	22	22
g / C, Green / Cycle	0.69	0.69	0.08	0.80	0.15	0.15
(v / s)_i Volume / Saturation Flow Rate	1.09	0.76	0.11	0.68	0.60	0.61
s, saturation flow rate [veh/h]	1302	561	647	1293	647	632
c, Capacity [veh/h]	903	389	54	1031	97	95
d1, Uniform Delay [s]	22.21	20.88	66.44	9.45	61.54	61.54
k, delay calibration	0.50	0.50	0.22	0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	265.86	71.99	169.46	9.26	1377.40	1391.64
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	1.58	1.09	1.27	0.86	4.01	4.04
d, Delay for Lane Group [s/veh]	288.07	92.87	235.90	18.71	1438.94	1453.19
Lane Group LOS	F	F	F	B	F	F
Critical Lane Group	Yes	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	46.60	18.51	4.49	8.10	40.82	40.28
50th-Percentile Queue Length [ft/ln]	1165.05	462.86	112.25	202.44	1020.44	1007.01
95th-Percentile Queue Length [veh/ln]	76.94	27.40	8.08	12.76	66.02	65.22
95th-Percentile Queue Length [ft/ln]	1923.42	684.89	202.05	319.10	1650.45	1630.51

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	288.07	92.87	235.90	18.71	1445.27	1453.19
Movement LOS	F	F	F	B	F	F
d_A, Approach Delay [s/veh]	243.33		34.21		1446.01	
Approach LOS	F		C		F	
d_I, Intersection Delay [s/veh]	447.85					
Intersection LOS	F					
Intersection V/C	1.927					

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	64.69
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	2.376
Crosswalk LOS	F	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1347	1595	301
d_b, Bicycle Delay [s]	7.74	2.97	52.42
l_b,int, Bicycle LOS Score for Intersection	3.086	2.346	2.837
Bicycle LOS	C	B	C

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 5000: Willow Rd (SR 114)/Newbridge St

Control Type:	Signalized	Delay (sec / veh):	199.1
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.227

Intersection Setup

Name	Willow Road (SR 114)			Willow Road (SR 114)			Newbridge Street			Newbridge Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	1	0	0	1	0	0	0
Entry Pocket Length [ft]	390.00	100.00	100.00	185.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	1	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	49.21	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			25.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Willow Road (SR 114)			Willow Road (SR 114)			Newbridge Street			Newbridge Street		
Base Volume Input [veh/h]	322	1429	522	93	1222	17	44	177	526	487	178	55
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	-3	0	-1	-13	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	175	0	0	45
Total Hourly Volume [veh/h]	322	1426	522	92	1209	17	44	177	351	487	178	10
Peak Hour Factor	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	86	379	139	24	322	5	12	47	93	130	47	3
Total Analysis Volume [veh/h]	343	1517	555	98	1286	18	47	188	373	518	189	11
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	3			7			7			3		
v_di, Inbound Pedestrian Volume crossing m	3			7			7			3		
v_co, Outbound Pedestrian Volume crossing	11			20			10			19		
v_ci, Inbound Pedestrian Volume crossing mi	10			19			11			20		
v_ab, Corner Pedestrian Volume [ped/h]	31			48			41			8		
Bicycle Volume [bicycles/h]	5			0			3			1		

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	140.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Split	Split	Split	Split	Split	Split
Signal Group	5	2	2	1	6	6	4	4	4	8	3	8
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lag	-	-	Lag	-	-	-	-	-
Minimum Green [s]	4	12	12	4	12	12	4	4	4	0	4	0
Maximum Green [s]	21	40	40	21	40	40	25	25	25	0	21	0
Amber [s]	3.0	4.4	4.4	3.0	4.4	4.4	3.6	3.6	3.6	0.0	3.0	0.0
All red [s]	0.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0
Split [s]	34	66	66	19	51	51	30	30	30	0	30	0
Vehicle Extension [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walk [s]	0	4	4	0	4	4	4	4	4	0	4	0
Pedestrian Clearance [s]	0	19	19	0	16	16	23	23	23	0	23	0
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	3.0	0.0	3.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	1.0	3.4	3.4	1.0	3.4	3.4	2.6	2.6	2.6	0.0	1.0	0.0
Minimum Recall	No	Yes		No	Yes			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	L	C	R	L	C	R
C, Cycle Length [s]	145	145	145	145	145	145	145	145	145	145	145	145
L, Total Lost Time per Cycle [s]	3.00	5.40	5.40	3.00	5.40	5.40	4.60	4.60	4.60	3.00	3.00	3.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.00	3.40	3.40	1.00	3.40	3.40	2.60	2.60	2.60	1.00	1.00	1.00
g_i, Effective Green Time [s]	31	60	60	16	46	46	27	27	27	25	25	25
g / C, Green / Cycle	0.21	0.42	0.42	0.11	0.31	0.31	0.19	0.19	0.19	0.17	0.17	0.17
(v / s)_i Volume / Saturation Flow Rate	0.27	0.55	0.60	0.10	0.46	0.46	0.03	0.19	0.25	0.15	0.14	0.01
s, saturation flow rate [veh/h]	1265	2530	1130	937	1874	976	1781	984	1513	3459	1329	1464
c, Capacity [veh/h]	270	1054	471	104	589	307	336	186	285	601	231	255
d1, Uniform Delay [s]	57.02	42.27	42.27	64.02	49.70	49.70	49.00	58.80	58.15	58.16	57.65	49.79
k, delay calibration	0.50	0.50	0.50	0.21	0.50	0.50	0.04	0.43	0.50	0.04	0.26	0.04
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	148.29	152.34	208.88	45.42	214.63	223.25	0.07	64.96	161.37	1.45	15.22	0.03
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	1.27	1.32	1.44	0.95	1.46	1.46	0.14	1.01	1.31	0.86	0.82	0.04
d, Delay for Lane Group [s/veh]	205.31	194.61	251.15	109.44	264.33	272.95	49.07	123.75	219.51	59.61	72.87	49.82
Lane Group LOS	F	F	F	F	F	F	D	F	F	E	E	D
Critical Lane Group	Yes	No	No	No	No	Yes	No	No	Yes	Yes	No	No
50th-Percentile Queue Length [veh/ln]	20.81	40.49	43.56	4.94	28.25	30.17	1.45	10.17	23.15	9.37	7.67	0.34
50th-Percentile Queue Length [ft/ln]	520.31	1012.21	1088.90	123.40	706.30	754.25	36.14	254.14	578.81	234.34	191.74	8.46
95th-Percentile Queue Length [veh/ln]	31.84	60.69	67.25	8.58	44.76	47.52	2.60	15.50	35.18	14.39	12.21	0.61
95th-Percentile Queue Length [ft/ln]	796.01	1517.33	1681.14	214.49	1119.11	1188.00	65.05	387.43	879.57	359.87	305.28	15.22

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	205.31	199.15	251.15	109.44	267.20	272.95	49.07	123.75	219.51	59.61	72.87	49.82
Movement LOS	F	F	F	F	F	F	D	F	F	E	E	D
d_A, Approach Delay [s/veh]	211.97			256.25			176.73			62.95		
Approach LOS	F			F			F			E		
d_I, Intersection Delay [s/veh]	199.07											
Intersection LOS	F											
Intersection V/C	1.227											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	43.71	142.16	372.60	0.00
d_p, Pedestrian Delay [s]	64.70	64.70	64.70	64.70
l_p,int, Pedestrian LOS Score for Intersectio	3.504	2.969	2.729	2.701
Crosswalk LOS	D	C	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	795	588	309	331
d_b, Bicycle Delay [s]	26.39	36.14	51.89	50.49
l_b,int, Bicycle LOS Score for Intersection	2.888	2.331	2.852	2.819
Bicycle LOS	C	B	C	C

Sequence

Ring 1	2	1	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 6000: Willow Rd/US-101 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	8.7
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.599

Intersection Setup

Name	Willow Road			Willow Road (SR 114)			US-101 NB Ramps			US-101 NB Ramps		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	1	0	0	0	1	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	200.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No						No		
Crosswalk	No			No			Yes			Yes		

Volumes

Name	Willow Road			Willow Road (SR 114)			US-101 NB Ramps			US-101 NB Ramps		
Base Volume Input [veh/h]	0	1408	729	0	1327	852	0	0	0	196	0	849
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	2.00	2.00	0.00	2.00	2.00	0.00	0.00	0.00	2.00	0.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	-1	0	0	-2	-11	0	0	0	0	0	-2
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	1407	729	0	1325	841	0	0	0	196	0	847
Peak Hour Factor	1.0000	0.9330	0.9330	1.0000	0.9330	0.9330	1.0000	1.0000	1.0000	0.9330	1.0000	0.9330
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	377	195	0	355	225	0	0	0	53	0	227
Total Analysis Volume [veh/h]	0	1508	781	0	1420	901	0	0	0	210	0	908
Presence of On-Street Parking	No		No	No		No				No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			6			16		
Bicycle Volume [bicycles/h]	0			7			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	2.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	8.00

Phasing & Timing

Control Type	Permiss	Permiss	Overlap	Permiss	Permiss	Overlap	Permiss	Permiss	Permiss	Permiss	Permiss	Overlap
Signal Group	0	6	6	0	2	2	0	0	0	3	0	4
Auxiliary Signal Groups			3,4,6			2,3,4						2,3,4
Lead / Lag	-	-	-	-	-	-	-	-	-	Lead	-	-
Minimum Green [s]	0	4	4	0	4	4	0	0	0	6	0	4
Maximum Green [s]	0	35	35	0	35	35	0	0	0	24	0	34
Amber [s]	0.0	4.1	4.1	0.0	4.1	4.1	0.0	0.0	0.0	3.0	0.0	3.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0
Split [s]	0	89	89	0	89	89	0	0	0	17	0	22
Vehicle Extension [s]	0.0	3.0	3.0	0.0	3.0	3.0	0.0	0.0	0.0	3.0	0.0	3.0
Walk [s]	0	4	4	0	4	4	0	0	0	0	0	0
Pedestrian Clearance [s]	0	29	29	0	7	7	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No					No		
l1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	2.0	2.0	0.0	0.0	0.0	2.0	0.0	2.0
l2, Clearance Lost Time [s]	0.0	2.1	2.1	0.0	2.1	2.1	0.0	0.0	0.0	3.0	0.0	1.0
Minimum Recall		No	No		No	No				No		No
Maximum Recall		No	No		No	No				No		No
Pedestrian Recall		No	No		No	No				No		No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	C	R		L	R
C, Cycle Length [s]	145	145	145	145		145	145
L, Total Lost Time per Cycle [s]	4.10	5.00	4.10	5.00		5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00		0.00	0.00
l2, Clearance Lost Time [s]	2.10	0.00	2.10	0.00		3.00	0.00
g_i, Effective Green Time [s]	109	136	109	136		12	136
g / C, Green / Cycle	0.75	0.94	0.75	0.94		0.08	0.94
(v / s)_i Volume / Saturation Flow Rate	0.50	0.49	0.47	0.58		0.06	0.55
s, saturation flow rate [veh/h]	3003	1589	3003	1553		3459	1658
c, Capacity [veh/h]	2250	1490	2250	1456		284	1554
d1, Uniform Delay [s]	9.15	0.28	8.64	0.33		64.97	0.32
k, delay calibration	0.50	0.50	0.50	0.50		0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00		1.00	1.00
d2, Incremental Delay [s]	1.61	1.32	1.36	1.99		3.78	1.61
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00		0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00		1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00		1.00	1.00

Lane Group Results

X, volume / capacity	0.67	0.52	0.63	0.62		0.74	0.58
d, Delay for Lane Group [s/veh]	10.76	1.61	10.00	2.32		68.75	1.93
Lane Group LOS	B	A	A	A		E	A
Critical Lane Group	Yes	No	No	Yes		No	No
50th-Percentile Queue Length [veh/ln]	7.61	0.55	6.75	0.80		3.96	0.35
50th-Percentile Queue Length [ft/ln]	190.29	13.69	168.84	20.07		98.96	8.71
95th-Percentile Queue Length [veh/ln]	12.14	0.99	11.02	1.45		7.13	0.63
95th-Percentile Queue Length [ft/ln]	303.40	24.65	275.39	36.13		178.13	15.67

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	0.00	10.76	1.61	0.00	10.00	2.32	0.00	0.00	0.00	68.75	0.00	1.93
Movement LOS		B	A		A	A				E		A
d_A, Approach Delay [s/veh]	7.63			7.02			0.00			14.48		
Approach LOS	A			A			A			B		
d_I, Intersection Delay [s/veh]	8.72											
Intersection LOS	A											
Intersection V/C	0.599											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	64.68	64.68
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	2.326	2.695
Crosswalk LOS	F	F	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1130	1130	0	166
d_b, Bicycle Delay [s]	13.70	13.75	72.46	60.96
l_b,int, Bicycle LOS Score for Intersection	2.819	2.836	4.132	1.560
Bicycle LOS	C	C	D	A

Sequence

Ring 1	-	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 7000: Willow Rd/US-101 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	46.9
Analysis Method:	HCM 7th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.431

Intersection Setup

Name	Willow Road			Willow Road			US-101 SB Ramps			US-101 SB Ramps		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	0	1	0	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No					
Crosswalk	No			No			Yes			Yes		

Volumes

Name	Willow Road			Willow Road			US-101 SB Ramps			US-101 SB Ramps		
Base Volume Input [veh/h]	0	1296	364	0	1068	782	285	0	357	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	2.00	2.00	0.00	2.00	2.00	2.00	0.00	2.00	0.00	0.00	0.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	-2	0	-1	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	1296	364	0	1066	782	284	0	357	0	0	0
Peak Hour Factor	1.0000	0.9520	0.9520	1.0000	0.9520	0.9520	0.9520	1.0000	0.9520	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	340	96	0	280	205	75	0	94	0	0	0
Total Analysis Volume [veh/h]	0	1361	382	0	1120	821	298	0	375	0	0	0
Presence of On-Street Parking	No		No	No		No	No		No			
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	1			0			7			17		
Bicycle Volume [bicycles/h]	0			3			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	99.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Permiss	Permiss	Overlap	Permiss	Permiss	Overlap	Permiss	Permiss	Overlap	Permiss	Permiss	Permiss
Signal Group	0	6	6	0	2	2	4	0	4	0	0	0
Auxiliary Signal Groups			6			2			4,6			
Lead / Lag	-	-	-	-	-	-	Lead	-	-	-	-	-
Minimum Green [s]	0	4	4	0	4	4	4	0	4	0	0	0
Maximum Green [s]	0	35	35	0	35	35	30	0	30	0	0	0
Amber [s]	0.0	4.1	4.1	0.0	4.1	4.1	3.0	0.0	3.0	0.0	0.0	0.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	2.0	0.0	0.0	0.0
Split [s]	0	103	103	0	103	103	25	0	25	0	0	0
Vehicle Extension [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	0.0	3.0	0.0	0.0	0.0
Walk [s]	0	4	4	0	4	4	0	0	0	0	0	0
Pedestrian Clearance [s]	0	7	7	0	32	32	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No		No					
l1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	2.0	2.0	2.0	0.0	2.0	0.0	0.0	0.0
l2, Clearance Lost Time [s]	0.0	2.1	2.1	0.0	2.1	2.1	3.0	0.0	3.0	0.0	0.0	0.0
Minimum Recall		No	No		No	No	No		No			
Maximum Recall		No	No		No	No	No		No			
Pedestrian Recall		No	No		No	No	No		No			
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	C	R	L	R	
C, Cycle Length [s]	145	145	145	145	145	145	
L, Total Lost Time per Cycle [s]	4.10	4.10	4.10	4.10	5.00	5.00	
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	
l2, Clearance Lost Time [s]	2.10	2.10	2.10	2.10	3.00	0.00	
g_i, Effective Green Time [s]	120	120	120	120	15	140	
g / C, Green / Cycle	0.83	0.83	0.83	0.83	0.11	0.97	
(v / s)_i Volume / Saturation Flow Rate	0.27	0.24	0.22	1.19	0.09	0.30	
s, saturation flow rate [veh/h]	5094	1589	5094	692	3459	1251	
c, Capacity [veh/h]	4232	1321	4232	575	368	1208	
d1, Uniform Delay [s]	2.83	2.73	2.66	11.08	63.24	0.12	
k, delay calibration	0.50	0.50	0.50	0.50	0.11	0.23	
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	
d2, Incremental Delay [s]	0.20	0.55	0.15	202.71	4.31	0.31	
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	

Lane Group Results

X, volume / capacity	0.32	0.29	0.26	1.43	0.81	0.31	
d, Delay for Lane Group [s/veh]	3.03	3.28	2.81	213.79	67.55	0.43	
Lane Group LOS	A	A	A	F	E	A	
Critical Lane Group	No	No	No	Yes	Yes	No	
50th-Percentile Queue Length [veh/ln]	2.51	2.18	1.94	44.44	5.61	0.05	
50th-Percentile Queue Length [ft/ln]	62.77	54.46	48.50	1111.10	140.30	1.30	
95th-Percentile Queue Length [veh/ln]	4.52	3.92	3.49	71.63	9.50	0.09	
95th-Percentile Queue Length [ft/ln]	112.99	98.03	87.30	1790.79	237.43	2.34	

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	0.00	3.03	3.28	0.00	2.81	213.79	67.55	0.00	0.43	0.00	0.00	0.00
Movement LOS		A	A		A	F	E		A			
d_A, Approach Delay [s/veh]	3.08			92.05			30.15			0.00		
Approach LOS	A			F			C			A		
d_I, Intersection Delay [s/veh]	46.90											
Intersection LOS	D											
Intersection V/C	1.431											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	64.65	64.65
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	2.616	1.820
Crosswalk LOS	F	F	B	A
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1324	1324	276	0
d_b, Bicycle Delay [s]	8.27	8.29	53.81	72.43
l_b,int, Bicycle LOS Score for Intersection	2.518	2.627	1.560	4.132
Bicycle LOS	B	B	A	D

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 8000: O'Brien Drive/Kavanaugh Drive

Control Type:	All-way stop	Delay (sec / veh):	80.6
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.176

Intersection Setup

Name	O'Brien Drive		O'Brien Drive		Kavanaugh Drive	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		Yes		No	

Volumes

Name	O'Brien Drive		O'Brien Drive		Kavanaugh Drive	
Base Volume Input [veh/h]	210	286	111	437	183	282
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	-3	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	210	283	111	437	183	282
Peak Hour Factor	0.9150	0.9150	0.9150	0.9150	0.9150	0.9150
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	57	77	30	119	50	77
Total Analysis Volume [veh/h]	230	309	121	478	200	308
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	547	599	535
Degree of Utilization, x	0.99	1.18	0.95

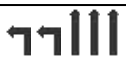
Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	13.71	21.60	12.18
95th-Percentile Queue Length [ft]	342.87	539.92	304.59
Approach Delay [s/veh]	60.32	122.46	52.92
Approach LOS	F	F	F
Intersection Delay [s/veh]	80.65		
Intersection LOS	F		

Intersection Level Of Service Report
Intersection 9000: Bayfront Expy (SR 84)/University Ave (SR 109)

Control Type:	Signalized	Delay (sec / veh):	93.5
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.961

Intersection Setup

Name	University Avenue (SR109)		Bayfront Expressway (SR84)		Bayfront Expressway (SR84)	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	2	0	1	2	0
Entry Pocket Length [ft]	100.00	250.00	100.00	100.00	830.00	100.00
No. of Lanes in Exit Pocket	0	2	0	0	0	0
Exit Pocket Length [ft]	0.00	74.61	0.00	0.00	0.00	0.00
Speed [mph]	35.00		55.00		55.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		No	

Volumes

Name	University Avenue (SR109)		Bayfront Expressway (SR84)		Bayfront Expressway (SR84)	
Base Volume Input [veh/h]	87	1378	3777	95	333	1116
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	-2	-4	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	87	1376	3773	95	333	1116
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	22	351	963	24	85	285
Total Analysis Volume [veh/h]	89	1404	3850	97	340	1139
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	1		2		0	
v_ci, Inbound Pedestrian Volume crossing mi	2		1		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	3		5		8	

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	200
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	198.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	10.00

Phasing & Timing

Control Type	Permissive	Overlap	Permissive	Permissive	Protected	Permissive
Signal Group	4	4	6	2	5	2
Auxiliary Signal Groups		4,5				
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	12	12	10	10	11	10
Maximum Green [s]	15	15	60	60	30	60
Amber [s]	3.0	3.0	5.0	5.4	3.0	5.4
All red [s]	1.0	1.0	1.0	0.5	0.5	0.5
Split [s]	36	36	124	154	26	154
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	3.0
Walk [s]	4	4	4	0	0	0
Pedestrian Clearance [s]	29	29	35	0	0	0
Delayed Vehicle Green [s]	3.0	3.0	3.0	0.0	0.0	0.0
Rest In Walk	No		No			No
l1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0
l2, Clearance Lost Time [s]	2.0	2.0	4.0	3.9	1.5	3.9
Minimum Recall	No	No	No		No	No
Maximum Recall	No	No	No		No	No
Pedestrian Recall	No	No	No		No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	20.0	20.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	R	C	R	L	C
C, Cycle Length [s]	200	200	200	200	200	200
L, Total Lost Time per Cycle [s]	4.00	3.50	6.00	6.00	3.50	5.90
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	0.00	4.00	4.00	1.50	3.90
g_i, Effective Green Time [s]	32	58	132	132	23	158
g / C, Green / Cycle	0.16	0.29	0.66	0.66	0.11	0.79
(v / s)_i Volume / Saturation Flow Rate	0.03	0.34	0.76	0.06	0.10	0.22
s, saturation flow rate [veh/h]	3459	4162	5094	1566	3459	5094
c, Capacity [veh/h]	553	1217	3361	1033	390	4027
d1, Uniform Delay [s]	72.38	70.26	33.99	12.31	87.25	5.65
k, delay calibration	0.11	0.23	0.50	0.50	0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.13	74.10	69.42	0.18	6.17	0.18
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.16	1.15	1.15	0.09	0.87	0.28
d, Delay for Lane Group [s/veh]	72.51	144.36	103.41	12.49	93.42	5.82
Lane Group LOS	E	F	F	B	F	A
Critical Lane Group	No	Yes	Yes	No	No	No
50th-Percentile Queue Length [veh/ln]	2.00	28.97	70.57	1.59	8.87	3.79
50th-Percentile Queue Length [ft/ln]	49.98	724.14	1764.18	39.68	221.68	94.71
95th-Percentile Queue Length [veh/ln]	3.60	41.25	94.83	2.86	13.75	6.82
95th-Percentile Queue Length [ft/ln]	89.96	1031.20	2370.86	71.43	343.77	170.48

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	72.51	144.36	103.41	12.49	93.42	5.82
Movement LOS	E	F	F	B	F	A
d_A, Approach Delay [s/veh]	140.08		101.17		25.96	
Approach LOS	F		F		C	
d_I, Intersection Delay [s/veh]	93.49					
Intersection LOS	F					
Intersection V/C	0.961					

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	1160.89	0.00	0.00
d_p, Pedestrian Delay [s]	92.12	92.12	0.00
l_p,int, Pedestrian LOS Score for Intersectio	3.132	3.954	0.000
Crosswalk LOS	C	D	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	290	1150	1482
d_b, Bicycle Delay [s]	73.17	18.08	6.74
l_b,int, Bicycle LOS Score for Intersection	1.670	3.730	2.373
Bicycle LOS	A	D	B

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 10000: University Avenue/Adams Drive

Control Type:	Two-way stop	Delay (sec / veh):	37.6
Analysis Method:	HCM 7th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.393

Intersection Setup

Name	University Avenue		University Avenue (SR109)		Adams Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		No	

Volumes

Name	University Avenue		University Avenue (SR109)		Adams Drive	
Base Volume Input [veh/h]	15	1379	386	7	62	19
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	-2	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	15	1377	386	7	62	19
Peak Hour Factor	0.9160	0.9160	0.9160	0.9160	0.9160	0.9160
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	376	105	2	17	5
Total Analysis Volume [veh/h]	16	1503	421	8	68	21
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.02	0.00	0.00	0.39	0.03
d_M, Delay for Movement [s/veh]	8.24	0.00	0.00	0.00	37.56	21.31
Movement LOS	A	A	A	A	E	C
95th-Percentile Queue Length [veh/ln]	0.04	0.00	0.00	0.00	1.93	1.93
95th-Percentile Queue Length [ft/ln]	1.08	0.00	0.00	0.00	48.20	48.20
d_A, Approach Delay [s/veh]	0.09		0.00		33.73	
Approach LOS	A		A		D	
d_I, Intersection Delay [s/veh]	1.54					
Intersection LOS	E					

Intersection Level Of Service Report
Intersection 11000: University Ave/O'Brien Dr

Control Type:	Signalized	Delay (sec / veh):	32.0
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.754

Intersection Setup

Name	University Avenue		University Avenue		O'Brien Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	1	0
Entry Pocket Length [ft]	90.00	100.00	100.00	100.00	45.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00		25.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	No		No		No	

Volumes

Name	University Avenue		University Avenue		O'Brien Drive	
Base Volume Input [veh/h]	300	1314	394	9	73	424
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	-2	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	300	1312	394	9	73	424
Peak Hour Factor	0.9250	0.9250	0.9250	0.9250	0.9250	0.9250
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	81	355	106	2	20	115
Total Analysis Volume [veh/h]	324	1418	426	10	79	458
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		1	
Bicycle Volume [bicycles/h]	2		3		1	

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	130
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	48.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	11.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	1	6	2	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	5	5	5	0	5	0
Maximum Green [s]	30	30	30	0	30	0
Amber [s]	3.0	3.0	3.0	0.0	3.0	0.0
All red [s]	1.0	1.0	1.0	0.0	1.0	0.0
Split [s]	67	76	9	0	54	0
Vehicle Extension [s]	3.0	3.0	3.0	0.0	3.0	0.0
Walk [s]	0	5	5	0	5	0
Pedestrian Clearance [s]	0	10	10	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
Minimum Recall	No	No	No		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	L	R
C, Cycle Length [s]	130	130	130	130	130	130
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	26	82	52	52	40	40
g / C, Green / Cycle	0.20	0.63	0.40	0.40	0.31	0.31
(v / s)_i Volume / Saturation Flow Rate	0.18	0.40	0.12	0.12	0.04	0.29
s, saturation flow rate [veh/h]	1781	3560	1870	1853	1781	1569
c, Capacity [veh/h]	354	2253	754	747	544	479
d1, Uniform Delay [s]	50.94	14.55	26.19	26.22	32.78	44.00
k, delay calibration	0.11	0.50	0.50	0.50	0.11	0.29
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	9.42	1.35	0.97	0.99	0.12	22.03
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.91	0.63	0.29	0.29	0.15	0.96
d, Delay for Lane Group [s/veh]	60.36	15.89	27.16	27.21	32.90	66.03
Lane Group LOS	E	B	C	C	C	E
Critical Lane Group	No	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	11.32	12.92	4.87	4.88	1.85	17.20
50th-Percentile Queue Length [ft/ln]	283.04	322.92	121.72	121.93	46.28	429.95
95th-Percentile Queue Length [veh/ln]	16.84	18.81	8.49	8.50	3.33	24.00
95th-Percentile Queue Length [ft/ln]	421.00	470.27	212.18	212.47	83.30	599.98

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	60.36	15.89	27.18	27.21	32.90	66.03
Movement LOS	E	B	C	C	C	E
d_A, Approach Delay [s/veh]	24.16		27.19		61.16	
Approach LOS	C		C		E	
d_I, Intersection Delay [s/veh]	31.96					
Intersection LOS	C					
Intersection V/C	0.754					

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	0.000
Crosswalk LOS	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1108	77	770
d_b, Bicycle Delay [s]	12.93	60.16	24.60
l_b,int, Bicycle LOS Score for Intersection	2.997	1.919	1.560
Bicycle LOS	C	A	A

Sequence

Ring 1	1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 12000: University Avenue/Kavanaugh Drive

Control Type:	Signalized	Delay (sec / veh):	20.5
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.615

Intersection Setup

Name	University Avenue		University Avenue		Kavanaugh Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00		25.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		No		No	

Volumes

Name	University Avenue		University Avenue		Kavanaugh Drive	
Base Volume Input [veh/h]	174	1326	489	112	97	155
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	-2	-1
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	174	1326	489	112	95	154
Peak Hour Factor	0.9440	0.9440	0.9440	0.9440	0.9440	0.9440
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	46	351	130	30	25	41
Total Analysis Volume [veh/h]	184	1405	518	119	101	163
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		13		4	
Bicycle Volume [bicycles/h]	1		5		2	

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fixed time
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal Group	1	6	2	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	5	5	5	0	5	0
Maximum Green [s]	30	30	30	0	30	0
Amber [s]	3.0	3.0	3.0	0.0	3.0	0.0
All red [s]	1.0	1.0	1.0	0.0	1.0	0.0
Split [s]	19	60	41	0	30	0
Vehicle Extension [s]	3.0	3.0	3.0	0.0	3.0	0.0
Walk [s]	0	5	5	0	5	0
Pedestrian Clearance [s]	0	10	10	0	21	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
Minimum Recall	No	No	No		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	C
C, Cycle Length [s]	90	90	90	90	90
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	15	56	37	37	26
g / C, Green / Cycle	0.17	0.62	0.41	0.41	0.29
(v / s)_i Volume / Saturation Flow Rate	0.11	0.44	0.19	0.20	0.18
s, saturation flow rate [veh/h]	1603	3204	1683	1563	1492
c, Capacity [veh/h]	267	1994	692	642	431
d1, Uniform Delay [s]	35.30	11.44	19.25	19.60	27.65
k, delay calibration	0.50	0.50	0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	13.59	2.12	2.20	2.72	6.37
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.69	0.70	0.46	0.50	0.61
d, Delay for Lane Group [s/veh]	48.90	13.56	21.45	22.32	34.02
Lane Group LOS	D	B	C	C	C
Critical Lane Group	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	4.79	9.08	5.16	5.31	5.54
50th-Percentile Queue Length [ft/ln]	119.66	226.92	129.05	132.79	138.50
95th-Percentile Queue Length [veh/ln]	8.37	14.02	8.89	9.09	9.40
95th-Percentile Queue Length [ft/ln]	209.37	350.45	222.20	227.29	235.00

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	48.90	13.56	21.78	22.32	34.02	34.02
Movement LOS	D	B	C	C	C	C
d_A, Approach Delay [s/veh]	17.65		21.88		34.02	
Approach LOS	B		C		C	
d_I, Intersection Delay [s/veh]	20.47					
Intersection LOS	C					
Intersection V/C	0.615					

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	36.45	0.00	0.00
l_p,int, Pedestrian LOS Score for Intersectio	2.670	0.000	0.000
Crosswalk LOS	B	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1244	822	578
d_b, Bicycle Delay [s]	6.43	15.64	22.78
l_b,int, Bicycle LOS Score for Intersection	2.871	2.085	1.995
Bicycle LOS	C	B	A

Sequence

Ring 1	1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 13000: Willow Road/Driveway A

Control Type:	Two-way stop	Delay (sec / veh):	15.6
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.056

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		Driveway A	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		Driveway A	
Base Volume Input [veh/h]	1481	5	0	941	0	25
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	-5	-1	0	-1	0	-5
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	1476	4	0	940	0	20
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	369	1	0	235	0	5
Total Analysis Volume [veh/h]	1476	4	0	940	0	20
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.01	0.00	0.06
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	0.00	0.00	15.61
Movement LOS	A	A		A		C
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.18
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.00	4.40
d_A, Approach Delay [s/veh]	0.00		0.00		15.61	
Approach LOS	A		A		C	
d_I, Intersection Delay [s/veh]	0.13					
Intersection LOS	C					

Intersection Level Of Service Report
Intersection 14000: Driveway B/O'Brien Drive

Control Type:	Two-way stop	Delay (sec / veh):	26.3
Analysis Method:	HCM 7th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.021

Intersection Setup

Name	Driveway B		O'Brien Drive		O'Brien Drive	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Driveway B		O'Brien Drive		O'Brien Drive	
Base Volume Input [veh/h]	4	68	3	488	782	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	-3	-19	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	4	68	3	485	763	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	17	1	121	191	0
Total Analysis Volume [veh/h]	4	68	3	485	763	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.17	0.00	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	26.27	16.10	9.24	0.00	0.00	0.00
Movement LOS	D	C	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.69	0.69	0.01	0.01	0.00	0.00
95th-Percentile Queue Length [ft/ln]	17.21	17.21	0.13	0.13	0.00	0.00
d_A, Approach Delay [s/veh]	16.67		0.06		0.00	
Approach LOS	C		A		A	
d_I, Intersection Delay [s/veh]	0.93					
Intersection LOS	D					

Intersection Level Of Service Report
Intersection 15000: Driveway C/O'Brien Drive

Control Type:	Two-way stop	Delay (sec / veh):	26.1
Analysis Method:	HCM 7th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.065

Intersection Setup

Name	Driveway C		O'Brien Drive		O'Brien Drive	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Driveway C		O'Brien Drive		O'Brien Drive	
Base Volume Input [veh/h]	15	38	15	469	763	4
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	-3	-19	-3	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	12	19	12	469	763	4
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	5	3	117	191	1
Total Analysis Volume [veh/h]	12	19	12	469	763	4
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

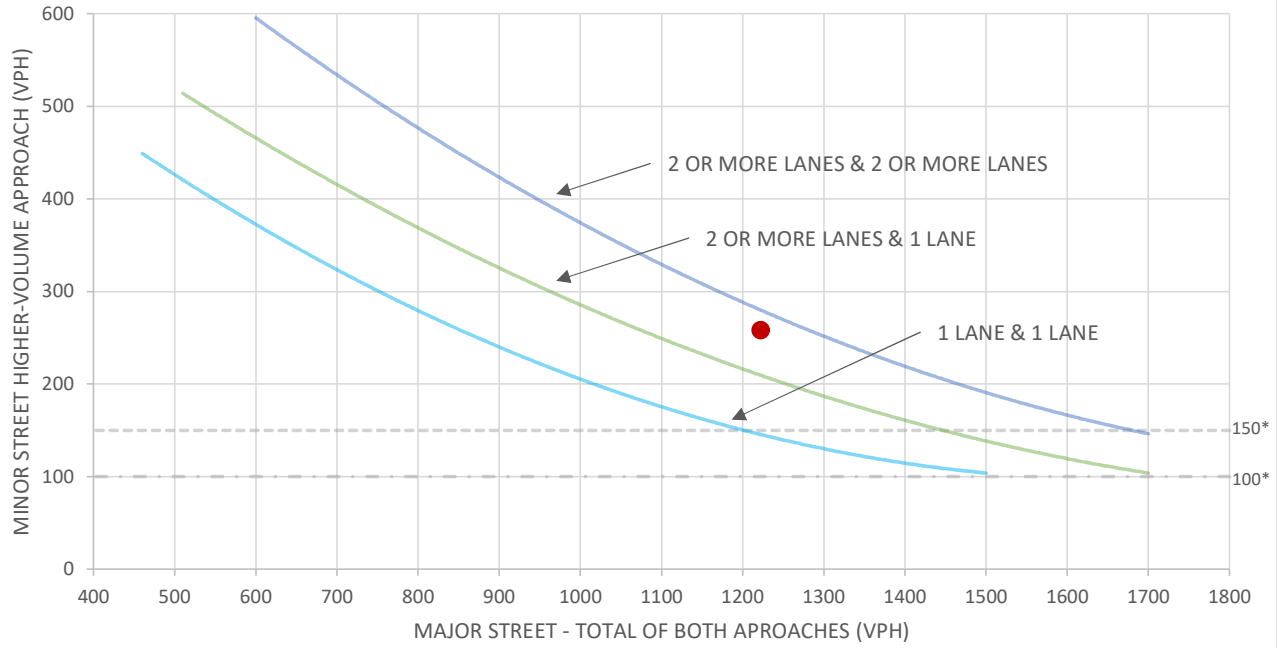
Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.06	0.05	0.01	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	26.09	15.56	9.27	0.00	0.00	0.00
Movement LOS	D	C	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.37	0.37	0.02	0.02	0.00	0.00
95th-Percentile Queue Length [ft/ln]	9.34	9.34	0.50	0.50	0.00	0.00
d_A, Approach Delay [s/veh]	19.64		0.23		0.00	
Approach LOS	C		A		A	
d_I, Intersection Delay [s/veh]	0.56					
Intersection LOS	D					

Appendix C
Signal Warrant Worksheets

				N-S	E-W
Project	1005 O'BRIEN/1320 WILLOW PROJECT	**Intersection #**	8	☑	☐
Scenario	Near-Term	**Major Street**	O'Brien Drive		
Peak Hour	AM	**Minor Street**	Kavanaugh Drive	☐	☑

Figure 4C-3. Warrant 3, Peak Hour



Source: California Manual on Uniform Traffic Control Devices, Caltrans, 2014.

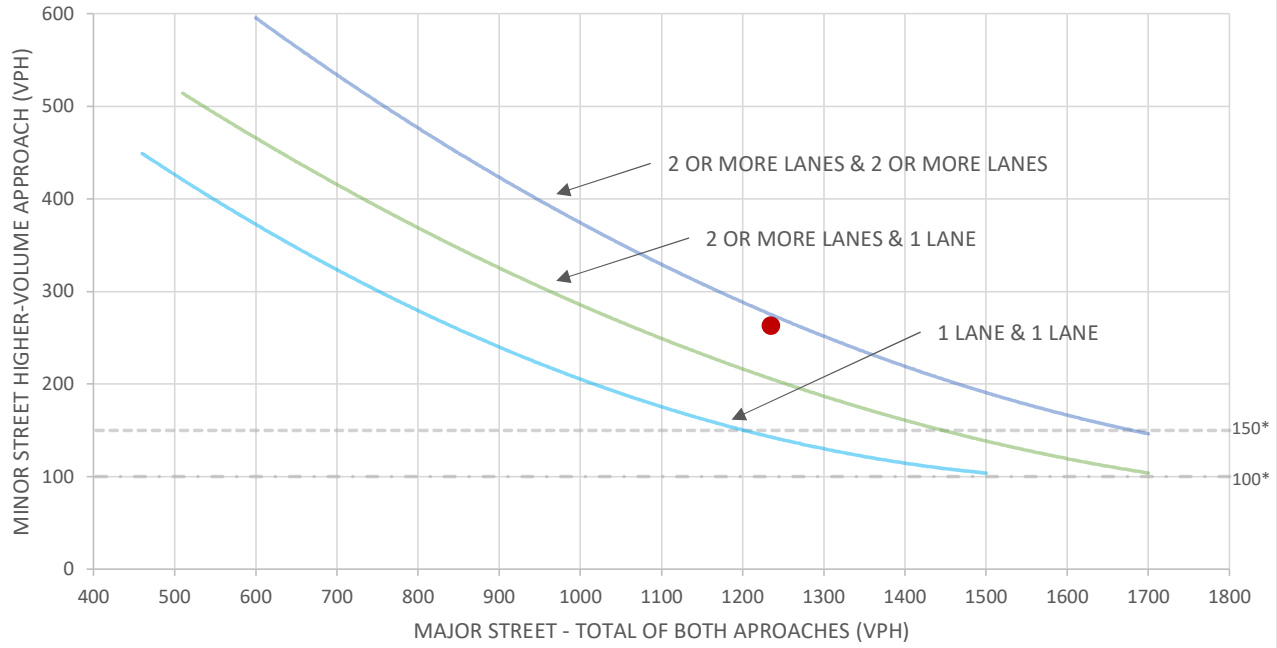
*Note: 150 vph applies as the lower threshold volumes for a minor-street approach with two or more lanes and a 100 vph applies as the lower threshold volumes for a minor-street approach with one lane.

	Major Street	Minor Street	Warrant Met?
	O'Brien Drive	Kavanaugh Drive	
Number of Approach Lanes	1	1	Yes
Traffic Volume (VPH)*	1,222	258	

*Note:
Traffic volume for the Major Street approach is the total volume of both approaches.
Traffic volume for the Minor Street is the highest volume approach.

				N-S	E-W
Project	1005 O'BRIEN/1320 WILLOW PROJECT	**Intersection #**	8	☑	☐
Scenario	Near-Term plus Project	**Major Street**	O'Brien Drive		
Peak Hour	AM	**Minor Street**	Kavanaugh Drive	☐	☑

Figure 4C-3. Warrant 3, Peak Hour



Source: California Manual on Uniform Traffic Control Devices, Caltrans, 2014.

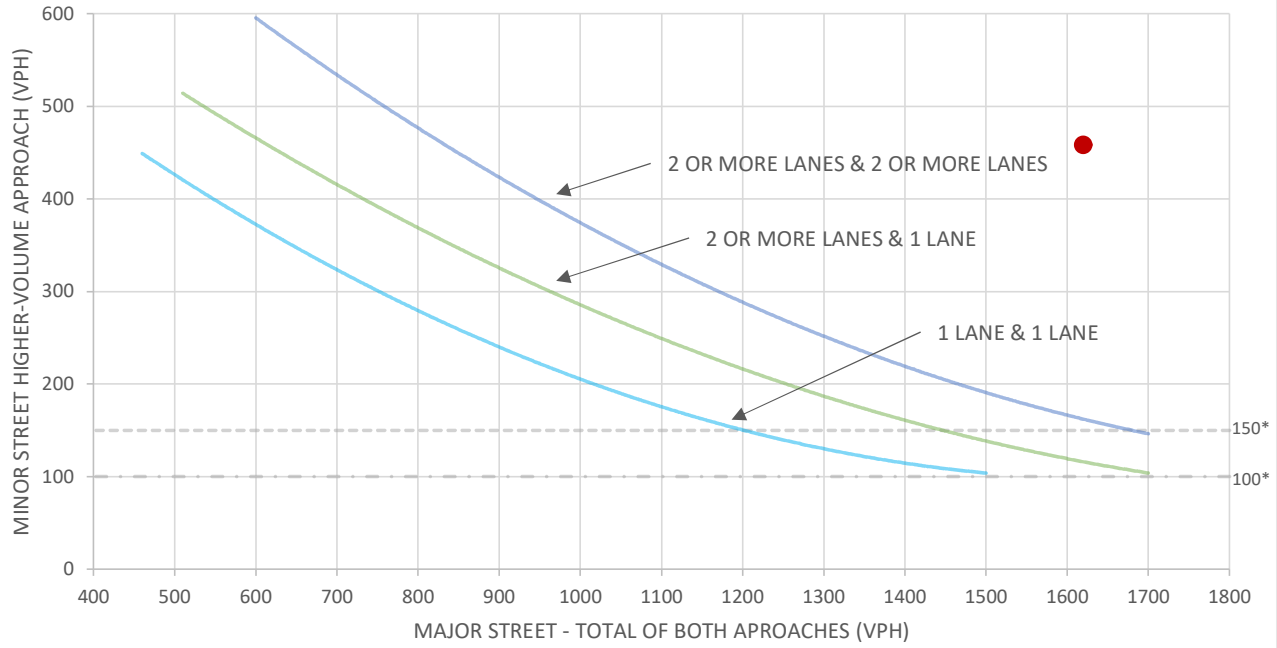
*Note: 150 vph applies as the lower threshold volumes for a minor-street approach with two or more lanes and a 100 vph applies as the lower threshold volumes for a minor-street approach with one lane.

	Major Street	Minor Street	Warrant Met?
	O'Brien Drive	Kavanaugh Drive	
Number of Approach Lanes	1	1	Yes
Traffic Volume (VPH)*	1,235	263	

*Note:
Traffic volume for the Major Street approach is the total volume of both approaches.
Traffic volume for the Minor Street is the highest volume approach.

				N-S	E-W
Project	1005 O'BRIEN/1320 WILLOW PROJECT	**Intersection #**	8	☑	☐
Scenario	2040	**Major Street**	O'Brien Drive		
Peak Hour	AM	**Minor Street**	Kavanaugh Drive	☐	☑

Figure 4C-3. Warrant 3, Peak Hour



Source: California Manual on Uniform Traffic Control Devices, Caltrans, 2014.

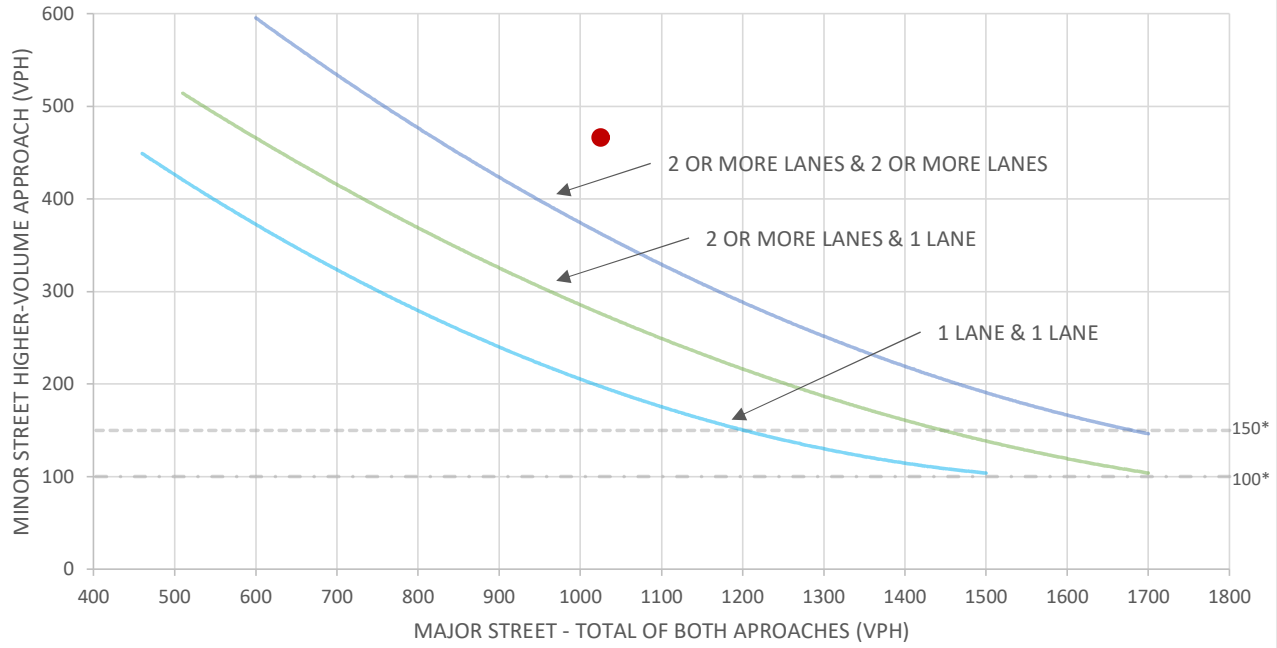
*Note: 150 vph applies as the lower threshold volumes for a minor-street approach with two or more lanes and a 100 vph applies as the lower threshold volumes for a minor-street approach with one lane.

	Major Street	Minor Street	Warrant Met?
	O'Brien Drive	Kavanaugh Drive	
Number of Approach Lanes	1	1	Yes
Traffic Volume (VPH)*	1,620	458	

*Note:
Traffic volume for the Major Street approach is the total volume of both approaches.
Traffic volume for the Minor Street is the highest volume approach.

				N-S	E-W
Project	1005 O'BRIEN/1320 WILLOW PROJECT	**Intersection #**	8	☑	☐
Scenario	2040	**Major Street**	O'Brien Drive		
Peak Hour	PM	**Minor Street**	Kavanaugh Drive	☐	☑

Figure 4C-3. Warrant 3, Peak Hour



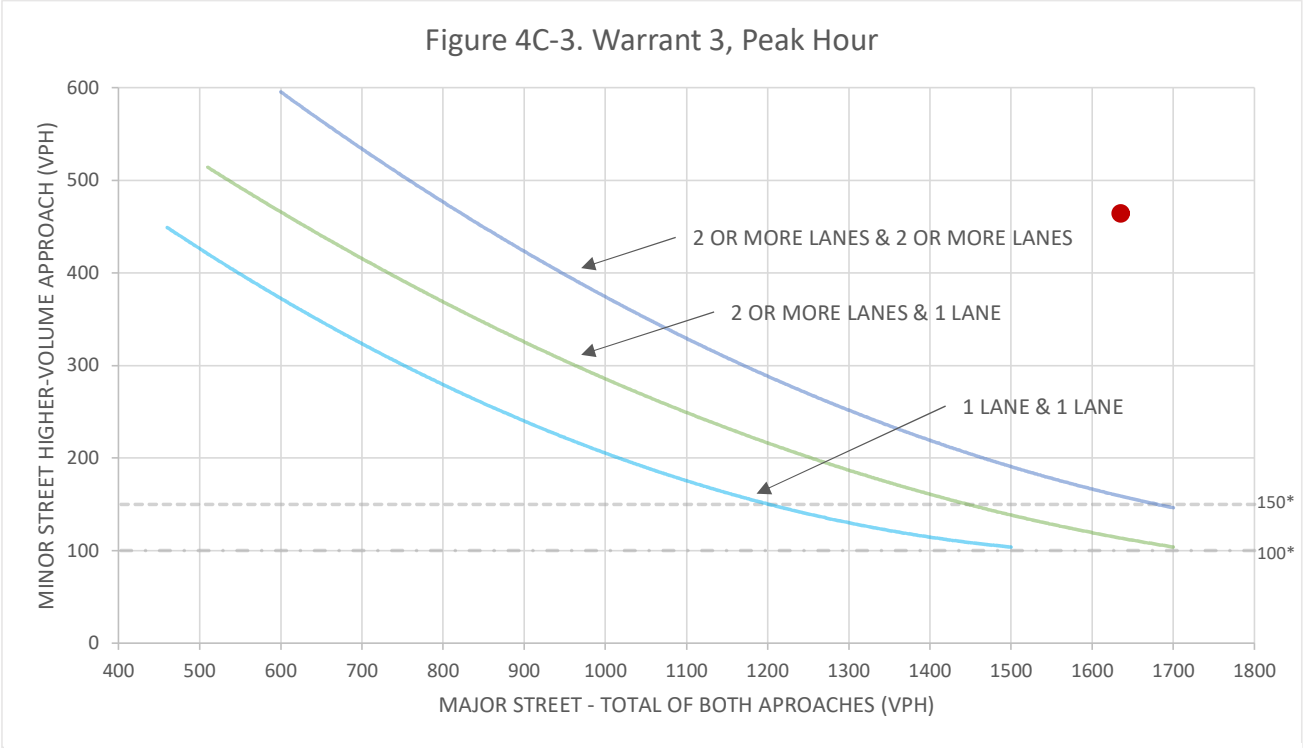
Source: California Manual on Uniform Traffic Control Devices, Caltrans, 2014.

*Note: 150 vph applies as the lower threshold volumes for a minor-street approach with two or more lanes and a 100 vph applies as the lower threshold volumes for a minor-street approach with one lane.

	Major Street	Minor Street	Warrant Met?
	O'Brien Drive	Kavanaugh Drive	
Number of Approach Lanes	1	1	Yes
Traffic Volume (VPH)*	1,025	466	

*Note:
Traffic volume for the Major Street approach is the total volume of both approaches.
Traffic volume for the Minor Street is the highest volume approach.

				N-S	E-W
Project	1005 O'BRIEN/1320 WILLOW PROJECT	**Intersection #**	8	☑	☐
Scenario	2040 plus Project	**Major Street**	O'Brien Drive		
Peak Hour	AM	**Minor Street**	Kavanaugh Drive	☐	☑



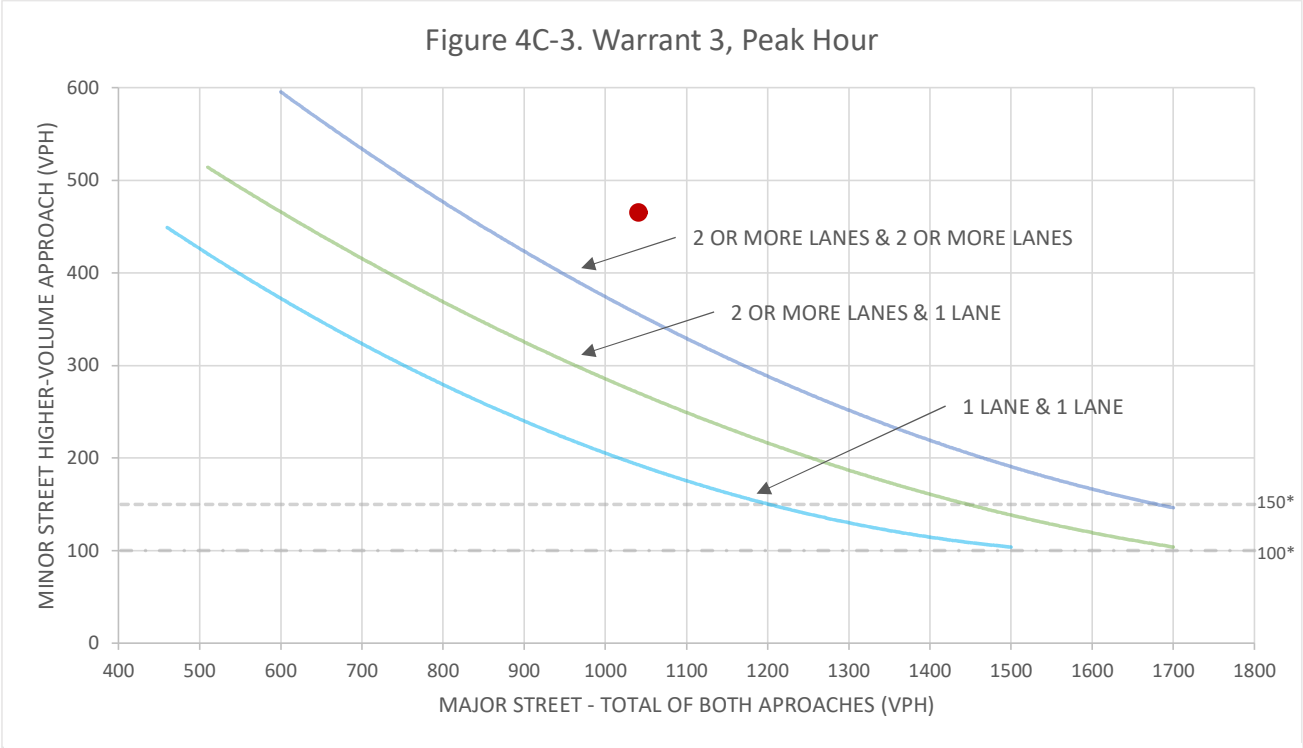
Source: California Manual on Uniform Traffic Control Devices, Caltrans, 2014.

*Note: 150 vph applies as the lower threshold volumes for a minor-street approach with two or more lanes and a 100 vph applies as the lower threshold volumes for a minor-street approach with one lane.

	Major Street	Minor Street	Warrant Met?
	O'Brien Drive	Kavanaugh Drive	
Number of Approach Lanes	1	1	Yes
Traffic Volume (VPH)*	1,635	464	

*Note:
Traffic volume for the Major Street approach is the total volume of both approaches.
Traffic volume for the Minor Street is the highest volume approach.

				N-S	E-W
Project	1005 O'BRIEN/1320 WILLOW PROJECT	**Intersection #**	8	☑	☐
Scenario	2040 plus Project	**Major Street**	O'Brien Drive		
Peak Hour	PM	**Minor Street**	Kavanaugh Drive	☐	☑



Source: California Manual on Uniform Traffic Control Devices, Caltrans, 2014.

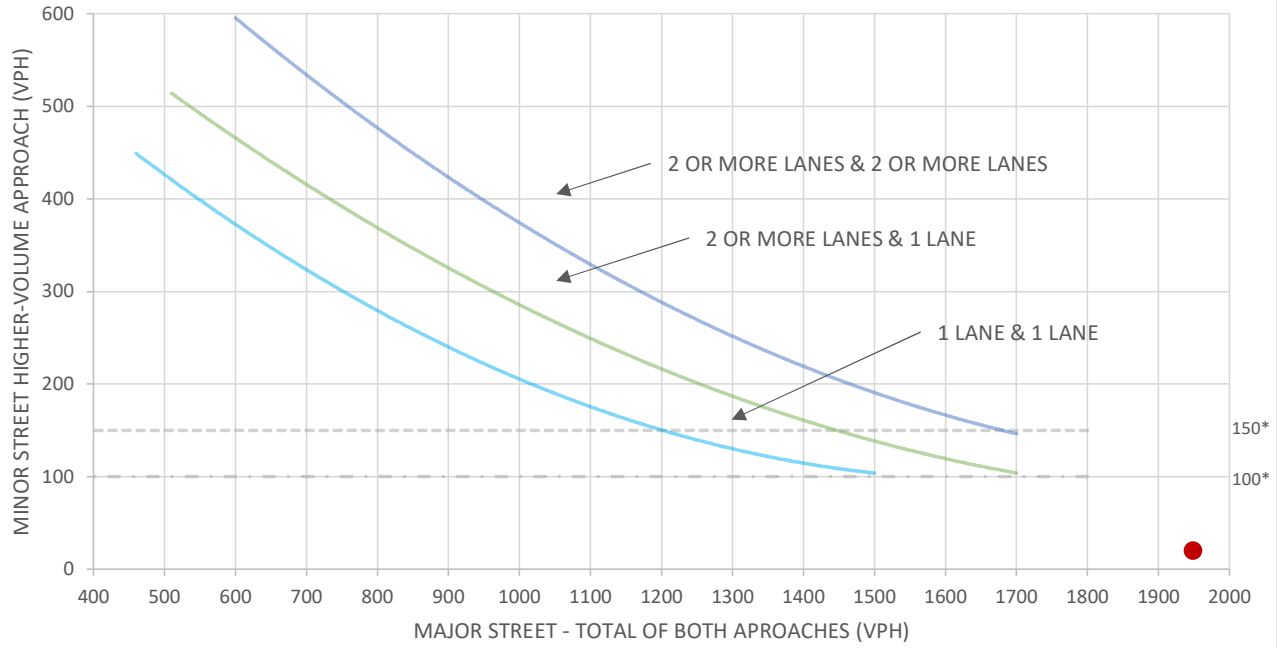
*Note: 150 vph applies as the lower threshold volumes for a minor-street approach with two or more lanes and a 100 vph applies as the lower threshold volumes for a minor-street approach with one lane.

	Major Street	Minor Street	Warrant Met?
	O'Brien Drive	Kavanaugh Drive	
Number of Approach Lanes	1	1	Yes
Traffic Volume (VPH)*	1,041	465	

*Note:
Traffic volume for the Major Street approach is the total volume of both approaches.
Traffic volume for the Minor Street is the highest volume approach.

				N-S	E-W
Project	1005 O'BRIEN/1320 WILLOW PROJECT	**Intersection #**	10	☑	☐
Scenario	Existing	**Major Street**	University Avenue		
Peak Hour	AM	**Minor Street**	Adams Drive	☐	☑

Figure 4C-3. Warrant 3, Peak Hour



Source: California Manual on Uniform Traffic Control Devices, Caltrans, 2014.

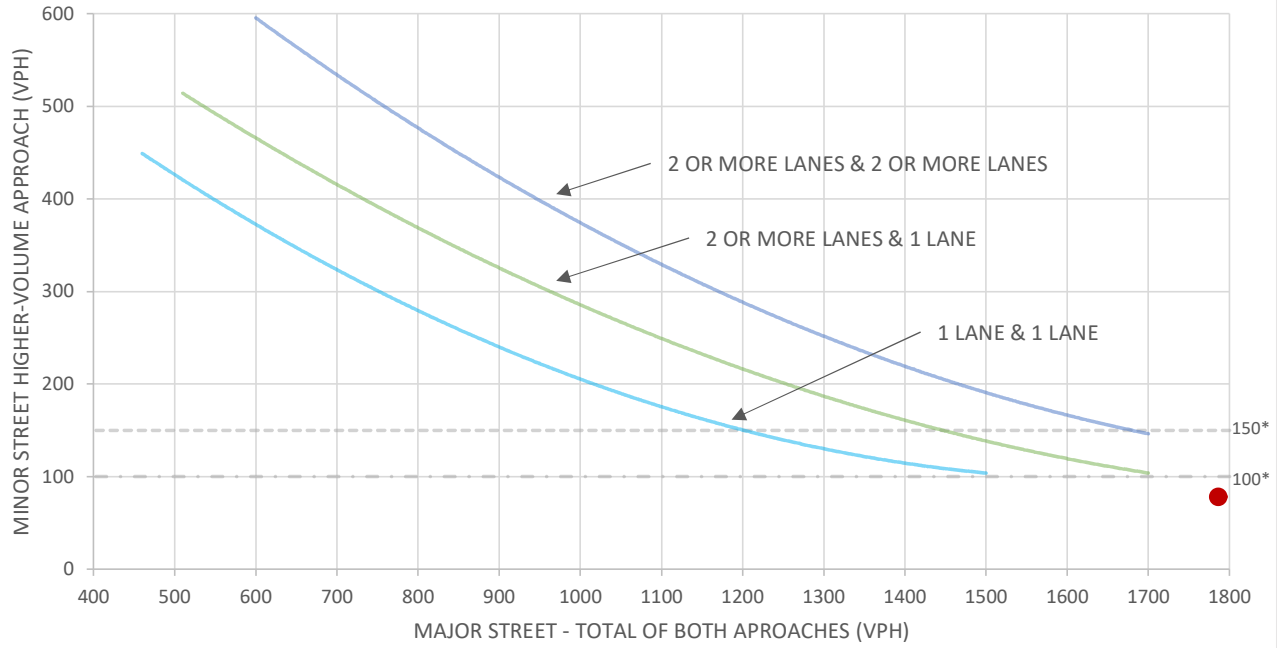
*Note: 150 vph applies as the lower threshold volumes for a minor-street approach with two or more lanes and a 100 vph applies as the lower threshold volumes for a minor-street approach with one lane.

	Major Street	Minor Street	Warrant Met?
	University Avenue	Adams Drive	
Number of Approach Lanes	2	1	**No**
Traffic Volume (VPH)*	1,949	20	

*Note:
Traffic volume for the Major Street approach is the total volume of both approaches.
Traffic volume for the Minor Street is the highest volume approach.

Project	1005 O'BRIEN/1320 WILLOW PROJECT	**Intersection #**	Volumes	**N-S**	**E-W**
Scenario	Existing	**Major Street**	University Avenue	☑	☐
Peak Hour	PM	**Minor Street**	Adams Drive	☐	☑

Figure 4C-3. Warrant 3, Peak Hour



Source: California Manual on Uniform Traffic Control Devices, Caltrans, 2014.

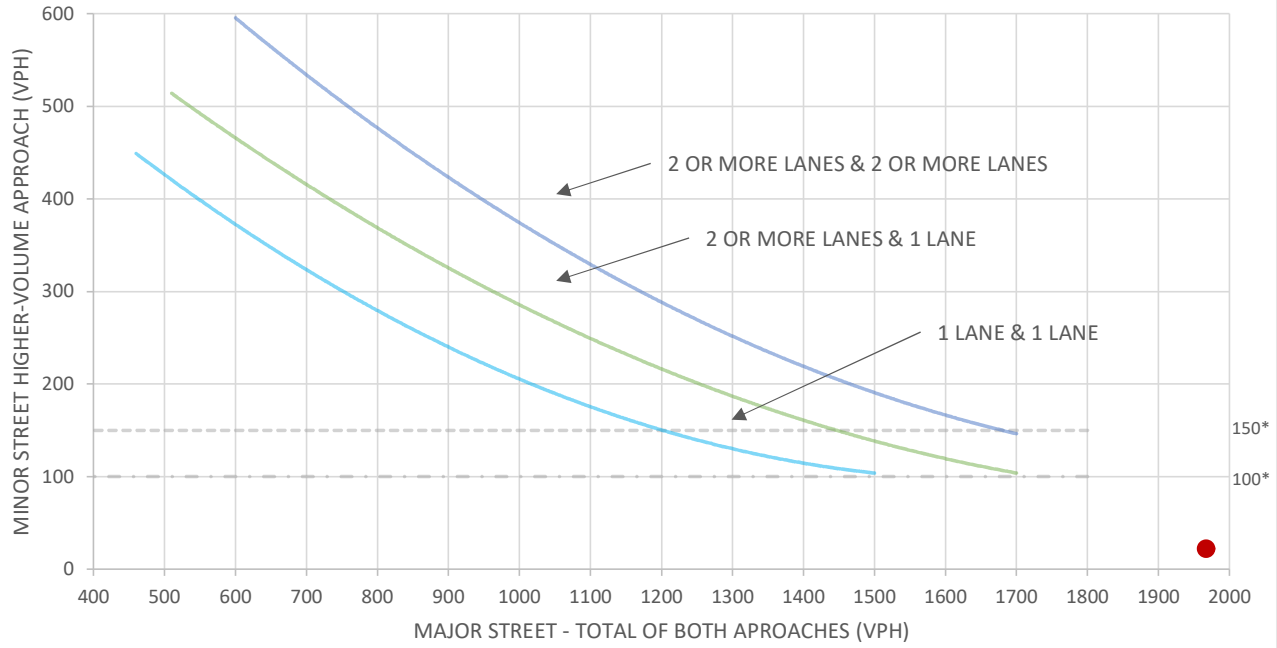
*Note: 150 vph applies as the lower threshold volumes for a minor-street approach with two or more lanes and a 100 vph applies as the lower threshold volumes for a minor-street approach with one lane.

	Major Street	**Minor Street**	**Warrant Met?**
	University Avenue	Adams Drive	
Number of Approach Lanes	2	1	**No**
Traffic Volume (VPH)*	1,786	78	

*Note:
Traffic volume for the Major Street approach is the total volume of both approaches.
Traffic volume for the Minor Street is the highest volume approach.

Project	1005 O'BRIEN/1320 WILLOW PROJECT	**Intersection #**	10	**N-S**	**E-W**
Scenario	Near-Term	**Major Street**	University Avenue	☑	☐
Peak Hour	AM	**Minor Street**	Adams Drive	☐	☑

Figure 4C-3. Warrant 3, Peak Hour



Source: California Manual on Uniform Traffic Control Devices, Caltrans, 2014.

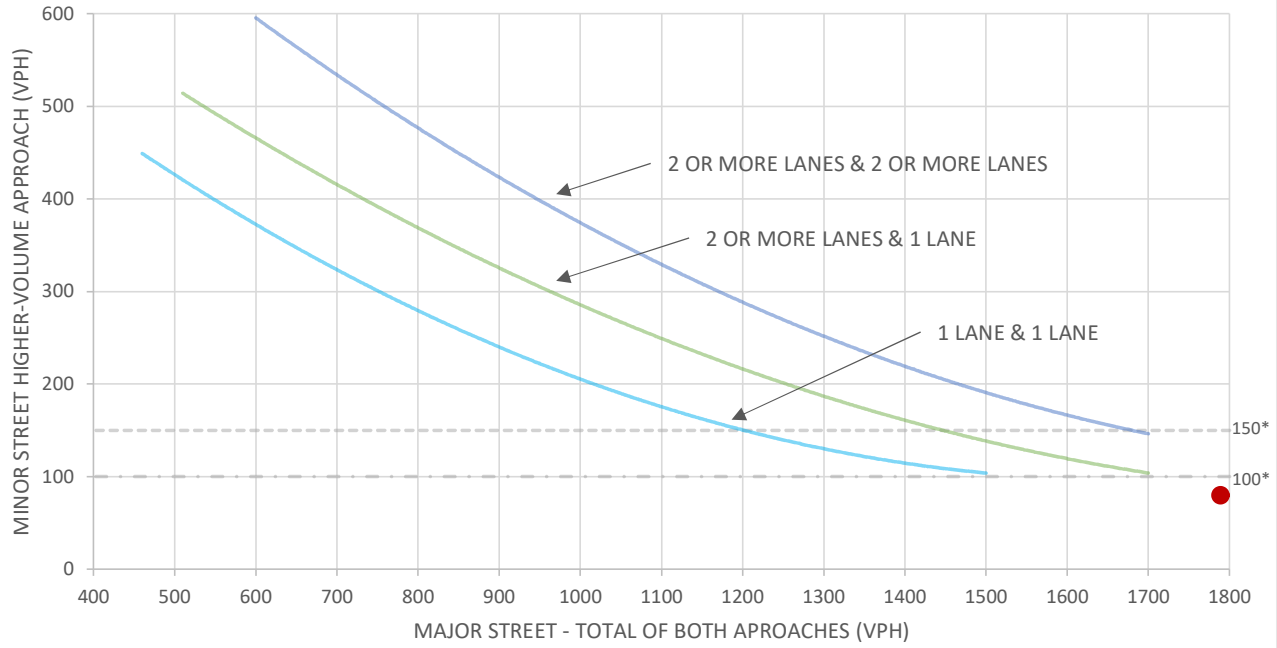
*Note: 150 vph applies as the lower threshold volumes for a minor-street approach with two or more lanes and a 100 vph applies as the lower threshold volumes for a minor-street approach with one lane.

	Major Street	**Minor Street**	**Warrant Met?**
	University Avenue	Adams Drive	
Number of Approach Lanes	2	1	**No**
Traffic Volume (VPH)*	1,967	22	

*Note:
Traffic volume for the Major Street approach is the total volume of both approaches.
Traffic volume for the Minor Street is the highest volume approach.

				N-S	E-W
Project	1005 O'BRIEN/1320 WILLOW PROJECT	**Intersection #**	10	☑	☐
Scenario	Near-Term	**Major Street**	University Avenue		
Peak Hour	PM	**Minor Street**	Adams Drive	☐	☑

Figure 4C-3. Warrant 3, Peak Hour



Source: California Manual on Uniform Traffic Control Devices, Caltrans, 2014.

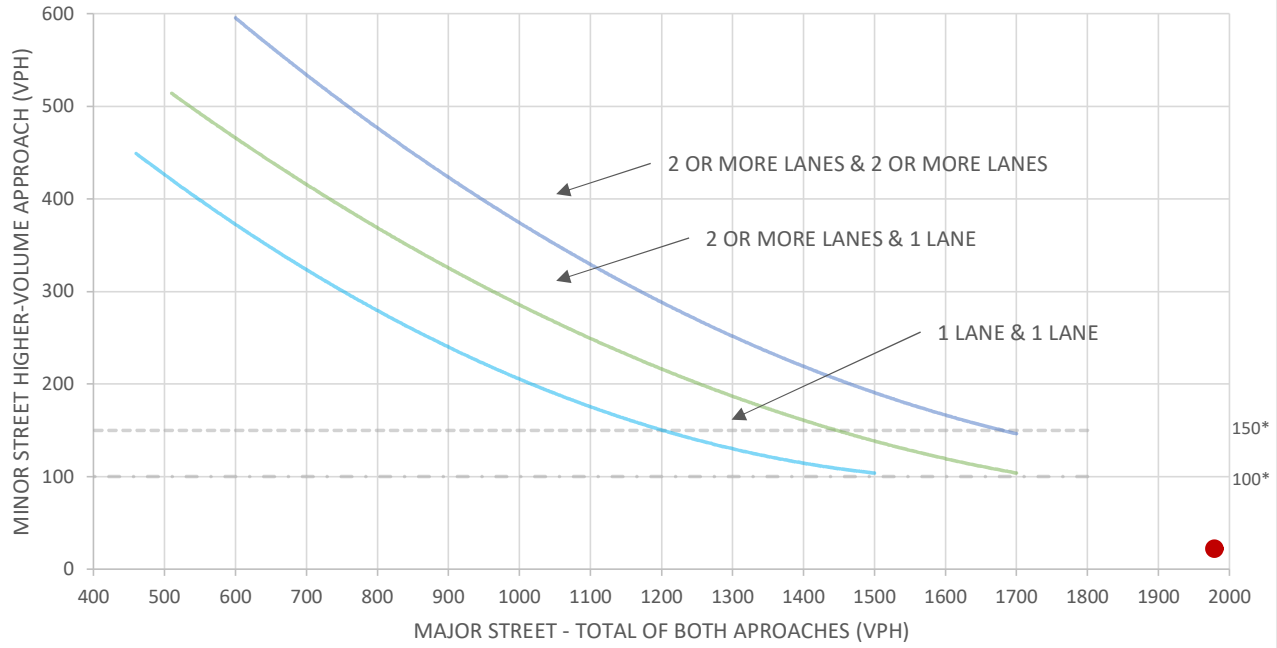
*Note: 150 vph applies as the lower threshold volumes for a minor-street approach with two or more lanes and a 100 vph applies as the lower threshold volumes for a minor-street approach with one lane.

	Major Street	**Minor Street**	**Warrant Met?**
	University Avenue	Adams Drive	
Number of Approach Lanes	2	1	**No**
Traffic Volume (VPH)*	1,789	80	

*Note:
Traffic volume for the Major Street approach is the total volume of both approaches.
Traffic volume for the Minor Street is the highest volume approach.

				N-S	E-W
Project	1005 O'BRIEN/1320 WILLOW PROJECT	**Intersection #**	10	☑	☐
Scenario	Near Term + Project	**Major Street**	University Avenue		
Peak Hour	AM	**Minor Street**	Adams Drive	☐	☑

Figure 4C-3. Warrant 3, Peak Hour



Source: California Manual on Uniform Traffic Control Devices, Caltrans, 2014.

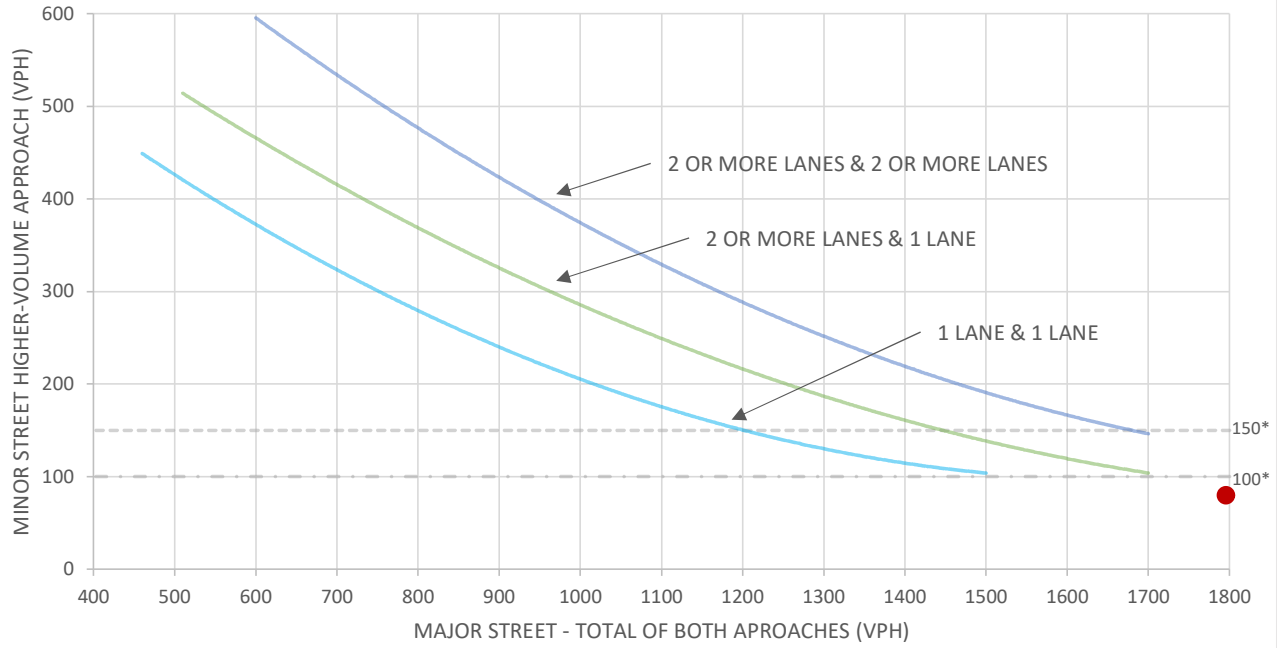
*Note: 150 vph applies as the lower threshold volumes for a minor-street approach with two or more lanes and a 100 vph applies as the lower threshold volumes for a minor-street approach with one lane.

	Major Street	**Minor Street**	**Warrant Met?**
	University Avenue	Adams Drive	
Number of Approach Lanes	2	1	**No**
Traffic Volume (VPH)*	1,979	22	

*Note:
Traffic volume for the Major Street approach is the total volume of both approaches.
Traffic volume for the Minor Street is the highest volume approach.

				N-S	E-W
Project	1005 O'BRIEN/1320 WILLOW PROJECT	**Intersection #**	10	☑	☐
Scenario	Near-Term plus Project	**Major Street**	University Avenue		
Peak Hour	PM	**Minor Street**	Adams Drive	☐	☑

Figure 4C-3. Warrant 3, Peak Hour



Source: California Manual on Uniform Traffic Control Devices, Caltrans, 2014.

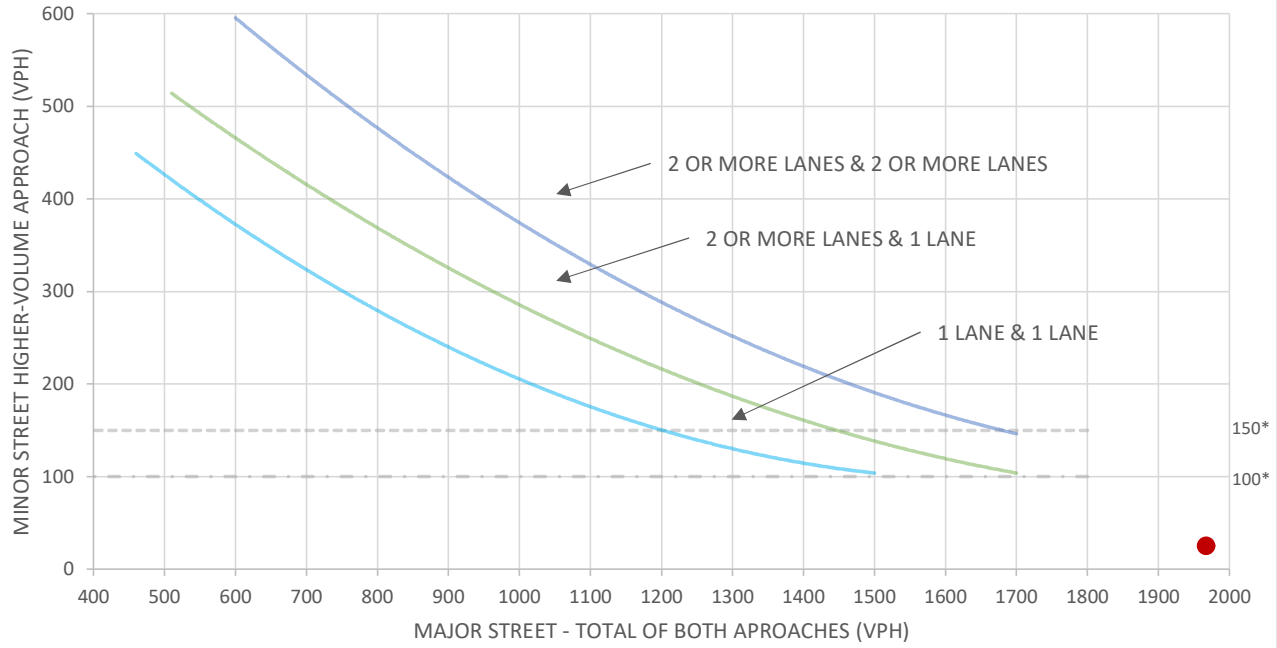
*Note: 150 vph applies as the lower threshold volumes for a minor-street approach with two or more lanes and a 100 vph applies as the lower threshold volumes for a minor-street approach with one lane.

	Major Street	Minor Street	Warrant Met?
	University Avenue	Adams Drive	
Number of Approach Lanes	2	1	**No**
Traffic Volume (VPH)*	1,796	80	

*Note:
Traffic volume for the Major Street approach is the total volume of both approaches.
Traffic volume for the Minor Street is the highest volume approach.

				N-S	E-W
Project	1005 O'BRIEN/1320 WILLOW PROJECT	**Intersection #**	10	☑	☐
Scenario	2040	**Major Street**	University Avenue		
Peak Hour	AM	**Minor Street**	Adams Drive	☐	☑

Figure 4C-3. Warrant 3, Peak Hour



Source: California Manual on Uniform Traffic Control Devices, Caltrans, 2014.

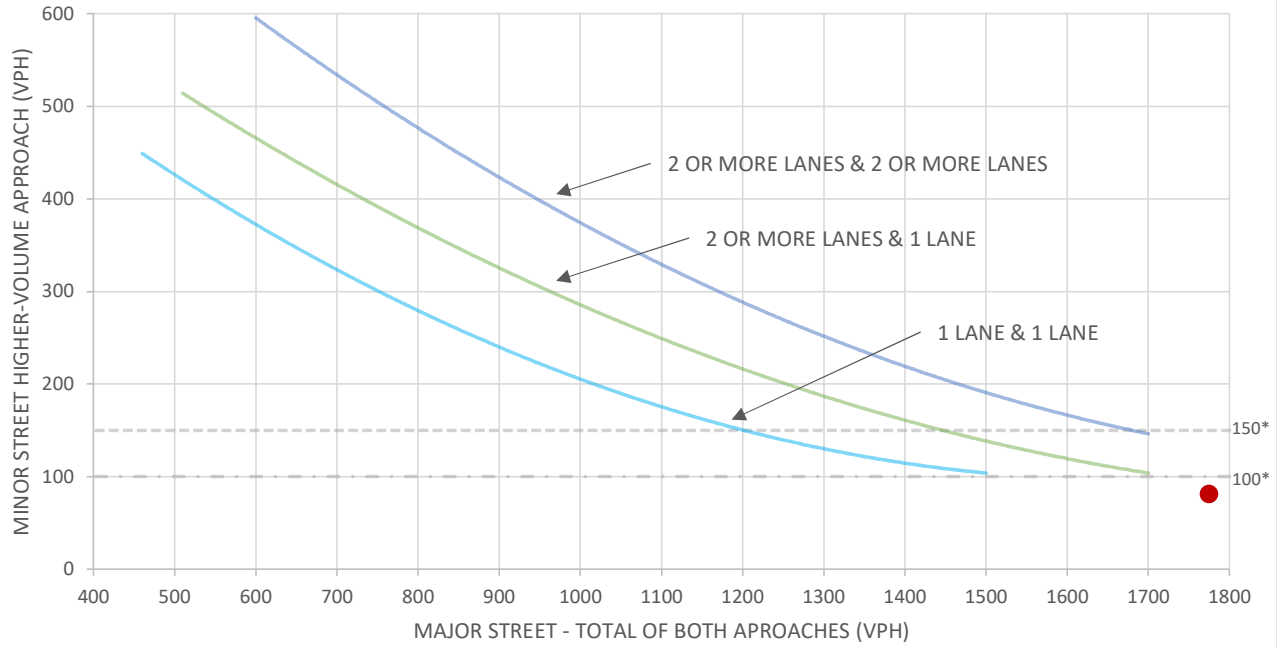
*Note: 150 vph applies as the lower threshold volumes for a minor-street approach with two or more lanes and a 100 vph applies as the lower threshold volumes for a minor-street approach with one lane.

	Major Street	Minor Street	Warrant Met?
	University Avenue	Adams Drive	
Number of Approach Lanes	2	1	**No**
Traffic Volume (VPH)*	1,967	25	

*Note:
Traffic volume for the Major Street approach is the total volume of both approaches.
Traffic volume for the Minor Street is the highest volume approach.

				N-S	E-W
Project	1005 O'BRIEN/1320 WILLOW PROJECT	**Intersection #**	10	☑	☐
Scenario	2040	**Major Street**	University Avenue		
Peak Hour	PM	**Minor Street**	Adams Drive	☐	☑

Figure 4C-3. Warrant 3, Peak Hour



Source: California Manual on Uniform Traffic Control Devices, Caltrans, 2014.

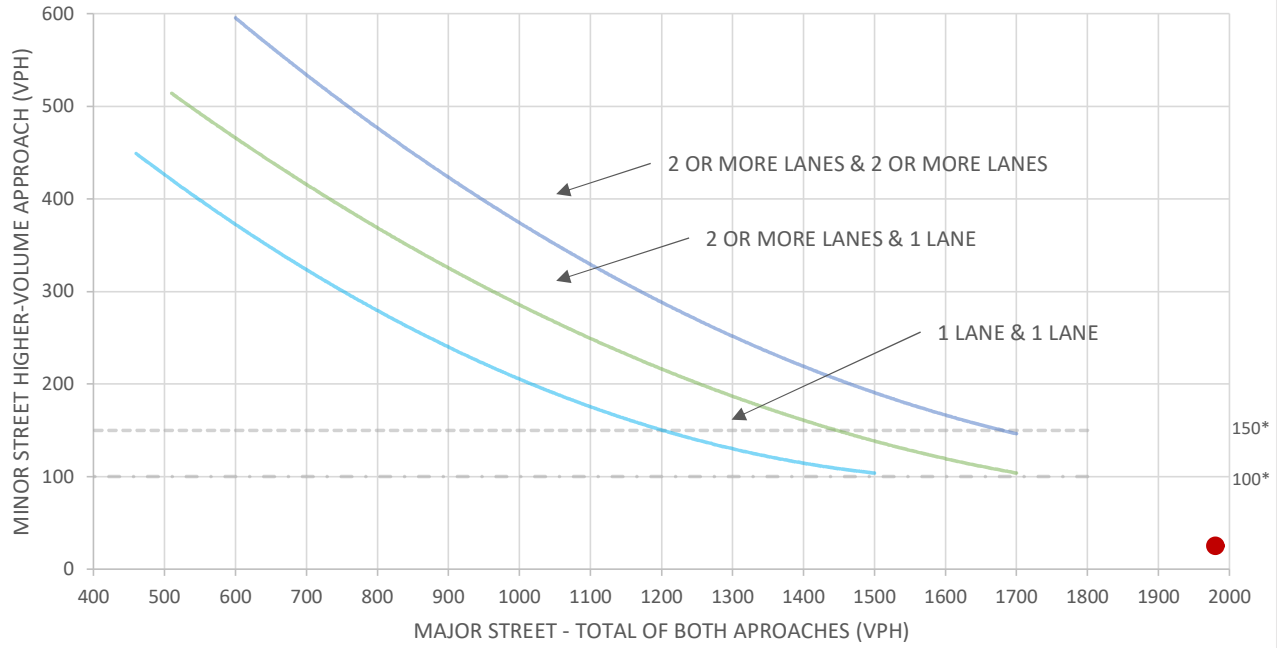
*Note: 150 vph applies as the lower threshold volumes for a minor-street approach with two or more lanes and a 100 vph applies as the lower threshold volumes for a minor-street approach with one lane.

	Major Street	**Minor Street**	**Warrant Met?**
	University Avenue	Adams Drive	
Number of Approach Lanes	2	1	**No**
Traffic Volume (VPH)*	1,775	81	

*Note:
Traffic volume for the Major Street approach is the total volume of both approaches.
Traffic volume for the Minor Street is the highest volume approach.

				N-S	E-W
Project	1005 O'BRIEN/1320 WILLOW PROJECT	**Intersection #**	10	☑	☐
Scenario	2040 plus Project	**Major Street**	University Avenue		
Peak Hour	AM	**Minor Street**	Adams Drive	☐	☑

Figure 4C-3. Warrant 3, Peak Hour



Source: California Manual on Uniform Traffic Control Devices, Caltrans, 2014.

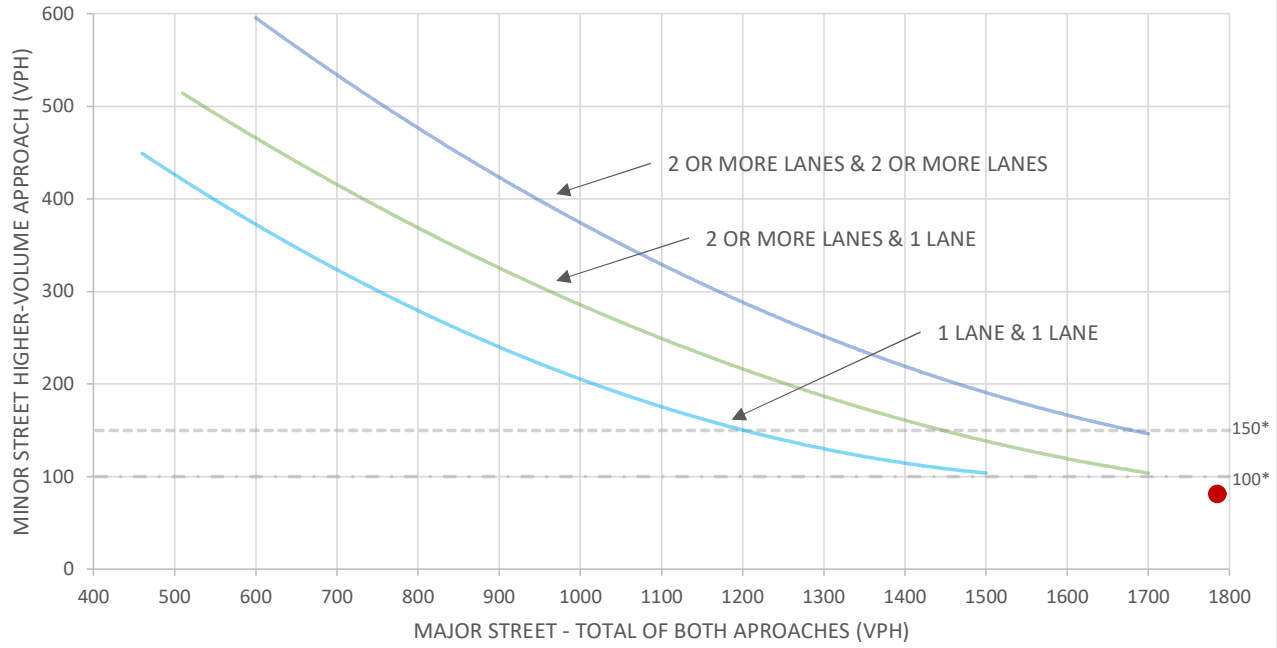
*Note: 150 vph applies as the lower threshold volumes for a minor-street approach with two or more lanes and a 100 vph applies as the lower threshold volumes for a minor-street approach with one lane.

	Major Street	**Minor Street**	**Warrant Met?**
	University Avenue	Adams Drive	
Number of Approach Lanes	2	1	**No**
Traffic Volume (VPH)*	1,980	25	

*Note:
Traffic volume for the Major Street approach is the total volume of both approaches.
Traffic volume for the Minor Street is the highest volume approach.

				N-S	E-W
Project	1005 O'BRIEN/1320 WILLOW PROJECT	**Intersection #**	10	☑	☐
Scenario	2040 plus Project	**Major Street**	University Avenue		
Peak Hour	PM	**Minor Street**	Adams Drive	☐	☑

Figure 4C-3. Warrant 3, Peak Hour



Source: California Manual on Uniform Traffic Control Devices, Caltrans, 2014.

*Note: 150 vph applies as the lower threshold volumes for a minor-street approach with two or more lanes and a 100 vph applies as the lower threshold volumes for a minor-street approach with one lane.

	Major Street	**Minor Street**	**Warrant Met?**
	University Avenue	Adams Drive	
Number of Approach Lanes	2	1	**No**
Traffic Volume (VPH)*	1,785	81	

*Note:
Traffic volume for the Major Street approach is the total volume of both approaches.
Traffic volume for the Minor Street is the highest volume approach.

Appendix D

Intersection LOS Worksheets
(with Recommended Improvements)

1005 O'Brien Drive and 1320 Willow Road

Vistro File: P:\...\OBrien_Willow_AM_Revised_V3.vistro
Scenario 21 IMP_ Near-term + Project AM (2027)
Report File: P:\...\IMP_NT+P_AM_v3.pdf
3/18/2025

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1000	Bayfront Expy (SR 84)/Willow Rd (SR 114)	Signalized	HCM 7th Edition	NB Left	0.848	44.8	D
2000	Willow Rd (SR 114)/Hamilton Ave	Signalized	HCM 7th Edition	SB Left	1.579	232.6	F
4000	Willow Rd (SR 114)/O'Brien Dr	Signalized	HCM 7th Edition	WB Left	0.894	45.9	D
5000	Willow Rd (SR 114) /Newbridge St	Signalized	HCM 7th Edition	SB Right	1.333	162.0	F
8000	O'Brien Drive/Kavanaugh Drive	All-way stop	HCM 7th Edition	SB Thru	1.268	84.8	F

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1000: Bayfront Expy (SR 84)/Willow Rd (SR 114)

Control Type:	Signalized	Delay (sec / veh):	44.8
Analysis Method:	HCM 7th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.848

Intersection Setup

Name	Willow Road (SR 114)			Willow Road			Bayfront Expy (SR 84)			Bayfront Expy (SR 84)		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	3	0	1	0	0	0	2	0	1	2	0	1
Entry Pocket Length [ft]	265.00	100.00	200.00	100.00	100.00	100.00	530.00	100.00	630.00	1500.00	100.00	600.00
No. of Lanes in Exit Pocket	0	0	1	0	0	0	0	0	1	0	0	1
Exit Pocket Length [ft]	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	100.00
Speed [mph]	40.00			20.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			No			Yes			No		

Volumes

Name	Willow Road (SR 114)			Willow Road			Bayfront Expy (SR 84)			Bayfront Expy (SR 84)		
Base Volume Input [veh/h]	93	208	414	10	28	27	62	733	161	829	2172	41
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	4	0	3	0	0	0	0	0	20	13	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	16	0	0	106	0	0	0
Total Hourly Volume [veh/h]	97	208	417	10	28	11	62	733	75	842	2172	41
Peak Hour Factor	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	26	55	111	3	7	3	17	195	20	224	579	11
Total Analysis Volume [veh/h]	103	222	445	11	30	12	66	781	80	898	2316	44
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			2			3			0		
v_di, Inbound Pedestrian Volume crossing m	0			3			2			0		
v_co, Outbound Pedestrian Volume crossing	4			0			3			0		
v_ci, Inbound Pedestrian Volume crossing mi	3			0			4			0		
v_ab, Corner Pedestrian Volume [ped/h]	12			0			0			1		
Bicycle Volume [bicycles/h]	2			0			0			1		

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	180
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	17.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Protecte	Permiss	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	7	4	4	3	8	0	1	6	0	5	2	0
Auxiliary Signal Groups			4,5									
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	13	12	12	15	15	0	6	11	0	11	10	0
Maximum Green [s]	22	15	15	9	9	0	26	40	0	25	30	0
Amber [s]	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	1.0	1.0	1.0	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	39	36	36	22	19	0	13	70	0	52	109	0
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	5	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	27	27	0	10	0	0	10	0	0	37	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
l1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall	No	No	No	No	No		No	No		No	No	
Maximum Recall	No	No	No	No	No		No	No		No	No	
Pedestrian Recall	No	No	No	No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
C, Cycle Length [s]	180	180	180	180	180	180	180	180	180	180	180	180
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	0.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	25	32	79	6	13	13	9	83	83	43	117	117
g / C, Green / Cycle	0.14	0.18	0.44	0.04	0.07	0.07	0.05	0.46	0.46	0.24	0.65	0.65
(v / s)_i Volume / Saturation Flow Rate	0.13	0.14	0.24	0.01	0.01	0.01	0.04	0.34	0.11	0.21	0.56	0.03
s, saturation flow rate [veh/h]	797	1593	1877	937	3560	1557	1547	2279	711	4232	4155	1281
c, Capacity [veh/h]	110	283	818	33	264	116	78	1053	329	1000	2694	830
d1, Uniform Delay [s]	76.67	70.70	37.43	84.72	77.73	77.66	84.76	39.58	29.31	66.59	25.13	11.52
k, delay calibration	0.21	0.11	0.11	0.11	0.11	0.11	0.11	0.50	0.50	0.11	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	40.70	4.79	0.57	5.80	0.19	0.39	21.63	4.71	1.75	3.21	3.86	0.12
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.93	0.79	0.54	0.33	0.11	0.10	0.85	0.74	0.24	0.90	0.86	0.05
d, Delay for Lane Group [s/veh]	117.37	75.49	38.00	90.52	77.92	78.05	106.39	44.29	31.07	69.79	28.99	11.64
Lane Group LOS	F	E	D	F	E	E	F	D	C	E	C	B
Critical Lane Group	No	No	Yes	Yes	No	No	Yes	No	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	5.94	5.06	4.86	0.56	0.67	0.54	1.77	9.97	2.33	13.70	26.61	0.70
50th-Percentile Queue Length [ft/ln]	148.62	126.46	121.55	14.07	16.75	13.56	44.26	249.35	58.13	342.52	665.15	17.44
95th-Percentile Queue Length [veh/ln]	9.94	8.75	8.48	1.01	1.21	0.98	3.19	15.15	4.19	19.77	35.07	1.26
95th-Percentile Queue Length [ft/ln]	248.58	218.68	211.95	25.33	30.15	24.41	79.66	378.83	104.64	494.28	876.63	31.40

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	117.37	75.49	38.00	90.52	77.92	78.05	106.39	44.29	31.07	69.79	28.99	11.64
Movement LOS	F	E	D	F	E	E	F	D	C	E	C	B
d_A, Approach Delay [s/veh]	59.43			80.57			47.57			40.00		
Approach LOS	E			F			D			D		
d_I, Intersection Delay [s/veh]	44.82											
Intersection LOS	D											
Intersection V/C	0.848											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	0.0	9.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	667.83	0.00	1006.19	0.00
d_p, Pedestrian Delay [s]	81.19	0.00	81.19	0.00
l_p,int, Pedestrian LOS Score for Intersectio	3.208	0.000	3.450	0.000
Crosswalk LOS	C	F	C	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	356	167	734	1167
d_b, Bicycle Delay [s]	60.87	75.59	36.07	15.61
l_b,int, Bicycle LOS Score for Intersection	2.195	1.617	2.128	3.352
Bicycle LOS	B	A	B	C

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 2000: Willow Rd (SR 114)/Hamilton Ave

Control Type:	Signalized	Delay (sec / veh):	232.6
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.579

Intersection Setup

Name	Willow Road (SR 114)			Willow Road (SR 114)			Hamilton Avenue			Hamilton Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			30.00			25.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Willow Road (SR 114)			Willow Road (SR 114)			Hamilton Avenue			Hamilton Avenue		
Base Volume Input [veh/h]	125	690	74	495	784	18	59	16	73	16	6	155
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	1	7	0	0	33	0	0	0	3	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	126	697	74	495	817	18	59	16	76	16	6	155
Peak Hour Factor	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	32	179	19	127	209	5	15	4	19	4	2	40
Total Analysis Volume [veh/h]	129	714	76	507	837	18	60	16	78	16	6	159
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	6			57			5			57		
v_di, Inbound Pedestrian Volume crossing m	5			57			6			57		
v_co, Outbound Pedestrian Volume crossing	5			18			18			6		
v_ci, Inbound Pedestrian Volume crossing mi	6			18			18			5		
v_ab, Corner Pedestrian Volume [ped/h]	5			6			13			5		
Bicycle Volume [bicycles/h]	1			1			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	48
Active Pattern	Free Running
Coordination Type	*Free Running*
Actuation Type	*Fully actuated*
Offset [s]	8.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	1	6	2	5	2	6	4	8	4	8	4	8
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lag	-	-	Lag	-	-	Lag	-	-
Minimum Green [s]	4	10	10	4	10	10	4	4	4	4	4	4
Maximum Green [s]	21	30	30	21	30	30	26	26	26	26	26	26
Amber [s]	3.0	4.4	4.4	3.0	4.4	4.4	3.6	3.7	3.6	3.7	3.6	3.7
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	0	30	38	0	38	30	30	0	30	0	30	0
Vehicle Extension [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walk [s]	0	4	4	0	4	4	4	4	4	4	4	4
Pedestrian Clearance [s]	0	19	15	0	15	19	25	25	25	25	25	25
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	1.0	2.4	2.4	1.0	2.4	2.4	1.6	1.7	1.6	1.7	1.6	1.7
Minimum Recall	No	Yes		No	Yes			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	6.0	6.0	6.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	C	L	C
C, Cycle Length [s]	88	88	88	88	88	88	88	88	88
L, Total Lost Time per Cycle [s]	3.00	4.40	4.40	3.00	4.40	4.40	3.70	3.60	3.60
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.00	0.00
l2, Clearance Lost Time [s]	1.00	2.40	2.40	1.00	2.40	2.40	1.70	0.00	1.60
g_i, Effective Green Time [s]	15	30	30	21	36	36	26	26	26
g / C, Green / Cycle	0.17	0.34	0.34	0.24	0.40	0.40	0.30	0.30	0.30
(v / s)_i Volume / Saturation Flow Rate	0.16	0.48	0.48	0.54	0.44	0.44	0.39	0.03	0.19
s, saturation flow rate [veh/h]	797	837	802	937	984	974	392	565	859
c, Capacity [veh/h]	140	285	273	223	397	393	173	83	254
d1, Uniform Delay [s]	35.72	29.05	29.05	33.55	26.29	26.29	37.08	22.10	27.00
k, delay calibration	0.18	0.50	0.50	0.50	0.50	0.50	0.50	0.04	0.14
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	29.24	204.17	210.09	585.19	68.45	70.32	44.86	0.41	3.68
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.92	1.41	1.42	2.27	1.08	1.09	0.89	0.19	0.65
d, Delay for Lane Group [s/veh]	64.96	233.22	239.14	618.74	94.74	96.61	81.94	22.52	30.69
Lane Group LOS	E	F	F	F	F	F	F	C	C
Critical Lane Group	No	No	Yes	Yes	No	No	Yes	No	No
50th-Percentile Queue Length [veh/ln]	3.73	21.69	21.23	40.94	15.33	15.37	5.51	0.25	3.23
50th-Percentile Queue Length [ft/ln]	93.27	542.14	530.83	1023.52	383.23	384.19	137.75	6.15	80.87
95th-Percentile Queue Length [veh/ln]	6.72	35.07	34.52	67.31	22.89	23.01	9.36	0.44	5.82
95th-Percentile Queue Length [ft/ln]	167.89	876.72	863.08	1682.65	572.31	575.17	233.99	11.07	145.57

Movement, Approach, & Intersection Results

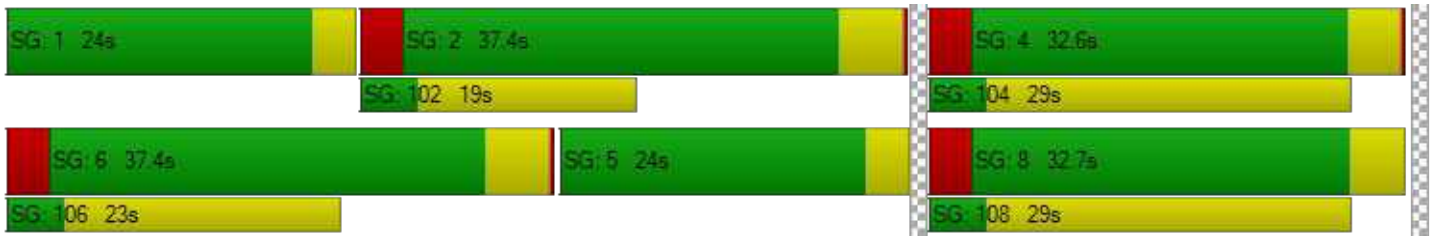
d_M, Delay for Movement [s/veh]	64.96	235.81	239.14	618.74	95.65	96.61	81.94	81.94	81.94	22.52	30.69	30.69
Movement LOS	E	F	F	F	F	F	F	F	F	C	C	C
d_A, Approach Delay [s/veh]	212.10			290.38			81.94			29.96		
Approach LOS	F			F			F			C		
d_I, Intersection Delay [s/veh]	232.59											
Intersection LOS	F											
Intersection V/C	1.579											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	687.23	55.67	206.32	615.03
d_p, Pedestrian Delay [s]	36.41	36.41	36.41	36.41
l_p,int, Pedestrian LOS Score for Intersectio	2.805	2.834	1.841	2.153
Crosswalk LOS	C	C	A	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	681	681	590	590
d_b, Bicycle Delay [s]	19.17	19.17	21.89	21.89
l_b,int, Bicycle LOS Score for Intersection	2.318	2.683	1.814	1.858
Bicycle LOS	B	B	A	A

Sequence

Ring 1	2	1	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 4000: Willow Rd (SR 114)/O'Brien Dr

Control Type:	Signalized	Delay (sec / veh):	45.9
Analysis Method:	HCM 7th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.894

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		O'Brien Drive	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	1	0	0	1
Entry Pocket Length [ft]	100.00	60.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	No		No		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		O'Brien Drive	
Base Volume Input [veh/h]	731	580	48	1011	446	49
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	11	42	40	0	11	5
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	742	622	88	1011	457	54
Peak Hour Factor	0.9510	0.9510	0.9510	0.9510	0.9510	0.9510
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	195	164	23	266	120	14
Total Analysis Volume [veh/h]	780	654	93	1063	481	57
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	13		0		14	
v_ci, Inbound Pedestrian Volume crossing mi	14		0		13	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	1		6		2	

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	160
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	93.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Permissive	Permissive	Protected	Permissive	Permissive	Permissive
Signal Group	2	2	1	6	4	8
Auxiliary Signal Groups						
Lead / Lag	-	-	Lead	-	Lead	-
Minimum Green [s]	10	10	5	10	8	0
Maximum Green [s]	35	35	21	35	21	0
Amber [s]	4.4	4.4	3.0	4.4	3.2	0.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	116	116	19	135	25	0
Vehicle Extension [s]	2.0	2.0	2.0	2.0	2.0	0.0
Walk [s]	4	4	0	0	0	0
Pedestrian Clearance [s]	17	17	0	0	0	0
Delayed Vehicle Green [s]	3.0	3.0	0.0	0.0	0.0	0.0
Rest In Walk	No			No	No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.4	2.4	1.0	2.4	1.2	0.0
Minimum Recall	Yes		No	Yes	No	
Maximum Recall	No		No	No	No	
Pedestrian Recall	No		No	No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	L	C	L	R
C, Cycle Length [s]	160	160	160	160	160	160
L, Total Lost Time per Cycle [s]	4.40	4.40	3.00	4.40	3.20	3.20
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.40	2.40	1.00	2.40	1.20	1.20
g_i, Effective Green Time [s]	117	117	10	131	22	22
g / C, Green / Cycle	0.73	0.73	0.06	0.82	0.14	0.14
(v / s)_i Volume / Saturation Flow Rate	0.49	0.43	0.05	0.67	0.18	0.05
s, saturation flow rate [veh/h]	1593	1528	1781	1593	2730	1236
c, Capacity [veh/h]	1170	1122	112	1300	372	169
d1, Uniform Delay [s]	11.06	9.59	74.03	8.13	69.03	62.45
k, delay calibration	0.50	0.50	0.04	0.50	0.14	0.04
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	3.02	2.21	5.76	5.80	137.22	0.44
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.67	0.58	0.83	0.82	1.29	0.34
d, Delay for Lane Group [s/veh]	14.08	11.81	79.79	13.93	206.25	62.89
Lane Group LOS	B	B	E	B	F	E
Critical Lane Group	No	No	No	Yes	Yes	No
50th-Percentile Queue Length [veh/ln]	6.96	10.10	3.94	8.76	14.74	2.14
50th-Percentile Queue Length [ft/ln]	174.05	252.50	98.40	219.08	368.62	53.48
95th-Percentile Queue Length [veh/ln]	11.29	15.31	7.08	13.62	23.32	3.85
95th-Percentile Queue Length [ft/ln]	282.24	382.80	177.12	340.45	583.11	96.27

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	14.08	11.81	79.79	13.93	206.25	62.89
Movement LOS	B	B	E	B	F	E
d_A, Approach Delay [s/veh]	13.04		19.23		191.06	
Approach LOS	B		B		F	
d_I, Intersection Delay [s/veh]	45.95					
Intersection LOS	D					
Intersection V/C	0.894					

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	72.16
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	2.473
Crosswalk LOS	F	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1358	1633	273
d_b, Bicycle Delay [s]	8.24	2.70	59.71
l_b,int, Bicycle LOS Score for Intersection	2.743	2.513	1.560
Bicycle LOS	B	B	A

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 5000: Willow Rd (SR 114)/Newbridge St

Control Type:	Signalized	Delay (sec / veh):	162.0
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.333

Intersection Setup

Name	Willow Road (SR 114)			Willow Road (SR 114)			Newbridge Street			Newbridge Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	1	0	0	1	0	0	0
Entry Pocket Length [ft]	390.00	100.00	100.00	185.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	1	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	49.21	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			25.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Willow Road (SR 114)			Willow Road (SR 114)			Newbridge Street			Newbridge Street		
Base Volume Input [veh/h]	175	1035	276	66	1358	20	22	136	364	349	97	123
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	51	0	1	10	0	-1	0	-1	0	0	3
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	44	0	0	34
Total Hourly Volume [veh/h]	175	1086	276	67	1368	20	21	136	319	349	97	92
Peak Hour Factor	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	47	294	75	18	371	5	6	37	86	95	26	25
Total Analysis Volume [veh/h]	190	1178	299	73	1484	22	23	148	346	379	105	100
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	2			2			3			3		
v_di, Inbound Pedestrian Volume crossing m	3			3			2			2		
v_co, Outbound Pedestrian Volume crossing	8			12			7			11		
v_ci, Inbound Pedestrian Volume crossing mi	7			11			8			12		
v_ab, Corner Pedestrian Volume [ped/h]	16			65			10			12		
Bicycle Volume [bicycles/h]	10			2			0			8		

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	160
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	97.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Split	Split	Split	Split	Split	Split
Signal Group	5	2	2	1	6	6	4	4	4	8	3	8
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	Lead	-	-	Lag	-	-	-	-	-
Minimum Green [s]	4	12	12	4	12	12	4	4	4	0	4	0
Maximum Green [s]	21	40	40	21	40	40	25	25	25	0	21	0
Amber [s]	3.0	4.4	4.4	3.0	4.4	4.4	3.6	3.6	3.6	0.0	3.0	0.0
All red [s]	0.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0
Split [s]	15	38	38	48	71	71	38	38	38	0	36	0
Vehicle Extension [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walk [s]	0	4	4	0	4	4	4	4	4	0	4	0
Pedestrian Clearance [s]	0	19	19	0	16	16	23	23	23	0	23	0
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	3.0	0.0	3.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	1.0	3.4	3.4	1.0	3.4	3.4	2.6	2.6	2.6	0.0	1.0	0.0
Minimum Recall	No	Yes		No	Yes			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	L	C	R	L	C	R
C, Cycle Length [s]	160	160	160	160	160	160	160	160	160	160	160	160
L, Total Lost Time per Cycle [s]	3.00	5.40	5.40	3.00	5.40	5.40	4.60	4.60	4.60	3.00	3.00	3.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.00	3.40	3.40	1.00	3.40	3.40	2.60	2.60	2.60	1.00	1.00	1.00
g_i, Effective Green Time [s]	12	69	69	8	66	66	33	33	33	33	33	33
g / C, Green / Cycle	0.08	0.43	0.43	0.05	0.41	0.41	0.21	0.21	0.21	0.21	0.21	0.21
(v / s)_i Volume / Saturation Flow Rate	0.11	0.28	0.29	0.04	0.62	0.62	0.02	0.09	0.26	0.24	0.13	0.15
s, saturation flow rate [veh/h]	1781	3560	1644	1781	1593	829	1528	1604	1334	1547	837	673
c, Capacity [veh/h]	134	1547	714	91	654	340	319	335	279	318	172	139
d1, Uniform Delay [s]	73.98	35.60	35.96	75.12	47.16	47.16	50.84	55.16	62.93	63.53	57.70	58.71
k, delay calibration	0.29	0.50	0.50	0.04	0.50	0.50	0.04	0.04	0.50	0.11	0.12	0.22
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	213.22	2.11	4.84	6.09	239.32	247.10	0.04	0.34	135.63	92.91	3.94	13.55
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	1.42	0.65	0.66	0.80	1.51	1.52	0.07	0.44	1.24	1.19	0.61	0.72
d, Delay for Lane Group [s/veh]	287.19	37.71	40.80	81.21	286.48	294.25	50.87	55.50	198.55	156.44	61.64	72.26
Lane Group LOS	F	D	D	F	F	F	D	E	F	F	E	E
Critical Lane Group	Yes	No	No	No	No	Yes	No	No	Yes	Yes	No	No
50th-Percentile Queue Length [veh/ln]	13.38	15.67	15.52	3.16	34.79	36.95	0.76	5.29	21.79	10.60	4.08	4.29
50th-Percentile Queue Length [ft/ln]	334.44	391.76	387.99	79.04	869.76	923.87	18.91	132.31	544.70	265.04	101.97	107.29
95th-Percentile Queue Length [veh/ln]	21.57	22.16	21.98	5.69	55.72	58.91	1.36	9.07	32.81	17.29	7.34	7.69
95th-Percentile Queue Length [ft/ln]	539.13	554.06	549.51	142.27	1392.92	1472.69	34.05	226.63	820.37	432.22	183.55	192.23

Movement, Approach, & Intersection Results

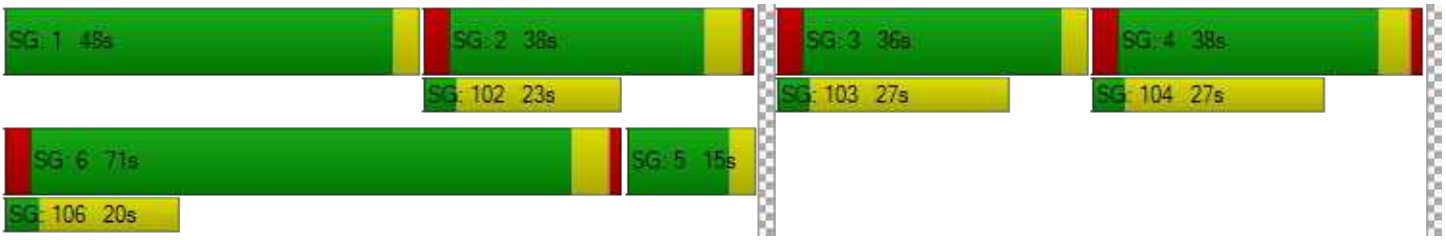
d_M, Delay for Movement [s/veh]	287.19	38.17	40.80	81.21	289.07	294.25	50.87	55.50	198.55	156.44	61.64	72.26
Movement LOS	F	D	D	F	F	F	D	E	F	F	E	E
d_A, Approach Delay [s/veh]	67.03			279.53			151.03			124.98		
Approach LOS	E			F			F			F		
d_I, Intersection Delay [s/veh]	161.99											
Intersection LOS	F											
Intersection V/C	1.333											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	48.85	178.27	931.34	168.17
d_p, Pedestrian Delay [s]	72.19	72.19	72.19	72.19
l_p,int, Pedestrian LOS Score for Intersectio	3.391	2.961	2.437	2.599
Crosswalk LOS	C	C	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	370	783	380	375
d_b, Bicycle Delay [s]	53.40	29.67	52.48	53.02
l_b,int, Bicycle LOS Score for Intersection	2.476	2.428	2.485	2.579
Bicycle LOS	B	B	B	B

Sequence

Ring 1	2	1	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 8000: O'Brien Drive/Kavanaugh Drive

Control Type:	All-way stop	Delay (sec / veh):	84.8
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.268

Intersection Setup

Name	O'Brien Drive		O'Brien Drive		Kavanaugh Drive	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	O'Brien Drive		O'Brien Drive		Kavanaugh Drive	
Base Volume Input [veh/h]	404	90	64	662	75	182
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	3	0	12	5	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	404	93	64	674	80	182
Peak Hour Factor	0.9340	0.9340	0.9340	0.9340	0.9340	0.9340
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	108	25	17	180	21	49
Total Analysis Volume [veh/h]	433	100	69	722	86	195
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	612	527	722	554
Degree of Utilization, x	0.87	0.13	1.27	0.51

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	10.05	0.45	28.57	2.85
95th-Percentile Queue Length [ft]	251.16	11.22	714.27	71.34
Approach Delay [s/veh]	36.00	142.02		16.02
Approach LOS	E	F		C
Intersection Delay [s/veh]	84.75			
Intersection LOS	F			

1005 O'Brien Drive and 1320 Willow Road

Vistro File: P:\...\OBrien_Willow_PM_Revised_V3.vistro
Scenario 21 IMP_Near-term + Project PM (2027)
Report File: P:\...\IMP_NT+P_PM_v3.pdf
3/18/2025

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
3000	Willow Rd (SR 114)/Ivy Dr	Signalized	HCM 7th Edition	NB Left	1.071	45.2	D
4000	Willow Rd (SR 114)/O'Brien Dr	Signalized	HCM 7th Edition	WB Left	1.650	230.8	F
5000	Willow Rd (SR 114) /Newbridge St	Signalized	HCM 7th Edition	NB Left	1.126	175.7	F
9000	Bayfront Expy (SR 84) /University Ave (SR 109)	Signalized	HCM 7th Edition	NB Right	0.703	46.1	D

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 3000: Willow Rd (SR 114)/Ivy Dr

Control Type:	Signalized	Delay (sec / veh):	45.2
Analysis Method:	HCM 7th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.071

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		Ivy Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	1
Entry Pocket Length [ft]	85.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	1	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	100.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		Ivy Drive	
Base Volume Input [veh/h]	101	1381	801	99	34	79
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	2	40	5	0	0	1
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	103	1421	806	99	34	80
Peak Hour Factor	0.9670	0.9670	0.9670	0.9670	0.9670	0.9670
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	27	367	208	26	9	21
Total Analysis Volume [veh/h]	107	1469	834	102	35	83
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	3		7		2	
v_di, Inbound Pedestrian Volume crossing m	2		6		3	
v_co, Outbound Pedestrian Volume crossing	6		3		3	
v_ci, Inbound Pedestrian Volume crossing mi	7		3		3	
v_ab, Corner Pedestrian Volume [ped/h]	9		10		5	
Bicycle Volume [bicycles/h]	0		4		1	

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	10.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Overlap
Signal Group	5	2	6	6	4	4
Auxiliary Signal Groups						4,5
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	4	10	10	10	11	11
Maximum Green [s]	21	30	30	30	28	28
Amber [s]	3.0	4.4	4.4	4.4	3.0	3.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	38	108	70	70	37	37
Vehicle Extension [s]	2.0	2.0	2.0	2.0	2.0	2.0
Walk [s]	0	0	4	4	4	4
Pedestrian Clearance [s]	0	0	22	22	24	24
Delayed Vehicle Green [s]	0.0	0.0	3.0	3.0	3.0	3.0
Rest In Walk		No	No		No	
l1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0
l2, Clearance Lost Time [s]	1.0	2.4	2.4	2.4	1.0	1.0
Minimum Recall	No	Yes	Yes		No	No
Maximum Recall	No	No	No		No	No
Pedestrian Recall	No	No	No		No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	L	R
C, Cycle Length [s]	145	145	145	145	145	145
L, Total Lost Time per Cycle [s]	3.00	4.40	4.40	4.40	3.00	3.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.00	2.40	2.40	2.40	1.00	0.00
g_i, Effective Green Time [s]	14	124	107	107	13	30
g / C, Green / Cycle	0.10	0.86	0.74	0.74	0.09	0.21
(v / s)_i Volume / Saturation Flow Rate	0.08	0.92	0.56	0.58	0.04	0.09
s, saturation flow rate [veh/h]	1265	1593	837	802	987	912
c, Capacity [veh/h]	123	1365	618	593	91	191
d1, Uniform Delay [s]	64.53	10.37	11.19	11.83	61.91	49.72
k, delay calibration	0.04	0.50	0.50	0.50	0.04	0.04
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	7.12	47.73	8.41	10.24	0.99	0.58
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.87	1.08	0.76	0.79	0.38	0.43
d, Delay for Lane Group [s/veh]	71.65	58.10	19.60	22.07	62.90	50.30
Lane Group LOS	E	F	B	C	E	D
Critical Lane Group	No	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	4.10	20.62	9.06	9.74	1.25	2.67
50th-Percentile Queue Length [ft/ln]	102.54	515.60	226.61	243.55	31.17	66.74
95th-Percentile Queue Length [veh/ln]	7.38	29.95	14.00	14.86	2.24	4.80
95th-Percentile Queue Length [ft/ln]	184.57	748.67	350.05	371.52	56.10	120.12

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	71.65	58.10	20.69	22.07	62.90	50.30
Movement LOS	E	F	C	C	E	D
d_A, Approach Delay [s/veh]	59.02		20.84		54.04	
Approach LOS	E		C		D	
d_I, Intersection Delay [s/veh]	45.21					
Intersection LOS	D					
Intersection V/C	1.071					

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	866.29	420.42	678.16
d_p, Pedestrian Delay [s]	64.69	64.69	64.69
l_p,int, Pedestrian LOS Score for Intersectio	2.973	2.949	2.235
Crosswalk LOS	C	C	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1430	864	428
d_b, Bicycle Delay [s]	5.90	23.44	44.81
l_b,int, Bicycle LOS Score for Intersection	2.860	2.332	1.560
Bicycle LOS	C	B	A

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 4000: Willow Rd (SR 114)/O'Brien Dr

Control Type:	Signalized	Delay (sec / veh):	230.8
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.650

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		O'Brien Drive	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	1	0	0	1
Entry Pocket Length [ft]	100.00	60.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	1	0	1	0	0
Exit Pocket Length [ft]	0.00	100.00	0.00	100.00	0.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	No		No		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		O'Brien Drive	
Base Volume Input [veh/h]	1407	350	28	873	441	17
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	3	5	6	0	51	24
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	1410	355	34	873	492	41
Peak Hour Factor	0.9860	0.9860	0.9860	0.9860	0.9860	0.9860
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	358	90	9	221	125	10
Total Analysis Volume [veh/h]	1430	360	34	885	499	42
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	5		0		5	
v_ci, Inbound Pedestrian Volume crossing mi	5		0		5	
v_ab, Corner Pedestrian Volume [ped/h]	3		0		13	
Bicycle Volume [bicycles/h]	2		0		4	

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	10.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Permissive	Permissive	Protected	Permissive	Permissive	Permissive
Signal Group	2	2	1	6	4	8
Auxiliary Signal Groups						
Lead / Lag	-	-	Lead	-	Lead	-
Minimum Green [s]	10	10	5	10	8	0
Maximum Green [s]	35	35	21	35	21	0
Amber [s]	4.4	4.4	3.0	4.4	3.2	0.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	100	100	15	115	30	0
Vehicle Extension [s]	2.0	2.0	2.0	2.0	2.0	0.0
Walk [s]	4	4	0	0	0	0
Pedestrian Clearance [s]	17	17	0	0	0	0
Delayed Vehicle Green [s]	3.0	3.0	0.0	0.0	0.0	0.0
Rest In Walk	No			No	No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.4	2.4	1.0	2.4	1.2	0.0
Minimum Recall	Yes		No	Yes	No	
Maximum Recall	No		No	No	No	
Pedestrian Recall	No		No	No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	L	C	L	R
C, Cycle Length [s]	145	145	145	145	145	145
L, Total Lost Time per Cycle [s]	4.40	4.40	3.00	4.40	3.20	3.20
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.40	2.40	1.00	2.40	1.20	1.20
g_i, Effective Green Time [s]	101	101	6	111	27	27
g / C, Green / Cycle	0.70	0.70	0.04	0.76	0.18	0.18
(v / s)_i Volume / Saturation Flow Rate	1.10	0.64	0.05	0.68	0.40	0.07
s, saturation flow rate [veh/h]	1302	565	647	1293	1256	568
c, Capacity [veh/h]	908	394	29	986	232	105
d1, Uniform Delay [s]	21.93	17.42	69.24	12.93	59.08	51.93
k, delay calibration	0.50	0.50	0.04	0.50	0.50	0.04
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	263.77	28.03	105.73	12.55	531.28	0.92
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	1.57	0.91	1.18	0.90	2.15	0.40
d, Delay for Lane Group [s/veh]	285.70	45.45	174.97	25.48	590.36	52.85
Lane Group LOS	F	D	F	C	F	D
Critical Lane Group	Yes	No	Yes	No	Yes	No
50th-Percentile Queue Length [veh/ln]	46.52	11.41	1.91	10.44	21.40	1.38
50th-Percentile Queue Length [ft/ln]	1163.06	285.26	47.70	260.93	534.90	34.57
95th-Percentile Queue Length [veh/ln]	76.77	16.95	3.43	15.74	36.43	2.49
95th-Percentile Queue Length [ft/ln]	1919.33	423.76	85.86	393.39	910.79	62.23

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	285.70	45.45	174.97	25.48	590.36	52.85
Movement LOS	F	D	F	C	F	D
d_A, Approach Delay [s/veh]	237.38		31.01		548.63	
Approach LOS	F		C		F	
d_I, Intersection Delay [s/veh]	230.84					
Intersection LOS	F					
Intersection V/C	1.650					

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	64.71
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	2.384
Crosswalk LOS	F	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1277	1526	370
d_b, Bicycle Delay [s]	9.47	4.07	48.26
l_b,int, Bicycle LOS Score for Intersection	3.036	2.318	1.560
Bicycle LOS	C	B	A

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 5000: Willow Rd (SR 114)/Newbridge St

Control Type:	Signalized	Delay (sec / veh):	175.7
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.126

Intersection Setup

Name	Willow Road (SR 114)			Willow Road (SR 114)			Newbridge Street			Newbridge Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	1	0	0	1	0	0	0
Entry Pocket Length [ft]	390.00	100.00	100.00	185.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	2	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	49.21	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			25.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Willow Road (SR 114)			Willow Road (SR 114)			Newbridge Street			Newbridge Street		
Base Volume Input [veh/h]	322	1457	434	93	1118	17	44	178	305	282	159	68
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	8	0	2	49	0	0	0	-2	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	175	0	0	45
Total Hourly Volume [veh/h]	322	1465	434	95	1167	17	44	178	128	282	159	23
Peak Hour Factor	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	86	390	115	25	310	5	12	47	34	75	42	6
Total Analysis Volume [veh/h]	343	1559	462	101	1241	18	47	189	136	300	169	24
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	3			7			7			3		
v_di, Inbound Pedestrian Volume crossing m	3			7			7			3		
v_co, Outbound Pedestrian Volume crossing	11			20			10			19		
v_ci, Inbound Pedestrian Volume crossing mi	10			19			11			20		
v_ab, Corner Pedestrian Volume [ped/h]	31			48			41			8		
Bicycle Volume [bicycles/h]	5			0			3			1		

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	140.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Split	Split	Split	Split	Split	Split
Signal Group	5	2	2	1	6	6	4	4	4	8	3	8
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	Lead	-	-	Lag	-	-	-	-	-
Minimum Green [s]	4	12	12	4	12	12	4	4	4	0	4	0
Maximum Green [s]	21	40	40	21	40	40	25	25	25	0	21	0
Amber [s]	3.0	4.4	4.4	3.0	4.4	4.4	3.6	3.6	3.6	0.0	3.0	0.0
All red [s]	0.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0
Split [s]	30	66	66	19	55	55	30	30	30	0	30	0
Vehicle Extension [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walk [s]	0	4	4	0	4	4	4	4	4	0	4	0
Pedestrian Clearance [s]	0	19	19	0	16	16	23	23	23	0	23	0
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	3.0	0.0	3.0	0.0
Rest In Walk		No			No			No			No	
l1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	0.0
l2, Clearance Lost Time [s]	1.0	3.4	3.4	1.0	3.4	3.4	2.6	2.6	2.6	0.0	1.0	0.0
Minimum Recall	No	Yes		No	Yes			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	L	C	R	L	C	R
C, Cycle Length [s]	145	145	145	145	145	145	145	145	145	145	145	145
L, Total Lost Time per Cycle [s]	3.00	5.40	5.40	3.00	5.40	5.40	4.60	4.60	4.60	3.00	3.00	3.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.00	3.40	3.40	1.00	3.40	3.40	2.60	2.60	2.60	1.00	1.00	1.00
g_i, Effective Green Time [s]	27	60	60	16	49	49	29	29	29	24	24	24
g / C, Green / Cycle	0.19	0.42	0.42	0.11	0.34	0.34	0.20	0.20	0.20	0.16	0.16	0.16
(v / s)_i Volume / Saturation Flow Rate	0.27	0.54	0.57	0.11	0.44	0.44	0.03	0.19	0.09	0.09	0.13	0.02
s, saturation flow rate [veh/h]	1265	2530	1156	937	1874	976	1781	984	1516	3459	1329	1457
c, Capacity [veh/h]	235	1054	482	104	640	333	354	196	302	564	217	238
d1, Uniform Delay [s]	58.95	42.24	42.24	64.19	47.70	47.70	47.72	57.50	50.81	55.53	58.10	51.49
k, delay calibration	0.50	0.50	0.50	0.23	0.50	0.50	0.04	0.39	0.04	0.04	0.19	0.04
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	227.82	137.00	182.29	53.76	143.58	153.32	0.06	48.75	0.39	0.29	9.89	0.07
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	1.46	1.29	1.38	0.97	1.29	1.30	0.13	0.96	0.45	0.53	0.78	0.10
d, Delay for Lane Group [s/veh]	286.77	179.24	224.53	117.95	191.27	201.01	47.78	106.25	51.20	55.81	67.99	51.55
Lane Group LOS	F	F	F	F	F	F	D	F	D	E	E	D
Critical Lane Group	Yes	No	No	No	No	Yes	No	Yes	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	23.40	38.24	41.00	5.30	24.34	26.25	1.42	9.52	4.40	5.08	6.56	0.75
50th-Percentile Queue Length [ft/ln]	585.05	956.03	1025.00	132.54	608.44	656.34	35.60	238.07	110.03	127.01	163.95	18.87
95th-Percentile Queue Length [veh/ln]	36.78	56.87	62.49	9.08	37.55	40.20	2.56	14.58	7.84	8.78	10.76	1.36
95th-Percentile Queue Length [ft/ln]	919.42	1421.69	1562.23	226.95	938.81	1005.07	64.08	364.59	196.04	219.43	268.95	33.97

Movement, Approach, & Intersection Results

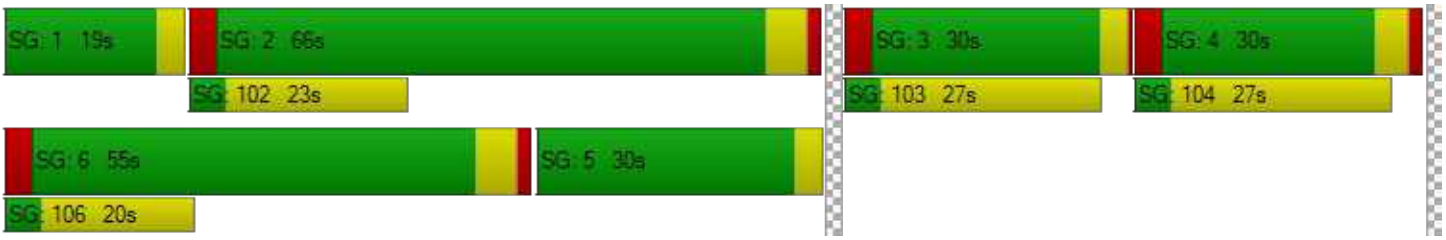
d_M, Delay for Movement [s/veh]	286.77	185.08	224.53	117.95	194.52	201.01	47.78	106.25	51.20	55.81	67.99	51.55
Movement LOS	F	F	F	F	F	F	D	F	D	E	E	D
d_A, Approach Delay [s/veh]	207.54			188.92			78.74			59.78		
Approach LOS	F			F			E			E		
d_I, Intersection Delay [s/veh]	175.71											
Intersection LOS	F											
Intersection V/C	1.126											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	183.72	138.75	372.71	0.00
d_p, Pedestrian Delay [s]	64.68	64.68	64.68	64.68
l_p,int, Pedestrian LOS Score for Intersectio	3.435	3.058	2.667	2.640
Crosswalk LOS	C	C	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	795	643	309	331
d_b, Bicycle Delay [s]	26.37	33.35	51.87	50.47
l_b,int, Bicycle LOS Score for Intersection	2.860	2.308	2.462	2.447
Bicycle LOS	C	B	B	B

Sequence

Ring 1	2	1	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 9000: Bayfront Expy (SR 84)/University Ave (SR 109)

Control Type:	Signalized	Delay (sec / veh):	46.1
Analysis Method:	HCM 7th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.703

Intersection Setup

Name	University Avenue (SR109)		Bayfront Expressway (SR84)		Bayfront Expressway (SR84)	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	2	0	1	2	0
Entry Pocket Length [ft]	100.00	250.00	100.00	100.00	830.00	100.00
No. of Lanes in Exit Pocket	0	2	0	0	0	0
Exit Pocket Length [ft]	0.00	74.61	0.00	0.00	0.00	0.00
Speed [mph]	35.00		55.00		55.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		No	

Volumes

Name	University Avenue (SR109)		Bayfront Expressway (SR84)		Bayfront Expressway (SR84)	
Base Volume Input [veh/h]	83	1316	3483	95	333	1116
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	6	18	0	2	2
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	83	1322	3501	95	335	1118
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	21	337	893	24	85	285
Total Analysis Volume [veh/h]	85	1349	3572	97	342	1141
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	1		2		0	
v_ci, Inbound Pedestrian Volume crossing mi	2		1		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	3		5		8	

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	200
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	198.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	10.00

Phasing & Timing

Control Type	Permissive	Overlap	Permissive	Permissive	Protected	Permissive
Signal Group	4	4	6	2	5	2
Auxiliary Signal Groups		4,5				
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	12	12	10	10	11	10
Maximum Green [s]	15	15	60	60	30	60
Amber [s]	3.0	3.0	5.0	5.4	3.0	5.4
All red [s]	1.0	1.0	1.0	0.5	0.5	0.5
Split [s]	36	36	124	154	26	154
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	3.0
Walk [s]	4	4	4	0	0	0
Pedestrian Clearance [s]	29	29	35	0	0	0
Delayed Vehicle Green [s]	3.0	3.0	3.0	0.0	0.0	0.0
Rest In Walk	No		No			No
l1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0
l2, Clearance Lost Time [s]	2.0	2.0	4.0	3.9	1.5	3.9
Minimum Recall	No	No	No		No	No
Maximum Recall	No	No	No		No	No
Pedestrian Recall	No	No	No		No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	20.0	20.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	R	C	R	L	C
C, Cycle Length [s]	200	200	200	200	200	200
L, Total Lost Time per Cycle [s]	4.00	3.50	6.00	6.00	3.50	5.90
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	0.00	4.00	4.00	1.50	3.90
g_i, Effective Green Time [s]	32	58	132	132	23	158
g / C, Green / Cycle	0.16	0.29	0.66	0.66	0.11	0.79
(v / s)_i Volume / Saturation Flow Rate	0.02	0.32	0.53	0.06	0.10	0.22
s, saturation flow rate [veh/h]	3459	4185	6792	1566	3459	5094
c, Capacity [veh/h]	553	1224	4482	1033	390	4027
d1, Uniform Delay [s]	72.29	70.43	24.39	12.31	87.31	5.65
k, delay calibration	0.11	0.21	0.50	0.50	0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.13	51.90	1.55	0.18	6.42	0.18
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.15	1.10	0.80	0.09	0.88	0.28
d, Delay for Lane Group [s/veh]	72.42	122.33	25.94	12.49	93.72	5.83
Lane Group LOS	E	F	C	B	F	A
Critical Lane Group	No	Yes	Yes	No	No	No
50th-Percentile Queue Length [veh/ln]	1.91	26.67	28.48	1.59	8.94	3.80
50th-Percentile Queue Length [ft/ln]	47.67	666.78	712.07	39.68	223.40	94.92
95th-Percentile Queue Length [veh/ln]	3.43	37.36	37.24	2.86	13.84	6.83
95th-Percentile Queue Length [ft/ln]	85.81	934.01	930.89	71.43	345.96	170.86

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	72.42	122.33	25.94	12.49	93.72	5.83
Movement LOS	E	F	C	B	F	A
d_A, Approach Delay [s/veh]	119.37		25.58		26.10	
Approach LOS	F		C		C	
d_I, Intersection Delay [s/veh]	46.12					
Intersection LOS	D					
Intersection V/C	0.703					

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	1160.89	0.00	0.00
d_p, Pedestrian Delay [s]	92.12	92.12	0.00
l_p,int, Pedestrian LOS Score for Intersectio	3.125	3.858	0.000
Crosswalk LOS	C	D	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	290	1150	1482
d_b, Bicycle Delay [s]	73.17	18.08	6.74
l_b,int, Bicycle LOS Score for Intersection	1.670	3.073	2.375
Bicycle LOS	A	C	B

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



1005 O'Brien Drive and 1320 Willow Road

Vistro File: P:\...\OBrien_Willow_AM_Revised_V3.vistro
Report File: P:\...\IMP_2040+P_AM_v3.pdf

Scenario 22 IMP_2040 + Project AM
3/18/2025

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1000	Bayfront Expy (SR 84)/Willow Rd (SR 114)	Signalized	HCM 7th Edition	EB Left	0.924	56.4	E
2000	Willow Rd (SR 114)/Hamilton Ave	Signalized	HCM 7th Edition	SB Left	1.628	243.7	F
4000	Willow Rd (SR 114)/O'Brien Dr	Signalized	HCM 7th Edition	WB Left	0.949	46.2	D
5000	Willow Rd (SR 114) /Newbridge St	Signalized	HCM 7th Edition	NB Left	1.429	178.0	F
7000	Willow Rd/US-101 SB Ramps	Signalized	HCM 7th Edition	SB Right	1.036	15.5	B
8000	O'Brien Drive/Kavanaugh Drive	All-way stop	HCM 7th Edition	NB Thru	1.694	235.7	F
11000	University Ave/O'Brien Dr	Signalized	HCM 7th Edition	SB Thru	1.063	106.0	F

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1000: Bayfront Expy (SR 84)/Willow Rd (SR 114)

Control Type:	Signalized	Delay (sec / veh):	56.4
Analysis Method:	HCM 7th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.924

Intersection Setup

Name	Willow Road (SR 114)			Willow Road			Bayfront Expy (SR 84)			Bayfront Expy (SR 84)		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	3	0	1	0	0	0	2	0	1	2	0	1
Entry Pocket Length [ft]	265.00	100.00	200.00	100.00	100.00	100.00	530.00	100.00	630.00	1500.00	100.00	600.00
No. of Lanes in Exit Pocket	0	0	1	0	0	0	0	0	0	0	0	1
Exit Pocket Length [ft]	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Speed [mph]	40.00			20.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			No			Yes			No		

Volumes

Name	Willow Road (SR 114)			Willow Road			Bayfront Expy (SR 84)			Bayfront Expy (SR 84)		
Base Volume Input [veh/h]	114	248	414	10	31	27	60	754	248	806	2459	41
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	-1	0	-1	0	0	0	0	0	-5	-3	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	16	0	0	106	0	0	0
Total Hourly Volume [veh/h]	113	248	413	10	31	11	60	754	137	803	2459	41
Peak Hour Factor	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	30	66	110	3	8	3	16	201	37	214	655	11
Total Analysis Volume [veh/h]	120	264	440	11	33	12	64	804	146	856	2622	44
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			2			3			0		
v_di, Inbound Pedestrian Volume crossing m	0			3			2			0		
v_co, Outbound Pedestrian Volume crossing	4			0			3			0		
v_ci, Inbound Pedestrian Volume crossing mi	3			0			4			0		
v_ab, Corner Pedestrian Volume [ped/h]	12			0			0			1		
Bicycle Volume [bicycles/h]	2			0			0			1		

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	180
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	17.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Protecte	Permiss	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	7	4	4	3	8	0	1	6	0	5	2	0
Auxiliary Signal Groups			4,5									
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	13	12	12	15	15	0	6	25	0	11	10	0
Maximum Green [s]	22	15	15	9	9	0	26	40	0	25	30	0
Amber [s]	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	1.0	1.0	1.0	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	54	43	43	30	19	0	61	29	0	78	46	0
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	5	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	27	27	0	10	0	0	10	0	0	37	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
l1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall	No	No	No	No	No		No	No		No	No	
Maximum Recall	No	No	No	No	No		No	No		No	No	
Pedestrian Recall	No	No	No	No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
C, Cycle Length [s]	180	180	180	180	180	180	180	180	180	180	180	180
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	0.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	29	36	82	6	14	14	9	79	79	42	112	112
g / C, Green / Cycle	0.16	0.20	0.46	0.04	0.08	0.08	0.05	0.44	0.44	0.23	0.62	0.62
(v / s)_i Volume / Saturation Flow Rate	0.15	0.17	0.23	0.01	0.01	0.01	0.04	0.35	0.21	0.20	0.63	0.03
s, saturation flow rate [veh/h]	797	1593	1877	937	3560	1558	1547	2279	711	4232	4155	1281
c, Capacity [veh/h]	128	319	858	33	269	118	79	1005	314	992	2595	800
d1, Uniform Delay [s]	74.67	68.90	34.56	84.72	77.59	77.45	84.53	43.42	35.36	66.09	33.77	13.12
k, delay calibration	0.12	0.11	0.11	0.11	0.11	0.11	0.11	0.50	0.50	0.11	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	27.34	5.42	0.48	5.80	0.20	0.38	17.88	6.67	4.90	2.38	20.22	0.13
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.94	0.83	0.51	0.33	0.12	0.10	0.81	0.80	0.47	0.86	1.01	0.06
d, Delay for Lane Group [s/veh]	102.01	74.32	35.03	90.52	77.79	77.83	102.41	50.09	40.26	68.47	53.99	13.25
Lane Group LOS	F	E	D	F	E	E	F	D	D	E	F	B
Critical Lane Group	No	No	Yes	Yes	No	No	Yes	No	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	6.43	6.03	4.58	0.56	0.74	0.54	1.68	11.01	5.04	12.87	41.49	0.75
50th-Percentile Queue Length [ft/ln]	160.64	150.80	114.58	14.07	18.41	13.54	42.06	275.20	125.88	321.76	1037.34	18.83
95th-Percentile Queue Length [veh/ln]	10.58	10.06	8.09	1.01	1.33	0.97	3.03	16.45	8.72	18.75	52.55	1.36
95th-Percentile Queue Length [ft/ln]	264.58	251.50	202.35	25.33	33.15	24.37	75.72	411.23	217.89	468.85	1313.66	33.90

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	102.01	74.32	35.03	90.52	77.79	77.83	102.41	50.09	40.26	68.47	53.99	13.25
Movement LOS	F	E	D	F	E	E	F	D	D	E	F	B
d_A, Approach Delay [s/veh]	57.37			80.30			51.98			57.00		
Approach LOS	E			F			D			E		
d_I, Intersection Delay [s/veh]	56.36											
Intersection LOS	E											
Intersection V/C	0.924											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	0.0	9.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	593.79	0.00	1006.19	0.00
d_p, Pedestrian Delay [s]	81.19	0.00	81.19	0.00
l_p,int, Pedestrian LOS Score for Intersectio	3.214	0.000	3.358	0.000
Crosswalk LOS	C	F	C	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	433	167	278	467
d_b, Bicycle Delay [s]	55.25	75.59	66.70	52.90
l_b,int, Bicycle LOS Score for Intersection	2.239	1.619	2.176	3.497
Bicycle LOS	B	A	B	C

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 2000: Willow Rd (SR 114)/Hamilton Ave

Control Type:	Signalized	Delay (sec / veh):	243.7
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.628

Intersection Setup

Name	Willow Road (SR 114)			Willow Road (SR 114)			Hamilton Avenue			Hamilton Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			30.00			25.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Willow Road (SR 114)			Willow Road (SR 114)			Hamilton Avenue			Hamilton Avenue		
Base Volume Input [veh/h]	116	764	74	495	784	19	59	16	79	16	6	155
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	-2	0	0	-8	0	0	0	-1	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	116	762	74	495	776	19	59	16	78	16	6	155
Peak Hour Factor	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760	0.9760
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	30	195	19	127	199	5	15	4	20	4	2	40
Total Analysis Volume [veh/h]	119	781	76	507	795	19	60	16	80	16	6	159
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	6			57			5			57		
v_di, Inbound Pedestrian Volume crossing m	5			57			6			57		
v_co, Outbound Pedestrian Volume crossing	5			18			18			6		
v_ci, Inbound Pedestrian Volume crossing mi	6			18			18			5		
v_ab, Corner Pedestrian Volume [ped/h]	5			6			13			5		
Bicycle Volume [bicycles/h]	1			1			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	48
Active Pattern	Free Running
Coordination Type	*Free Running*
Actuation Type	*Fully actuated*
Offset [s]	8.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	1	6	2	5	2	6	4	8	4	8	4	8
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lag	-	-	Lag	-	-	Lag	-	-
Minimum Green [s]	4	10	10	4	10	10	4	4	4	4	4	4
Maximum Green [s]	21	30	30	21	30	30	26	26	26	26	26	26
Amber [s]	3.0	4.4	4.4	3.0	4.4	4.4	3.6	3.7	3.6	3.7	3.6	3.7
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	0	30	0	0	0	30	30	0	30	0	30	0
Vehicle Extension [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walk [s]	0	4	4	0	4	4	4	4	4	4	4	4
Pedestrian Clearance [s]	0	19	15	0	15	19	25	25	25	25	25	25
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	1.0	2.4	2.4	1.0	2.4	2.4	1.6	1.7	1.6	1.7	1.6	1.7
Minimum Recall	No	Yes		No	Yes			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	6.0	6.0	6.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	C	L	C
C, Cycle Length [s]	88	88	88	88	88	88	88	88	88
L, Total Lost Time per Cycle [s]	3.00	4.40	4.40	3.00	4.40	4.40	3.70	3.60	3.60
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.00	0.00
l2, Clearance Lost Time [s]	1.00	2.40	2.40	1.00	2.40	2.40	1.70	0.00	1.60
g_i, Effective Green Time [s]	14	30	30	21	37	37	26	26	26
g / C, Green / Cycle	0.16	0.34	0.34	0.24	0.42	0.42	0.30	0.30	0.30
(v / s)_i Volume / Saturation Flow Rate	0.15	0.52	0.52	0.54	0.42	0.42	0.40	0.03	0.19
s, saturation flow rate [veh/h]	797	837	804	937	984	973	394	560	859
c, Capacity [veh/h]	129	285	274	223	410	405	173	83	254
d1, Uniform Delay [s]	36.34	29.05	29.05	33.55	25.63	25.70	37.10	22.10	27.00
k, delay calibration	0.13	0.50	0.50	0.50	0.50	0.50	0.50	0.04	0.14
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	24.80	254.54	260.38	585.19	43.50	44.93	46.86	0.41	3.68
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.92	1.53	1.54	2.27	1.00	1.00	0.90	0.19	0.65
d, Delay for Lane Group [s/veh]	61.14	283.59	289.43	618.74	69.13	70.62	83.96	22.52	30.69
Lane Group LOS	E	F	F	F	E	F	F	C	C
Critical Lane Group	No	No	Yes	Yes	No	No	Yes	No	No
50th-Percentile Queue Length [veh/ln]	3.29	25.67	25.13	40.94	12.89	12.95	5.65	0.25	3.23
50th-Percentile Queue Length [ft/ln]	82.37	641.80	628.26	1023.52	322.37	323.87	141.28	6.15	80.87
95th-Percentile Queue Length [veh/ln]	5.93	41.91	41.21	67.31	18.78	18.87	9.55	0.44	5.82
95th-Percentile Queue Length [ft/ln]	148.26	1047.66	1030.20	1682.65	469.60	471.72	238.74	11.07	145.57

Movement, Approach, & Intersection Results

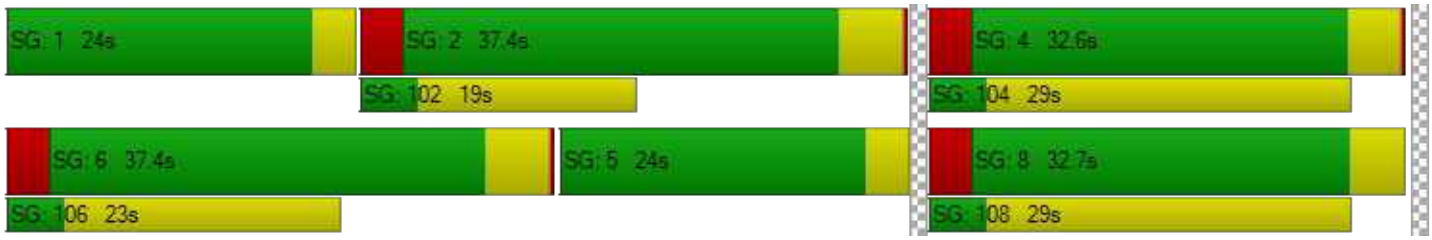
d_M, Delay for Movement [s/veh]	61.14	286.18	289.43	618.74	69.86	70.62	83.96	83.96	83.96	22.52	30.69	30.69
Movement LOS	E	F	F	F	E	E	F	F	F	C	C	C
d_A, Approach Delay [s/veh]	258.99			280.53			83.96			29.96		
Approach LOS	F			F			F			C		
d_I, Intersection Delay [s/veh]	243.69											
Intersection LOS	F											
Intersection V/C	1.628											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	684.58	55.67	205.66	615.03
d_p, Pedestrian Delay [s]	36.41	36.41	36.41	36.41
l_p,int, Pedestrian LOS Score for Intersectio	2.809	2.839	1.838	2.153
Crosswalk LOS	C	C	A	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	681	681	590	590
d_b, Bicycle Delay [s]	19.17	19.17	21.89	21.89
l_b,int, Bicycle LOS Score for Intersection	2.365	2.649	1.817	1.858
Bicycle LOS	B	B	A	A

Sequence

Ring 1	2	1	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 4000: Willow Rd (SR 114)/O'Brien Dr

Control Type:	Signalized	Delay (sec / veh):	46.2
Analysis Method:	HCM 7th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.949

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		O'Brien Drive	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	1	0	0	1
Entry Pocket Length [ft]	100.00	60.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	No		No		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		O'Brien Drive	
Base Volume Input [veh/h]	773	949	94	1011	525	80
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	-4	-11	-10	0	-4	-1
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	769	938	84	1011	521	79
Peak Hour Factor	0.9510	0.9510	0.9510	0.9510	0.9510	0.9510
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	202	247	22	266	137	21
Total Analysis Volume [veh/h]	809	986	88	1063	548	83
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	13		0		14	
v_ci, Inbound Pedestrian Volume crossing mi	14		0		13	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	1		6		2	

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	160
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	93.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Permissive	Permissive	Protected	Permissive	Permissive	Permissive
Signal Group	2	2	1	6	4	8
Auxiliary Signal Groups						
Lead / Lag	-	-	Lead	-	Lead	-
Minimum Green [s]	10	10	5	10	8	0
Maximum Green [s]	35	35	21	35	21	0
Amber [s]	4.4	4.4	3.0	4.4	3.2	0.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	111	111	19	130	30	0
Vehicle Extension [s]	2.0	2.0	2.0	2.0	2.0	0.0
Walk [s]	4	4	0	0	0	0
Pedestrian Clearance [s]	17	17	0	0	0	0
Delayed Vehicle Green [s]	3.0	3.0	0.0	0.0	0.0	0.0
Rest In Walk	No			No	No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.4	2.4	1.0	2.4	1.2	0.0
Minimum Recall	Yes		No	Yes	No	
Maximum Recall	No		No	No	No	
Pedestrian Recall	No		No	No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	L	C	L	R
C, Cycle Length [s]	160	160	160	160	160	160
L, Total Lost Time per Cycle [s]	4.40	4.40	3.00	4.40	3.20	3.20
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.40	2.40	1.00	2.40	1.20	1.20
g_i, Effective Green Time [s]	113	113	10	126	27	27
g / C, Green / Cycle	0.71	0.71	0.06	0.78	0.17	0.17
(v / s)_i Volume / Saturation Flow Rate	0.51	0.65	0.05	0.67	0.20	0.07
s, saturation flow rate [veh/h]	1593	1527	1781	1593	2730	1236
c, Capacity [veh/h]	1125	1078	107	1250	458	207
d1, Uniform Delay [s]	14.04	18.20	74.28	11.12	66.54	59.31
k, delay calibration	0.50	0.50	0.04	0.50	0.11	0.04
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	3.98	13.28	5.80	7.37	93.84	0.47
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.72	0.91	0.82	0.85	1.20	0.40
d, Delay for Lane Group [s/veh]	18.02	31.48	80.08	18.49	160.38	59.78
Lane Group LOS	B	C	F	B	F	E
Critical Lane Group	No	Yes	Yes	No	Yes	No
50th-Percentile Queue Length [veh/ln]	8.61	29.23	3.73	11.21	15.33	3.06
50th-Percentile Queue Length [ft/ln]	215.34	730.70	93.22	280.29	383.34	76.43
95th-Percentile Queue Length [veh/ln]	13.43	38.09	6.71	16.70	23.63	5.50
95th-Percentile Queue Length [ft/ln]	335.68	952.36	167.79	417.57	590.81	137.58

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	18.02	31.48	80.08	18.49	160.38	59.78
Movement LOS	B	C	F	B	F	E
d_A, Approach Delay [s/veh]	25.41		23.20		147.15	
Approach LOS	C		C		F	
d_I, Intersection Delay [s/veh]	46.17					
Intersection LOS	D					
Intersection V/C	0.949					

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	72.16
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	2.576
Crosswalk LOS	F	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1296	1571	335
d_b, Bicycle Delay [s]	9.92	3.70	55.47
l_b,int, Bicycle LOS Score for Intersection	3.040	2.509	1.560
Bicycle LOS	C	B	A

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 5000: Willow Rd (SR 114)/Newbridge St

Control Type:	Signalized	Delay (sec / veh):	178.0
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.429

Intersection Setup

Name	Willow Road (SR 114)			Willow Road (SR 114)			Newbridge Street			Newbridge Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	1	0	0	1	0	0	0
Entry Pocket Length [ft]	390.00	100.00	100.00	185.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	1	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	49.21	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			25.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Willow Road (SR 114)			Willow Road (SR 114)			Newbridge Street			Newbridge Street		
Base Volume Input [veh/h]	175	1208	448	66	1398	20	22	126	390	402	132	221
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	-13	0	0	-4	0	0	0	0	0	0	-1
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	44	0	0	34
Total Hourly Volume [veh/h]	175	1195	448	66	1394	20	22	126	346	402	132	186
Peak Hour Factor	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220	0.9220
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	47	324	121	18	378	5	6	34	94	109	36	50
Total Analysis Volume [veh/h]	190	1296	486	72	1512	22	24	137	375	436	143	202
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	2			2			3			3		
v_di, Inbound Pedestrian Volume crossing m	3			3			2			2		
v_co, Outbound Pedestrian Volume crossing	8			12			7			11		
v_ci, Inbound Pedestrian Volume crossing mi	7			11			8			12		
v_ab, Corner Pedestrian Volume [ped/h]	16			65			10			12		
Bicycle Volume [bicycles/h]	10			2			0			8		

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	160
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	97.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Split	Split	Split	Split	Split	Split
Signal Group	5	2	2	1	6	6	4	4	4	8	3	8
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	Lead	-	-	Lag	-	-	-	-	-
Minimum Green [s]	4	12	12	4	12	12	4	4	4	0	4	0
Maximum Green [s]	21	40	40	21	40	40	25	25	25	0	21	0
Amber [s]	3.0	4.4	4.4	3.0	4.4	4.4	3.6	3.6	3.6	0.0	3.0	0.0
All red [s]	0.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0
Split [s]	13	35	35	51	73	73	38	38	38	0	36	0
Vehicle Extension [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walk [s]	0	4	4	0	4	4	4	4	4	0	4	0
Pedestrian Clearance [s]	0	19	19	0	16	16	23	23	23	0	23	0
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	3.0	0.0	3.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	1.0	3.4	3.4	1.0	3.4	3.4	2.6	2.6	2.6	0.0	1.0	0.0
Minimum Recall	No	Yes		No	Yes			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	L	C	R	L	C	R
C, Cycle Length [s]	160	160	160	160	160	160	160	160	160	160	160	160
L, Total Lost Time per Cycle [s]	3.00	5.40	5.40	3.00	5.40	5.40	4.60	4.60	4.60	3.00	3.00	3.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.00	3.40	3.40	1.00	3.40	3.40	2.60	2.60	2.60	1.00	1.00	1.00
g_i, Effective Green Time [s]	10	70	70	8	68	68	33	33	33	33	33	33
g / C, Green / Cycle	0.06	0.43	0.43	0.05	0.42	0.42	0.21	0.21	0.21	0.21	0.21	0.21
(v / s)_i Volume / Saturation Flow Rate	0.11	0.34	0.36	0.04	0.63	0.63	0.02	0.09	0.28	0.28	0.17	0.30
s, saturation flow rate [veh/h]	1781	3560	1574	1781	1593	829	1528	1604	1334	1547	837	673
c, Capacity [veh/h]	111	1549	685	90	674	351	319	335	278	318	172	139
d1, Uniform Delay [s]	74.98	38.78	39.78	75.17	46.16	46.16	50.88	54.76	62.93	63.52	60.85	62.66
k, delay calibration	0.29	0.50	0.50	0.04	0.50	0.50	0.04	0.04	0.50	0.19	0.32	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	338.63	4.09	10.81	6.12	231.35	239.04	0.04	0.30	178.00	173.84	24.77	241.31
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	1.70	0.79	0.82	0.80	1.50	1.50	0.08	0.41	1.35	1.37	0.83	1.46
d, Delay for Lane Group [s/veh]	413.60	42.88	50.59	81.29	277.51	285.19	50.92	55.05	240.93	237.36	85.62	303.98
Lane Group LOS	F	D	D	F	F	F	D	E	F	F	F	F
Critical Lane Group	Yes	No	No	No	No	Yes	No	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	15.04	21.04	21.22	3.12	35.07	37.27	0.79	4.86	25.06	14.18	6.77	14.86
50th-Percentile Queue Length [ft/ln]	376.00	525.98	530.54	77.99	876.82	931.73	19.75	121.53	626.50	354.54	169.32	371.61
95th-Percentile Queue Length [veh/ln]	24.48	28.56	28.78	5.62	56.02	59.24	1.42	8.48	38.32	23.33	11.04	24.76
95th-Percentile Queue Length [ft/ln]	611.92	714.05	719.41	140.38	1400.38	1481.12	35.55	211.92	958.02	583.22	276.02	619.09

Movement, Approach, & Intersection Results

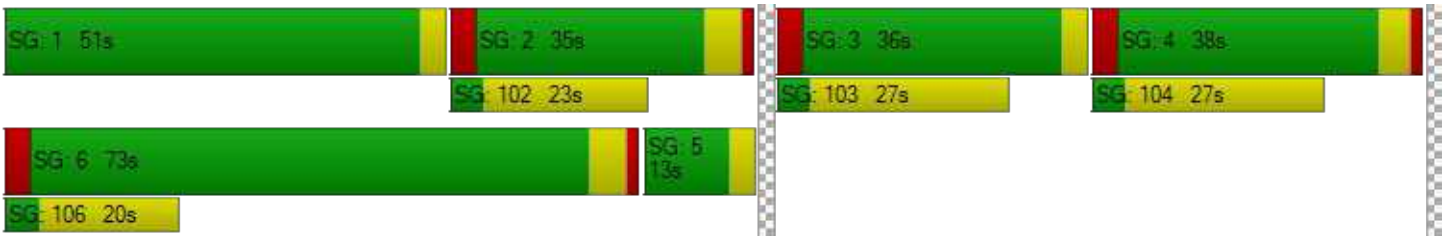
d_M, Delay for Movement [s/veh]	413.60	43.34	50.59	81.29	280.07	285.19	50.92	55.05	240.93	237.36	85.62	303.98
Movement LOS	F	D	D	F	F	F	D	E	F	F	F	F
d_A, Approach Delay [s/veh]	80.80			271.23			184.91			226.81		
Approach LOS	F			F			F			F		
d_I, Intersection Delay [s/veh]	177.97											
Intersection LOS	F											
Intersection V/C	1.429											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	24.86	132.25	931.34	0.00
d_p, Pedestrian Delay [s]	72.19	72.19	72.19	72.19
l_p,int, Pedestrian LOS Score for Intersectio	3.459	2.990	2.450	2.672
Crosswalk LOS	C	C	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	333	808	380	375
d_b, Bicycle Delay [s]	55.88	28.46	52.48	53.02
l_b,int, Bicycle LOS Score for Intersection	2.644	2.443	2.517	2.904
Bicycle LOS	B	B	B	C

Sequence

Ring 1	2	1	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 7000: Willow Rd/US-101 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	15.5
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.036

Intersection Setup

Name	Willow Road			Willow Road			US-101 SB Ramps			US-101 SB Ramps		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	0	1	0	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No					
Crosswalk	Yes			No			Yes			No		

Volumes

Name	Willow Road			Willow Road			US-101 SB Ramps			US-101 SB Ramps		
Base Volume Input [veh/h]	0	1070	646	0	1417	550	922	0	360	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	2.00	2.00	0.00	2.00	2.00	2.00	0.00	2.00	0.00	0.00	0.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	-2	0	0	0	0	-2	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	1068	646	0	1417	550	920	0	360	0	0	0
Peak Hour Factor	1.0000	0.9190	0.9190	1.0000	0.9190	0.9190	0.9190	1.0000	0.9190	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	291	176	0	385	150	250	0	98	0	0	0
Total Analysis Volume [veh/h]	0	1162	703	0	1542	598	1001	0	392	0	0	0
Presence of On-Street Parking	No		No	No		No	No		No			
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			29		
Bicycle Volume [bicycles/h]	9			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	3 - Willow Road
Cycle Length [s]	80
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	54.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Overlap	Permiss	Permiss	Permiss
Signal Group	0	2	0	0	6	0	4	0	4	0	0	0
Auxiliary Signal Groups									2,4			
Lead / Lag	-	-	-	-	-	-	Lead	-	-	-	-	-
Minimum Green [s]	0	4	0	0	4	0	4	0	4	0	0	0
Maximum Green [s]	0	35	0	0	35	0	30	0	30	0	0	0
Amber [s]	0.0	4.1	0.0	0.0	4.1	0.0	3.0	0.0	3.0	0.0	0.0	0.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	2.0	0.0	0.0	0.0
Split [s]	0	55	0	0	55	0	25	0	25	0	0	0
Vehicle Extension [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	0.0	3.0	0.0	0.0	0.0
Walk [s]	0	1	0	0	1	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	7	0	0	32	0	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	3.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No		No					
l1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	0.0	2.0	0.0	0.0	0.0
l2, Clearance Lost Time [s]	0.0	2.1	0.0	0.0	2.1	0.0	3.0	0.0	3.0	0.0	0.0	0.0
Minimum Recall		No			No		No		No			
Maximum Recall		No			No		No		No			
Pedestrian Recall		No			No		No		No			
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	C	R	L	R	
C, Cycle Length [s]	80	80	80	80	80	80	
L, Total Lost Time per Cycle [s]	4.10	4.10	4.10	4.10	5.00	5.00	
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	
l2, Clearance Lost Time [s]	2.10	2.10	2.10	2.10	3.00	0.00	
g_i, Effective Green Time [s]	52	52	52	52	18	75	
g / C, Green / Cycle	0.66	0.66	0.66	0.66	0.23	0.94	
(v / s)_i Volume / Saturation Flow Rate	0.23	0.45	0.30	0.64	0.19	0.14	
s, saturation flow rate [veh/h]	5094	1550	5094	941	5188	2813	
c, Capacity [veh/h]	3339	1016	3339	617	1196	2637	
d1, Uniform Delay [s]	6.14	8.50	6.80	13.00	29.31	0.18	
k, delay calibration	0.50	0.50	0.50	0.50	0.11	0.50	
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	
d2, Incremental Delay [s]	0.29	3.87	0.46	29.42	1.63	0.12	
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	

Lane Group Results

X, volume / capacity	0.35	0.69	0.46	0.97	0.84	0.15	
d, Delay for Lane Group [s/veh]	6.43	12.37	7.26	42.42	30.94	0.30	
Lane Group LOS	A	B	A	D	C	A	
Critical Lane Group	No	No	No	Yes	Yes	No	
50th-Percentile Queue Length [veh/ln]	2.47	7.09	3.65	12.84	6.06	0.04	
50th-Percentile Queue Length [ft/ln]	61.86	177.14	91.18	320.98	151.44	1.09	
95th-Percentile Queue Length [veh/ln]	4.45	11.45	6.57	18.72	10.09	0.08	
95th-Percentile Queue Length [ft/ln]	111.36	286.28	164.13	467.89	252.35	1.96	

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	0.00	6.43	12.37	0.00	7.26	42.42	30.94	0.00	0.30	0.00	0.00	0.00
Movement LOS		A	B		A	D	C		A			
d_A, Approach Delay [s/veh]	8.67			17.08			22.32			0.00		
Approach LOS	A			B			C			A		
d_I, Intersection Delay [s/veh]	15.53											
Intersection LOS	B											
Intersection V/C	1.036											

Other Modes

g_Walk,mi, Effective Walk Time [s]	20.0	0.0	5.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	22.48	0.00	35.13	0.00
l_p,int, Pedestrian LOS Score for Intersectio	3.105	0.000	2.776	0.000
Crosswalk LOS	C	F	C	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1198	1198	500	0
d_b, Bicycle Delay [s]	6.45	6.43	22.48	39.98
l_b,int, Bicycle LOS Score for Intersection	2.585	2.737	1.560	4.132
Bicycle LOS	B	B	A	D

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 8000: O'Brien Drive/Kavanaugh Drive

Control Type:	All-way stop	Delay (sec / veh):	235.7
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.694

Intersection Setup

Name	O'Brien Drive		O'Brien Drive		Kavanaugh Drive	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	O'Brien Drive		O'Brien Drive		Kavanaugh Drive	
Base Volume Input [veh/h]	487	358	101	692	194	271
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	-3	-1	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	487	358	101	689	193	271
Peak Hour Factor	0.9340	0.9340	0.9340	0.9340	0.9340	0.9340
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	130	96	27	184	52	73
Total Analysis Volume [veh/h]	521	383	108	738	207	290
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	904	452	738	534
Degree of Utilization, x	1.69	0.24	1.53	0.93

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	52.72	0.92	39.07	11.52
95th-Percentile Queue Length [ft]	1317.92	23.07	976.63	287.89
Approach Delay [s/veh]	337.64	236.19		49.39
Approach LOS	F	F		E
Intersection Delay [s/veh]	235.69			
Intersection LOS	F			

Intersection Level Of Service Report
Intersection 11000: University Ave/O'Brien Dr

Control Type:	Signalized	Delay (sec / veh):	106.0
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.063

Intersection Setup

Name	University Avenue		University Avenue		O'Brien Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	1	0
Entry Pocket Length [ft]	90.00	100.00	100.00	100.00	45.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00		25.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	No		No		No	

Volumes

Name	University Avenue		University Avenue		O'Brien Drive	
Base Volume Input [veh/h]	507	889	834	149	18	359
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	-3	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	507	889	834	146	18	359
Peak Hour Factor	0.8540	0.8540	0.8540	0.8540	0.8540	0.8540
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	148	260	244	43	5	105
Total Analysis Volume [veh/h]	594	1041	977	171	21	420
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		2	
Bicycle Volume [bicycles/h]	1		1		1	

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	130
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	48.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	11.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal Group	1	6	2	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	5	5	5	0	5	0
Maximum Green [s]	30	30	30	0	30	0
Amber [s]	3.0	3.0	3.0	0.0	3.0	0.0
All red [s]	1.0	1.0	1.0	0.0	1.0	0.0
Split [s]	67	76	9	0	54	0
Vehicle Extension [s]	3.0	3.0	3.0	0.0	3.0	0.0
Walk [s]	0	5	5	0	5	0
Pedestrian Clearance [s]	0	10	10	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
Minimum Recall	No	No	No		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	R	L	R
C, Cycle Length [s]	130	130	130	130	130	130
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	50	82	27	27	40	40
g / C, Green / Cycle	0.39	0.63	0.21	0.21	0.31	0.31
(v / s)_i Volume / Saturation Flow Rate	0.37	0.32	0.30	0.12	0.01	0.30
s, saturation flow rate [veh/h]	1603	3204	3204	1399	1603	1412
c, Capacity [veh/h]	620	2014	676	295	497	438
d1, Uniform Delay [s]	38.83	13.28	51.27	45.93	31.36	43.82
k, delay calibration	0.30	0.50	0.50	0.50	0.11	0.30
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	19.46	0.95	208.20	8.03	0.03	24.76
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.96	0.52	1.44	0.58	0.04	0.96
d, Delay for Lane Group [s/veh]	58.30	14.23	259.47	53.97	31.40	68.58
Lane Group LOS	E	B	F	D	C	E
Critical Lane Group	Yes	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	21.73	8.56	30.64	5.68	0.47	16.11
50th-Percentile Queue Length [ft/ln]	543.14	213.95	766.09	141.97	11.84	402.73
95th-Percentile Queue Length [veh/ln]	29.37	13.36	47.01	9.59	0.85	22.69
95th-Percentile Queue Length [ft/ln]	734.25	333.89	1175.29	239.67	21.31	567.29

Movement, Approach, & Intersection Results

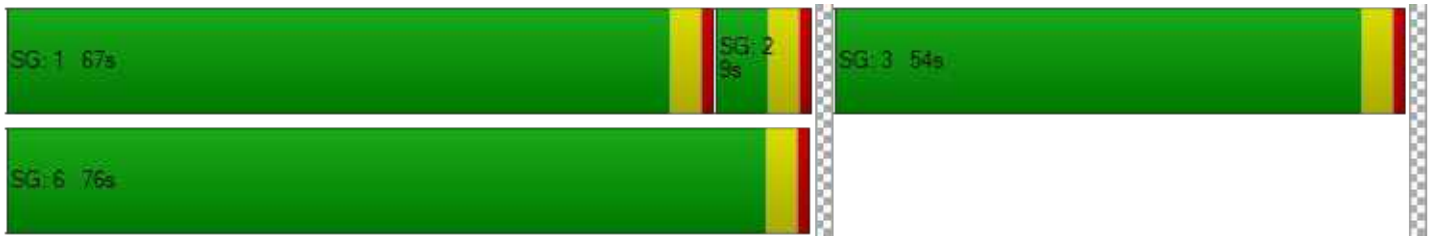
d_M, Delay for Movement [s/veh]	58.30	14.23	259.47	53.97	31.40	68.58
Movement LOS	E	B	F	D	C	E
d_A, Approach Delay [s/veh]	30.24		228.86		66.81	
Approach LOS	C		F		E	
d_I, Intersection Delay [s/veh]	105.97					
Intersection LOS	F					
Intersection V/C	1.063					

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	0.000
Crosswalk LOS	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1108	77	769
d_b, Bicycle Delay [s]	12.94	60.12	24.62
l_b,int, Bicycle LOS Score for Intersection	2.908	2.507	1.560
Bicycle LOS	C	B	A

Sequence

Ring 1	1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



1005 O'Brien Drive and 1320 Willow Road

Vistro File: P:\...\OBrien_Willow_PM_Revised_V3.vistro
Report File: P:\...\IMP_2040+P_PM_v3.pdf

Scenario 22 IMP_2040+ Project PM
3/18/2025

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
3000	Willow Rd (SR 114)/Ivy Dr	Signalized	HCM 7th Edition	NB Left	1.033	50.7	D
4000	Willow Rd (SR 114)/O'Brien Dr	Signalized	HCM 7th Edition	WB Left	1.875	348.1	F
5000	Willow Rd (SR 114) /Newbridge St	Signalized	HCM 7th Edition	NB Left	1.225	194.8	F
8000	O'Brien Drive/Kavanaugh Drive	All-way stop	HCM 7th Edition	SB Thru	1.007	59.2	F
9000	Bayfront Expy (SR 84) /University Ave (SR 109)	Signalized	HCM 7th Edition	NB Right	0.760	51.5	D

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 3000: Willow Rd (SR 114)/Ivy Dr

Control Type:	Signalized	Delay (sec / veh):	50.7
Analysis Method:	HCM 7th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.033

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		Ivy Drive	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	1
Entry Pocket Length [ft]	85.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	1	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	100.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		Ivy Drive	
Base Volume Input [veh/h]	133	1381	801	281	64	79
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	-1	-10	-2	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	132	1371	799	281	64	79
Peak Hour Factor	0.9670	0.9670	0.9670	0.9670	0.9670	0.9670
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	34	354	207	73	17	20
Total Analysis Volume [veh/h]	137	1418	826	291	66	82
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	3		7		2	
v_di, Inbound Pedestrian Volume crossing m	2		6		3	
v_co, Outbound Pedestrian Volume crossing	6		3		3	
v_ci, Inbound Pedestrian Volume crossing mi	7		3		3	
v_ab, Corner Pedestrian Volume [ped/h]	9		10		5	
Bicycle Volume [bicycles/h]	0		4		1	

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	10.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Overlap
Signal Group	5	2	6	6	4	4
Auxiliary Signal Groups						4,5
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	4	10	10	10	11	11
Maximum Green [s]	21	30	30	30	28	28
Amber [s]	3.0	4.4	4.4	4.4	3.0	3.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	22	111	89	89	34	34
Vehicle Extension [s]	2.0	2.0	2.0	2.0	2.0	2.0
Walk [s]	0	0	4	4	4	4
Pedestrian Clearance [s]	0	0	22	22	24	24
Delayed Vehicle Green [s]	0.0	0.0	3.0	3.0	3.0	3.0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	1.0	2.4	2.4	2.4	1.0	1.0
Minimum Recall	No	Yes	Yes		No	No
Maximum Recall	No	No	No		No	No
Pedestrian Recall	No	No	No		No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	L	R
C, Cycle Length [s]	145	145	145	145	145	145
L, Total Lost Time per Cycle [s]	3.00	4.40	4.40	4.40	3.00	3.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.00	2.40	2.40	2.40	1.00	0.00
g_i, Effective Green Time [s]	17	125	104	104	13	33
g / C, Green / Cycle	0.12	0.86	0.72	0.72	0.09	0.23
(v / s)_i Volume / Saturation Flow Rate	0.11	0.89	0.67	0.74	0.07	0.09
s, saturation flow rate [veh/h]	1265	1593	837	759	986	913
c, Capacity [veh/h]	152	1368	601	545	89	210
d1, Uniform Delay [s]	62.91	10.21	17.29	20.40	64.32	47.09
k, delay calibration	0.24	0.50	0.50	0.50	0.04	0.04
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	30.44	34.22	22.90	44.73	4.58	0.44
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.90	1.04	0.93	1.02	0.75	0.39
d, Delay for Lane Group [s/veh]	93.35	44.43	40.19	65.13	68.90	47.53
Lane Group LOS	F	F	D	F	E	D
Critical Lane Group	No	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	6.21	17.85	17.28	22.29	2.50	2.55
50th-Percentile Queue Length [ft/ln]	155.35	446.24	432.01	557.27	62.52	63.85
95th-Percentile Queue Length [veh/ln]	10.30	25.58	24.10	30.66	4.50	4.60
95th-Percentile Queue Length [ft/ln]	257.55	639.50	602.44	766.57	112.53	114.93

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	93.35	44.43	48.26	65.13	68.90	47.53
Movement LOS	F	F	D	E	E	D
d_A, Approach Delay [s/veh]	48.74		52.66		57.06	
Approach LOS	D		D		E	
d_I, Intersection Delay [s/veh]	50.73					
Intersection LOS	D					
Intersection V/C	1.033					

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	869.04	420.42	244.25
d_p, Pedestrian Delay [s]	64.69	64.69	64.69
l_p,int, Pedestrian LOS Score for Intersectio	2.965	3.001	2.296
Crosswalk LOS	C	C	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1471	1126	386
d_b, Bicycle Delay [s]	5.07	13.87	47.20
l_b,int, Bicycle LOS Score for Intersection	2.842	2.481	1.560
Bicycle LOS	C	B	A

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 4000: Willow Rd (SR 114)/O'Brien Dr

Control Type:	Signalized	Delay (sec / veh):	348.1
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.875

Intersection Setup

Name	Willow Road (SR 114)		Willow Road (SR 114)		O'Brien Drive	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	1	0	0	1
Entry Pocket Length [ft]	100.00	60.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	1	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	100.00	0.00	0.00
Speed [mph]	40.00		40.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	No		No		Yes	

Volumes

Name	Willow Road (SR 114)		Willow Road (SR 114)		O'Brien Drive	
Base Volume Input [veh/h]	1407	420	68	873	705	77
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	-1	-2	-1	0	-14	-5
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	1406	418	67	873	691	72
Peak Hour Factor	0.9860	0.9860	0.9860	0.9860	0.9860	0.9860
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	356	106	17	221	175	18
Total Analysis Volume [veh/h]	1426	424	68	885	701	73
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	5		0		5	
v_ci, Inbound Pedestrian Volume crossing mi	5		0		5	
v_ab, Corner Pedestrian Volume [ped/h]	3		0		13	
Bicycle Volume [bicycles/h]	2		0		4	

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	10.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	9.00

Phasing & Timing

Control Type	Permissive	Permissive	Protected	Permissive	Permissive	Permissive
Signal Group	2	2	1	6	4	8
Auxiliary Signal Groups						
Lead / Lag	-	-	Lead	-	Lead	-
Minimum Green [s]	10	10	5	10	8	0
Maximum Green [s]	35	35	21	35	21	0
Amber [s]	4.4	4.4	3.0	4.4	3.2	0.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	100	100	15	115	30	0
Vehicle Extension [s]	2.0	2.0	2.0	2.0	2.0	0.0
Walk [s]	4	4	0	0	0	0
Pedestrian Clearance [s]	17	17	0	0	0	0
Delayed Vehicle Green [s]	3.0	3.0	0.0	0.0	0.0	0.0
Rest In Walk	No			No	No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.4	2.4	1.0	2.4	1.2	0.0
Minimum Recall	Yes		No	Yes	No	
Maximum Recall	No		No	No	No	
Pedestrian Recall	No		No	No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	L	C	L	R
C, Cycle Length [s]	145	145	145	145	145	145
L, Total Lost Time per Cycle [s]	4.40	4.40	3.00	4.40	3.20	3.20
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.40	2.40	1.00	2.40	1.20	1.20
g_i, Effective Green Time [s]	96	96	12	111	27	27
g / C, Green / Cycle	0.66	0.66	0.08	0.76	0.18	0.18
(v / s)_i Volume / Saturation Flow Rate	1.09	0.75	0.11	0.68	0.56	0.13
s, saturation flow rate [veh/h]	1302	565	647	1293	1256	568
c, Capacity [veh/h]	858	372	54	986	232	105
d1, Uniform Delay [s]	24.70	23.41	66.44	12.93	59.05	55.10
k, delay calibration	0.50	0.50	0.22	0.50	0.50	0.19
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	302.83	90.10	169.46	12.56	919.95	13.72
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	1.66	1.14	1.27	0.90	3.02	0.70
d, Delay for Lane Group [s/veh]	327.53	113.51	235.90	25.49	979.00	68.83
Lane Group LOS	F	F	F	C	F	E
Critical Lane Group	Yes	No	Yes	No	Yes	No
50th-Percentile Queue Length [veh/ln]	49.17	20.06	4.49	10.44	33.93	2.90
50th-Percentile Queue Length [ft/ln]	1229.23	501.50	112.25	260.91	848.32	72.54
95th-Percentile Queue Length [veh/ln]	81.91	30.27	8.08	15.73	56.39	5.22
95th-Percentile Queue Length [ft/ln]	2047.73	756.85	202.05	393.37	1409.70	130.57

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	327.53	113.51	235.90	25.49	979.00	68.83
Movement LOS	F	F	F	C	F	E
d_A, Approach Delay [s/veh]	278.48		40.50		893.16	
Approach LOS	F		D		F	
d_I, Intersection Delay [s/veh]	348.08					
Intersection LOS	F					
Intersection V/C	1.875					

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	64.69
l_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	2.464
Crosswalk LOS	F	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1278	1526	370
d_b, Bicycle Delay [s]	9.46	4.07	48.25
l_b,int, Bicycle LOS Score for Intersection	3.086	2.346	1.560
Bicycle LOS	C	B	A

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 5000: Willow Rd (SR 114)/Newbridge St

Control Type:	Signalized	Delay (sec / veh):	194.8
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.225

Intersection Setup

Name	Willow Road (SR 114)			Willow Road (SR 114)			Newbridge Street			Newbridge Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	1	0	0	1	0	0	0
Entry Pocket Length [ft]	390.00	100.00	100.00	185.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	2	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	49.21	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			25.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Willow Road (SR 114)			Willow Road (SR 114)			Newbridge Street			Newbridge Street		
Base Volume Input [veh/h]	322	1429	522	93	1222	17	44	177	526	487	178	55
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	-3	0	-1	-13	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	175	0	0	45
Total Hourly Volume [veh/h]	322	1426	522	92	1209	17	44	177	351	487	178	10
Peak Hour Factor	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	86	379	139	24	322	5	12	47	93	130	47	3
Total Analysis Volume [veh/h]	343	1517	555	98	1286	18	47	188	373	518	189	11
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	3			7			7			3		
v_di, Inbound Pedestrian Volume crossing m	3			7			7			3		
v_co, Outbound Pedestrian Volume crossing	11			20			10			19		
v_ci, Inbound Pedestrian Volume crossing mi	10			19			11			20		
v_ab, Corner Pedestrian Volume [ped/h]	31			48			41			8		
Bicycle Volume [bicycles/h]	5			0			3			1		

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	145
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	140.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Split	Split	Split	Split	Split	Split
Signal Group	5	2	2	1	6	6	4	4	4	8	3	8
Auxiliary Signal Groups												
Lead / Lag	Lag	-	-	Lead	-	-	Lag	-	-	-	-	-
Minimum Green [s]	4	12	12	4	12	12	4	4	4	0	4	0
Maximum Green [s]	21	40	40	21	40	40	25	25	25	0	21	0
Amber [s]	3.0	4.4	4.4	3.0	4.4	4.4	3.6	3.6	3.6	0.0	3.0	0.0
All red [s]	0.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0
Split [s]	24	59	59	12	47	47	38	38	38	0	36	0
Vehicle Extension [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walk [s]	0	4	4	0	4	4	4	4	4	0	4	0
Pedestrian Clearance [s]	0	19	19	0	16	16	23	23	23	0	23	0
Delayed Vehicle Green [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	3.0	0.0	3.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	1.0	3.4	3.4	1.0	3.4	3.4	2.6	2.6	2.6	0.0	1.0	0.0
Minimum Recall	No	Yes		No	Yes			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	L	C	R	L	C	R
C, Cycle Length [s]	145	145	145	145	145	145	145	145	145	145	145	145
L, Total Lost Time per Cycle [s]	3.00	5.40	5.40	3.00	5.40	5.40	4.60	4.60	4.60	3.00	3.00	3.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.00	3.40	3.40	1.00	3.40	3.40	2.60	2.60	2.60	1.00	1.00	1.00
g_i, Effective Green Time [s]	21	61	61	9	49	49	33	33	33	25	25	25
g / C, Green / Cycle	0.14	0.42	0.42	0.06	0.34	0.34	0.23	0.23	0.23	0.17	0.17	0.17
(v / s)_i Volume / Saturation Flow Rate	0.27	0.55	0.60	0.10	0.46	0.46	0.03	0.19	0.24	0.15	0.14	0.01
s, saturation flow rate [veh/h]	1265	2530	1130	937	1874	976	1781	984	1523	3459	1329	1464
c, Capacity [veh/h]	183	1072	479	58	639	333	409	226	350	603	231	255
d1, Uniform Delay [s]	62.00	41.77	41.77	68.00	47.77	47.77	44.21	53.21	55.18	58.15	57.64	49.78
k, delay calibration	0.50	0.50	0.50	0.21	0.50	0.50	0.04	0.16	0.33	0.04	0.14	0.04
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	412.29	142.41	197.97	337.72	163.74	172.85	0.05	11.20	58.02	1.43	8.65	0.03
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	1.87	1.30	1.41	1.68	1.34	1.34	0.11	0.83	1.07	0.86	0.82	0.04
d, Delay for Lane Group [s/veh]	474.29	184.18	239.74	405.72	211.51	220.62	44.25	64.41	113.20	59.58	66.28	49.81
Lane Group LOS	F	F	F	F	F	F	D	E	F	E	E	D
Critical Lane Group	Yes	No	No	No	No	Yes	No	No	Yes	Yes	No	No
50th-Percentile Queue Length [veh/ln]	27.65	39.73	42.88	7.64	26.13	28.07	1.36	7.24	18.23	9.37	7.25	0.34
50th-Percentile Queue Length [ft/ln]	691.36	993.17	1072.02	190.91	653.37	701.87	34.07	180.94	455.87	234.33	181.23	8.46
95th-Percentile Queue Length [veh/ln]	44.43	59.21	65.89	13.71	40.63	43.35	2.45	11.65	26.19	14.39	11.66	0.61
95th-Percentile Queue Length [ft/ln]	1110.67	1480.16	1647.13	342.64	1015.83	1083.77	61.32	291.24	654.75	359.85	291.62	15.22

Movement, Approach, & Intersection Results

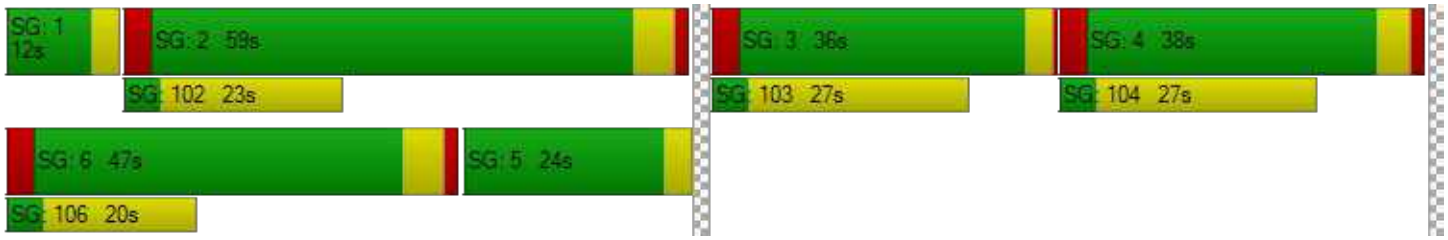
d_M, Delay for Movement [s/veh]	474.29	188.64	239.74	405.72	214.55	220.62	44.25	64.41	113.20	59.58	66.28	49.81
Movement LOS	F	F	F	F	F	F	D	E	F	E	E	D
d_A, Approach Delay [s/veh]	240.96			227.99			92.78			61.19		
Approach LOS	F			F			F			E		
d_I, Intersection Delay [s/veh]	194.81											
Intersection LOS	F											
Intersection V/C	1.225											

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	8.0	8.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	43.63	142.12	372.48	0.00
d_p, Pedestrian Delay [s]	64.72	64.72	64.72	64.72
l_p,int, Pedestrian LOS Score for Intersectio	3.525	3.057	2.729	2.701
Crosswalk LOS	D	C	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	698	532	419	414
d_b, Bicycle Delay [s]	30.81	39.04	45.35	45.63
l_b,int, Bicycle LOS Score for Intersection	2.888	2.331	2.852	2.819
Bicycle LOS	C	B	C	C

Sequence

Ring 1	2	1	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 8000: O'Brien Drive/Kavanaugh Drive

Control Type:	All-way stop	Delay (sec / veh):	59.2
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.007

Intersection Setup

Name	O'Brien Drive		O'Brien Drive		Kavanaugh Drive	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		Yes		No	

Volumes

Name	O'Brien Drive		O'Brien Drive		Kavanaugh Drive	
Base Volume Input [veh/h]	210	286	111	437	183	282
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	-3	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	210	283	111	437	183	282
Peak Hour Factor	0.9150	0.9150	0.9150	0.9150	0.9150	0.9150
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	57	77	30	119	50	77
Total Analysis Volume [veh/h]	230	309	121	478	200	308
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	539	448	478	536
Degree of Utilization, x	1.01	0.27	1.00	0.95

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	14.47	1.08	13.46	12.17
95th-Percentile Queue Length [ft]	361.68	27.10	336.45	304.34
Approach Delay [s/veh]	66.65	57.93		52.85
Approach LOS	F	F		F
Intersection Delay [s/veh]	59.22			
Intersection LOS	F			

Intersection Level Of Service Report
Intersection 9000: Bayfront Expy (SR 84)/University Ave (SR 109)

Control Type:	Signalized	Delay (sec / veh):	51.5
Analysis Method:	HCM 7th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.760

Intersection Setup

Name	University Avenue (SR109)		Bayfront Expressway (SR84)		Bayfront Expressway (SR84)	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	2	0	1	2	0
Entry Pocket Length [ft]	100.00	250.00	100.00	100.00	830.00	100.00
No. of Lanes in Exit Pocket	0	2	0	0	0	0
Exit Pocket Length [ft]	0.00	74.61	0.00	0.00	0.00	0.00
Speed [mph]	35.00		55.00		55.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		No	

Volumes

Name	University Avenue (SR109)		Bayfront Expressway (SR84)		Bayfront Expressway (SR84)	
Base Volume Input [veh/h]	87	1378	3777	95	333	1116
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	-2	-4	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	87	1376	3773	95	333	1116
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	22	351	963	24	85	285
Total Analysis Volume [veh/h]	89	1404	3850	97	340	1139
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	1		2		0	
v_ci, Inbound Pedestrian Volume crossing mi	2		1		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	3		5		8	

Intersection Settings

Located in CBD	No
Signal Coordination Group	4 - Willow Road
Cycle Length [s]	200
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	198.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	10.00

Phasing & Timing

Control Type	Permissive	Overlap	Permissive	Permissive	Protected	Permissive
Signal Group	4	4	6	2	5	2
Auxiliary Signal Groups		4,5				
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	12	12	10	10	11	10
Maximum Green [s]	15	15	60	60	30	60
Amber [s]	3.0	3.0	5.0	5.4	3.0	5.4
All red [s]	1.0	1.0	1.0	0.5	0.5	0.5
Split [s]	36	36	124	154	26	154
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	3.0
Walk [s]	4	4	4	0	0	0
Pedestrian Clearance [s]	29	29	35	0	0	0
Delayed Vehicle Green [s]	3.0	3.0	3.0	0.0	0.0	0.0
Rest In Walk	No		No			No
l1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0
l2, Clearance Lost Time [s]	2.0	2.0	4.0	3.9	1.5	3.9
Minimum Recall	No	No	No		No	No
Maximum Recall	No	No	No		No	No
Pedestrian Recall	No	No	No		No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	20.0	20.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	R	C	R	L	C
C, Cycle Length [s]	200	200	200	200	200	200
L, Total Lost Time per Cycle [s]	4.00	3.50	6.00	6.00	3.50	5.90
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	0.00	4.00	4.00	1.50	3.90
g_i, Effective Green Time [s]	32	58	132	132	23	158
g / C, Green / Cycle	0.16	0.29	0.66	0.66	0.11	0.79
(v / s)_i Volume / Saturation Flow Rate	0.03	0.34	0.57	0.06	0.10	0.22
s, saturation flow rate [veh/h]	3459	4185	6792	1566	3459	5094
c, Capacity [veh/h]	553	1224	4482	1033	390	4027
d1, Uniform Delay [s]	72.38	70.43	26.69	12.31	87.25	5.65
k, delay calibration	0.11	0.23	0.50	0.50	0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.13	71.12	2.36	0.18	6.17	0.18
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.16	1.15	0.86	0.09	0.87	0.28
d, Delay for Lane Group [s/veh]	72.51	141.55	29.05	12.49	93.42	5.82
Lane Group LOS	E	F	C	B	F	A
Critical Lane Group	No	Yes	Yes	No	No	No
50th-Percentile Queue Length [veh/ln]	2.00	28.85	33.77	1.59	8.87	3.79
50th-Percentile Queue Length [ft/ln]	49.98	721.24	844.16	39.68	221.68	94.71
95th-Percentile Queue Length [veh/ln]	3.60	40.97	43.30	2.86	13.75	6.82
95th-Percentile Queue Length [ft/ln]	89.96	1024.24	1082.40	71.43	343.77	170.48

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	72.51	141.55	29.05	12.49	93.42	5.82
Movement LOS	E	F	C	B	F	A
d_A, Approach Delay [s/veh]	137.43		28.64		25.96	
Approach LOS	F		C		C	
d_I, Intersection Delay [s/veh]	51.55					
Intersection LOS	D					
Intersection V/C	0.760					

Other Modes

g_Walk,mi, Effective Walk Time [s]	8.0	8.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	1160.89	0.00	0.00
d_p, Pedestrian Delay [s]	92.12	92.12	0.00
l_p,int, Pedestrian LOS Score for Intersectio	3.132	3.920	0.000
Crosswalk LOS	C	D	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	290	1150	1482
d_b, Bicycle Delay [s]	73.17	18.08	6.74
l_b,int, Bicycle LOS Score for Intersection	1.670	3.188	2.373
Bicycle LOS	A	C	B

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Appendix E

SimTraffic Queueing Worksheets

Intersection: 4: Willow Road (SR 114) & O'Brien Drive

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	LR	T	T	R	L	T	T
Maximum Queue (ft)	120	340	622	760	345	131	210	199
Average Queue (ft)	113	333	301	446	289	85	143	128
95th Queue (ft)	139	340	543	894	413	140	228	222
Link Distance (ft)		326	731	731			168	168
Upstream Blk Time (%)		57	0	11			8	4
Queuing Penalty (veh)		352	0	0			41	24
Storage Bay Dist (ft)	95				320	105		
Storage Blk Time (%)	28	72		1	23	11	12	
Queuing Penalty (veh)	96	188		7	88	54	10	

Intersection: 101: Willow Road (SR 114) & Project Dwy A

Movement	WB	NB	NB	SB	SB
Directions Served	R	T	TR	T	T
Maximum Queue (ft)	52	194	204	80	89
Average Queue (ft)	11	168	142	34	20
95th Queue (ft)	47	219	227	81	68
Link Distance (ft)	311	168	168	57	57
Upstream Blk Time (%)		21	3	5	2
Queuing Penalty (veh)		88	13	23	11
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 102: O'Brien Drive & Project Dwy B

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	261	253	149
Average Queue (ft)	49	245	69
95th Queue (ft)	180	261	162
Link Distance (ft)	326	237	344
Upstream Blk Time (%)	0	50	
Queuing Penalty (veh)	1	304	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 103: O'Brien Drive & Project Dwy C

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	239	767	48
Average Queue (ft)	50	496	8
95th Queue (ft)	174	920	31
Link Distance (ft)	237	798	316
Upstream Blk Time (%)	0	19	
Queuing Penalty (veh)	3	0	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 1302

Intersection: 4: Willow Road (SR 114) & O'Brien Drive

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	LR	T	T	R	L	T	T
Maximum Queue (ft)	120	340	785	786	345	130	201	192
Average Queue (ft)	113	334	726	722	325	81	148	133
95th Queue (ft)	138	340	863	887	442	139	227	214
Link Distance (ft)		326	731	731			168	168
Upstream Blk Time (%)		51	47	53			8	4
Queuing Penalty (veh)		418	0	0			38	19
Storage Bay Dist (ft)	95				320	105		
Storage Blk Time (%)	31	65		54	1	8	15	
Queuing Penalty (veh)	131	226		228	5	33	10	

Intersection: 101: Willow Road (SR 114) & Project Dwy A

Movement	WB	NB	NB	SB	SB
Directions Served	R	T	TR	T	T
Maximum Queue (ft)	49	199	237	80	65
Average Queue (ft)	13	173	184	32	14
95th Queue (ft)	39	219	247	82	54
Link Distance (ft)	311	168	168	57	57
Upstream Blk Time (%)		14	11	5	2
Queuing Penalty (veh)		101	82	21	7
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 102: O'Brien Drive & Project Dwy B

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	139	252	367
Average Queue (ft)	8	245	307
95th Queue (ft)	68	257	457
Link Distance (ft)	326	237	344
Upstream Blk Time (%)		47	74
Queuing Penalty (veh)		367	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 103: O'Brien Drive & Project Dwy C

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	202	846	213
Average Queue (ft)	21	700	89
95th Queue (ft)	109	1053	222
Link Distance (ft)	237	798	316
Upstream Blk Time (%)	0	51	6
Queuing Penalty (veh)	0	0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 1686

Appendix M
Transportation

Appendix M2 Transportation Demand Management Memorandum

MEMORANDUM

To: Ron Krietemeyer
Tarlton Properties, Inc.

From: Ben Huie, P.E.

Date: January 31, 2024

Subject: **Transportation Demand Management (TDM) Memorandum for 985-1005 O'Brien Drive**

Kimley-Horn and Associates, Inc. (KHA) was retained by Tarlton Properties, Inc. to prepare a transportation demand management (TDM) memorandum for the project located at 985-1005 O'Brien Drive in Menlo Park, CA. The proposed project replaces the existing 1320 Willow building, 985 O'Brien Drive building, and the 1001 O'Brien Drive building with a new 1320 Willow building, a new 1005 O'Brien Drive building, and a parking garage. The project would be completed in two phases:

- Phase 1 – 1005 O'Brien Drive and a 4-level parking garage
- Phase 2 – 1320 Willow and add two levels to the parking garage

The total project would result in approximately 227,050 square feet of research and development building and approximately 530 parking spaces.

Per the zoning ordinance in the City of Menlo Park City Code[1], new construction development projects are required to develop a TDM plan to reduce the number of vehicle trips to at least 20 percent below the standard trip generation rates for the project. In addition, the project would be required to meet the applicable City of Menlo Park vehicle miles traveled (VMT) threshold of 15 percent below the existing regionwide VMT per employee and the City/County Association of Governments of San Mateo County (C/CAG) requirement of a 35 percent trip reduction for transit proximate projects. C/CAG defines transit proximate projects as projects located between 0.5-3 miles of a transit station or stop featuring a maximum 15-minute service frequency (headways) during weekday peak hours between 6-10 AM and 3-7 PM.

Although the project is being completed in two phases, the TDM has been proposed for the entire project because the entire project would be required to meet the same trip reduction and VMT reductions (i.e., they are not different for each phase). In addition, the project would likely be monitored as a single project due to the buildings sharing a parking garage.

[1] Zoning Ordinance 16.44.090 Transportation demand management, City of Menlo Park, October 2017.

PROJECT PEAK HOUR TRIPS

The number of project trips for the project site was estimated using the industry standard Institute of Transportation Engineer's (ITE) *Trip Generation Manual*[2]. This reference estimates project trips based on land use from survey data. The proposed project is a redevelopment, so existing trip credits will be taken.

Table 1 summarizes the trip generation for the project proposal. Specific details of the trip generation are provided in **Attachment A**.

Table 1 – Trip Generation Summary – Proposed Use

Existing or Proposed	Address	ITE Land Use Code	Land Use	Vehicle Trips		
				Daily	AM Peak	PM Peak
Existing	985 O'Brien Dr	151	10.022 KSF Mini-Warehouse	14	1	2
	985 O'Brien Dr	760	10.022 KSF R&D	111	10	10
	1001 O'Brien Dr	760	20.542 KSF R&D	228	21	20
	1320 Willow Rd	151	50.045 KSF Mini-Warehouse	73	5	8
Existing Total Trips				**426**	**37**	**40**
Proposed	1005 O'Brien Dr	760	154.581 KSF R&D	1,713	159	151
	1320 Willow Rd	760	73.500 KSF R&D	814	75	72
Proposed Total Trips				**2,527**	**234**	**223**
Net Trips Generated (Proposed – Existing)				**+2,101**	**+197**	**+183**

Note: The trip generation summary does not include a 35% trip reduction for the TDM plan.

The proposed land use results in net 2,101 daily trips, 197 AM peak hour trips, and 183 PM peak hour trips. This TDM program was proposed to reduce the vehicle trips by at least 35 percent for the proposed project or by 884 daily trips, 82 AM peak hour trips, and by 78 PM peak hour trips.

[2] *Trip Generation Manual, 11th Edition*, Institute of Transportation Engineers, 2021.

PROJECT VEHICLE-MILES TRAVELED (VMT)

As of June 16, 2020, the City has adopted VMT thresholds and methods described in their staff report to City Council on June 23, 2020. The VMT threshold for an office use is 15 percent below the average Citywide VMT. Since January 11, 2022, this has been revised to be the regionwide VMT average. Based on the information presented in Staff Report 22-005-CC to City Council, **the VMT threshold would be 13.6 VMT per employee**. The project's VMT was based on the VMT for office uses in its traffic analysis zone (TAZ) as determined by the City's travel demand model. The project's TAZ indicates the VMT as 19.0 VMT per employee. Therefore, the project would need a 28.4 percent VMT reduction to be below the City's established VMT threshold.

TRANSPORTATION DEMAND MANAGEMENT PROGRAM

The following summarizes an initial approach to the proposed TDM program for the proposed project. The City's transportation demand management program includes required monitoring and reporting, and it is assumed that the TDM program will be refined over time to adapt to changing transportation trends and to maximize the efficiency of the program. The TDM program is specifically designed to focus on incentives and rewards for employees to participate in the program rather than penalties for not participating.

POTENTIAL PROGRAM ELEMENTS

Tarlton Properties, Inc. should offer a combination of program elements to encourage employees to utilize alternative modes of transportation to driving alone. Potential program elements are listed below:

- Increase employment density
- Participation in a local transportation management association (TMA)
- Preferential carpool parking spaces
- Preferential vanpool parking spaces
- Designated parking spaces for car share vehicles
- Pay for parking program
- Bike share program
- Subsidized transit tickets for employees
- Subsidy for carpool, vanpool, shuttle, or bus service
- Compressed workweek program
- Alternate hours workweek program
- Telecommuting
- Passenger loading zones for carpools and vanpools
- Safe and well-lit and accessible routes to nearby transit or shuttle stops
- Car share membership for employees
- Guaranteed ride home program
- Bike lockers/racks
- Showers/changing rooms
- Shuttle service
- Vanpool program
- Commute assistance center

- Parking cash out program

These program elements are listed in the City of Menlo Park's *Transportation Demand Management Program Guidelines*. Additionally, C/CAG has its own guidelines for a TDM program mentioned in the *Transportation Demand Management Policy Update Approach*. Each of these documents summarizes the potential program measures, a description of each measure, and the trip credits associated with each measure.

PROPOSED PROGRAM ELEMENTS

The project applicant is interested in working with the City to develop a practical TDM plan that can be both effective and provide the most value for all parties.

The effectiveness of the TDM plan was predicted using two separate methodologies:

1. California Air Pollution Control Officers Association (CAPCOA) *Quantifying Greenhouse Gas Mitigation Measures* for the City's VMT reduction analysis
2. City/County Association of Governments of San Mateo County (C/CAG) *Transportation Demand Management Policy Update Approach* for C/CAG's trip reduction analysis

The CAPCOA methodology and the C/CAG methodology are consistent with the methodologies used for other TDM plans in the City of Menlo Park.

CAPCOA Methodology

The CAPCOA methodology is based on the *Quantifying Greenhouse Gas Mitigation Measures* reference. This document estimates trip reductions, VMT reductions, and emissions reductions based on various relevant data sources, reports, and studies around the world.

Focusing on the transportation section, the estimated trip reduction and VMT reduction ranges for various measures are based on different transportation categories. In addition to the specific reductions for each measure, the CAPCOA methodology provides guidance on maximum reductions due to similar measures. The intent is to not double count measures that are similar and work in harmony with similar measures within the same category. CAPCOA provides the following equation for determining reductions when combining similar measures:

Combined Reduction Percentage = 1 – [(1-A) x (1-B) x (1-C)]

where: A, B, and C = Individual mitigation measure reduction percentages

Table 2 shows the estimated trip reduction and VMT reduction for each proposed TDM measure using the CAPCOA methodology.

Table 2 – Proposed TDM Measure Summary – CAPCOA

TDM Measure #	Transportation Demand Management Measure	Description	TDM Type	Estimated VMT Reduction (%)	CAPCOA Measure #
1	Provide End-of-Trip Bicycle facilities	This measure will install and maintain end-of-trip facilities for employee use. End-of-trip facilities include bike parking, bike lockers, showers, and personal lockers. The provision and maintenance of secure bike parking and related facilities encourages commuting by bicycle, thereby reducing VMT and greenhouse gas (GHG) emissions.	Trip Reduction Program	4.4%	T-10
2	Subsidized transit tickets for employees	This measure will provide subsidized or discounted, or free transit passes for employees and/or residents. Reducing the out-of-pocket cost for choosing transit improves the competitiveness of transit against driving, increasing the total number of transit trips and decreasing vehicle trips. This decrease in vehicle trips results in reduced VMT and thus a reduction in GHG emissions.	Trip Reduction Program	1.4%	T-9
3	Implement Commute Trip Reduction Marketing	This measure will implement a marketing strategy to promote the project site employer's CTR program. Information sharing and marketing promote and educate employees about their travel choices to the employment location beyond driving such as carpooling, taking transit, walking, and biking, thereby reducing VMT and GHG emissions. The following features (or similar alternatives) of the marketing strategy are essential for effectiveness. ▪ Onsite or online commuter information services. ▪ Employee transportation coordinators. ▪ Onsite or online transit pass sales. ▪ Guaranteed ride home service.	Trip Reduction Program	4.0%	T-7
4	Implement Pedal (Non-Electric) Bikeshare Program	This measure will establish a bikeshare program. Bikeshare programs provide users with on-demand access to bikes for short-term rentals. This encourages a mode shift from vehicles to bicycles, displacing VMT and thus reducing GHG emissions.	Neighborhood Design	0.0%	T-22 A
5	Implement Conventional Carshare Program	This measure will increase carshare access in the user's community by deploying conventional carshare vehicles. Carsharing offers people convenient access to a vehicle for personal or commuting purposes. This helps encourage transportation alternatives and reduces vehicle ownership, thereby avoiding VMT and associated GHG emissions.	Neighborhood Design	0.0%	T-21 A
6	Provide Employer-Sponsored Vanpool	This measure will implement an employer-sponsored vanpool service. Vanpooling is a flexible form of public transportation that provides groups of 5 to 15 people with a cost-effective and convenient rideshare option for commuting. The mode shift from long-distance, single-occupied vehicles to shared vehicles reduces overall commute VMT, thereby reducing GHG emissions.	Trip Reduction Program	5.2%	T-11

TDM Measure #	Transportation Demand Management Measure	Description	TDM Type	Estimated VMT Reduction (%)	CAPCOA Measure #
7	Provide a ridesharing program	This measure will implement a ridesharing program and establish a permanent transportation management association with funding requirements for employers. Ridesharing encourages carpooled vehicle trips in place of single-occupied vehicle trips, thereby reducing the number of trips, VMT, and GHG emissions.	Trip Reduction Program	4.0%	T-8
8	Implement Commute Trip Reduction Program (Mandatory)	This measure will implement a mandatory Commute Trip Reduction (CTR) program with employers. CTR programs discourage single-occupancy vehicle trips and encourage alternative modes of transportation such as carpooling, taking transit, walking, and biking, thereby reducing VMT and GHG emissions. The mandatory CTR program must include all other elements (i.e., implement commute trip reduction marketing, provide a ridesharing program, subsidized transit tickets for employees, provide end-of-trip bicycle facilities, and provide employee sponsored vanpool) plus include mandatory trip reduction requirements (including penalties for non-compliance) and regular monitoring and reporting to ensure the calculated VMT reduction matches the observed VMT reduction.	Trip Reduction Program	26.0%	T-6
			Estimated Maximum Trip Reduction[1]	**39.1%**	

[1]Estimated maximum trip reduction is calculated by the Combined Reduction Percentage equation on Page 4, not by summing the individual estimated VMT reduction percentages.

As shown in **Table 2**, the estimated trip reduction is 39.1 percent using the CAPCOA methodology. This satisfies the City of Menlo Park requirement of a 28.4 percent VMT reduction.

C/CAG Methodology

The initial set of TDM measures proposed for the 985-1005 O'Brien Drive site using the C/CAG TDM Mitigation score sheet for large, transit proximate, non-residential land uses. The measures and estimated trip reductions are summarized in **Table 3**.

Table 3 – Proposed TDM Measure Summary – C/CAG

TDM Measure		Description	C/CAG	
			Estimated Trip Reduction	Required
1	Free/Preferential Parking for Carpools	Provide free or preferential parking, including reserved spaces or spaces near an entrance or in another desirable location, to incentivize ridesharing.	1.0%	x
2	TDM Coordinator	In addition to, or in place of a building-wide Commute Assistance Center, a TDM Coordinator can be appointed by each building tenant. This representative is responsible for implementing the TDM Plan within its organization, with responsibilities that may include distributing transit and commute alternative information, conducting an annual commuter survey, and preparing an annual report summarizing the TDM Plan activities and performance.	0.5%	x
3	Actively Participate in Commute.org, or Transportation Management Association (TMA) Equivalent	Sites shall register with Commute.org or else join or create a Transportation Management Association (TMA) with equivalent TDM service, whose role is to coordinate transportation-related programs and services in specific geographic areas. Notably, for Large Non-Residential (Office, Industrial, Institutional, as well as Medical & Lodging) projects categorized as Transit Proximate there are five components an applicant must fulfill to satisfactorily implement this measure: 1. Obtain certification of participation with Commute.org, or equivalent program. 2. Provide commute assistance or ride-matching program. 3. Provide (or fund) a dedicated shuttle program/consortium or equivalent transit service. 4. Provide Guaranteed Ride Home 5. Supply orientation, education, and promotional programs and/or materials for tenants	16.5%	x
3a	*Certified participation in Commute.org, or equivalent program such as TMA*	*See above*	*4.0%*	*x*
3b	*Commute assistance and ride-matching*	*Establish a commute assistance program to provide individualized trip planning services. These services can help employees and residents understand the range of transportation options available to them based on their commute patterns. Ride-matching services aim to find carpools or vanpools for employees or residents with similar commute patterns. Dynamic ridesharing apps are increasing in popularity and allow for ride-matching on a day-by-day basis.*	*1.0%*	*x*
3c	*Shuttle Program/Shuttle Consortium/Fund Transit Service*	*Establish a shuttle service to regional transit hubs, commercial centers, or residential areas. Shuttle service should be provided free of charge to residents, employees, and guests. Alternatively, a project site may buy into a shuttle consortium with neighboring developments to pool resources and run shuttle services to multiple nearby sites. Developers may also fund enhanced transit service to/from their project site in collaboration with SamTrans.*	*10.0%*	*x*

TDM Measure		Description	C/CAG	
			Estimated Trip Reduction	Required
3d	*Guaranteed Ride Home*	*Offer employees a Guaranteed Ride Home (GRH) program to provide an occasional subsidized ride to commuters who use alternative modes, for example, if a bus rider must return home in an emergency, or a car pooler must stay at work later than expected. This addresses a common objection to the use of alternative modes. In San Mateo County, a countywide GRH program is managed by Commute.org. This program is open to all persons with a workplace in San Mateo County or students who commute to a participating college in San Mateo County.*	*0.5%*	*x*
3e	*Orientation, Education, Promotional Programs and/or Materials*	*Offer new employees or residents an orientation or education program or materials. This should explain the importance of trip reduction methods and provide information on alternative transport mode options available at the site, including transit schedules, maps, and trip planning. These orientation or education programs and materials can also highlight transportation-focused benefits or amenities available to employees or residents, such as pre-tax benefits, car share, bike share, or shuttle services.*	*1.0%*	*x*
4	Carpool or Vanpool Program	Carpool and vanpooling are types of ridesharing that seek to allow vehicles to carry additional passengers when making a trip, with minimal additional mileage. Carpooling generally uses participants' own automobiles. Vanpooling generally uses leased vans (often supplied by employers, non-profit organizations, or government agencies). Carpool and vanpool programs may receive financial incentives from property managers or employers, as well as ride-matching services to help facilitate these shared trips.	2.0%	x
5	Transit or Ridesharing Passes/Subsidies	Offer public transit passes or subsidies; or carpool/vanpool subsidies to tenants' equivalent to 30% of the value of their monthly fare or $50 monthly, to incentivize transit use and ridesharing and comply with regional environmental sustainability goals. NOTE: Funding contributions towards and/or participation in Commute.org shuttle program does not count for this measure. Passes/subsides provided must be valid for public transportation options, including but not limited to BART, Caltrain, SamTrans, and ridesharing platforms and vanpool subscription (or costs).	10.0%	x
6	Pre-Tax Transportation Benefits	Allow employees to participate in a pre-tax transit and parking benefits program to save money and encourage the use of sustainable transportation modes. In the Bay Area, the Bay Area Air Quality Management District (BAAQMD) requires that employers with 50+ employees within the air district provide commuter benefits.	1.0%	x
7	Secure Bicycle Storage	Provide safe and convenient long-term (Class I) bicycle parking. Long-term bicycle parking should offer protection from weather and convenient access to and from the street, without the need to use stairs and with doorways and corridors that are sufficiently wide to navigate with a bicycle. Short term (Class II) bicycle parking should be near pedestrian entries and may be in the public right-of-way. Short term bicycle parking may be used for visitors, couriers, or customers, typically for less than two hours.	1.0%	x

TDM Measure		Description	C/CAG	
			Estimated Trip Reduction	Required
8	Showers, Lockers, and Changing Rooms for Cyclists	These amenities serve as end of trip facilities for employees arriving by bike or other active transportation forms. Commuters who bicycle or walk often arrive wet, muddy or sweaty. Providing employees with a place to shower, change and store clothes can encourage bicycle commuting. Such facilities also benefit employees who exercise during breaks or may occasionally need to wash and change clothes for other reasons	2.0%	x
9	Design Streets to Encourage Bike/Ped Access	Design street or roadways that provide travel choices and give people the option to avoid traffic congestion, increasing the overall capacity of the transportation network. Street designs should enable safe access for all users of all ages and abilities. Improving pedestrian and cyclist safety and comfort can increase the use of active transportation for residents or employees of a project site.	1.0%	x
10	Bike/Scooter Share On-Site	Provide on-site bike share or bicycle fleets. Availability of bike-share bikes or bicycle fleets reduces the need for individual vehicle ownership and use, which, reduced the number of VMT by individuals. Bike share systems allow for bikes to be rented at one location and returned to another. Bike share systems can play a role in the first or last mile of a commute. Subsidizing or offering complementary bike share memberships, can encourage greater use of the bike share systems and may reduce the barrier for individuals to try bike share. Similarly, on-site fleet bicycles at employer sites allow employees who either drive or a commute alternative to run errands during the day, using a non-motorized form of transport.	1.0%	
		TOTAL	**36.0%**	

As shown in **Table 3**, the estimated trip reduction is 36 percent using the C/CAG TDM Mitigation score sheet for large, transit proximate, non-residential land uses. This satisfies the C/CAG requirement of a 35 percent trip reduction.

Tarlton TDM Monitoring

A TDM plan was proposed and implemented for a similar project on a nearby property at 1305 O'Brien Drive, which is operated by the same applicant as the proposed project here. This project was completed and the TDM effectiveness has been monitored since 2018. The vehicular traffic at each of the project's driveways were counted in 2018, 2019, and 2021 as part of the TDM Monitoring process. Based on this monitoring, the TDM plan for 1305 O'Brien Drive achieved a 32 percent to 57 percent trip reduction for the AM and PM peak hours in 2018, 2019, and 2021 (see Attachment B for monitoring reports). The results from the 2020 TDM monitoring were not used because of the impact from COVID-19. As shown from a similar Tarlton project, a maximum trip reduction of 57 percent was achieved, which suggests that the CAPCOA and C/CAG methodologies provide an accurate estimation of the effectiveness of the proposed TDM program when considering the combination of the TDM and increase in land use density.

TDM Reductions

VMT Results

The estimated VMT reduction for the proposed TDM plan is 39.1 percent based on the CAPCOA methodology. The 39.1 percent VMT reduction for the TDM plan was applied to the project's VMT. As stated previously, the project is estimated to have a VMT of 19.0 VMT per employee without a TDM plan. After applying a 39.1 percent reduction, the project VMT with the TDM plan would be 11.6 VMT per employee. The project's VMT with the TDM plan would be under the City's VMT threshold of 13.6 VMT per employee. Therefore, the project is expected to have a less than significant VMT impact with the TDM plan.

Peak Hour Trip Results

The estimated trip reduction for the proposed TDM plan is 36 percent based on the C/CAG methodology. The 36 percent trip reduction for the TDM plan was applied to the project's trip generation. **Table 3** shows the net new project trips based on the existing trips, and the proposed trips with the TDM reduction. Applying the 36 percent TDM reduction to the proposed project trips results in a net new 1,191 daily trips, 113 AM peak hour trips, and 103 PM peak hour trips.

Table 3 – Trip Generation Summary – Net New Trips

Existing or Proposed	ITE Land Use Code	Land Use	Vehicle Trips		
			Daily	AM Peak	PM Peak
Existing	151	10.022 KSF Mini-Warehouse	14	1	2
	760	10.022 KSF R&D	111	10	10
	760	20.542 KSF R&D	228	21	20
	151	50.045 KSF Mini-Warehouse	73	5	8
Existing Total Trips			**426**	**37**	**40**
Proposed	760	154.581 KSF R&D	1,713	159	151
	760	73.500 KSF R&D	814	75	72
Proposed Total Trips			**2,527**	**234**	**223**
Net Trips Generated (Proposed – Existing)			**+2,101**	**+197**	**+183**
TDM Reduction (36%)			**-910**	**-84**	**-80**
Net Proposed Trips			**+1,191**	**+113**	**+103**

CONCLUSION

The proposed project is anticipated to generate a net new 2,101 daily trips, 197 AM peak hour trips, and 183 PM peak hour trips without the TDM program. The Life Sciences zoning regulations (Section 16.44.090) requires a TDM program to reduce the vehicle trips by at least 20 percent for the proposed project. C/CAG also requires a trip reduction of 35 percent for large, transit proximate, non-residential projects. The proposed TDM plan would result in a 36 percent trip reduction using the C/CAG methodology. Using the 36 percent trip reduction, the project would result in 1,191 daily trips, 113 AM peak hour trips, and 103 PM peak hour trips. The proposed TDM plan would result in a 39.1 percent VMT reduction using the CAPCOA methodology. Using the 39.1 percent VMT reduction, the project VMT would be 11.6 VMT per employee, which is less than the City's VMT threshold of 13.6 VMT per employee. Therefore, the project is expected to have a less than significant VMT impact with the TDM plan.

Attachment A

Tarlton - 985-1005 O'Brien Drive								
TIME PERIOD		**LAND USE**	**Trip Rate**			**Trips**		
			In	**Out**	**Total**	**In**	**Out**	**Total**
Daily	Existing Use	Research and Development Center (10.022 KSF)	5.54	5.54	11.08	55	56	111
		Research and Development Center (20.542 KSF)	5.54	5.54	11.08	114	114	228
		Wholesale Market (10.022 KSF)	0.73	0.73	1.45	7	7	14
		Wholesale Market (50.045 KSF)	2.23	2.23	4.45	37	36	73
		Total Existing Use Daily Trips				213	213	426
	Proposed Use	Research and Development Center (154.581 KSF)	5.54	5.54	11.08	857	856	1,713
		Research and Development Center (73.500 KSF)	5.54	5.54	11.08	407	407	814
		Total Proposed Use Daily Trips				1,264	1,263	2,527
		Net New Daily Trips				**1,051**	**1,050**	**2,101**
AM Peak	Existing Use	Research and Development Center (10.022 KSF)	0.84	0.19	1.03	8	2	10
		Research and Development Center (20.542 KSF)	0.84	0.19	1.03	17	4	21
		Wholesale Market (10.022 KSF)	0.05	0.04	0.09	1	0	1
		Wholesale Market (50.045 KSF)	0.05	0.04	0.09	3	2	5
		Total Existing Use AM Trips				29	8	37
	Proposed Use	Research and Development Center (154.581 KSF)	0.84	0.19	1.03	131	28	159
		Research and Development Center (73.500 KSF)	0.84	0.19	1.03	62	13	75
		Total Proposed Use AM Trips				193	41	234
		Net New AM Trips				**164**	**33**	**197**
PM Peak	Existing Use	Research and Development Center (10.022 KSF)	0.16	0.82	0.98	2	8	10
		Research and Development Center (20.542 KSF)	0.16	0.82	0.98	3	17	20
		Wholesale Market (10.022 KSF)	0.07	0.08	0.15	1	1	2
		Wholesale Market (50.045 KSF)	0.07	0.08	0.15	4	4	8
		Total Existing Use PM Trips				10	30	40
	Proposed Use	Research and Development Center (154.581 KSF)	0.16	0.82	0.98	24	127	151
		Research and Development Center (73.500 KSF)	0.16	0.82	0.98	11	61	72
		Total Proposed Use PM Trips				35	188	223
		Net New PM Trips				**25**	**158**	**183**

Attachment B

November 10, 2021

Ron Krietemeyer
Menlo Park Portfolio II, LLC c/o Tarlton Properties, Inc.
1530 O'Brien Drive, Suite C
Menlo Park, CA 94025
(transmitted via email)

RE: ***Tarlton 1305 O'Brien Drive – 2021 Transportation Demand Management (TDM) Monitoring Final Letter***

Dear Mr. Krietemeyer:

This project is to monitor the vehicular traffic at 1305 O'Brien Drive as part of its Transportation Demand Management (TDM) plan. Kimley-Horn developed a TDM plan[1] (see **Attachments**) for the 1315 O'Brien Drive project in December 2015, which has since been renamed as 1305 O'Brien Drive. The TDM plan was developed to reduce the net new project trips to fewer than 16 peak hour trips. To achieve this, TDM measures were proposed to reduce the number of project trips, in addition to the existing trip credits from the existing site. The City of Menlo Park (City) is requesting that the 1305 O'Brien Drive building be in compliance with this TDM plan for each year of operation. A TDM monitoring report was prepared and submitted in 2018, 2019, and 2020 for this project. In 2020, COVID-19 changed the typical travel patterns due to the shelter-in-place restrictions by local agencies and reduced the traffic levels areawide, including for 1305 O'Brien Drive. Therefore, the 2020 TDM monitoring report estimated vehicles trips based on the number of employees working on-site at the time. This is the fourth year of monitoring to be performed since the building has opened. Although travel patterns have yet to fully return to typical conditions, traffic conditions have been shown to slowly return as many employees are beginning to commute to work and schools are transitioning back to in-person teaching. As directed by the City, traffic counts were collected as part of the 2021 TDM monitoring. In addition to the counts, a survey was distributed electronically to the employees of the 1305 O'Brien Drive building to gather information about each employee's travel pattern before COVID-19 and how those patterns have changed as a result of COVID-19. The following discusses the methodology, analysis, and results of the TDM monitoring process.

VEHICLE TRIPS ALLOWED

The primary purpose of the TDM monitoring process is to determine if the project exceeds the vehicle trip threshold as stated in the TDM plan and the conditions of approval. In the TDM plan, the goal for the project was to generate fewer than 16 net new peak hour trips (based on a 10,000-square foot office building) by including the previous use trip credits and the TDM trip reduction. **Table 1** shows

[1] Transportation Demand Management (TDM) Memorandum for 1315 O'Brien Drive, Kimley-Horn and Associates, Inc., December 8, 2015.

the estimated trip generation summary for the 1305 O'Brien Drive project in the TDM plan. The project is allowed to generate the number of vehicle trips from the existing trip credits plus the 16-vehicle threshold. **Table 2** shows the number of vehicle trips the project is allowed to generate. The project is allowed to generate 152 AM peak hour trips and 151 PM peak hour trips.

Table 1 – Trip Generation Summary for 1305 O'Brien Drive

Uses	Vehicle Trips		
	Daily	AM Peak Hour	PM Peak Hour
Proposed Use Trips	1,316	189	174
TDM Trip Reduction (21.1%)	-278	-40	-36
Previous Use Trip Credits	-1,196	-136	-135
Net New Trips	**-158**	**13**	**3**

Table 2 – Trips Allowed for 1305 O'Brien Drive (10,000-SF Office Building Trip Threshold)

Uses	Vehicle Trips		
	Daily	AM Peak Hour	PM Peak Hour
Previous Use Trip Credits	1,196	136	135
City Threshold Allowed	110	16	16
Net New Trips Allowed	**1,306**	**152**	**151**

Although, there was no specified maximum for daily trips generated by the project in the TDM plan, the conditions of approval (COA) specifically mentioned a daily maximum number of trips. Therefore, the City has directed us to use a daily threshold of 110 new daily vehicle trips, which was calculated based on the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 9th Edition* for a 10,000-square foot office building. The ITE *Trip Generation Manual, 9th Edition* was used because it was the current reference when the TDM plan was developed and was used for the AM and PM peak hour vehicle trip thresholds. **Table 2** also shows the number of daily vehicle trips the project is allowed to generate. The project is allowed to generate 1,306 daily vehicle trips.

Although not specified in the TDM plan, the City also has required that buildings in the Life Sciences zone develop a transportation demand management (TDM) plan. *"All new construction, regardless of size, and building additions of ten thousand (10,000) or more square feet of gross floor area, or a change of use of ten thousand (10,000) or more square feet of gross floor area shall develop a Transportation Demand Management (TDM) plan necessary to reduce associated vehicle trips to at*

least twenty percent (20%) below the standard generation rates for uses on the project site."[2] This zoning requirement was implemented in November 2016, which was subsequent to the approval of the TDM plan in December 2015 and therefore was not included in the TDM plan. Nonetheless, the 20 percent TDM reduction was considered for the trip thresholds in this monitoring report. **Table 3** shows the required trip threshold for a reduction in vehicle trips by 20 percent.

Table 3 – Trips Allowed for 1305 O'Brien Drive (20% TDM Reduction)

Uses	Vehicle Trips		
	Daily	AM Peak Hour	PM Peak Hour
Proposed Use Trips	1,316	189	174
TDM Trip Reduction (20%)	-263	-38	-35
Net New Trips Allowed	**1,053**	**151**	**139**

VEHICLE TRIPS COUNTED

To determine if the project met the vehicle trip thresholds described above, the project driveways were monitored.

Methodology

The project driveways for 1305 O'Brien Drive were counted for three (3) days, at 15-minute intervals, to determine the number of vehicle trips in and out of the project site. The project site is isolated and therefore all the vehicles counted at the driveways can be attributed to the 1305 O'Brien Drive project. **Figure 1** shows the location of the driveways counted relative to 1305 O'Brien Drive. It should be noted that there were vehicles related to the UPS center (both UPS trucks and employee passenger cars), just north of the project site, that would cut-through the project site. Therefore, to remove these vehicles from the 1305 O'Brien Drive vehicle trips, Driveway #1 and the UPS driveway were counted simultaneously to determine if there were any vehicles going directly between the two driveways. Further review of the data showed UPS trucks also cut-through the site at Driveways #2, #3A, and #3B in the AM peak period. Many UPS trucks exiting the UPS center would enter Driveway #2 and wait in the 1305 O'Brien Drive parking lot to begin their route since there is limited on-street parking along Adams Court. Once they are ready to begin their route, the UPS truck will exit the project site at Driveways #3A and #3B. Because these vehicle trips are not associated with the 1305 O'Brien Drive project, they were removed from the TDM monitoring for 1305 O'Brien Drive.

[2] Ordinance No. 1025 Ordinance of the City Council of the City of Menlo Park adding the LS (Life Sciences) Zoning District to Title 16 of the Municipal Code, City of Menlo Park, November 2016.

Data Collection

The project driveways were counted on three days:

- Tuesday, September 28, 2021
- Wednesday, September 29, 2021
- Thursday, September 30, 2021

The counts for each driveway are shown in the **Attachments**.

For each day of data collected, the peak hour in the AM peak and in the PM peak was determined for the site combined (i.e. all the driveways combined). For the AM peak hour, the 8:30 AM to 9:30 AM hour was determined to have the highest combined volumes for all driveways on each day of the data collection. For the PM peak hour, the 4:30 PM to 5:30 PM was determined to have the highest combined volumes for all driveways on September 28 and September 30, 2021 and the 5:00 PM to 6:00 PM was the highest for September 28 and September 29, 2021. It should be noted that the PM peak hour volume occurred during both peak periods from 4:30 PM to 5:30 PM and from 5:00 PM to 6:00 PM on September 28, 2021. These driveway volumes were then averaged for these specific peak hours to determine the average peak hour volumes. **Table 4** summarizes the average of the daily, AM peak hour, and PM peak hour trips for all the driveways combined. It should be noted that UPS cut-through traffic at Driveways #2, #3A, and #3B were removed only in the AM peak hour trips. The UPS cut-through traffic at these driveways were not removed from the Daily and PM peak hour trips as the traffic count for all the driveways during these two time periods are expected to be less than the vehicle trip threshold allowed even without removing cut-through traffic.

Figure 1 – Driveway Locations

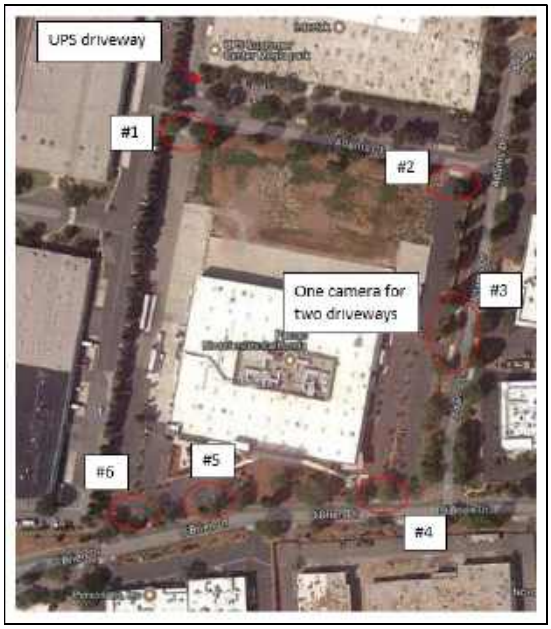


Table 4 – Vehicle Counts Summary

#	Driveway	Vehicle Trips					
		Daily		AM Peak Hour		PM Peak Hour	
		In	Out	In	Out	In	Out
1	NW Driveway on Adams Ct	73	53	23	6	1	7
2	NE Driveway on Adams Dr	70	25	33	1	2	2
3A	East Driveway on Adams Dr (North)	17	51	0	29	1	3
3B	East Driveway on Adams Dr (South)	29	44	6	2	1	8
4	SE Driveway on O'Brien Dr	66	63	15	2	2	15
5	South Driveway on O'Brien Dr	44	33	8	1	2	4
6	SW Driveway on O'Brien Dr	139	169	29	17	2	29
Subtotal (a)		***438***	***438***	***114***	***58***	***11***	***68***
1	UPS Driveway to NW Driveway on Adams Ct	51	51	17	17	1	1
2	UPS Trucks at NE Driveway on Adams Dr	-	-	29	0	-	-
3A	UPS Trucks East Driveway on Adams Dr (North)	-	-	0	28	-	-
3B	UPS Trucks East Driveway on Adams Dr (South)	-	-	0	1	-	-
Cut-through Traffic Subtotal (b)		***-51***	***-51***	***-46***	***-46***	***-1***	***-1***
Total (a + b)		**387**	**387**	**68**	**12**	**10**	**67**

Note – Vehicle trips are an average of Tuesday, Wednesday, and Thursday counts during the week of September 28th to 30th, 2021. UPS cut-through traffic at Driveways #2, #3A, and #3B were determined only in the AM peak hour.

VEHICLE TRIPS COMPARISON

The 1305 O'Brien Drive building generates 774 daily trips, 80 AM peak hour trips, and 77 PM peak hour trips. Each of these trip totals are well below the allowed daily and peak hour trips for the project. Using the existing credits and the 10,000-square foot office building trip threshold, the project is allowed 1,306 daily trips, 152 AM peak hour trips, and 151 PM peak hour trips. As shown in **Table 5**, the project generates 532 fewer daily trips, 72 fewer AM peak hour trips, and 74 fewer PM peak hour trips than the threshold. This is expected as COVID-19 has resulted in many employees telecommuting rather than commuting to work.

Table 5 – Trip Comparison (10,000-SF Office Building Trip Threshold)

Uses	Vehicle Trips		
	Daily	AM Peak Hour	PM Peak Hour
Net New Trips Allowed	1,306	152	151
Net New Trips Generated	774	80	77
Net Difference	-532	-72	-74

Using the 20 percent TDM threshold, the project is allowed 1,053 daily trips, 151 AM peak hour trips, and 139 PM peak hour trips. As shown in **Table 6**, the project generates 279 fewer daily trips, 71 fewer AM peak hour trips, and 62 fewer PM peak hour trips than the threshold.

Table 6 – Trip Comparison (20% TDM Reduction)

Uses	Vehicle Trips		
	Daily	AM Peak Hour	PM Peak Hour
Net New Trips Allowed	1,053	151	139
Net New Trips Generated	774	80	77
Net Difference	-279	-71	-62

The project is compliant with the TDM plan with regards to the number of vehicle trips generated. Although the project is compliant with the TDM plan, a travel survey was still conducted to determine the change in commute patterns as a result of COVID-19.

PREVIOUS TDM MONITORING

The 2021 TDM monitoring project is the fourth year of TDM monitoring for the 1305 O'Brien Drive project. For comparison purposes, **Table 7** summarizes the vehicle trips from the previous TDM monitoring. Between the 2018 to 2021 TDM monitoring, the vehicle trips are each below the allowed number of vehicle trips for each time period. As shown in the table, vehicle trips for both the 2020 and 2021 TDM monitoring shows a significant decrease from 2018 and 2019 as a result of COVID-19. Vehicle trips for the 2020 TDM monitoring were not collected as mentioned previously but were instead estimated based on the 2018 and 2019 vehicle trip counts, as well as the number of employees working on-site at the time of the 2020 TDM monitoring.

Table 7 – Previous TDM Monitoring

Monitoring Year	Vehicle Trips		
	Daily	AM Peak Hour	PM Peak Hour
Net New Trips Allowed (10,000-SF Office Threshold)	1,306	152	151
Net New Trips Allowed (20% TDM Reduction)	1,053	151	139
2018 Monitoring	1,030	118	114
2019 Monitoring	1,009	114	118
2020 Monitoring[1]	340	110	110
2021 Monitoring	774	80	77

[1] Vehicle trips were not collected as part of the 2020 TDM Monitoring due to COVID-19. Instead, the vehicle trips shown were determined using the 2018 and 2019 counts with an adjustment based on the number of employees working on-site at the time of the 2020 TDM monitoring.

TRAVEL SURVEY

A survey was developed using Survey Monkey and distributed electronically for the employees of 1305 O'Brien Drive to help determine their typical commute before COVID-19 and their change in travel patterns as a result of COVID-19. The survey also assists in determining which TDM measures would more likely be utilized if implemented. The survey is included in the **Attachments**. A total of 92 employees responded to the questionnaire. Based on the 2020 TDM monitoring report, the project employs a total of 304 employees. Therefore, the survey results are only representative of approximately 30 percent of the total employees. The results of the survey, by question, are also included in the **Attachments**. Some of the key results from the survey responses are:

- Primary mode of transportation before COVID:
  - 78 percent of the respondents drive alone
  - 3 percent of the respondents carpool
  - 0 percent of the respondents telecommute
  - 19 percent of the respondents use alternative modes of transportation

- Primary mode of transportation as a result of COVID
  - 60 percent of the respondents drive alone as a result of COVID
  - 3 percent of the respondents carpool
  - 29 percent of the respondents telecommute
  - 8 percent of the respondents use alternative modes of transportation

- Time period employees typically arrive to work in the AM period:
  - Before COVID:
    - 42 percent of respondents arrive between 8:00 – 9:00 AM
    - 32 percent of respondents arrive between 9:00 – 10:00 AM
  - As a result of COVID:
    - 41 percent of respondents arrive between 8:00 – 9:00 AM
    - 29 percent of respondents arrive between 9:00 – 10:00 AM

- Time period employees typically leave work in the PM period:
  - Before COVID:
    - 3 percent of respondents leave before 4:00 PM
    - 31 percent of respondents leave between 4:00 – 5:00 PM
    - 52 percent of respondents leave between 5:00 – 6:00 PM
  - As a result of COVID:
    - 14 percent of respondents leave before 4:00 PM
    - 21 percent of respondents leave between 4:00 – 5:00 PM
    - 51 percent of respondents leave between 5:00 – 6:00 PM

- Approximately 42 percent of employees who telecommute as a result of COVID will only be comfortable returning to their typical (pre-COVID) transportation mode under certain circumstances (i.e. when it is safe, when employees or family members are all vaccinated, or when it is more convenient)

- Approximately 14 percent of employees plan to telecommute indefinitely.

- The primary reason respondents chose their preferred commute method (pre-COVID) is for convenience (48 percent).

- Although employees typically drive alone, they have researched or considered other means of transportation. The highest alternative mode that respondents considered was using a shuttle (42 percent) and riding Caltrain (34 percent).

- The biggest obstacles preventing respondents to commute using alternative modes (pre-COVID) are no nearby transit to their home (45 percent of respondents) and people require a car for personal commitments after work (39 percent of respondents).

- The majority of the respondents (52 percent) stated that none of the proposed measures would cause them to switch to an alternate means of commuting other than driving alone. The second highest response (35 percent) was having a guaranteed ride home program.

- If respondents were offered a rewards or discount program, 31 percent stated that a reward programs for carpooling would cause them to switch to an alternate means of commuting to work other than driving alone.

- The following is the ranking of which alternate means of commuting to work (pre-COVID) they would consider:

1) Carpool	2) Shuttle	3) Transit
4) Vanpool	5) Bicycle	6) Walk

CONCLUSIONS

The proposed project at 1305 O'Brien Drive is allowed to generate 1,306 daily trips, 152 AM peak hour trips, and 151 PM peak hour trips based on the 10,000-square foot office building trip allowance (including the existing trip credits). Based on the 2021 driveway counts, the project generates 774 daily trips, 80 AM peak hour trips and 77 PM peak hour trips. Therefore, the project is below the vehicle trip threshold as stated in the TDM plan.

Subsequent to the TDM plan being developed for 1305 O'Brien Drive, the City of Menlo Park developed a TDM trip reduction goal of 20 percent for buildings in the Life Sciences zone. Based on this trip threshold, the project is allowed to generate 1,053 daily trips, 151 AM peak hour trips, and 139 PM peak hour trips. Based on the 2021 driveway counts, the project generates 774 daily trips, 80 AM peak hour trips, and 77 PM peak hour trips. Therefore, the project is below this trip threshold as well. The project meets the requirements in the TDM plan.

An employee survey was administered electronically to understand the changes in commute trends as a result of COVID-19. The results showed that 78 percent of the respondents drove alone for their typical commute (pre-COVID) and 60 percent of the respondents drove alone as a result of COVID-19, a reduction in 18 percent. However, although fewer respondents drove as a result of COVID-19, the number of respondents telecommuting has increased to 29 percent. Approximately 13 percent of employees used shuttle as their primary mode of transportation before COVID, whether it was shuttle alone or in combination with Caltrain, bike, or bus. As a result of COVID, approximately 4 percent of employees now use shuttle as their primary mode. The biggest difference in time period of when employees would arrive or leave work was in the PM peak period where 31 percent of employees typically leave work between 4:00 PM to 5:00 PM and was reduced to 21 percent of employees leaving during this time period as a result of COVID-19, a reduction in 10 percent. These employees now leave work earlier, before 4:00 PM. In addition, approximately 14 percent of employees plan to telecommute indefinitely.

Sincerely,



Ben Huie, P.E.
California Professional Engineer #C76682

Attachments:

Attachment A – TDM Memorandum for 1315 O'Brien Drive (dated December 8, 2015)

Attachment B – Driveway Counts

Attachment C – Travel Survey Results

Attachment A

Kimley»Horn

MEMORANDUM

To:	Ron Krietemeyer Tarlton Properties, Inc.
From:	Michael Mowery, P.E. Ben Huie, P.E.
Date:	December 8, 2015
Subject:	**Transportation Demand Management (TDM) Memorandum for 1315 O'Brien Drive**

Kimley-Horn and Associates, Inc. (KHA) was retained by Tarlton Properties, Inc. to evaluate the expected number of project trips based on the existing and proposed land uses at 1315 O'Brien Drive in the City of Menlo Park and mitigate the number of trips by implementing a Transportation Demand Management (TDM) Plan. The proposed project will realign the previous building uses. Below are the proposed sizes and land uses for the proposed site:

- 113,382 square feet of research & development (Pac Bio)
- 45,796 square feet of manufacturing (Pac Bio)
- 17,797 square feet of warehousing (Pac Bio)
- 43,541 square feet of warehousing (other tenants)

The previous use for the project site consisted of:

- 162,839 square feet of warehousing
- 55,787 square feet of general office building

These changes in land use for 1315 O'Brien Drive will result in an increase in peak hour trips generated from the project site.

PROJECT PEAK HOUR TRIPS

The number of project trips for the project site was estimated using the industry standard Institute of Transportation Engineer's (ITE) *Trip Generation* Manual. This reference estimates project trips based on land use from survey data. Since the proposed project is not a new project, but updating an existing land use, trip rates were calculated for both the proposed use and the previous use.

The previous land use was a distribution center with regional administrative offices including a showroom and sales offices. A distribution center does not have a specific land use in the ITE *Trip Generation* manual. There are similar land uses in the *Trip Generation* manual such as: the warehousing land use (ITE LU code 150), the general light industrial (ITE LU code 110), and the high-

cube warehouse/distribution center (ITE LU code 152). The *Dumbarton Distribution Center EIR*[1], which was the name of the Menlo Business Park before 1984, was reviewed as well. It documented the distribution center as a warehousing and light industrial land use. Therefore, for trip generation purposes, the existing use for the 1315 O'Brien Drive site was a warehousing land use, along with office, as described previously. **Table 1** summarizes the trip generation for the previous use. Specific land use and trip generation breakdowns are provided in **Attachment A**.

Table 1 – Trip Generation Summary – Previous Use

Previous Use	Vehicle Trips		
	Daily	AM Peak	PM Peak
55.787 KSF Office and 162.839 KSF Warehousing	1,196	136	135

The previous land uses resulted in 136 AM peak hour trips and 135 PM peak hour trips. No adjustments for trip reductions (e.g. pass-by trips or internal capture) were used in this calculation. The previous use trips will be used as a trip credit for determining the overall net change in proposed project trips.

Table 2 summarizes the trip generation for the proposed use. Specific land use and trip generation breakdowns are provided in **Attachment A**.

Table 2 – Trip Generation Summary – Proposed Use

Proposed Use	Vehicle Trips		
	Daily	AM Peak	PM Peak
113.382 KSF R&D 45.796 KSF Manufacturing 61.338 KSF Warehousing	1,316	189	174

The proposed land uses result in 189 AM peak hour trips and 174 PM peak hour trips. No adjustments for trip reductions (e.g. pass-by trips or internal capture) were used in this calculation. A Transportation Demand Management (TDM) program is being proposed to reduce the proposed project vehicle trips.

TRANSPORTATION DEMAND MANAGEMENT PROGRAM

The following summarizes an initial approach to the proposed TDM program for the proposed project at 1315 O'Brien Drive. It is assumed that the TDM program will be refined over time to adapt to changing transportation trends and to maximize the efficiency of the program. The TDM program is

[1] Dumbarton Distribution Center Final EIR, The Environmental Center, March 12, 1982.

specifically designed to focus on incentives and rewards for employees to participate in the program rather than penalties for not participating.

POTENTIAL PROGRAM ELEMENTS

Tarlton Properties, Inc. should offer a combination of program elements to encourage employees to utilize alternative modes of transportation to driving alone. Potential program elements are listed below:

- Bike lockers/racks
- Showers/changing rooms
- Shuttle service
- Subsidized transit tickets for employees
- Preferential carpool parking spaces
- Preferential vanpool parking spaces
- Vanpool program
- Commute assistance center
- Allowance program for bicyclists, walkers, and carpoolers
- Parking cash out program
- Telecommuting
- Compressed workweek program
- Alternate hours workweek program
- Join the Alliance's guaranteed ride home program

These program elements are listed in the City of Menlo Park's *Transportation Demand Management Program Guidelines*. Additionally, the City/County Association of Governments of San Mateo County (C/CAG) has its own guidelines for a TDM program mentioned in the *Revised C/CAG Guideline for the Implementation of the Land Use Component of the Congestion Management Program*. Each of these documents summarizes the potential program measures, a description of each measure, and the trip credits associated with each measure.

PROPOSED PROGRAM ELEMENTS

Tarlton Properties, Inc. is interested in working with the City to develop a practical TDM plan that can be both effective and provide the most value for all parties. An initial set of TDM measures are proposed for the 1315 O'Brien Drive site and is summarized in **Table 3**. The number of trip credits was determined from the City of Menlo Park's TDM Guidelines. The following provides a brief description of each proposed TDM element:

- **Bike Storage**: Bike lockers are proposed to be located on the property. The specific location will be shown on the proposed site plan. Secure bike storage lockers for 20 bicycles are proposed. The bike lockers are furnished by the American Bicycle Security Company and provide a safe storage for bikes at work. Additionally, bike racks for 12 bicycles are proposed and will be shown on the proposed site plan.

Table 3 – Proposed TDM Measure Summary

TDM Measure	Number of Trips Credited	Peak Hour Trip Credits	Program Elements	Trip Credits[1]
Bike Storage	One credit per 3 bike lockers/racks	1/3	32	10
Showers/Changing Rooms	Two credits per 1 shower/changing room	2	12	24
Shuttle service	One trip credit for each round trip seat on the shuttle	1	60	60
Additional credit for combination with Guaranteed Ride Home Program	*Additional one trip credit for each seat*	*1*	*60*	*60*
Subsidized transit tickets (Go Pass for Caltrain)	One trip credit for each transit pass provided	1	100	100
Preferential carpool parking	Two credits per 1 space reserved	2	32	64
Commute assistance center				
Transit brochure rack	*One peak hour trip credited for each feature*	*1*	*1*	*1*
Computer kiosk connected to Internet	*One peak hour trip credited for each feature*	*1*	*1*	*1*
Telephone	*One peak hour trip credited for each feature*	*1*	*1*	*1*
Desk and chairs	*One peak hour trip credited for each feature*	*1*	*1*	*1*
Allowance for bicyclists, walkers, and carpoolers	One trip credit for each monthly allowance offered to an employee	1	30	30
Join Alliance's guaranteed ride home program	One credit for every two slots purchased in the program with Alliance[2]	-	-	-
Implement flexible work hours	One peak hour credit for each employee offered the opportunity to work flexible hours	1	35	35
Combine any two of these elements and receive additional five credits	Five trip credits for combination of two elements	5	1	5
			Total Trip Credits:	**392**

[1]The number of peak hour trips credited is outlined in the City of Menlo Park's *Transportation Demand Management (TDM) Guidelines*.

[2]The Alliance's guaranteed ride home program operates differently than when the TDM guidelines were created. The Alliance no longer offers slots to be purchased. Trip credits for this TDM measure are combined with the shuttle service.

- **Showers/Changing Rooms**: Twelve shower/changing rooms are proposed for the building on the first floor. The shower/changing rooms provide a dedicated facility for the cyclists and persons walking to work. This measure, combined with the bike lockers/racks, should provide employees with a great alternative for commuting to work.
- **Guaranteed Ride Home Program**: Tarlton Properties, Inc. will also enroll its tenants in a Guaranteed Ride Home Program administered by the Peninsula Traffic Congestion Relief Alliance. The program provides employees a free taxi ride home in the case of an emergency. Employers will pay 25 percent of the taxi costs and the Peninsula Traffic Congestion Relief Alliance will pay the remaining 75 percent. There is no additional cost to

join the program. This program provides a safety net when an emergency arises for those carpooling, vanpooling, taking transit, walking to work, or bicycling to work.

- **Shuttle Service**: A shuttle service will be provided for employees to use for commuting to work. The shuttle service is provided by Bauers and is currently being implemented in the existing business park surrounding the proposed project. A new shuttle service, specifically serving the buildings along O'Brien Drive, recently started on February 1, 2015. The shuttle service has a stop in front of 1505 O'Brien Drive. This shuttle service will include a separate BART shuttle and Caltrain shuttle.
  - The BART shuttle will carry up to 20 passengers between the Union City BART Station and the project site during each of the AM and PM peak hours. There is also a pick-up/drop-off location at Decoto Road/Ozark Park Way in Fremont, CA. The shuttle departs every 60-65 minutes. It should be noted that the BART shuttle service does provide 80 passenger seats during the AM (6-10 AM) and PM (4-8 PM) periods, but only 20 passenger seats were used in the TDM credit calculations because the other 60 seats are outside the peak hour.
  - The Caltrain shuttle service will provide two shuttles of 20 passenger seats each between the Palo Alto Caltrain Station and the project site during the AM and PM peak hours. The shuttle departs every 40-45 minutes and currently provides a minimum of two roundtrips in the AM and PM peak hours, each carrying 20 passengers, for a total of 40 additional seats per peak hour. It should be noted that the shuttle service will expand its operations if the demand is needed in the future. It should also be noted that the Caltrain shuttle service does provide up to 100 passenger seats during the AM (6-10 AM) and PM (4-8 PM) periods, but only 40 passenger seats were used in the TDM credit calculations because the other 60 seats are outside the peak hour.
  - The combined BART and Caltrain shuttle services currently provide a total of 60 seats during each of the AM and PM peak hours.
- **Subsidized Transit Tickets**: Caltrain Go Passes will be provided to employees at no cost to the employees. The Caltrain Go Pass allows for unlimited rides, seven days a week. The cost of the Go Pass is $180 per person, but a minimum of $15,120 per employer. This equates to 84 Go Passes at a minimum to distribute to all employees. For TDM calculations, it was assumed that 100 Go Passes will be provided for this specific site.
- **Preferential Carpool Parking**: 32 preferential carpool parking spaces are provided. The carpool parking spaces will be located close to the building's entrances to provide an incentive for employees to carpool. Marked carpool parking spaces will be shown on the proposed site plan.
- **Commute Assistance Center**: A Commute Assistance Center will be provided with the following features: transit brochure rack, computer kiosk connected to internet, telephone, and a desk and chairs. The center should encourage employees to use transit to commute to work and provide ease of access to determine the optimal mode of transportation home.
- **Monthly Allowance for Bicyclists, Walkers, and Carpoolers**: A monthly allowance of $20 will be offered to those employees who walk, bicycle, or carpool to work. This measure provides further incentive to not drive alone to work. The $20 monthly allowance equates to approximately $1 per day.

- **Flexible work hours**: Employees will be offered the opportunity to work a flexible work schedule. Employees can work outside the traditional 8 AM to 5 PM work day. This measure will result in employees avoiding the AM peak (7 AM to 9 AM) and PM peak (4 PM and 6 PM) for their daily commute. It is anticipated that 35 employees would participate in this flexible work schedule.
- **Combination of Two Elements**: Combining at least two elements in the TDM program results in five additional peak hour trips. By offering complimentary TDM elements, experience has shown that the effectiveness of the program increases.

As shown in **Table 3**, the proposed TDM measures total to 392 trip credits. Although the TDM program results in 392 trip credits, the effectiveness of the TDM program was calculated separately.

EFFECTIVENESS OF TDM PROGRAM ELEMENTS

The effectiveness of the TDM plan was predicted using the COMMUTER model developed by the United States Environmental Protection Agency (EPA). The COMMUTER model is a spreadsheet based model that predicts the travel and emission effects resulting from an employer implemented transportation management program. The model allows for inputs to local work-trip mode shares, work trip lengths, vehicle occupancy, financial incentives for alternative modes of transportation, employer participation rates, and the level of each program to determine the predicted trip reduction rates. After inputting the specific TDM measures mentioned in **Table 3** for the proposed project, the anticipated trip reduction percentage is 21.1 percent. The 21.1 percent effectiveness is similar to other TDM plans in the local area. The COMMUTER model output for this project is shown in **Attachment B**.

The anticipated trip reduction of 21.1 percent was applied to the proposed project trips only, not the trip credits. **Table 4** shows the trip generation summary including the previous use trip credits and the TDM trip reduction.

Table 4 – Trip Generation Summary with Trip Credits

Uses	Vehicle Trips		
	Daily	AM Peak	PM Peak
Proposed Use Trips	1,316	189	174
TDM Trip Reduction (21.1%)	-278	-40	-36
Previous Use Trip Credits	-1,196	-136	-135
Net New Trips	***-158***	***13***	***3***

The net new trips for the proposed project after taking trip credits for the previous use and the TDM program are -159 daily trips, 13 AM peak hour trips, and three (3) PM peak hour trips. The 13 AM peak hour trips and three (3) PM peak hour trips are below the City's threshold of 16 peak hour trips (the equivalent number of peak hour trips for a 10 KSF office building).

Attachment A

1315 O'Brien Trip Generation Table

TIME PERIOD		LAND USE	Trip Rate			Trips		
			In	Out	Total	In	Out	Total
Daily	Previous	Warehousing (162.839 KSF)	1.78	1.78	3.56	290	290	580
		General Office Building (55.787 KSF)	5.515	5.515	11.03	308	308	616
		Total Previous Use Daily Trips				**(598)**	**(598)**	**(1,196)**
	Proposed	Research and Development Center (113.382 KSF)	4.06	4.06	8.11	460	460	920
		Manufacturing (45.796 KSF)	1.91	1.91	3.82	88	88	176
		Warehousing (61.338 KSF)	1.78	1.78	3.56	110	110	220
		Total Proposed Use Daily Trips				**658**	**658**	**1,316**
		TDM Reduction (21.1%)				(139)	(139)	(278)
		Net New Daily Trips				**(79)**	**(79)**	**(158)**
AM Peak	Previous	Warehousing (162.839 KSF)	0.24	0.06	0.30	39	10	49
		General Office Building (55.787 KSF)	1.37	0.19	1.56	77	10	87
		Total Previous Use AM Trips				**(116)**	**(20)**	**(136)**
	Proposed	Research and Development Center (113.382 KSF)	1.01	0.21	1.22	115	23	138
		Manufacturing (45.796 KSF)	0.57	0.16	0.73	26	7	33
		Warehousing (61.338 KSF)	0.24	0.06	0.30	14	4	18
		Total Proposed Use AM Trips				**155**	**34**	**189**
		TDM Reduction (21.1%)				(33)	(7)	(40)
		Net New AM Peak Trips				**6**	**7**	**13**
PM Peak	Previous	Warehousing (162.839 KSF)	0.08	0.24	0.32	13	39	52
		General Office Building (55.787 KSF)	0.25	1.24	1.49	14	69	83
		Total Previous Use PM Trips				**(27)**	**(108)**	**(135)**
	Proposed	Research and Development Center (113.382 KSF)	0.16	0.91	1.07	18	103	121
		Manufacturing (45.796 KSF)	0.26	0.47	0.73	12	21	33
		Warehousing (61.338 KSF)	0.08	0.24	0.32	5	15	20
		Total Proposed Use PM Trips				**35**	**139**	**174**
		TDM Reduction (21.1%)				(7)	(29)	(36)
		Net New PM Peak Trips				**1**	**2**	**3**

Attachment B

COMMUTER MODEL RESULTS

SCENARIO INFORMATION

Description	C/CAG Base TDM Program
Scenario Filename	Tarlton1315-incAltWorkWeek.vme
Emission Factor File	
Performing Agency	Kimley-Horn and Associates, Inc
Analyst	Ben Huie
Metropolitan Area	Menlo Park, CA
Area Size	1 - Large (over 2 million)
Analysis Scope	2 - Site or Employer-Based
Analysis Area/Site	1315 O'Brien Drive
Total Employment	360

PROGRAMS EVALUATED

- [X] Site Walk Access Improvements
- [ ] Transit Service Improvements
- [X] Financial Incentives
- [X] Employer Support Programs
- [X] Alternative Work Schedules

- [ ] User-Supplied Final Mode Shares

MODE SHARE IMPACTS

Mode	Baseline	Final	%Change
Drive Alone	70.5%	55.2%	-15.3%
Carpool	6.5%	9.0%	+2.5%
Vanpool	0.0%	0.0%	+0.0%
Transit	4.3%	17.4%	+13.1%
Bicycle	7.3%	8.6%	+1.3%
Pedestrian	2.7%	2.8%	+0.1%
Other	8.7%	7.0%	-1.7%
No Trip	-	0.0%	+0.0%
Total	100.0%	100.0%	-

Shifted from Peak to Off-Peak	1.1%

TRAVEL IMPACTS (relative to affected employment)

Quantity	Peak	Off-Peak	Total
Baseline VMT	4,483	2,818	7,301
Final VMT	3,688	2,425	6,113
VMT Reduction	794	394	1,188
% VMT Reduction	17.7%	14.0%	16.3%
Baseline Trips	324	204	528
Final Trips	256	170	426
Trip Reduction	68	34	102
% Trip Reduction	21.1%	16.6%	19.4%

Attachment B

Prepared by National Data & Surveying Services

Trip Gen Study

Location: Pacific Biosciences West Dwy@Adams Ct **City:** Menlo Park, CA

TIME	28-Sep		29-Sep		30-Sep	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
12:00 AM	0	0	0	0	0	0
12:15 AM	0	0	0	0	0	0
12:30 AM	0	0	0	0	0	0
12:45 AM	0	0	0	0	0	0
1:00 AM	0	0	0	0	1	0
1:15 AM	0	0	0	0	0	0
1:30 AM	0	0	0	0	0	0
1:45 AM	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0
2:15 AM	0	0	0	0	0	0
2:30 AM	0	0	0	1	0	1
2:45 AM	0	2	0	1	0	2
3:00 AM	1	0	0	1	1	1
3:15 AM	0	1	0	3	0	2
3:30 AM	0	2	0	3	0	2
3:45 AM	1	2	0	0	1	2
4:00 AM	1	0	0	0	1	2
4:15 AM	0	0	1	1	0	0
4:30 AM	0	1	0	1	0	2
4:45 AM	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0
5:15 AM	0	0	0	0	0	0
5:30 AM	0	0	0	0	1	0
5:45 AM	0	0	0	0	1	0
6:00 AM	0	0	1	0	2	1
6:15 AM	0	0	0	0	0	0
6:30 AM	0	1	0	0	0	0
6:45 AM	0	1	0	0	0	0
7:00 AM	0	0	0	0	0	1
7:15 AM	0	0	2	0	0	0
7:30 AM	1	0	0	0	0	0
7:45 AM	1	0	0	1	0	0
8:00 AM	0	1	1	2	2	1
8:15 AM	2	0	1	0	4	0
8:30 AM	8	1	6	0	10	1
8:45 AM	1	1	11	3	7	2
9:00 AM	8	3	7	1	3	3
9:15 AM	2	1	2	0	5	2
9:30 AM	1	0	3	0	1	1
9:45 AM	2	1	1	2	3	0
10:00 AM	3	1	2	0	1	0
10:15 AM	1	1	1	0	1	0
10:30 AM	3	1	1	0	4	0
10:45 AM	1	2	2	1	1	0
11:00 AM	1	0	3	0	1	0
11:15 AM	1	2	1	0	1	2

11:30 AM	1	0	0	0	0	0
11:45 AM	1	0	0	1	1	1
12:00 PM	1	1	0	0	0	1
12:15 PM	0	1	0	0	0	0
12:30 PM	0	0	0	0	3	1
12:45 PM	1	1	0	0	2	1
1:00 PM	0	1	2	1	0	0
1:15 PM	0	1	1	0	1	2
1:30 PM	0	0	1	1	0	1
1:45 PM	0	0	1	1	1	0
2:00 PM	1	1	1	0	0	1
2:15 PM	0	0	1	1	1	0
2:30 PM	0	1	3	1	1	0
2:45 PM	2	2	3	1	3	2
3:00 PM	3	0	0	1	1	0
3:15 PM	1	2	1	0	1	0
3:30 PM	1	0	2	0	2	0
3:45 PM	1	1	0	1	0	1
4:00 PM	0	1	1	2	2	2
4:15 PM	0	1	0	1	2	0
4:30 PM	0	1	0	0	0	4
4:45 PM	1	1	1	1	0	0
5:00 PM	1	1	0	4	2	3
5:15 PM	0	2	0	1	0	1
5:30 PM	0	1	0	2	0	1
5:45 PM	1	2	0	2	1	1
6:00 PM	0	3	1	2	2	3
6:15 PM	1	1	0	0	0	0
6:30 PM	1	0	0	0	2	0
6:45 PM	0	0	1	0	1	0
7:00 PM	0	0	0	0	0	0
7:15 PM	0	0	0	1	0	2
7:30 PM	0	0	0	0	1	0
7:45 PM	0	0	1	0	0	1
8:00 PM	1	0	0	0	0	0
8:15 PM	0	0	0	0	0	0
8:30 PM	0	0	0	0	1	0
8:45 PM	0	0	0	0	0	1
9:00 PM	0	0	0	0	2	1
9:15 PM	0	0	0	0	0	0
9:30 PM	1	0	3	0	0	0
9:45 PM	0	0	1	0	0	0
10:00 PM	2	1	0	0	1	0
10:15 PM	0	0	0	0	0	0
10:30 PM	0	0	0	1	0	0
10:45 PM	0	0	0	0	0	0
11:00 PM	0	0	0	1	0	0
11:15 PM	1	0	0	0	0	0
11:30 PM	0	0	0	0	0	0
11:45 PM	0	0	0	0	0	0
Totals	***62***	***52***	***71***	***48***	***86***	***59***

Prepared by National Data & Surveying Services

Trip Gen Study

Location: Pacific Biosciences East Dwy@Adams Ct **City:** Menlo Park, CA

TIME	28-Sep		29-Sep		30-Sep	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
12:00 AM	0	0	0	0	0	0
12:15 AM	0	0	0	0	1	0
12:30 AM	0	0	0	0	1	0
12:45 AM	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	1
1:15 AM	0	0	0	0	0	0
1:30 AM	0	0	0	0	0	0
1:45 AM	0	0	0	0	0	0
2:00 AM	0	0	0	0	1	0
2:15 AM	0	0	0	0	0	0
2:30 AM	0	0	0	0	0	0
2:45 AM	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0
3:15 AM	0	0	0	0	0	0
3:30 AM	0	0	0	0	0	0
3:45 AM	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0
4:15 AM	0	0	0	0	0	0
4:30 AM	0	0	0	0	0	0
4:45 AM	0	0	0	0	0	0
5:00 AM	2	0	1	0	1	0
5:15 AM	0	0	1	0	1	0
5:30 AM	1	0	2	0	0	0
5:45 AM	1	0	1	0	1	0
6:00 AM	3	0	1	0	2	0
6:15 AM	0	0	2	1	0	0
6:30 AM	0	0	0	0	1	0
6:45 AM	1	0	2	1	0	0
7:00 AM	1	1	1	0	3	0
7:15 AM	2	0	0	0	1	0
7:30 AM	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0
8:00 AM	1	0	2	0	2	0
8:15 AM	2	0	0	0	0	1
8:30 AM	9	0	4	0	13	0
8:45 AM	12	0	18	1	10	1
9:00 AM	9	1	9	0	7	0
9:15 AM	3	0	1	1	3	0
9:30 AM	1	0	1	0	1	1
9:45 AM	2	0	1	0	1	0
10:00 AM	3	1	1	0	2	0
10:15 AM	0	0	1	0	1	1
10:30 AM	2	1	1	0	0	0
10:45 AM	1	0	1	1	2	0
11:00 AM	1	2	0	1	0	1
11:15 AM	1	0	1	1	0	0

11:30 AM	0	0	0	0	2	0
11:45 AM	1	1	2	0	2	1
12:00 PM	1	1	0	1	0	0
12:15 PM	1	1	1	0	1	0
12:30 PM	0	0	0	0	0	0
12:45 PM	1	1	0	1	1	1
1:00 PM	1	1	1	0	0	0
1:15 PM	2	1	0	0	0	0
1:30 PM	0	1	0	1	0	0
1:45 PM	0	0	0	0	0	0
2:00 PM	0	0	0	0	1	1
2:15 PM	0	1	0	0	0	0
2:30 PM	1	1	1	1	1	0
2:45 PM	0	0	1	3	0	0
3:00 PM	0	2	0	2	1	1
3:15 PM	0	0	0	0	0	0
3:30 PM	0	1	1	1	0	2
3:45 PM	1	1	0	0	0	0
4:00 PM	0	1	1	0	0	0
4:15 PM	2	2	1	1	0	0
4:30 PM	0	0	0	0	1	0
4:45 PM	0	0	0	0	3	1
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5:15 PM	0	0	0	1	0	2
5:30 PM	0	1	0	0	0	0
5:45 PM	0	1	0	1	1	1
6:00 PM	0	0	1	1	0	1
6:15 PM	2	0	1	1	0	3
6:30 PM	1	1	0	0	0	0
6:45 PM	0	0	0	1	0	0
7:00 PM	0	1	0	1	0	0
7:15 PM	0	0	0	0	0	0
7:30 PM	0	0	0	0	0	0
7:45 PM	0	0	0	1	0	0
8:00 PM	0	0	1	1	0	1
8:15 PM	0	0	0	0	0	0
8:30 PM	0	0	1	0	0	0
8:45 PM	0	0	0	0	1	0
9:00 PM	0	1	0	0	0	0
9:15 PM	0	0	0	0	0	0
9:30 PM	0	0	0	0	0	0
9:45 PM	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0
10:15 PM	0	0	0	0	0	0
10:30 PM	0	0	0	0	0	0
10:45 PM	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0
11:15 PM	0	0	0	0	0	0
11:30 PM	0	0	0	0	0	0
11:45 PM	0	0	0	0	0	0
Totals	***72***	***27***	***66***	***26***	***71***	***23***

Prepared by National Data & Surveying Services

Trip Gen Study

Location: Pacific Biosciences North Dwy@Adams Dr **City:** Menlo Park, CA

TIME	28-Sep		29-Sep		30-Sep	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
12:00 AM	0	0	0	0	0	0
12:15 AM	0	0	0	0	0	0
12:30 AM	0	0	0	0	1	2
12:45 AM	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0
1:15 AM	0	0	0	0	0	0
1:30 AM	0	0	0	0	0	0
1:45 AM	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0
2:15 AM	0	0	0	0	0	0
2:30 AM	0	0	0	0	0	0
2:45 AM	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0
3:15 AM	0	0	0	0	0	0
3:30 AM	0	0	0	0	0	0
3:45 AM	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0
4:15 AM	0	0	0	0	0	0
4:30 AM	0	0	0	0	0	0
4:45 AM	0	0	0	0	1	0
5:00 AM	0	0	0	0	0	0
5:15 AM	0	0	0	0	0	0
5:30 AM	1	1	0	0	0	0
5:45 AM	0	0	1	1	2	2
6:00 AM	0	0	0	0	0	0
6:15 AM	1	0	1	0	0	0
6:30 AM	0	0	0	0	1	0
6:45 AM	0	0	1	0	0	0
7:00 AM	0	0	0	0	0	2
7:15 AM	0	0	0	0	0	1
7:30 AM	0	1	1	1	1	0
7:45 AM	0	0	0	1	0	0
8:00 AM	1	0	0	0	0	0
8:15 AM	1	1	1	0	0	0
8:30 AM	0	6	0	2	0	4
8:45 AM	0	12	1	11	0	11
9:00 AM	0	8	0	8	0	9
9:15 AM	0	6	0	6	0	3
9:30 AM	0	0	0	1	0	0
9:45 AM	0	0	0	1	0	0
10:00 AM	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0
10:30 AM	0	0	0	1	0	0
10:45 AM	0	2	0	2	0	0
11:00 AM	1	0	1	0	0	1
11:15 AM	0	1	0	0	0	0

11:30 AM	0	0	0	0	0	0
11:45 AM	2	0	1	0	1	0
12:00 PM	0	1	0	0	0	0
12:15 PM	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0
12:45 PM	1	0	0	0	0	1
1:00 PM	0	0	0	1	0	0
1:15 PM	0	0	0	0	0	0
1:30 PM	0	0	0	0	0	0
1:45 PM	0	0	0	0	0	0
2:00 PM	0	0	0	0	1	0
2:15 PM	1	0	0	0	0	0
2:30 PM	1	0	0	0	1	0
2:45 PM	0	1	1	0	0	1
3:00 PM	0	4	2	5	0	4
3:15 PM	1	0	0	1	1	1
3:30 PM	0	0	2	1	1	0
3:45 PM	1	1	0	0	1	0
4:00 PM	1	1	0	2	0	0
4:15 PM	0	0	1	1	0	0
4:30 PM	0	1	0	0	1	0
4:45 PM	0	0	0	0	1	2
5:00 PM	0	0	0	3	0	1
5:15 PM	0	0	1	2	0	0
5:30 PM	1	2	0	0	1	1
5:45 PM	0	0	1	1	0	1
6:00 PM	0	0	1	0	1	0
6:15 PM	0	1	0	0	0	1
6:30 PM	0	0	0	0	0	0
6:45 PM	0	0	0	0	0	0
7:00 PM	0	0	1	1	0	0
7:15 PM	0	0	0	0	0	0
7:30 PM	0	0	0	0	0	0
7:45 PM	0	0	0	0	0	0
8:00 PM	0	0	0	0	2	1
8:15 PM	0	0	0	0	0	0
8:30 PM	1	1	0	0	0	0
8:45 PM	0	0	0	0	0	0
9:00 PM	1	0	0	0	0	0
9:15 PM	0	0	0	0	0	0
9:30 PM	0	0	0	0	0	0
9:45 PM	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0
10:15 PM	0	0	0	0	0	0
10:30 PM	0	0	0	0	0	0
10:45 PM	0	1	0	0	0	0
11:00 PM	0	0	0	0	0	0
11:15 PM	0	0	0	0	0	0
11:30 PM	0	0	0	0	0	0
11:45 PM	0	0	0	0	0	0
Totals	***16***	***52***	***18***	***53***	***18***	***49***

Prepared by National Data & Surveying Services

Trip Gen Study

Location: Pacific Biosciences South Dwy@Adams Dr **City:** Menlo Park, CA

TIME	28-Sep		29-Sep		30-Sep	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
12:00 AM	1	1	1	1	1	1
12:15 AM	0	0	0	0	0	0
12:30 AM	0	0	0	0	0	0
12:45 AM	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0
1:15 AM	1	0	0	1	0	1
1:30 AM	0	1	0	0	0	0
1:45 AM	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0
2:15 AM	0	0	0	0	0	0
2:30 AM	0	0	0	0	0	0
2:45 AM	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0
3:15 AM	0	0	0	0	0	0
3:30 AM	0	0	0	0	0	0
3:45 AM	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0
4:15 AM	0	0	0	0	0	0
4:30 AM	0	0	0	0	0	0
4:45 AM	0	0	0	0	0	1
5:00 AM	0	0	0	0	0	0
5:15 AM	0	0	0	0	0	0
5:30 AM	0	0	0	0	0	0
5:45 AM	0	0	0	1	0	0
6:00 AM	0	1	0	0	0	0
6:15 AM	0	1	0	0	1	0
6:30 AM	1	0	1	0	0	0
6:45 AM	0	1	0	1	0	1
7:00 AM	0	1	0	1	0	1
7:15 AM	0	0	0	0	1	0
7:30 AM	0	0	0	0	1	0
7:45 AM	0	0	0	0	0	0
8:00 AM	1	1	1	1	2	1
8:15 AM	1	0	1	0	1	0
8:30 AM	1	0	0	0	0	0
8:45 AM	2	1	3	1	1	1
9:00 AM	2	1	1	2	2	1
9:15 AM	2	0	3	0	2	0
9:30 AM	1	0	1	0	3	0
9:45 AM	0	0	1	0	1	0
10:00 AM	1	2	3	1	0	1
10:15 AM	0	0	0	0	0	0
10:30 AM	0	1	0	0	1	1
10:45 AM	1	1	0	0	0	1
11:00 AM	2	0	0	0	0	0
11:15 AM	0	1	0	0	0	0

11:30 AM	0	1	0	0	0	0
11:45 AM	0	2	0	1	1	2
12:00 PM	1	0	2	3	1	0
12:15 PM	0	0	0	1	1	0
12:30 PM	0	1	1	0	0	2
12:45 PM	2	0	1	1	1	0
1:00 PM	0	2	0	0	0	0
1:15 PM	0	0	0	2	2	1
1:30 PM	0	1	0	0	0	3
1:45 PM	0	0	0	0	1	0
2:00 PM	0	0	0	1	1	0
2:15 PM	0	0	0	0	0	1
2:30 PM	0	1	0	2	0	3
2:45 PM	0	1	0	0	1	0
3:00 PM	0	0	0	1	1	0
3:15 PM	0	0	1	1	0	1
3:30 PM	0	0	3	1	0	0
3:45 PM	0	1	2	0	0	2
4:00 PM	0	1	0	1	0	1
4:15 PM	0	2	0	2	0	0
4:30 PM	0	0	0	1	0	1
4:45 PM	2	2	2	1	0	4
5:00 PM	0	3	0	2	0	2
5:15 PM	0	1	0	5	0	3
5:30 PM	0	0	1	1	0	1
5:45 PM	0	0	0	1	1	1
6:00 PM	0	2	1	2	0	3
6:15 PM	0	0	0	2	2	1
6:30 PM	0	2	0	1	0	0
6:45 PM	0	1	0	0	0	0
7:00 PM	0	0	1	0	0	0
7:15 PM	0	0	1	0	0	0
7:30 PM	0	0	0	0	0	0
7:45 PM	0	0	1	0	0	0
8:00 PM	0	0	0	0	0	0
8:15 PM	0	0	0	0	0	0
8:30 PM	0	0	0	2	0	1
8:45 PM	0	0	0	0	0	2
9:00 PM	0	0	0	0	1	1
9:15 PM	0	0	0	0	0	0
9:30 PM	0	0	0	0	0	0
9:45 PM	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0
10:15 PM	0	0	1	0	0	0
10:30 PM	0	0	0	0	0	0
10:45 PM	0	0	1	0	0	0
11:00 PM	0	0	0	0	0	1
11:15 PM	0	0	0	0	0	0
11:30 PM	0	0	0	0	0	0
11:45 PM	0	0	0	0	0	0
Totals	***22***	***38***	***35***	***45***	***31***	***48***

Prepared by National Data & Surveying Services

Trip Gen Study

Location: Pacific Biosciences East Dwy@O'Brien Dr **City:** Menlo Park, CA

TIME	28-Sep		29-Sep		30-Sep	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
12:00 AM	0	0	0	0	0	1
12:15 AM	0	0	0	0	1	1
12:30 AM	0	0	0	0	0	0
12:45 AM	0	0	0	0	0	3
1:00 AM	0	0	1	0	0	0
1:15 AM	0	0	0	0	0	0
1:30 AM	0	0	0	0	0	0
1:45 AM	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0
2:15 AM	0	0	0	0	0	1
2:30 AM	0	0	0	0	0	0
2:45 AM	0	0	0	0	1	0
3:00 AM	0	0	0	0	1	0
3:15 AM	0	0	0	0	1	0
3:30 AM	0	0	0	0	0	0
3:45 AM	0	0	0	0	1	0
4:00 AM	0	0	0	0	0	0
4:15 AM	0	0	0	0	0	0
4:30 AM	0	0	0	0	0	0
4:45 AM	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0
5:15 AM	0	0	0	0	0	0
5:30 AM	0	0	1	0	0	0
5:45 AM	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0
6:15 AM	4	0	1	0	2	0
6:30 AM	1	0	1	0	2	0
6:45 AM	0	0	1	0	0	0
7:00 AM	1	0	1	0	2	0
7:15 AM	0	1	1	1	1	0
7:30 AM	3	0	3	0	4	0
7:45 AM	4	0	2	0	2	0
8:00 AM	1	0	2	0	3	0
8:15 AM	2	0	2	1	7	2
8:30 AM	6	1	4	0	1	1
8:45 AM	9	1	7	1	5	1
9:00 AM	2	0	3	2	5	0
9:15 AM	0	0	1	0	3	0
9:30 AM	3	2	3	0	2	0
9:45 AM	5	0	1	1	1	0
10:00 AM	1	1	2	0	2	0
10:15 AM	1	1	1	0	0	0
10:30 AM	0	0	1	0	1	0
10:45 AM	1	0	0	1	1	0
11:00 AM	0	1	2	1	1	0
11:15 AM	1	1	1	0	0	0

11:30 AM	0	0	0	0	0	1
11:45 AM	3	0	3	1	1	0
12:00 PM	2	2	0	1	0	7
12:15 PM	1	2	2	3	3	0
12:30 PM	0	1	0	0	2	1
12:45 PM	2	2	2	0	1	1
1:00 PM	1	1	2	1	3	1
1:15 PM	3	0	0	0	1	1
1:30 PM	2	1	1	1	2	2
1:45 PM	1	1	1	1	0	1
2:00 PM	1	0	0	0	0	1
2:15 PM	0	0	0	0	1	0
2:30 PM	0	1	0	2	0	5
2:45 PM	1	1	2	0	1	0
3:00 PM	0	1	0	1	0	2
3:15 PM	0	0	0	0	0	3
3:30 PM	0	2	0	0	0	0
3:45 PM	0	2	0	1	1	1
4:00 PM	0	0	1	2	0	1
4:15 PM	0	0	0	2	0	0
4:30 PM	1	3	0	0	2	7
4:45 PM	0	4	1	2	0	0
5:00 PM	1	3	0	5	0	5
5:15 PM	0	7	0	3	0	4
5:30 PM	0	2	1	3	0	0
5:45 PM	0	5	0	0	0	3
6:00 PM	0	4	0	5	0	5
6:15 PM	1	3	1	3	1	2
6:30 PM	1	2	0	2	0	1
6:45 PM	0	0	0	2	0	3
7:00 PM	0	1	1	1	0	1
7:15 PM	0	0	0	0	1	1
7:30 PM	0	0	0	0	0	0
7:45 PM	0	0	0	1	0	0
8:00 PM	0	0	0	1	0	0
8:15 PM	0	0	0	0	0	0
8:30 PM	0	0	0	2	0	0
8:45 PM	0	0	0	0	0	1
9:00 PM	0	0	0	0	0	0
9:15 PM	0	0	0	0	0	0
9:30 PM	0	0	0	0	0	0
9:45 PM	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0
10:15 PM	0	0	0	1	0	0
10:30 PM	0	0	0	0	0	0
10:45 PM	0	0	0	1	1	1
11:00 PM	0	0	0	0	1	0
11:15 PM	0	0	0	0	0	0
11:30 PM	0	0	0	0	0	0
11:45 PM	0	0	0	0	0	0
Totals	***66***	***60***	***60***	***56***	***72***	***72***

Prepared by National Data & Surveying Services

Trip Gen Study

Location: Pacific Biosciences Middle Dwy@O'Brien Dr **City:** Menlo Park, CA

TIME	28-Sep		29-Sep		30-Sep	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
12:00 AM	0	0	0	0	0	0
12:15 AM	0	0	0	1	0	0
12:30 AM	0	0	0	0	0	0
12:45 AM	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0
1:15 AM	0	0	0	0	0	0
1:30 AM	0	0	0	0	0	0
1:45 AM	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0
2:15 AM	0	0	0	0	0	1
2:30 AM	0	2	0	2	0	1
2:45 AM	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0
3:15 AM	0	0	0	0	0	0
3:30 AM	0	0	0	0	0	0
3:45 AM	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0
4:15 AM	0	0	0	0	0	0
4:30 AM	0	0	0	0	2	0
4:45 AM	0	0	2	0	1	0
5:00 AM	0	0	1	0	0	0
5:15 AM	1	0	0	0	0	0
5:30 AM	0	0	0	0	0	0
5:45 AM	0	0	0	0	0	0
6:00 AM	1	0	0	0	0	0
6:15 AM	0	0	0	0	1	0
6:30 AM	1	0	1	1	0	0
6:45 AM	0	0	0	0	1	0
7:00 AM	2	0	1	0	0	0
7:15 AM	0	0	2	0	1	0
7:30 AM	1	0	2	1	1	0
7:45 AM	1	0	0	0	2	0
8:00 AM	1	0	1	0	0	0
8:15 AM	1	0	2	0	4	0
8:30 AM	1	0	1	0	4	0
8:45 AM	2	0	0	0	3	0
9:00 AM	3	0	3	0	2	0
9:15 AM	2	2	2	0	0	0
9:30 AM	1	0	2	0	1	0
9:45 AM	1	0	1	1	0	1
10:00 AM	2	0	0	0	0	0
10:15 AM	2	0	1	0	1	2
10:30 AM	0	2	0	1	0	0
10:45 AM	4	2	2	0	0	0
11:00 AM	0	0	1	0	0	0
11:15 AM	1	0	0	0	0	1

11:30 AM	2	1	1	2	0	0
11:45 AM	2	2	1	0	0	1
12:00 PM	1	0	0	0	0	1
12:15 PM	0	0	1	0	2	3
12:30 PM	1	1	1	1	2	2
12:45 PM	1	1	0	0	2	0
1:00 PM	0	0	2	1	1	1
1:15 PM	0	0	0	0	2	0
1:30 PM	0	2	0	1	0	1
1:45 PM	1	0	1	0	1	0
2:00 PM	0	1	0	0	0	0
2:15 PM	0	0	0	1	1	0
2:30 PM	0	0	1	0	2	2
2:45 PM	1	0	0	1	0	1
3:00 PM	0	1	0	0	0	0
3:15 PM	1	0	0	0	0	0
3:30 PM	0	0	0	0	0	0
3:45 PM	0	1	0	0	1	1
4:00 PM	1	4	1	1	0	3
4:15 PM	0	0	0	1	1	1
4:30 PM	2	1	0	2	2	1
4:45 PM	0	1	0	3	0	1
5:00 PM	0	1	1	1	0	3
5:15 PM	0	0	0	2	0	0
5:30 PM	0	1	0	0	1	2
5:45 PM	1	0	0	2	2	2
6:00 PM	0	2	1	0	0	0
6:15 PM	0	0	2	2	0	1
6:30 PM	0	0	0	0	0	0
6:45 PM	0	0	0	1	0	1
7:00 PM	0	0	0	0	0	0
7:15 PM	0	0	0	0	0	1
7:30 PM	0	0	0	0	0	1
7:45 PM	0	0	0	1	1	0
8:00 PM	0	0	1	0	0	0
8:15 PM	0	0	0	0	0	0
8:30 PM	0	0	1	0	0	0
8:45 PM	0	0	0	0	1	0
9:00 PM	0	0	0	0	0	0
9:15 PM	0	0	0	0	0	0
9:30 PM	0	0	0	0	0	1
9:45 PM	1	0	0	0	0	0
10:00 PM	0	0	0	0	0	0
10:15 PM	0	0	1	0	0	0
10:30 PM	0	0	0	0	0	0
10:45 PM	0	0	0	0	0	1
11:00 PM	0	0	1	0	0	0
11:15 PM	0	1	0	0	0	0
11:30 PM	0	0	0	0	0	0
11:45 PM	0	1	0	1	1	0
Totals	***43***	***30***	***42***	***31***	***47***	***38***

Prepared by National Data & Surveying Services

Trip Gen Study

Location: Pacific Biosciences West Dwy@O'Brien Dr **City:** Menlo Park, CA

TIME	28-Sep		29-Sep		30-Sep	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
12:00 AM	0	0	0	0	0	0
12:15 AM	0	0	0	1	0	0
12:30 AM	0	0	0	0	0	0
12:45 AM	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	1
1:15 AM	0	0	0	0	0	0
1:30 AM	0	0	0	0	0	0
1:45 AM	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0
2:15 AM	0	0	0	0	0	0
2:30 AM	0	0	1	0	2	0
2:45 AM	2	0	1	0	2	0
3:00 AM	0	0	1	0	1	1
3:15 AM	1	0	3	0	2	0
3:30 AM	2	0	3	0	2	0
3:45 AM	1	0	0	0	2	0
4:00 AM	0	0	0	0	2	1
4:15 AM	1	0	3	0	2	0
4:30 AM	3	0	2	0	3	0
4:45 AM	1	0	0	0	1	0
5:00 AM	0	0	0	0	0	0
5:15 AM	0	0	0	0	0	0
5:30 AM	1	0	1	0	0	1
5:45 AM	0	0	0	0	0	1
6:00 AM	1	0	1	1	2	2
6:15 AM	1	0	0	0	0	1
6:30 AM	2	0	3	0	2	0
6:45 AM	1	0	2	0	1	0
7:00 AM	1	0	1	0	1	0
7:15 AM	3	0	1	2	5	0
7:30 AM	2	0	5	2	2	0
7:45 AM	5	0	4	0	4	0
8:00 AM	9	0	6	1	6	2
8:15 AM	5	3	6	2	2	5
8:30 AM	3	9	3	3	5	10
8:45 AM	8	3	6	9	6	0
9:00 AM	8	3	7	4	10	6
9:15 AM	12	1	10	1	10	3
9:30 AM	5	3	7	3	5	2
9:45 AM	4	2	5	1	9	2
10:00 AM	5	1	1	2	6	1
10:15 AM	1	0	0	0	5	1
10:30 AM	3	2	4	1	4	4
10:45 AM	3	3	1	3	4	1
11:00 AM	1	2	1	4	3	5
11:15 AM	2	2	1	2	3	4

11:30 AM	3	4	3	4	5	5
11:45 AM	3	3	1	3	2	4
12:00 PM	2	2	1	1	3	0
12:15 PM	1	1	2	1	1	1
12:30 PM	2	3	2	1	3	1
12:45 PM	4	3	1	1	1	5
1:00 PM	1	0	0	3	1	0
1:15 PM	3	0	2	4	2	6
1:30 PM	2	0	0	2	4	0
1:45 PM	3	1	4	1	0	3
2:00 PM	2	2	1	5	2	1
2:15 PM	3	5	0	2	2	3
2:30 PM	0	1	2	6	1	5
2:45 PM	0	0	0	3	2	4
3:00 PM	2	5	0	2	2	4
3:15 PM	1	6	0	3	0	5
3:30 PM	1	5	0	1	1	6
3:45 PM	0	4	1	2	2	9
4:00 PM	1	6	1	5	0	4
4:15 PM	0	7	0	3	1	5
4:30 PM	1	10	0	3	0	9
4:45 PM	0	4	1	5	0	7
5:00 PM	0	9	0	7	1	12
5:15 PM	1	8	2	3	0	3
5:30 PM	0	8	0	4	0	4
5:45 PM	2	7	1	12	2	3
6:00 PM	2	2	0	3	0	5
6:15 PM	0	7	0	5	1	6
6:30 PM	0	1	0	3	0	2
6:45 PM	0	1	0	3	0	4
7:00 PM	0	3	0	0	0	1
7:15 PM	0	0	0	1	1	1
7:30 PM	0	1	0	0	1	2
7:45 PM	0	0	0	1	0	3
8:00 PM	0	1	0	0	0	0
8:15 PM	0	1	0	0	0	1
8:30 PM	0	0	2	2	1	1
8:45 PM	0	0	0	1	0	1
9:00 PM	0	1	0	0	0	2
9:15 PM	0	0	0	0	0	0
9:30 PM	0	1	0	3	0	0
9:45 PM	0	0	0	1	0	0
10:00 PM	0	1	0	0	0	1
10:15 PM	0	0	1	0	0	0
10:30 PM	0	0	0	1	0	0
10:45 PM	0	0	0	1	1	0
11:00 PM	0	0	1	0	0	0
11:15 PM	0	0	0	0	0	0
11:30 PM	0	1	1	0	1	0
11:45 PM	1	0	1	1	0	1
Totals	***138***	***159***	***121***	***155***	***158***	***194***

Prepared by National Data & Surveying Services

In & Out

Location: Pacific Biosciences (PacBio) West Dwy & Adams Ct
City: Menlo Park
Date: 9/28/2021
Day: Tuesday

TIME	NT	ST	TIME	NT	ST
12:00 AM	0	0	12:00 PM	0	0
12:15 AM	0	0	12:15 PM	0	0
12:30 AM	0	0	12:30 PM	0	0
12:45 AM	0	0	12:45 PM	0	0
1:00 AM	0	0	1:00 PM	0	0
1:15 AM	0	0	1:15 PM	0	0
1:30 AM	0	0	1:30 PM	0	0
1:45 AM	0	0	1:45 PM	0	0
2:00 AM	0	0	2:00 PM	0	0
2:15 AM	0	0	2:15 PM	0	0
2:30 AM	0	0	2:30 PM	0	0
2:45 AM	2	0	2:45 PM	0	0
3:00 AM	0	0	3:00 PM	0	0
3:15 AM	1	0	3:15 PM	0	0
3:30 AM	2	0	3:30 PM	0	0
3:45 AM	2	0	3:45 PM	1	1
4:00 AM	0	0	4:00 PM	0	0
4:15 AM	0	0	4:15 PM	0	0
4:30 AM	1	0	4:30 PM	0	0
4:45 AM	0	0	4:45 PM	0	1
5:00 AM	0	0	5:00 PM	0	0
5:15 AM	0	0	5:15 PM	0	0
5:30 AM	0	0	5:30 PM	0	0
5:45 AM	0	0	5:45 PM	1	0
6:00 AM	0	0	6:00 PM	1	0
6:15 AM	0	0	6:15 PM	0	0
6:30 AM	0	0	6:30 PM	0	1
6:45 AM	0	0	6:45 PM	0	0
7:00 AM	0	0	7:00 PM	0	0
7:15 AM	0	0	7:15 PM	0	0
7:30 AM	0	0	7:30 PM	0	0
7:45 AM	0	0	7:45 PM	0	0
8:00 AM	1	0	8:00 PM	0	0
8:15 AM	0	2	8:15 PM	0	0
8:30 AM	0	8	8:30 PM	0	0
8:45 AM	0	1	8:45 PM	0	0
9:00 AM	0	4	9:00 PM	0	0
9:15 AM	0	0	9:15 PM	0	0
9:30 AM	0	1	9:30 PM	0	0
9:45 AM	0	1	9:45 PM	0	0
10:00 AM	1	0	10:00 PM	1	2
10:15 AM	0	0	10:15 PM	0	0
10:30 AM	0	1	10:30 PM	0	0
10:45 AM	0	0	10:45 PM	0	0
11:00 AM	0	1	11:00 PM	0	0
11:15 AM	1	0	11:15 PM	0	0
11:30 AM	0	0	11:30 PM	0	0
11:45 AM	0	0	11:45 PM	0	0
			Totals	***11***	***19***

Prepared by National Data & Surveying Services

In & Out

Location: Pacific Biosciences (PacBio) West Dwy & Adams Ct
City: Menlo Park
Date: 9/29/2021
Day: Wednesday

TIME	NT	ST	TIME	NT	ST
12:00 AM	0	0	12:00 PM	0	0
12:15 AM	0	0	12:15 PM	0	0
12:30 AM	0	0	12:30 PM	0	0
12:45 AM	0	0	12:45 PM	0	0
1:00 AM	0	0	1:00 PM	0	0
1:15 AM	0	0	1:15 PM	0	0
1:30 AM	0	0	1:30 PM	0	0
1:45 AM	0	0	1:45 PM	0	0
2:00 AM	0	0	2:00 PM	0	0
2:15 AM	0	0	2:15 PM	0	0
2:30 AM	1	0	2:30 PM	0	1
2:45 AM	1	0	2:45 PM	0	2
3:00 AM	1	0	3:00 PM	0	0
3:15 AM	3	0	3:15 PM	0	0
3:30 AM	3	0	3:30 PM	0	0
3:45 AM	0	0	3:45 PM	0	0
4:00 AM	0	0	4:00 PM	0	0
4:15 AM	1	0	4:15 PM	0	0
4:30 AM	1	0	4:30 PM	0	0
4:45 AM	0	0	4:45 PM	1	0
5:00 AM	0	0	5:00 PM	0	0
5:15 AM	0	0	5:15 PM	0	0
5:30 AM	0	0	5:30 PM	0	0
5:45 AM	0	0	5:45 PM	0	0
6:00 AM	0	1	6:00 PM	0	0
6:15 AM	0	0	6:15 PM	0	0
6:30 AM	0	0	6:30 PM	0	0
6:45 AM	0	0	6:45 PM	0	0
7:00 AM	0	0	7:00 PM	0	0
7:15 AM	0	2	7:15 PM	0	0
7:30 AM	0	0	7:30 PM	0	0
7:45 AM	0	0	7:45 PM	0	0
8:00 AM	1	0	8:00 PM	0	0
8:15 AM	0	1	8:15 PM	0	0
8:30 AM	0	3	8:30 PM	0	0
8:45 AM	1	10	8:45 PM	0	0
9:00 AM	0	3	9:00 PM	0	0
9:15 AM	0	0	9:15 PM	0	0
9:30 AM	0	2	9:30 PM	0	3
9:45 AM	1	0	9:45 PM	0	1
10:00 AM	0	1	10:00 PM	0	0
10:15 AM	0	0	10:15 PM	0	0
10:30 AM	0	0	10:30 PM	0	0
10:45 AM	0	1	10:45 PM	0	0
11:00 AM	0	1	11:00 PM	0	0
11:15 AM	0	0	11:15 PM	0	0
11:30 AM	0	0	11:30 PM	0	0
11:45 AM	0	0	11:45 PM	0	0
			Totals	***14***	***25***

Prepared by National Data & Surveying Services

In & Out

Location: Pacific Biosciences (PacBio) West Dwy & Adams Ct
City: Menlo Park
Date: 9/30/2021
Day: Thursday

TIME	NT	ST	TIME	NT	ST
12:00 AM	0	0	12:00 PM	0	0
12:15 AM	0	0	12:15 PM	0	0
12:30 AM	0	0	12:30 PM	0	0
12:45 AM	0	0	12:45 PM	0	0
1:00 AM	0	1	1:00 PM	0	0
1:15 AM	0	0	1:15 PM	0	1
1:30 AM	0	0	1:30 PM	0	0
1:45 AM	0	0	1:45 PM	0	1
2:00 AM	0	0	2:00 PM	0	0
2:15 AM	0	0	2:15 PM	0	1
2:30 AM	1	0	2:30 PM	0	0
2:45 AM	2	0	2:45 PM	0	1
3:00 AM	1	1	3:00 PM	0	1
3:15 AM	2	0	3:15 PM	0	0
3:30 AM	2	0	3:30 PM	0	0
3:45 AM	2	1	3:45 PM	0	0
4:00 AM	2	0	4:00 PM	0	0
4:15 AM	0	0	4:15 PM	0	0
4:30 AM	1	0	4:30 PM	0	0
4:45 AM	0	0	4:45 PM	0	0
5:00 AM	0	0	5:00 PM	0	1
5:15 AM	0	0	5:15 PM	0	0
5:30 AM	0	1	5:30 PM	0	0
5:45 AM	0	1	5:45 PM	0	0
6:00 AM	1	2	6:00 PM	0	1
6:15 AM	0	0	6:15 PM	0	0
6:30 AM	0	0	6:30 PM	0	0
6:45 AM	0	0	6:45 PM	0	0
7:00 AM	0	0	7:00 PM	0	0
7:15 AM	0	0	7:15 PM	2	0
7:30 AM	0	0	7:30 PM	0	0
7:45 AM	0	0	7:45 PM	0	0
8:00 AM	1	2	8:00 PM	0	0
8:15 AM	0	3	8:15 PM	0	0
8:30 AM	1	9	8:30 PM	0	0
8:45 AM	0	5	8:45 PM	0	0
9:00 AM	2	3	9:00 PM	1	2
9:15 AM	0	1	9:15 PM	0	0
9:30 AM	0	1	9:30 PM	0	0
9:45 AM	0	1	9:45 PM	0	0
10:00 AM	0	1	10:00 PM	0	1
10:15 AM	0	0	10:15 PM	0	0
10:30 AM	0	0	10:30 PM	0	0
10:45 AM	0	1	10:45 PM	0	0
11:00 AM	0	0	11:00 PM	0	0
11:15 AM	1	1	11:15 PM	0	0
11:30 AM	0	0	11:30 PM	0	0
11:45 AM	0	1	11:45 PM	0	0
			Totals	***19***	***36***

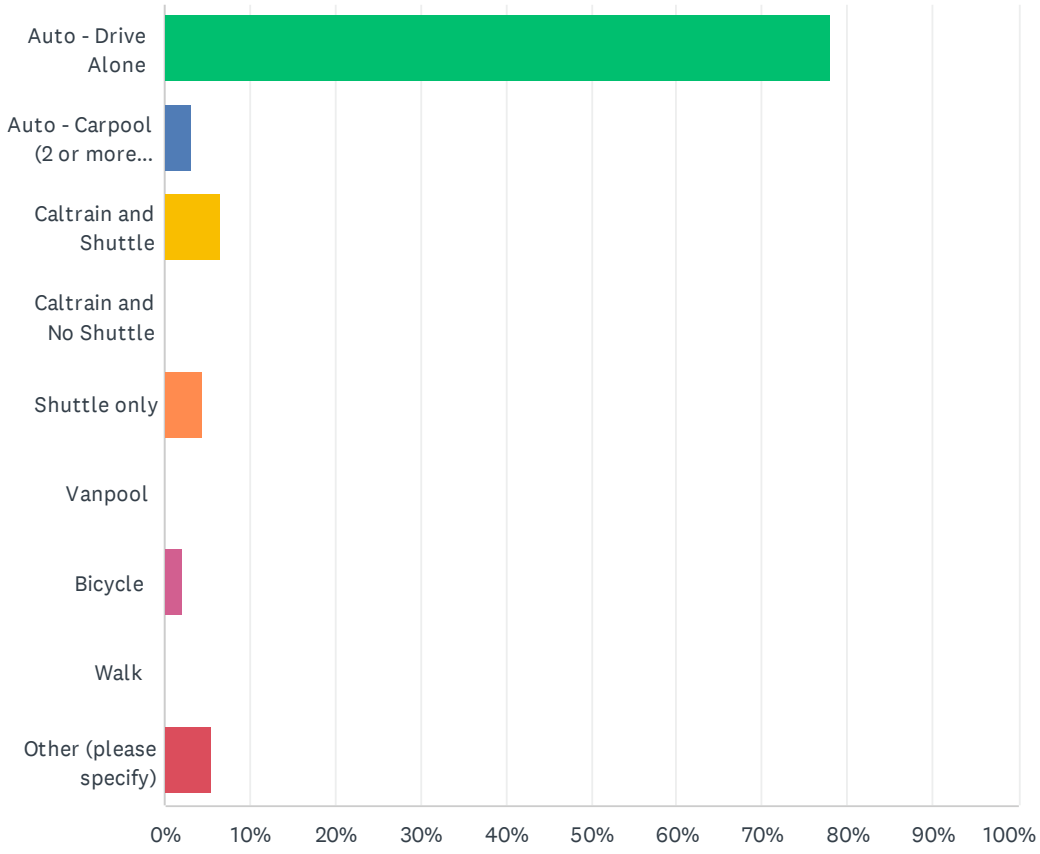
UPS Cut-Through Counts - AM Peak Hour

Driveway #	Location	AM Peak Hour (8:30 AM to 9:30 AM)					
		9/28/2021		9/29/2021		9/30/2021	
		IN	OUT	IN	OUT	IN	OUT
UPS Cut-Through							
2	Northeast Dwy on Adams Dr	30		29	1	28	
3A	East Dwy on Adams Drive (North)		31		25		27
3B	East Dwy on Adams Drive (South)				2		2
Total		30	31	29	28	28	29

Attachment C

Q1 On a typical workday (pre-COVID), what is your primary mode of transportation for getting to/from work?

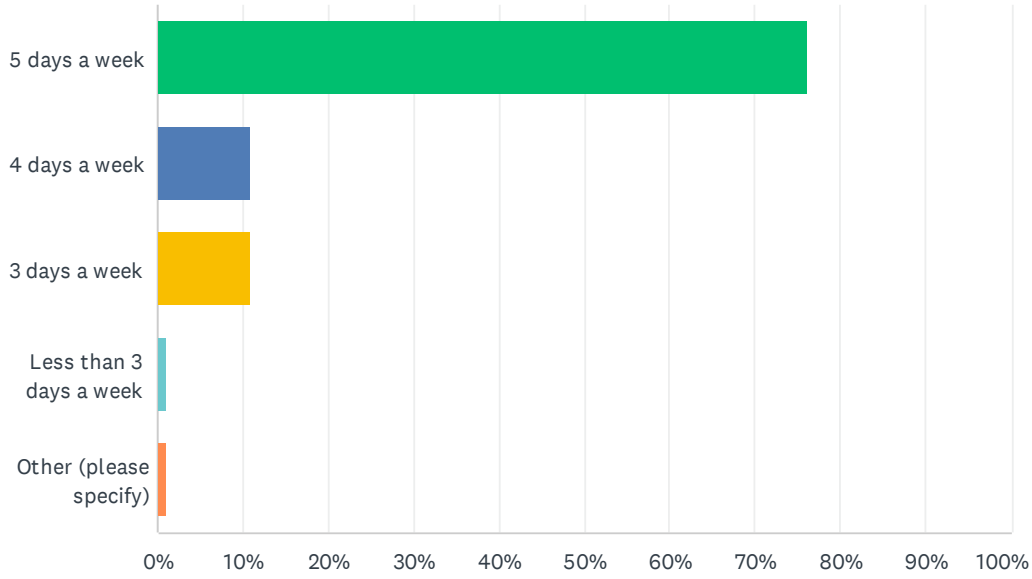
Answered: 91 Skipped: 1



ANSWER CHOICES	RESPONSES	
Auto - Drive Alone	78.02%	71
Auto - Carpool (2 or more persons)	3.30%	3
Caltrain and Shuttle	6.59%	6
Caltrain and No Shuttle	0.00%	0
Shuttle only	4.40%	4
Vanpool	0.00%	0
Bicycle	2.20%	2
Walk	0.00%	0
Other (please specify)	5.49%	5
TOTAL		91

Q2 For your answer to Question #1, how often a week do you use that mode of transportation on average (pre-COVID)?

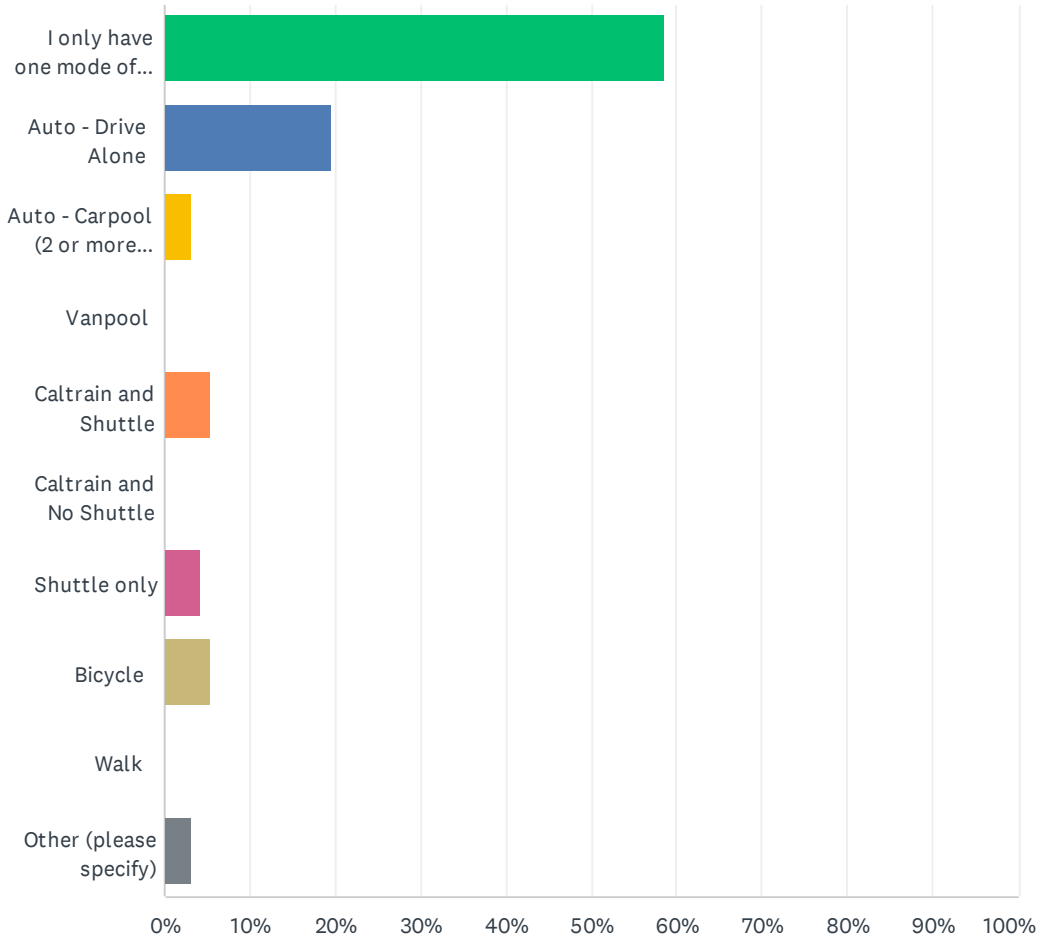
Answered: 92 Skipped: 0



ANSWER CHOICES	RESPONSES	
5 days a week	76.09%	70
4 days a week	10.87%	10
3 days a week	10.87%	10
Less than 3 days a week	1.09%	1
Other (please specify)	1.09%	1
TOTAL		92

Q3 On a typical workday (pre-COVID), what is your secondary mode of transportation for getting to/from work?

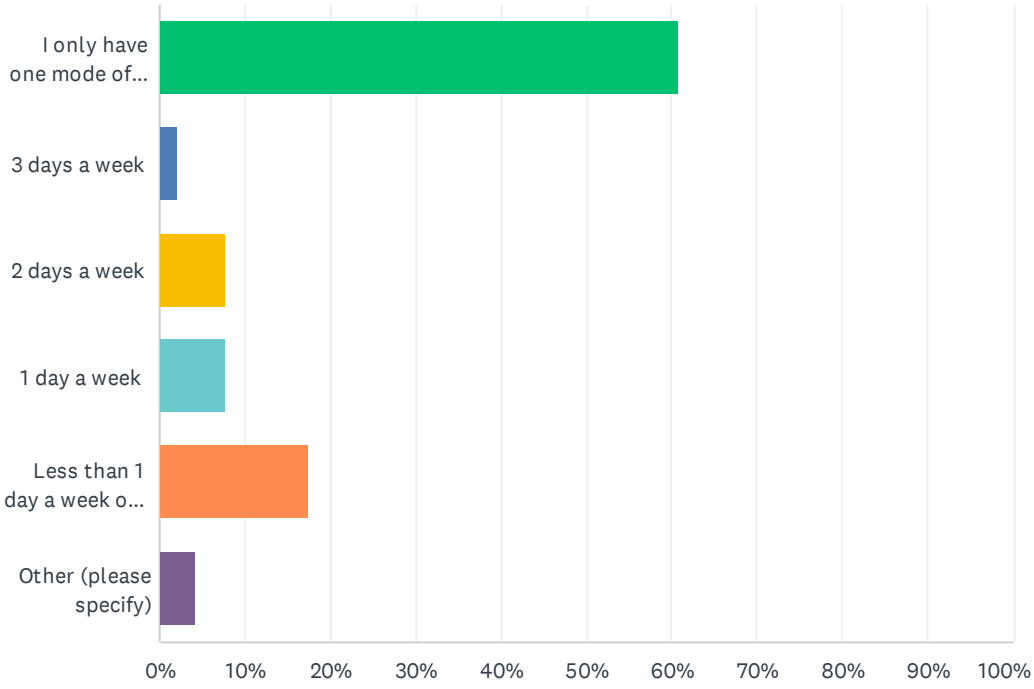
Answered: 92 Skipped: 0



ANSWER CHOICES	RESPONSES	
I only have one mode of transportation (same answer as Question #1)	58.70%	54
Auto - Drive Alone	19.57%	18
Auto - Carpool (2 or more persons)	3.26%	3
Vanpool	0.00%	0
Caltrain and Shuttle	5.43%	5
Caltrain and No Shuttle	0.00%	0
Shuttle only	4.35%	4
Bicycle	5.43%	5
Walk	0.00%	0
Other (please specify)	3.26%	3
TOTAL		92

Q4 For your answer to Question #3, how often a week do you use that mode of transportation on average (pre-COVID)?

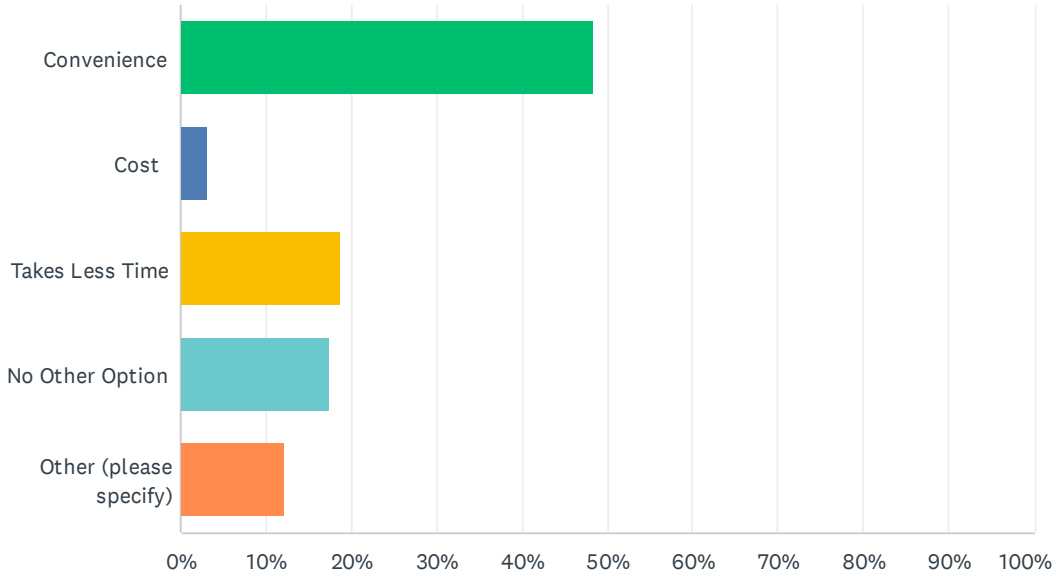
Answered: 92 Skipped: 0



ANSWER CHOICES	RESPONSES	
I only have one mode of transportation (same answer as Questions #1)	60.87%	56
3 days a week	2.17%	2
2 days a week	7.61%	7
1 day a week	7.61%	7
Less than 1 day a week on average	17.39%	16
Other (please specify)	4.35%	4
TOTAL		92

Q5 What is the reason why you have chosen your primary commute method (pre-COVID)?

Answered: 91 Skipped: 1



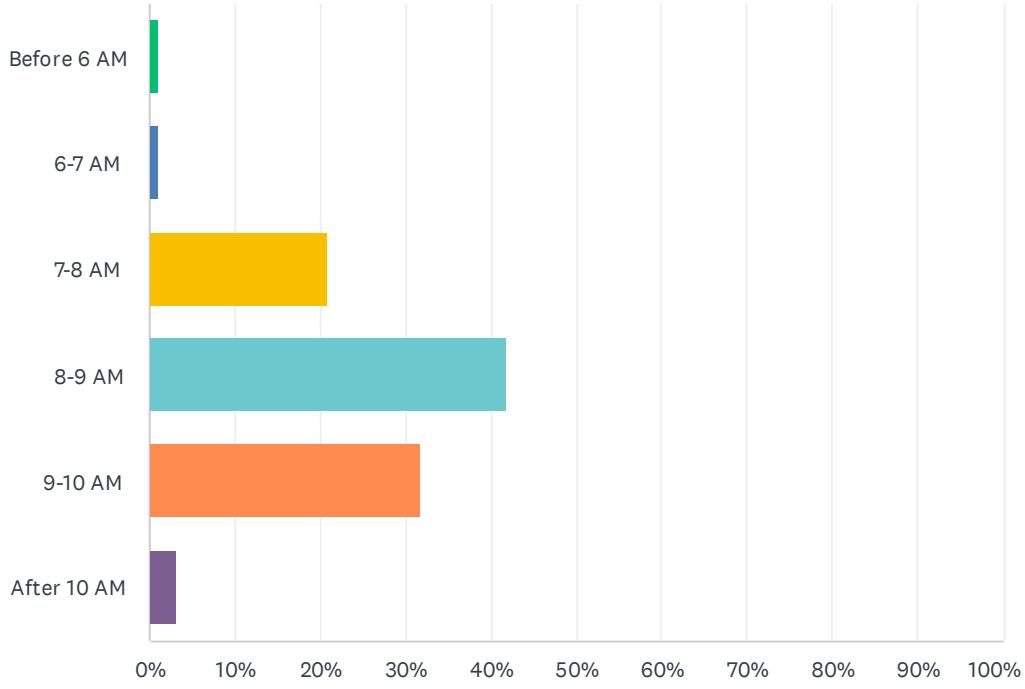
ANSWER CHOICES	RESPONSES	
Convenience	48.35%	44
Cost	3.30%	3
Takes Less Time	18.68%	17
No Other Option	17.58%	16
Other (please specify)	12.09%	11
TOTAL		91

Q6 On a typical workday (pre-COVID), approximately how long is your one-way trip to work (in miles)?

Answered: 89 Skipped: 3

Q7 What approximate time do you typically arrive to work (pre-COVID)?

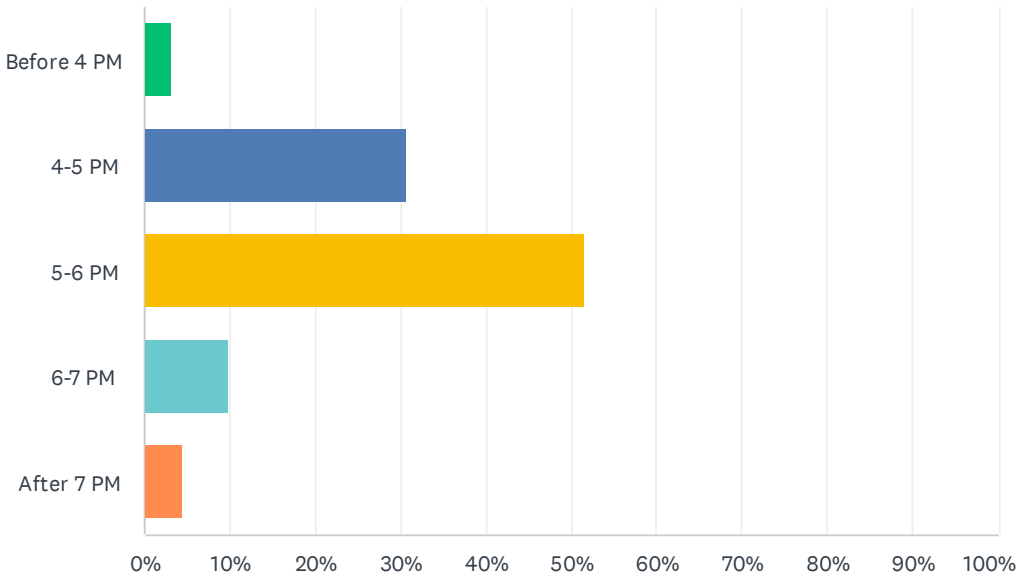
Answered: 91 Skipped: 1



ANSWER CHOICES	RESPONSES	
Before 6 AM	1.10%	1
6-7 AM	1.10%	1
7-8 AM	20.88%	19
8-9 AM	41.76%	38
9-10 AM	31.87%	29
After 10 AM	3.30%	3
TOTAL		91

Q8 What approximate time do you typically leave work (pre-COVID)?

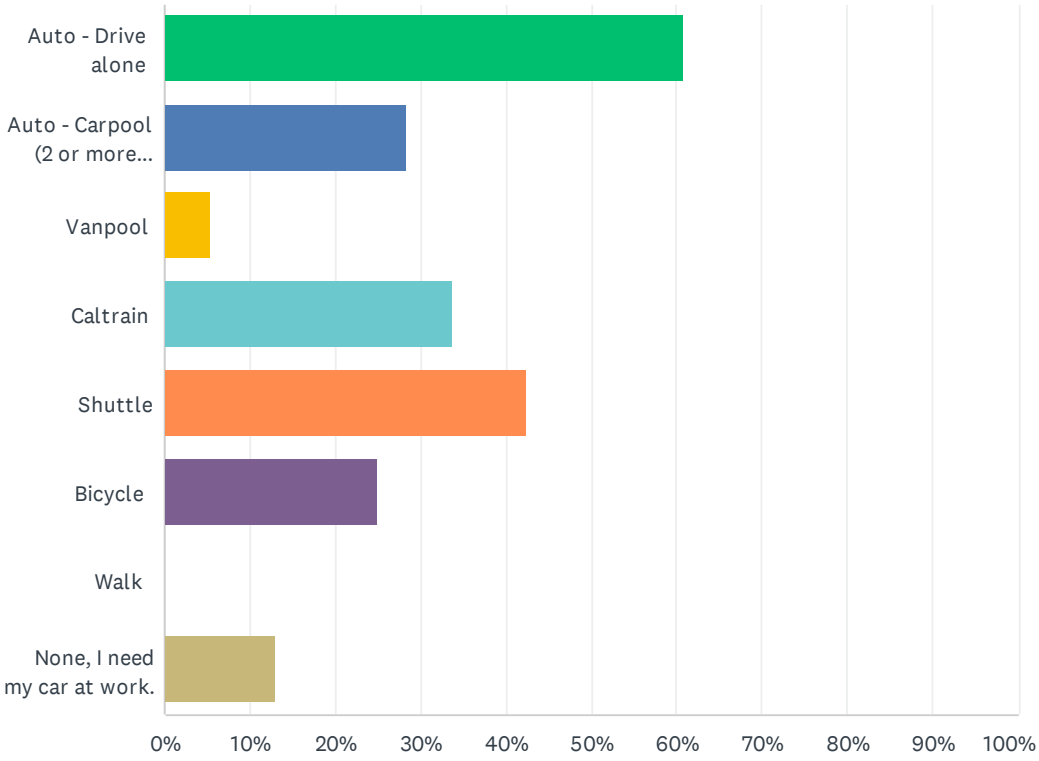
Answered: 91 Skipped: 1



ANSWER CHOICES	RESPONSES	
Before 4 PM	3.30%	3
4-5 PM	30.77%	28
5-6 PM	51.65%	47
6-7 PM	9.89%	9
After 7 PM	4.40%	4
TOTAL		91

Q9 What options have you researched or considered to travel to work? (Please check all that apply)

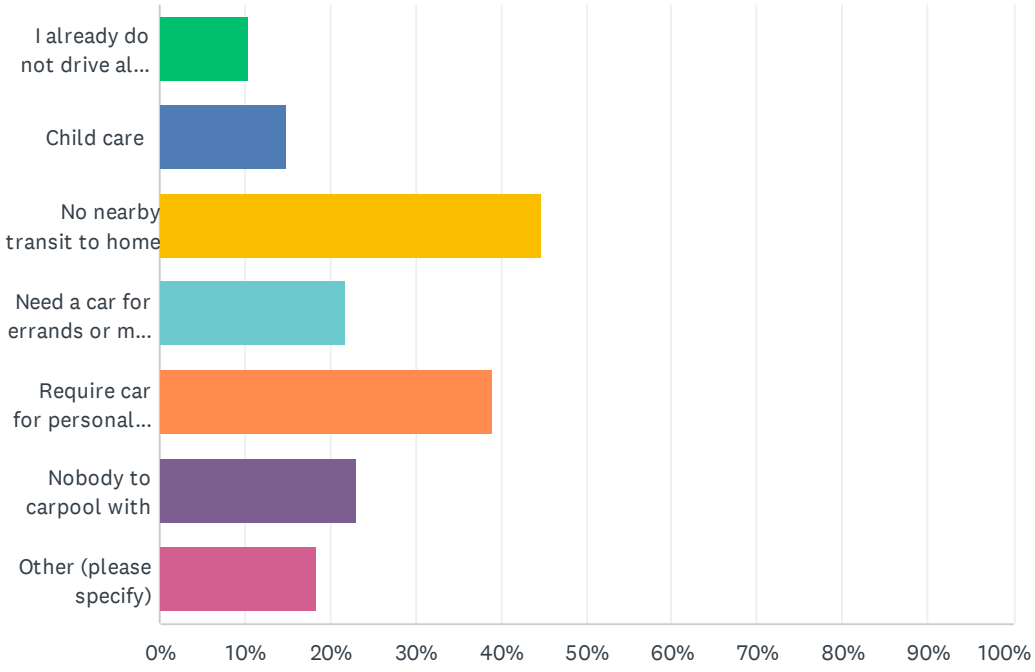
Answered: 92 Skipped: 0



ANSWER CHOICES	RESPONSES	
Auto - Drive alone	60.87%	56
Auto - Carpool (2 or more persons)	28.26%	26
Vanpool	5.43%	5
Caltrain	33.70%	31
Shuttle	42.39%	39
Bicycle	25.00%	23
Walk	0.00%	0
None, I need my car at work.	13.04%	12
Total Respondents: 92		

Q10 If you typically drive alone to work (pre-COVID), what are the obstacles preventing you from commuting by other means? (Please check all that apply)

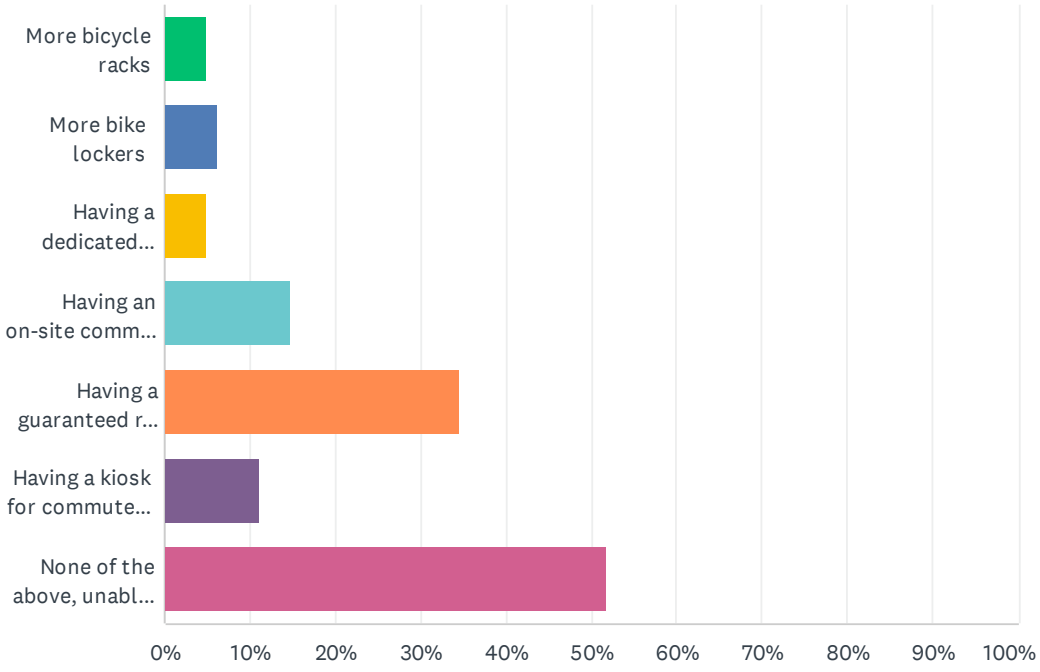
Answered: 87 Skipped: 5



ANSWER CHOICES	RESPONSES	
I already do not drive alone to work	10.34%	9
Child care	14.94%	13
No nearby transit to home	44.83%	39
Need a car for errands or my work during the day	21.84%	19
Require car for personal commitments after work	39.08%	34
Nobody to carpool with	22.99%	20
Other (please specify)	18.39%	16
Total Respondents: 87		

Q11 Please check if any of the following would cause you to use alternate means of commuting to work other than driving alone (pre-COVID). (Please check all that apply)

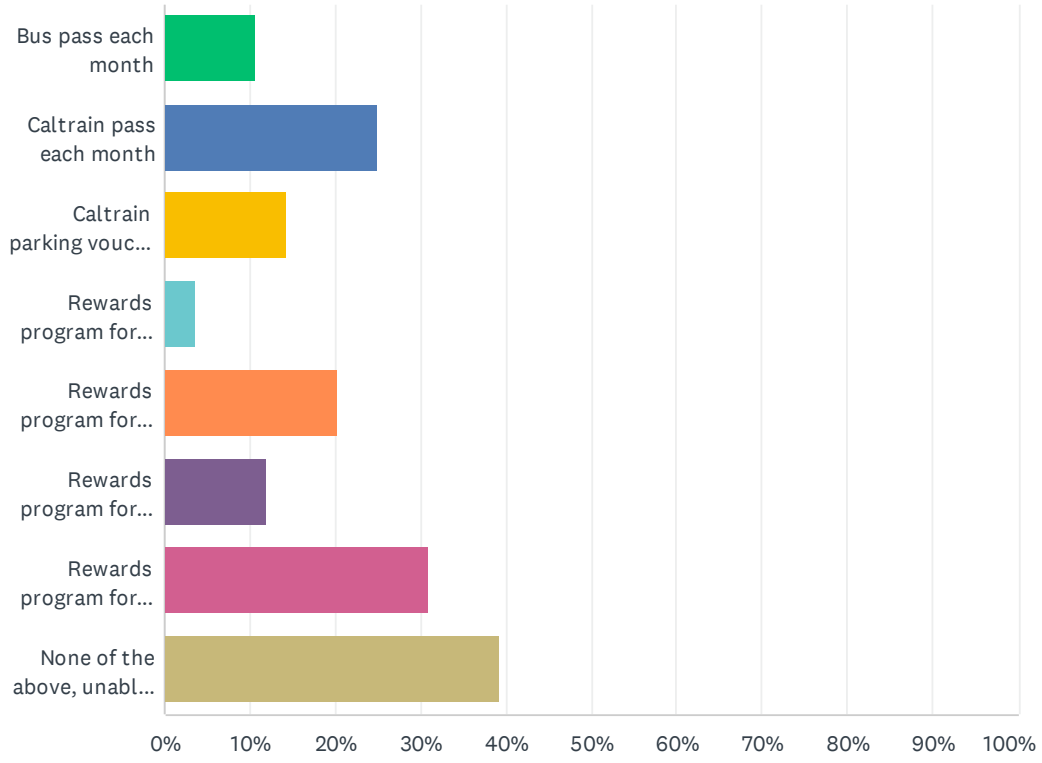
Answered: 81 Skipped: 11



ANSWER CHOICES	RESPONSES	
More bicycle racks	4.94%	4
More bike lockers	6.17%	5
Having a dedicated carpool or vanpool parking space nearest to the building entrance	4.94%	4
Having an on-site commute coordinator	14.81%	12
Having a guaranteed ride home program (e.g. taxi voucher when emergency arises)	34.57%	28
Having a kiosk for commute info	11.11%	9
None of the above, unable to use alternate means other than driving alone	51.85%	42
Total Respondents: 81		

Q12 Please check if any of the following rewards or discount programs would cause you to use alternate means of commuting to work other than driving alone (pre-COVID). (Please check all that apply)

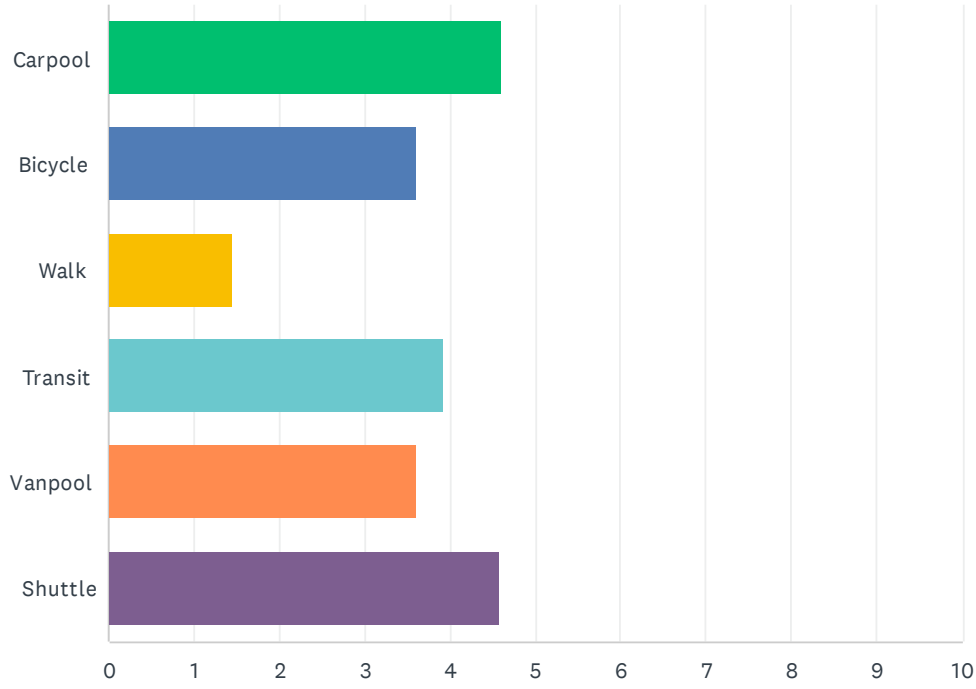
Answered: 84 Skipped: 8



ANSWER CHOICES	RESPONSES	
Bus pass each month	10.71%	9
Caltrain pass each month	25.00%	21
Caltrain parking voucher each month	14.29%	12
Rewards program for walking	3.57%	3
Rewards program for bicycling	20.24%	17
Rewards program for using a vanpool	11.90%	10
Rewards program for carpooling	30.95%	26
None of the above, unable to use alternate means other than driving alone	39.29%	33
Total Respondents: 84		

Q13 If you had to choose another means of transportation to driving alone, which would you choose (pre-COVID)? (Please rank with 1 being the highest)

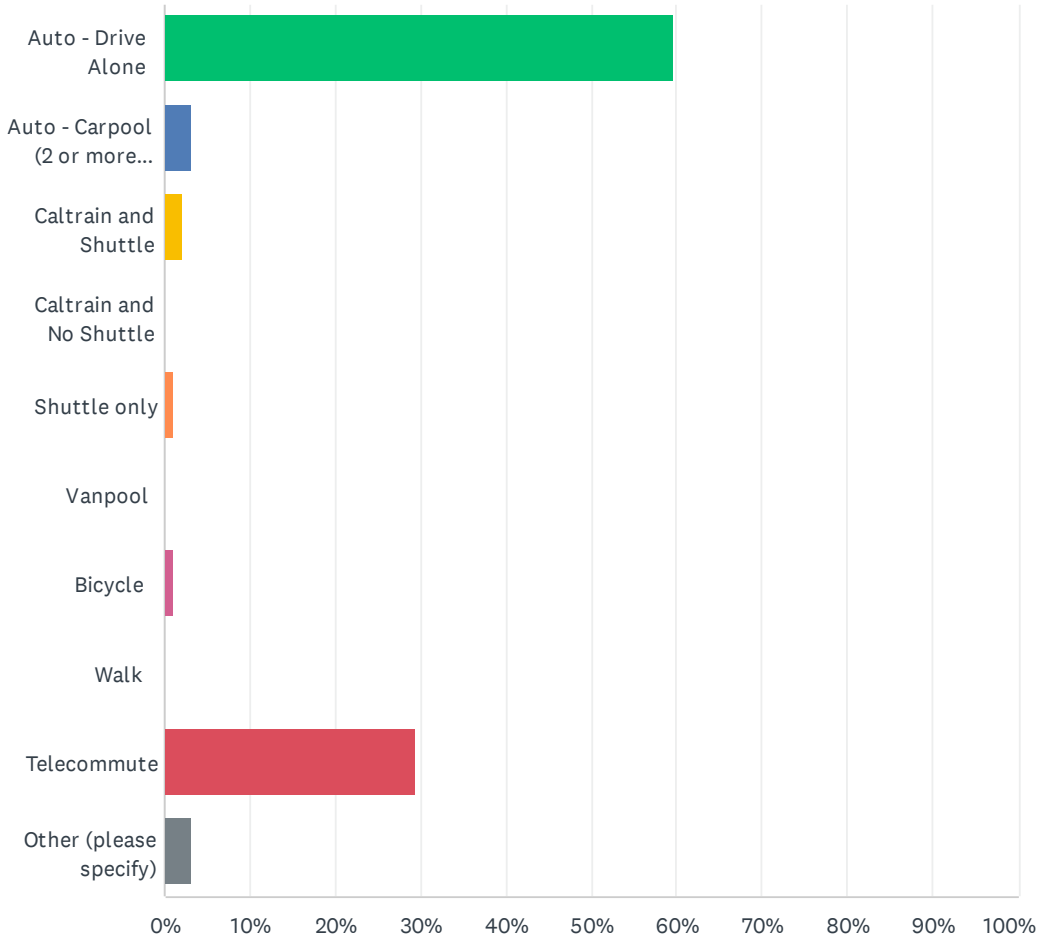
Answered: 84 Skipped: 8



	1	2	3	4	5	6	TOTAL	SCORE
Carpool	37.66% 29	18.18% 14	16.88% 13	20.78% 16	6.49% 5	0.00% 0	77	4.60
Bicycle	24.24% 16	12.12% 8	7.58% 5	13.64% 9	40.91% 27	1.52% 1	66	3.61
Walk	1.75% 1	1.75% 1	3.51% 2	5.26% 3	8.77% 5	78.95% 45	57	1.46
Transit	15.71% 11	21.43% 15	20.00% 14	28.57% 20	11.43% 8	2.86% 2	70	3.93
Vanpool	5.97% 4	20.90% 14	32.84% 22	14.93% 10	19.40% 13	5.97% 4	67	3.61
Shuttle	28.95% 22	31.58% 24	22.37% 17	9.21% 7	1.32% 1	6.58% 5	76	4.58

Q14 What is your current mode of transportation for getting to/from work as a result of COVID-19?

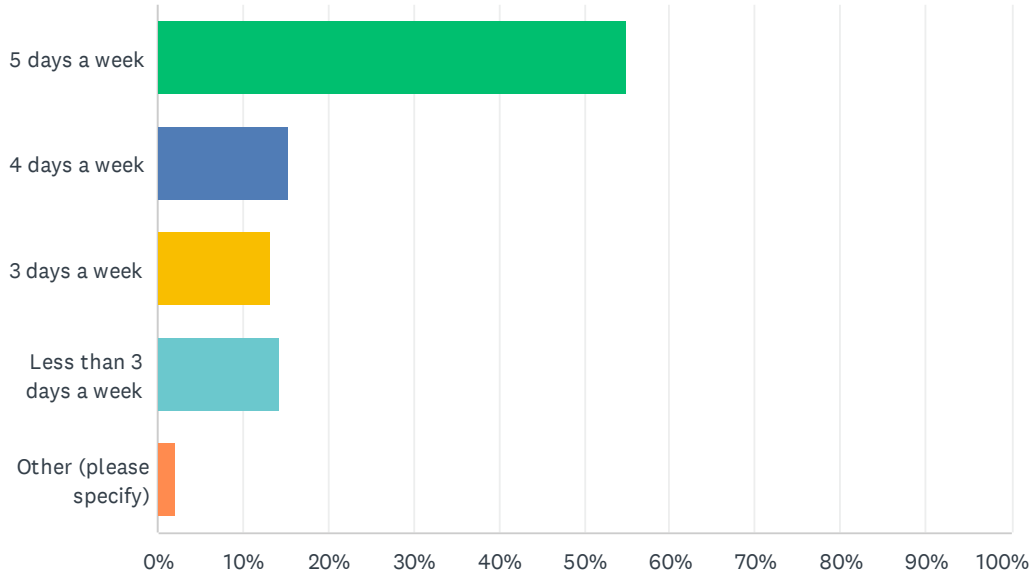
Answered: 92 Skipped: 0



ANSWER CHOICES	RESPONSES	
Auto - Drive Alone	59.78%	55
Auto - Carpool (2 or more persons)	3.26%	3
Caltrain and Shuttle	2.17%	2
Caltrain and No Shuttle	0.00%	0
Shuttle only	1.09%	1
Vanpool	0.00%	0
Bicycle	1.09%	1
Walk	0.00%	0
Telecommute	29.35%	27
Other (please specify)	3.26%	3
TOTAL		92

Q15 For your answer to Question #14, how often a week do you use that mode of transportation on average during COVID?

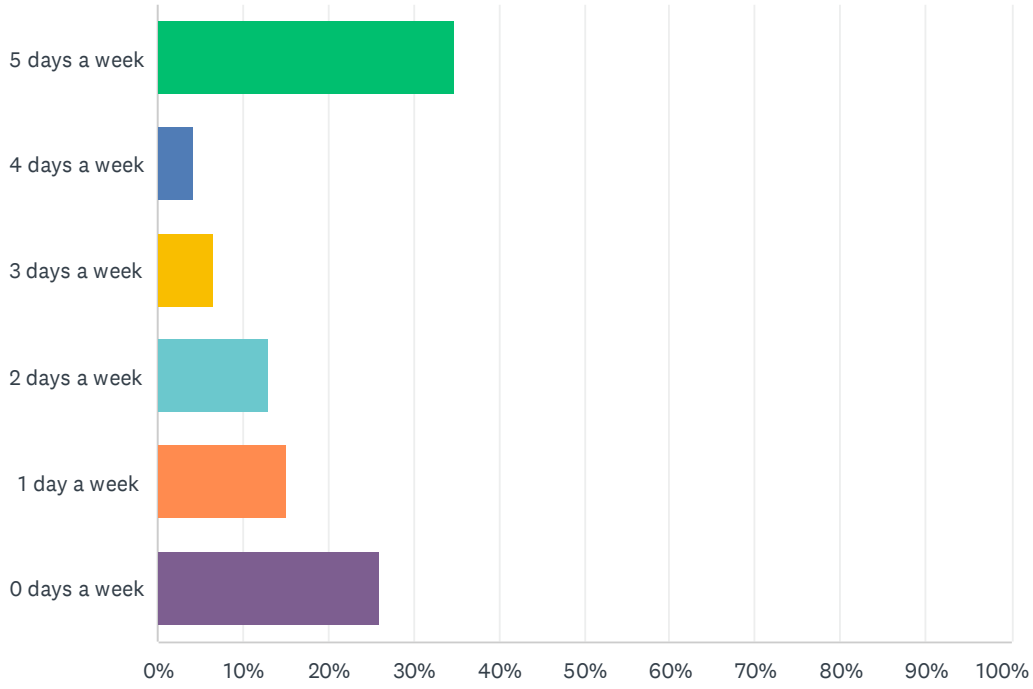
Answered: 91 Skipped: 1



ANSWER CHOICES	RESPONSES	
5 days a week	54.95%	50
4 days a week	15.38%	14
3 days a week	13.19%	12
Less than 3 days a week	14.29%	13
Other (please specify)	2.20%	2
TOTAL		91

Q16 How many days a week on average do you telecommute to work as a result of COVID-19?

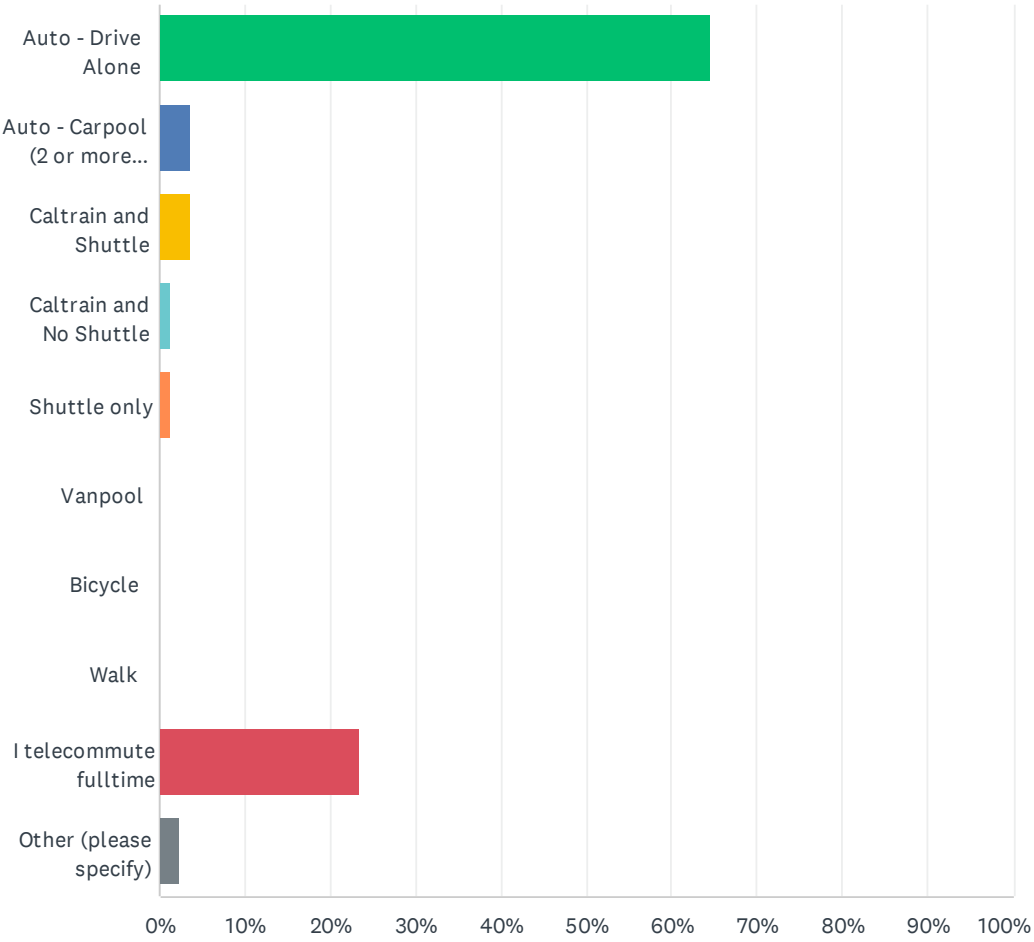
Answered: 92 Skipped: 0



ANSWER CHOICES	RESPONSES	
5 days a week	34.78%	32
4 days a week	4.35%	4
3 days a week	6.52%	6
2 days a week	13.04%	12
1 day a week	15.22%	14
0 days a week	26.09%	24
TOTAL		92

Q17 If you currently telecommute less than 5 days a week as a result of COVID-19, what is your mode of transportation when you are not telecommuting?

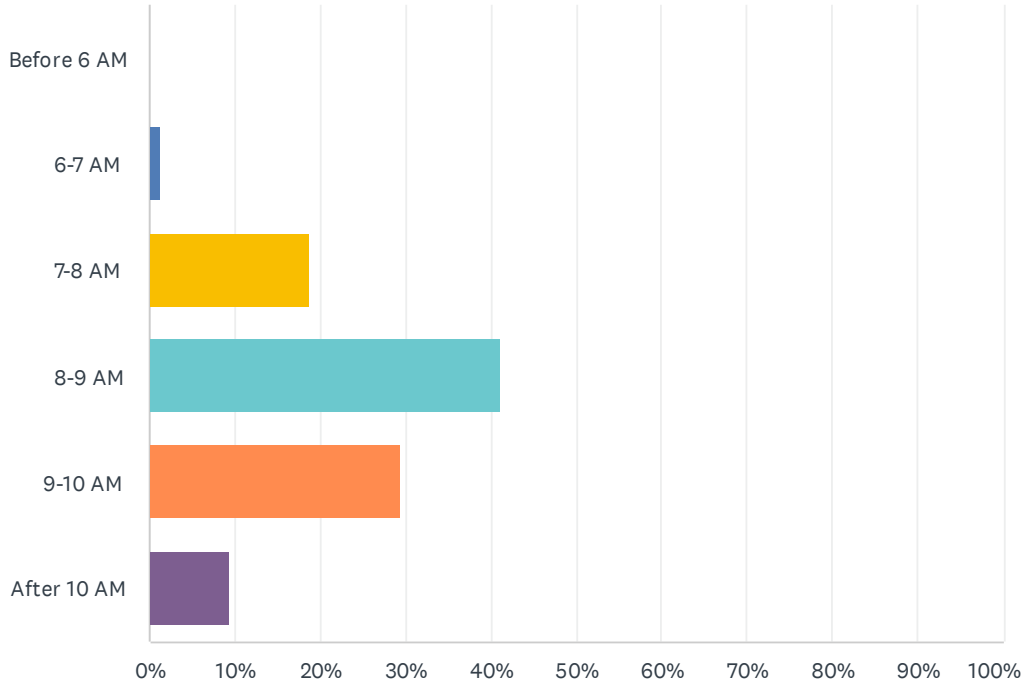
Answered: 85 Skipped: 7



ANSWER CHOICES	RESPONSES	
Auto - Drive Alone	64.71%	55
Auto - Carpool (2 or more persons)	3.53%	3
Caltrain and Shuttle	3.53%	3
Caltrain and No Shuttle	1.18%	1
Shuttle only	1.18%	1
Vanpool	0.00%	0
Bicycle	0.00%	0
Walk	0.00%	0
I telecommute fulltime	23.53%	20
Other (please specify)	2.35%	2
TOTAL		85

Q18 If/when you are not telecommuting during COVID, what approximate time do you typically arrive to work?

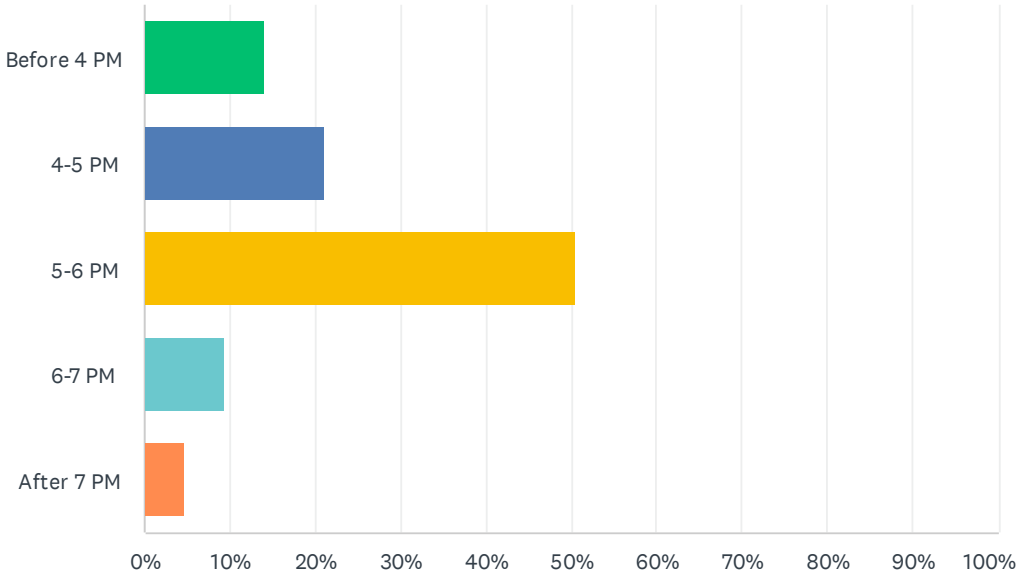
Answered: 85 Skipped: 7



ANSWER CHOICES	RESPONSES	
Before 6 AM	0.00%	0
6-7 AM	1.18%	1
7-8 AM	18.82%	16
8-9 AM	41.18%	35
9-10 AM	29.41%	25
After 10 AM	9.41%	8
TOTAL		85

Q19 If/when you are not telecommuting during COVID, what approximate time do you typically leave work?

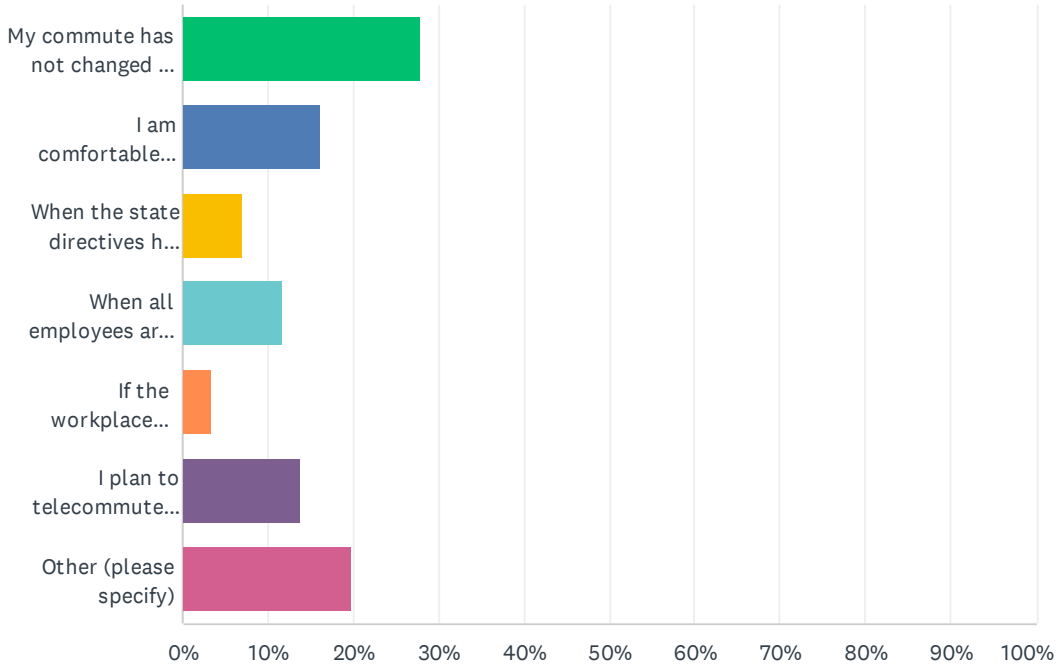
Answered: 85 Skipped: 7



ANSWER CHOICES	RESPONSES	
Before 4 PM	14.12%	12
4-5 PM	21.18%	18
5-6 PM	50.59%	43
6-7 PM	9.41%	8
After 7 PM	4.71%	4
TOTAL		85

Q20 If you currently are telecommuting as a result of COVID-19, when would you return back to your typical (pre-COVID) transportation mode?

Answered: 86 Skipped: 6



ANSWER CHOICES	RESPONSES	
My commute has not changed due to COVID	27.91%	24
I am comfortable returning now	16.28%	14
When the state directives have deemed it safe to work in the office	6.98%	6
When all employees are vaccinated	11.63%	10
If the workplace requires COVID testing for all employees	3.49%	3
I plan to telecommute indefinitely	13.95%	12
Other (please specify)	19.77%	17
TOTAL		86