

Village at Novato Mixed-Use Project

Initial Study – Mitigated Negative Declaration

prepared by

City of Novato
Community Development Department
922 Machin Avenue
Novato, California 94945
Contact: Vivek Damodaran, Senior Planner

prepared with the assistance of

Rincon Consultants, Inc.
4825 J Street, Suite 200
Sacramento, California 95819

November 2023

RINCON CONSULTANTS, INC.
Environmental Scientists | Planners | Engineers
rinconconsultants.com

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Table of Contents

Initial Study 1
1. Project Title 1
2. Lead Agency Name and Address 1
3. Contact Person and Phone Number 1
4. Project Location 1
5. Project Sponsor's Name and Address 1
6. General Plan Designation 1
7. Zoning 4
8. Project Description 4
9. Surrounding Land Uses and Setting 11
10. Other Public Agencies Whose Approval is Required 12
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? 12
12. Project Consistency with General Plan 2035 Mitigation Measures 13

Environmental Factors Potentially Affected 23

Determination 23

Environmental Checklist 25
1 Aesthetics 25
2 Agriculture and Forestry Resources 29
3 Air Quality 31
4 Biological Resources 41
5 Cultural Resources 49
6 Energy 55
7 Geology and Soils 61
8 Greenhouse Gas Emissions 67
9 Hazards and Hazardous Materials 73
10 Hydrology and Water Quality 79
11 Land Use and Planning 85
12 Mineral Resources 89
13 Noise 91
14 Population and Housing 105
15 Public Services 107
16 Recreation 111
17 Transportation 113
18 Tribal Cultural Resources 119
19 Utilities and Service Systems 125
20 Wildfire 131
21 Mandatory Findings of Significance 133

References 139
Bibliography 139
List of Preparers 142

Tables

Table 1 Proposed Building and Unit Summary 4
Table 2 Proposed Unit Size Summary 5
Table 3 Project Construction Phases 9
Table 4 General Plan 2035 Mitigation Consistency 14
Table 5 Health Effects Associated with Non-Attainment Criteria Pollutants 32
Table 6 BAAQMD Air Quality Thresholds of Significance 33
Table 7 Maximum Daily Construction Emissions (lbs/day) 37
Table 8 Maximum Daily and Annual Operational Period Emissions 38
Table 9 2019 Electricity Consumption 56
Table 10 2019 Annual Gasoline and Diesel Consumption 56
Table 11 Estimated Fuel Consumption during Construction 57
Table 12 Estimated Project Annual Operational Energy Consumption 58
Table 13 Project Compliance with Energy Efficiency Goals and Policies 59
Table 14 Project Consistency with Land Use Plans 86
Table 15 AASHTO Maximum Vibration Levels for Preventing Damage 93
Table 16 Vibration Annoyance Potential Criteria 94
Table 17 Project Site Vicinity Sound Level Monitoring Results- Short-Term 95
Table 18 Land Use Compatibility Standards 96
Table 19 City of Novato Municipal Code Table 3-5: Allowable Exterior Noise Levels[1] 97
Table 20 Operational HVAC Noise 100
Table 21 Off-Site Traffic Volume Increases 101
Table 22 Vibration Levels at Sensitive Receivers 102
Table 23 NMWD Water Supply and Demand in Acre-Feet for Normal, Single Dry, and Multiple Dry Years 128
Table 24 Cumulative Development Projects 135

Figures

Figure 1 Regional Location 2
Figure 2 Project Site Location 3
Figure 3 Proposed Project Site Plan 6
Figure 4 Proposed Drainage and Stormwater Control Plan 8
Figure 5 Proposed Landscape Plan 10

Appendices

Appendix A Arborist Report, Biological Constraints Assessment, and Peer Review

Appendix B Traffic Impact Study

Appendix C CalEEMod Modeling Outputs

Appendix D Confidential Cultural Resources Assessment

Appendix E Fuel Energy Calculations

Appendix F Geotechnical Investigation Report

Appendix G Preliminary Stormwater Control Plan

Appendix H Noise and Vibration Analysis

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Initial Study

1. Project Title

Village at Novato Mixed-Use Project

2. Lead Agency Name and Address

City of Novato
Community Development Department
922 Machin Avenue
Novato, California 94945

3. Contact Person and Phone Number

Vivek Damodaran, Senior Planner
City of Novato
(415) 899-8939

4. Project Location

The approximately 5.85-acre project site is located northeast of the intersection of Redwood Boulevard and Olive Avenue at 7530 and 7506 Redwood Boulevard (Assessor Parcel Numbers [APNs] 143-011-05 and 143-011-08) in the City of Novato, Marin County, California. The project site is currently vacant, although approximately 0.25 acres of the site along Redwood Blvd has a paved parking lot. Figure 1 shows the regional location of the project area, and Figure 2 shows the project site and surrounding uses.

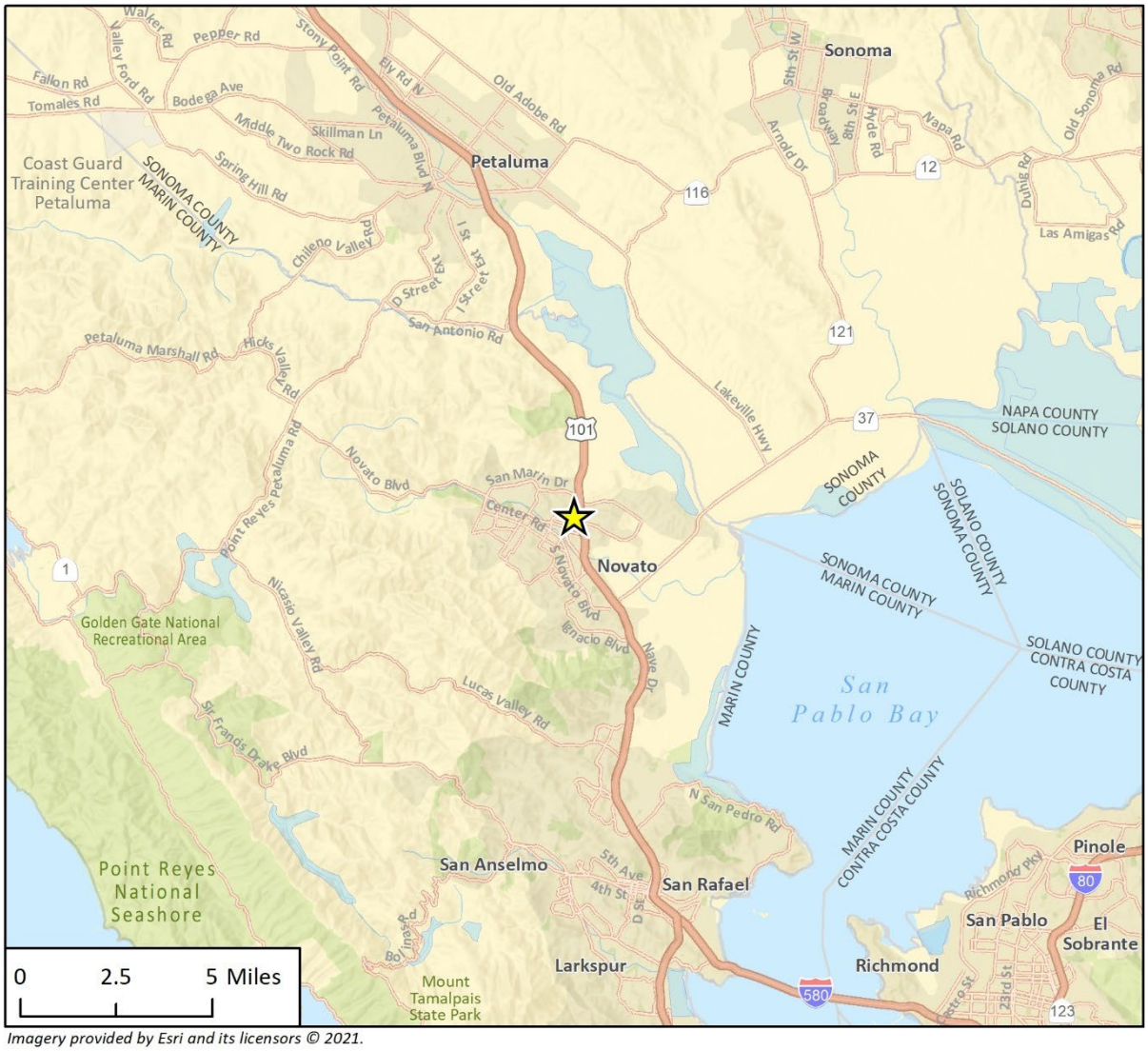
5. Project Sponsor's Name and Address

Robert Doran
Retail Opportunity Investments Corporation
11250 El Camino Real
San Diego, California 92130

6. General Plan Designation

The project site is currently designated as General Commercial (CG) in the City's 2035 General Plan. The southern parcel is also designated Affordable Housing Opportunity (AHO) Overlay.

Figure 1 Regional Location



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★ Project Location

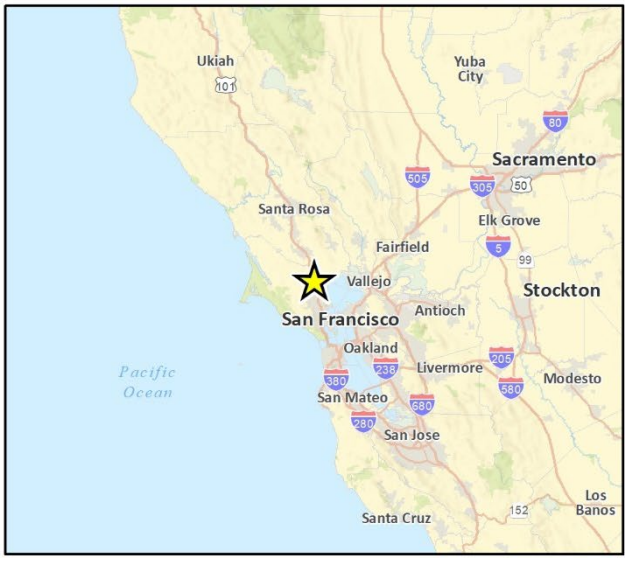


Figure 2 Project Site Location



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7. Zoning

The northern parcel of the project site is designated as General Commercial: (CG). The southern parcel of the project site is zoned General Commercial: Affordable Housing Opportunity Combining Designation (CG:AHO).

8. Project Description

The project would involve the construction of a mixed-use development with 178 residential units and 14,000 square feet of commercial/retail use on an approximately 5.85-acre infill site. The northern parcel is approximately 4.07 acres, and the southern parcel is approximately 1.71 acres. Project development would consist of three buildings (Buildings A, B, and C) with Buildings A and B located on the northern parcel and Building C located on the southern parcel.

- Building A would be located in the site's northwestern corner adjacent to Redwood Boulevard and would consist of three stories with 46,250 gross square feet. The ground floor would include 14,000 square feet of retail and 4,848 square feet of residential amenities, such as a lounge, bike parking, and mail room. The second and third floors would include residences with 14 units on each floor for a total of 28 units.
- Building B would be a four-story residential building with approximately 92 units located in the northeastern section of the project site. The ground floor would include a gym, leasing office, lounge, lobby, mail room, and bike parking with 19 residential units. The second and third floors would include 25 residential units each, while the fourth floor would include 23 residential units.
- Building C would be located directly east of the existing retail development and would include four stories with 58 residential units. Similar residential amenities, including a lounge, lobby, mail room, and bike parking would be available on the ground level. The first floor would include 12 residential units, while the second and third floors would include 16 residential units per floor. On the fourth floor, there would be 14 residential units.

Each building would include mix of studio, one-bedroom, and two-bedroom units. In addition, 25 of the total 178 residential units (14 percent) would be below-market-rate housing. Table 1 and Table 2 include the proposed unit count for each building and size for each unit. The project site would be designed to have retail development facing Redwood Boulevard and the residential units would face a common central green space. The 42,750 square feet of private open space in the center of the site would include courtyards for resident use with firepit lounges, barbeques, community garden, dining areas, and a bocce ball court.

Table 1 Proposed Building and Unit Summary

Building Type	Total Units	Total Residential SF	Total Retail SF	Total Gross SF
Building A	28	32,250	14,000	46,250
Building B	92	110,356	N/A	110,056
Building C	58	73,226	N/A	72,426
Total	**178**	**215,832**	**14,000**	**228,732**

SF = square feet; N/A = not applicable

Table 2 Proposed Unit Size Summary

Unit Type	Total Units	Average SF
Studio	21	548
1 Bedroom	80	782
2 Bedroom	77	1,196
Total	**178**	

Commercial/Retail Use

It is anticipated that the 14,000 square feet of commercial space would be occupied by multiple tenants, although the exact mix of tenant uses, and size of tenant spaces are currently unknown. Anticipated uses, based on the proposed Mixed-Use land use designation and zoning classification includes retail and service uses, and restaurants. Other potential uses, based on zoning, include banks and financial institutions, massage establishments, and offices. Other potential uses requiring discretionary use permit approval include convenient stores, grocery stores, medical clinics, and personal service uses[1].

The project would require a General Plan Amendment to Mixed-Use (MU), Zoning Map Amendment (AKA Rezone) to Mixed Use (MU),Use Permit, and Design Review for the development. Additionally, the project proposes to include below-market-rate units affordable to Low-Income and Very Low-Income households, which would qualify the project for a density bonus. The base density number of units is 124, and with the density bonus the total unit count is 178.

The proposed site plan is shown Figure 3.

[1] For a complete list of permitted and conditionally permit uses, refer to the Novato Municipal Code, Mixed Use Zoning Classification, accessible at NMC Section 19.14.040, including Table 2-9.

Figure 3 Proposed Project Site Plan



Source: Trachtenberg Architects, 2021.

Access and Circulation

The project site would be accessed via two driveways on Redwood Boulevard and two driveways on Olive Avenue, as well as through the parking lots for the adjacent retail development on the northeast corner of Redwood Boulevard/Olive Avenue and the approved hotel development north of the site. The existing western Olive Avenue driveway (at the northeast corner of the Redwood Boulevard/Olive Avenue intersection) also provides access to the existing retail development adjacent to the site. Both the northern and southern parcels would be interconnected via onsite pedestrian paths and would be connected to the approved hotel development (currently under construction) to the north.

A total of 471 new parking spaces would be spread throughout the site in parking lots and as on-street parking along Redwood Boulevard. Of the 471 parking spaces, 263 parking spaces would be provided on-site for residents with most of the parking spaces located on the southern parcel and along the eastern edge of the project site as shown in Figure 3. For the proposed retail development, 183 new onsite parking spaces would be provided and an additional 25 parking spaces would be provided on-street. There are six existing on-street parking spaces on Redwood Boulevard parallel to the existing retail development.

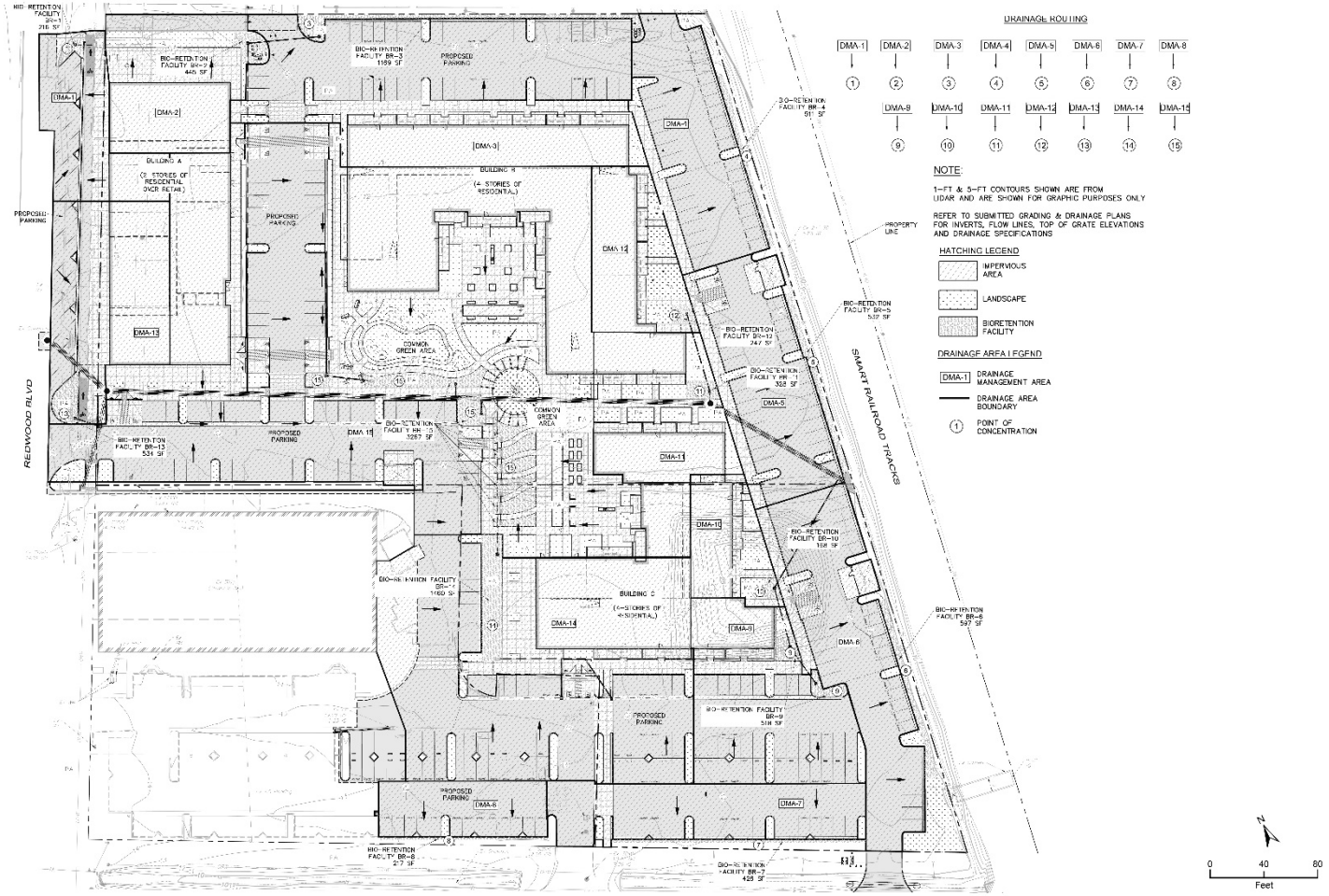
The project would also include 202 bicycle parking spaces throughout the site and indoor bicycle parking rooms. Approximately 192 bicycle parking spaces would be for residents and the remaining 10 spaces would be for the commercial/retail uses. Sidewalks would be added along the project frontage on Redwood Boulevard and Olive Avenue. However, the sidewalk improvements along Olive Avenue would be completed by the City as part of a City-sponsored Capital Improvement Program (CIP). The City's road widening and streetscape improvement work proposed for Olive Avenue are not included as part of the project but shown for context and to depict the Olive Avenue frontage improvements once completed.[2] As part of the project, sidewalks and pedestrian crossings would also be included on-site to facilitate pedestrian access to the site.

Stormwater Management

The project would include a stormwater system designed to maintain historical flows on the project site. The project proposes to construct 15 drainage management areas and bioretention facilities throughout the site. Stormwater from the buildings' roofs would be directed toward bioretention facilities via downspouts and a series of storm drain networks. The stormwater from the parking lots and other hardscaped areas would be directed toward bioretention facilities via storm drain networks. The bioretention facilities would provide retention and treatment to control the excess runoff. Figure 4 shows the proposed drainage and stormwater control plan.

[2] The City of Novato is completing a separate CEQA analysis for the Olive Avenue improvements.

Figure 4 Proposed Drainage and Stormwater Control Plan



Source: Adobe Associates, Inc., 2021.

Landscape Design

The project site would be landscaped with landscape trees, fruit trees, shrubs, grasses, and perennials. Landscape trees, small shrubs, grasses and perennials would be planted along Redwood Boulevard adjacent to Building A. The project would require removal of a total of 47 trees located along the southern, eastern, and western perimeter of the northern parcel (trees to be removed would include valley oak, coast live oak, coast redwood, and silver wattle). Of these 47 trees, 11 were identified as heritage trees (Appendix A). Figure 5 shows the proposed landscape plan. The vegetation selected for the project's landscaping are designated as medium to low water use plants. Note that landscaping would occur along Olive Avenue, but landscaping improvements are part of the City of Novato CIP project and were not analyzed as part of this Initial Study.

Construction

Construction of the proposed project is anticipated to commence in September 2024 and be completed by January 2027. Construction would involve demolition of the existing surface parking lot, site preparation, grading, building construction, paving, and architectural coating. Table 3 summarizes the estimated duration of construction phases.

Table 3 Project Construction Phases

Construction Phase	Duration	Corresponding Date
Demolition	1 month	September 2024
Site Preparation	1 month	October 2024
Grading	1 month	November 2024
Building Construction	23 months	December 2024 – November 2026
Paving	2 weeks	November/December 2026
Architectural Coating	2 months	January 2027

Construction would occur between 7:00 a.m. and 3:30 p.m., Monday through Friday. Nighttime construction is not anticipated to be necessary. Construction equipment would be staged on site, and construction worker vehicles would be parked on site or in off-street private parking lots.

Debris and cut soil generated during demolition, site preparation, and grading phases would be disposed of approximately 13 miles from the project site at the Marin Resource Recovery Center.

Figure 5 Proposed Landscape Plan



Source: Trachtenberg Architects, 2021.

Sustainability

Project construction equipment would meet or exceed minimum emissions standards for Marin County and Novato and would include the use of Tier 3/Tier 4 engines. In operation, the project would include green building features such as energy-efficient appliances and lighting; water-efficient appliances and fixtures; and electric vehicle charging spaces. The project would also be required to be solar-ready or include the installation of photovoltaic systems on all low-rise residential buildings of three stories or less, equal to the expected electricity usage, in accordance with Section 110.10 of the current Building Energy Efficiency Standards. The project would meet the requirements of the current California Energy Code. The project will be all electric, and natural gas will not be included as an energy source. Additionally, the project will comply with the off-street electric vehicle requirements in the most recent version of the 2022 California Building Code CALGreen Tier 2 requirements, which states that 40 percent of the total number of parking spaces be electric vehicle ready (EV ready) with low power Level 2 EV charging receptables, and 15 percent of the total number of parking spaces will be equipped with Level 2 electric vehicle supply equipment (EVSE).

9. Surrounding Land Uses and Setting

Land uses surrounding the project site include commercial structures to the north, which is an approved hotel with retail uses currently under construction; industrial uses to the northeast and single-family residences to the southeast; commercial and retail development to the south; and retail to the southwest and multi-family residences to the northwest. Sonoma-Marin Area Rail Transit (SMART) railroad tracks abut the project site to the east.

The site is also located within the Gnoss Field Aviation Safety Zone 5, specifically in the Referral Area Boundary and is two miles from the future airport property line based on the Gnoss Field Airport Land Use Plan (Marin County Airport Land Use Commission 1991).

Regional access to the site is available via Highway 101, and local access to the site is available via Olive Avenue and Redwood Boulevard. Bus stops within ¼ mile of the site are served by Marin Transit lines 35, 57, 71, and 654 and Golden Gate Transit line 101 is located at the intersection of Redwood Boulevard and Olive Avenue adjacent to the site. Additionally, SMART's Novato-Downtown stop is located approximately 0.3 mile south.

10. Other Public Agencies Whose Approval is Required

The City of Novato has the authority to approve the proposed project's land use entitlements, including:

- General Plan land use amendment from CG to MU
- Zoning amendment from CG (APN 143-011-05) and CG:AHO (APN 143-011-08) to MU, with the southern parcel retaining the AHO designation.
- Use Permit
- Design Review

In addition, because the project site is located in the Gnoss Field Aviation Safety Zone 5 the Marin County Airport Land Use Commission has the authority make a finding that the project is consistent with the adopted Airport Land Use Plan.

The following service districts require their own permits to approve various aspects of project construction and various project-serving utilities:

- **Novato Fire Protection District (NFPD)** would determine compliance with local fire code requirements for emergency access, life safety systems (e.g., fire sprinklers), and Wildland Urban Interface (WUI) building standards.
- **Novato Sanitary District (NSD)** is the wastewater utility at the project site. The sanitary district will review the project design and construction of new wastewater infrastructure associated with the project.
- **North Marin Water District (NMWD)** is the domestic and recycled water provider at the site. New domestic and recycled water connections will need to be designed to NMWD standards and approved by NMWD.

The following regional, state, and federal agencies may require their own permits, inspections, reporting and/or certifications prior to construction and/or completion of the project:

- **Regional Water Quality Control Board.** A waste discharge requirement permit (NPDES Construction General Permit) may be required.
- **California Department of Fish and Wildlife (CDFW)**. A Fish and Game Code Section 1602 Lake and Streambed Alteration Permit may be required.

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?

On July 9, 2020, the City of Novato emailed consultation letters to the Federated Indians of Graton Rancheria (FIGR) and the Guidiville Indian Rancheria (GIR) Native American tribes under the provisions of Assembly Bill 52. The City received a response requesting consultation from the FIGR on August 12, 2020. Consultation with local tribes is further detailed in Section 18, *Tribal Cultural Resources*.

12. Project Consistency with General Plan 2035 Mitigation Measures

Mitigation measures from General Plan 2035 would be conditions of approval for the project. Table 4 outlines the project's consistency with mitigation measures included in General Plan 2035 and outlines where applicable mitigation measures are discussed in the IS-MND and the project's consistency with the mitigation measure.

Table 4 General Plan 2035 Mitigation Consistency

General Plan 2035 Mitigation Measure	Project Consistency	IS-MND Section and Page Number
MM AQ-1 Construction Emissions Measures. New discretionary projects in the Plan Area that exceed the construction screening criteria of the Bay Area Air Quality Management District (BAAQMD) shall be conditioned to reduce construction emissions of reactive organic gases, nitrogen oxides, and particulate matter (PM_{10} and $PM_{2.5}$) by implementing the BAAQMD's Basic Construction Mitigation Measures (described below) or equivalent, expanded, or modified measures based on project and site-specific conditions. Basic Construction Mitigation Measures 1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day, with priority given to the use of recycled water for this activity when feasible. 2. All haul trucks transporting soil, sand, or other loose material off-site shall be covered. 3. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited. 4. All vehicle speeds on unpaved roads shall be limited to 15 mph. 5. All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used. 6. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points. 7. All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified visible emissions evaluator. 8. A publicly visible sign shall be posted with the telephone number and person to contact at the lead agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations.	During the construction phase, the proposed project would implement all listed basic construction mitigation measures as a condition of approval for the project. CALEEMOD emission estimates can be found in Appendix C, which includes the construction emissions measures and shows that the project would not exceed BAAQMD thresholds. Therefore, the project is consistent with Mitigation Measure AQ-1.	3 – *Air Quality*, pages 24 through 34
Mitigation Measure AQ-2 Health Risk Assessments. Projects that may result in additional toxic air contaminants that are located within 1,000 feet of a sensitive receptors(s) or would place sensitive receptors within 1,000 feet of uses generating toxic air contaminants, such as roadways with volumes of 10,000 average annual daily trips or greater, shall implement Bay Area Air Quality Management District Guidelines and State Office of Environmental Health Hazard Assessment policies and procedures requiring health risk assessments (HRAs) for residential development and other sensitive receptors; screening area distances may be increased on a case-by-case basis if an unusually large source or sources of hazardous emissions are proposed or currently exist. Based on the results of the HRA, identify and implement measures (such as air filtration systems) to reduce potential exposure to particulate matter, carbon monoxide, diesel fumes, and other potential health hazards. Measures identified in HRAs shall be included into the site development plan as a component of a proposed project.	The closest sensitive receptors to the project site are single-family residences located approximately 120 feet east across the railroad tracks. As discussed within Section 3, health risk assessments should be based on a 70-year exposure period; however, such assessments should be limited to the period/duration of activities associated with the project. BAAQMD recommends an	3 – *Air Quality*, pages 24 through 34

General Plan 2035 Mitigation Measure	Project Consistency	IS-MND Section and Page Number
	exposure duration of 30-years. Thus, the duration of proposed construction activities (i.e., 28 months) is approximately eight percent of the total exposure period used for 30-year health risk calculations. While the maximum DPM emissions associated with demolition, site preparation, and grading activities would only occur for a portion of the overall construction period, these activities represent the worst-case condition for the total construction period. This would represent less than one percent of the total 30-year exposure period for health risk calculation. Therefore, the project would not expose sensitive receptors to substantial TAC concentrations, and impacts would be consistent with Mitigation Measure AQ-2.	
AQ-3 Odor Reduction. Require new manufacturing and laboratory development to be designed and constructed in a way that reduces the potential for future odors. Ensure prompt response to complaints about odors reported by residences and businesses by developing a website link that directs users to BAAQMD's odor reporting and inspection program.	The project would not generate substantial operational odors. As a residential development, Mitigation Measure AQ-3 does not apply to the proposed project.	3 – *Air Quality*, pages 24 through 34

General Plan 2035 Mitigation Measure	Project Consistency	IS-MND Section and Page Number
BIO-2 Biological Studies for New Development. Project applicants shall be required to provide a biological resources assessment for projects on parcels with potentially suitable habitat or potential for the occurrence of special status species. The biological resources assessment shall be conducted by a qualified biologist and will include a data review and habitat assessment prior to project activities to identify whether any special-status plant or animal species habitat or sensitive natural communities occur on-site. The data reviewed shall include the biological resources setting, Appendix C species list, and best available, current data for the area, including current review of the California Natural Diversity Database. Habitat assessments shall be completed at an appropriate time of year for identifying potential habitat and no more than one year prior to commencement of project activity. The purpose of these biological resources assessments is to identify appropriate measures to avoid or minimize harm to sensitive biological resources and to incorporate the recommended measures as conditions of approval for the project. Based on the results of the biological resources assessment, the qualified biologist will provide site-specific mitigation measures to avoid special status species or reduce impacts to a less than significant level.	A biological resources assessment (BRA) was prepared by WRA, Inc. in May 2020, please see Appendix D. The assessment identifies three mitigation measures included in the IS-MND, Mitigation Measure BIO-1, to mitigate impacts to nesting birds. Therefore, the project is consistent with Mitigation Measure BIO-2.	4 – *Biological Resources*, pages 34 through 40
BIO-3 Biological Resources Inventory for New Development. A detailed inventory of biological resources conducted by an independent, professionally qualified biologist, as identified in Mitigation Measure BIO-2. If there are seasonal constraints with performing surveys, presence of such special status species shall be assumed and measures to reduce impacts to special status species and avoidance shall be implemented in accordance with a biological resources assessment and/or project specific California Environmental Quality Act documentation. If sensitive resources are identified on the project site, recommendations to protect the sensitive resources shall conform with applicable State and federal regulations regarding their protection and may include avoidance of the resource, providing setbacks, clustering development onto less sensitive areas, preparing restoration plans, off-site mitigation, and/or other similar measures as determined on a project specific basis.	The BRA prepared by WRA, Inc. Biological Constraints Assessment, Jurisdictional Delineation Report and a Tree Survey Report did not document any special status species present on the project site. Mitigation Measure BIO-1, outlined in the biological resources section of the IS-MND, would be implemented to protect nesting birds. Therefore, the project is consistent with Mitigation Measure BIO-3.	4 – *Biological Resources*, pages 34 through 40
BIO-4 Nesting Bird Protection. All discretionary projects shall retain the services of a qualified biologist(s) to conduct a pre-construction nesting bird survey during the nesting season (February 1 through August 31) at most 14 days prior to any and all development that may remove trees or vegetation that may provide suitable nesting habitat for migratory birds or other special-status bird species. If nests are found the qualified biologist(s) shall identify and the project sponsor shall implement appropriate avoidance measures, such as fenced buffer areas or staged tree removal periods.	Mitigation Measures BIO-1 avian species during nesting. Therefore, the project is consistent with Mitigation Measure BIO-4.	4 – *Biological Resources*, pages 34 through 40
BIO-6 Biological Studies for Wildlife Movement Corridors. All discretionary projects on parcels with indicators of wildlife movement corridors shall retain the services of a qualified biologist(s) to conduct a biological assessment prior to any and all development that may impact wildlife movement. If movement corridors are potentially impacted by the proposed project, the qualified biologist(s) shall identify appropriate mitigation measures to avoid or minimize the impact. Such measures shall be a condition of approval and implemented by the project sponsor.	The project is not located within a designated wildlife corridor, nor would it constrain wildlife movement. Therefore, Mitigation Measure BIO-6 does not apply to the project.	4 – *Biological Resources*, pages 34 through 40

General Plan 2035 Mitigation Measure	Project Consistency	IS-MND Section and Page Number
CUL-1 Historical Resources Study Program. All discretionary projects shall investigate the potential to impact historical resources. A historical resources evaluation shall be performed to confirm the presence of historical resources within the project site when there is a structure(s) or feature of a type, period, and/or method of construction that could be qualified as having historic status. The study shall, at a minimum, be conducted by a qualified professional meeting the Secretary of the Interior's (SOI) Professional Qualification Standard (PQS) for architectural history (NPS 1983). The study shall include a pedestrian survey of the project site and background research including a records search at the Northwest Information Center (NWIC), building permit research, and/or research with the local historical society(ies). The subject property(ies) shall be evaluated for federal, state, and local designation on California Department of Parks and Recreation 523 series forms, included as an appendix to the study. If historical impacts are identified, the study shall include recommendations to avoid or reduce impacts on historical resources and the project sponsor shall implement the recommendations or conduct additional environmental review.	A Cultural Resources Assessment prepared for the Village at Novato Project by Rincon in June 2023. The study consisted of background and archival research, a California Historical Resources Information System (CHRIS) records search at the Northwest Information Center (NWIC) of the project site as well as a 0.5-mile radius around the project site, a search of the Sacred Lands File (SLF) with the Native American Heritage Commission (NAHC), and a pedestrian field survey conducted on October 19, 2021. Following consultation with the Federated Indians of Graton Rancheria, a canine detection survey was also completed as part of the study. No historical impacts were identified on the site. Therefore, the project is consistent with Mitigation Measure CUL-1.	5 – *Cultural Resources*, pages 41 through 46
CUL-2 Archaeological Resources Study Program. All discretionary projects shall investigate the potential to disturb archaeological resources. If preliminary reconnaissance suggests that cultural resources may exist, a Phase I cultural resources study shall be performed by a qualified professional meeting the Secretary of the Interior's (SOI) Professional Qualification Standard (PQS) for archaeology (NPS 1983). A Phase I cultural resources study shall include a pedestrian survey of the project site and sufficient background research and, as necessary, field sampling to determine whether archaeological resources may be present. Archival research shall include a records search at the Northwest Information Center (NWIC) and a Sacred Lands File (SLF) search with the Native American Heritage Commission (NAHC), and coordination with Native American tribes listed by the NAHC. The Phase I technical report documenting the study shall include recommendations to avoid or reduce impacts on archaeological resources. The project sponsor shall implement the recommendations.	The cultural resources study conducted for the project concluded that cultural resources are likely to exist on the project site and the project site is considered sensitive for containing subsurface archaeological resources. To address impacts to archeological resources Mitigation Measures CUL-1 through CUL-4 in the IS-MND would be implemented. Therefore, the project is consistent with Mitigation Measure CUL-2.	5 – *Cultural Resources*, pages 41 through 46

General Plan 2035 Mitigation Measure	Project Consistency	IS-MND Section and Page Number
CUL-3 Paleontological Resource Studies. Avoidance and/or mitigation for potential impacts to paleontological resources shall be required for any development in Novato that occurs within high sensitivity geologic units (Pleistocene alluvium [Qpa] and Pleistocene alluvium [Qoa] deposits), whether they are mapped at the surface or occur at the subsurface. When paleontological resources are uncovered during site excavation, grading, or construction activities, work on the site will be suspended until the significance of the fossils can be determined by a qualified paleontologist. If significant resources are determined to exist, the paleontologist shall make recommendations for protection or recovery of the resource. The City shall require the following specific measures for projects that could disturb geologic units with high paleontological sensitivity: ▪ **Retain a Qualified Paleontologist to Prepare a PMMP.** Prior to initial ground disturbance, the project applicant shall retain a Qualified Paleontologist, as defined by the SVP (2010), to direct all mitigation measures related to paleontological resources and design a Paleontological Mitigation and Monitoring Program (PMMP) for the project. The PMMP shall include measures for a preconstruction survey, a training program for construction personnel, paleontological monitoring, fossil salvage, curation, and final reporting, as applicable.	The project site is in an area of low paleontological sensitivity (City of Novato 2020b). As the project site is located in a low sensitivity geologic unit, the project is unlikely to encounter paleontological resources. However, the possibility exists that construction may uncover previously undiscovered paleontological resources. Impacts would be less than significant with incorporation of Mitigation Measure GEO-1. Therefore, the project is consistent with Mitigation Measure CUL-3.	5 – *Cultural Resources*, pages 41 through 46
GEO-1 Soil Investigation Report. New development projects not connected to the municipal sewer system and requiring the use of septic tanks or alternative wastewater disposal systems shall complete a soil investigation report to be submitted to the City of Novato for review and approval prior to issuance of grading and building permits. The study shall demonstrate the capability of the underlying soils to support the use of septic tanks or alternative wastewater disposal systems. Such report shall be prepared by a registered professional geologist and shall include soil type characteristics, percolation rates, and design recommendations.	The proposed project would be connected to the municipal sewer system and does not require the use of a septic tank or alternative wastewater disposal system. Therefore, Mitigation Measure GEO-1 does not apply to the project.	7 – *Geology and Soils*, pages 54 through 59
N-1 Construction Noise Reduction Measures. The following measures to minimize exposure to construction noise shall be included as standard conditions of approval for applicable projects involving construction: 1. *Mufflers*. During excavation and grading construction phases, all construction equipment, fixed or mobile, shall be operated with closed engine doors and shall be equipped with properly operating and maintained mufflers consistent with manufacturers' standards. 2. *Stationary Equipment*. All stationary construction equipment shall be placed so that emitted noise is directed away from the nearest sensitive receptors. 3. *Equipment Staging Areas*. Equipment staging shall be located in areas that will create the greatest distance feasible between construction-related noise sources and noise-sensitive receptors. 4. *Smart Back-up Alarms*. Mobile construction equipment shall have smart back-up alarms that automatically adjust the sound level of the alarm in response to ambient noise levels. Alternatively, back-up alarms shall be disabled and replaced with human spotters to ensure safety when mobile construction equipment is moving in the reverse direction.	All construction equipment used for the project would be operated in accordance with manufacturer's standards and noise impacts would be less than significant. Maximum hourly construction noise levels were estimated to be 75.6 dBA Leq at a distance of 120 feet (see Appendix H). Therefore, the proposed project is consistent with Mitigation Measure N-1 and would implement construction noise reduction measures as a condition of approval for the project to further reduce construction noise.	13 – *Noise*, pages 82 through 95

General Plan 2035 Mitigation Measure	Project Consistency	IS-MND Section and Page Number
N-2 Construction Vibration Reduction Measures. The following measures to minimize exposure to construction vibration shall be included as standard conditions of approval for applicable projects involving construction: 1. *Building Examination*. The pre-existing condition of any buildings within 25 feet of any construction activities shall be recorded in order to evaluate damage from project-related construction. Fixtures and finishes within a 25-foot radius of construction activities susceptible to damage will be documented (photographically and in writing) prior to construction. All damage will be repaired back to its pre-existing condition. 2. *Stationary Equipment*. All vibratory stationary construction equipment shall be placed as far as possible from the nearest sensitive receptors. 3. *Equipment Staging Areas*. Equipment staging shall be located in areas that will create the greatest distance feasible between construction-related vibration sources and noise-sensitive receptors.	Project construction would not involve activities typically associated with excessive groundborne vibration such as pile driving or blasting. The equipment utilized during project construction that would generate the highest levels of vibration would include rollers, loaded trucks, and bulldozers. The City of Novato has not adopted standards to assess vibration impacts during construction and operation. Vibration levels from individual pieces of construction equipment would not exceed the threshold at which damage can occur to residential structures, 0.20 PPV, or the threshold at which transient vibration sources would be distinctly perceptible to 0.25 PPV. Therefore, the proposed project would be consistent with Mitigation Measure N-2.	13 – *Noise*, pages 82 through 95
T-1 Intersection Delay Mitigations. The following additional intersection improvements are necessary to maintain acceptable operation under Existing plus Project and Cumulative conditions with the proposed project. ▪ San Marin Drive/Simmons Lane (Intersection #1) ▫ Signalize the intersection; restripe both San Marin Drive approaches to include separate left-turn, through, and right-turn lanes. ▫ Alternative Mitigation: install a roundabout; the westbound approach would have two lanes, one serving through/right movements and one serving left-turn movements, and the remaining three approaches would have single lanes. ▫ The alternative roundabout mitigation may require minor right-of-way acquisitions on one or more intersection corners. ▪ Redwood Boulevard/San Marin Drive (Intersection #4)	Since adoption of the General Plan 2035 Environmental Impact Report vehicle miles traveled has replaced level of service as the metric to determine a transportation impact under CEQA pursuant to Senate Bill 743. Therefore, Mitigation Measure T-1 from the General Plan EIR would no longer apply to the project under CEQA.	17 – *Transportation*, pages 104 through 108

General Plan 2035 Mitigation Measure	Project Consistency	IS-MND Section and Page Number
▫ Widen the SMART railroad overpass to provide space on the westbound approach for two left-turn lanes, two through lanes, and one right-turn lane, as well as bike lanes and a widened sidewalk on the south side of the overpass. ▫ Widen the southbound Redwood Boulevard approach to include a left-turn lane, shared left-turn/through lane, and right-turn lane. ▫ Restripe the northbound Redwood Boulevard to include a left-turn lane, left-turn/through lane, and two right-turn lanes. ▫ Add right-turn overlap signal phasing on the northbound and westbound approaches. ▫ This mitigation would entail roadway and overpass widening that could require right-of-way acquisition. ▫ To make this intersection function acceptably, additional improvements would be needed at the Highway 101 South Ramps/San Marin Drive intersection, as described in the next bullet. ▪ Highway 101 South Ramps/San Marin Drive (Intersection #5) ▫ Modify the eastbound San Marin Drive approach (the SMART railroad overpass) to include a through lane, a shared through/right-turn lane, and a right-turn lane. ▫ Provide an enhanced bicycle-pedestrian crossing at the on-ramp entrance, including modified signal phasing to include protected pedestrian and bicyclist movements across the ramp. ▫ This mitigation would entail roadway and overpass widening that could require right-of-way acquisition, and potentially affect areas that appear to be wetlands between the SMART rail corridor and the off-ramp. ▪ Highway 101 North Ramps/Atherton Avenue (Intersection #6) ▫ Widen the northbound off-ramp to include two left-turn lanes and a shared through/right-turn lane. ▪ Novato Boulevard/San Marin Drive-Sutro Avenue (Intersection #9) ▫ Signalize the intersection. ▫ Alternative Mitigation: install a single-lane roundabout with a southbound right-turn “slip” lane. ▫ The alternative roundabout mitigation may require minor right-of-way acquisition on one or more intersection corners. ▪ Diablo Avenue/Novato Boulevard (Intersection #14) ▫ Restripe the eastbound and westbound Diablo Avenue approaches to include separate left-turn, through, and right-turn lanes. ▫ Restripe the northbound Novato Boulevard Approach to include a left-turn lane, through lane, and through/right-turn lane. ▫ Widen and modify southbound Novato Boulevard to include dual left-turn lanes and a shared through/right-turn lane. ▫ Modify the signal phasing to protected left-turns on all approaches plus a westbound right-turn overlap phase.		

General Plan 2035 Mitigation Measure	Project Consistency	IS-MND Section and Page Number
▫ The mitigation may require minor right-of-way acquisition on Novato Boulevard to the northwest of the intersection. ▪ South Novato Boulevard/Redwood Boulevard (Intersection #30) ▫ Signalize the intersection. ▫ Alternative Mitigation: install a single-lane roundabout with an eastbound right-turn "slip" lane. ▫ The alternative roundabout mitigation may require minor right-of-way acquisition on one or more intersection corners. ▪ Highway 101 South Ramps/Ignacio Boulevard-Enfrente Road (Intersection #32) ▫ On the southbound Highway 101 "loop" off-ramp, extend the length of the dual right-turn pockets to 500 feet. ▫ Optimize signal timing on the coordinated Ignacio Boulevard-Bel Marin Keys Boulevard corridor. ▪ Bel Marin Keys Boulevard/Digital Drive (Intersection #35) ▫ Restripe the westbound approach to include a left-turn lane and a left-turn/through/right-turn lane, and modify the signal to operate with split phasing in the eastbound and westbound directions.		

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Environmental Factors Potentially Affected

This project would potentially affect the environmental factors checked below, involving at least one impact that is "Potentially Significant" or "Less than Significant with Mitigation Incorporated" as indicated by the checklist on the following pages.

☐	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/Housing	☐	Public Services
☐	Recreation	☐	Transportation	■	Tribal Cultural Resources
☐	Utilities/Service Systems	☐	Wildfire	■	Mandatory Findings of Significance

Determination

Based on this initial evaluation:

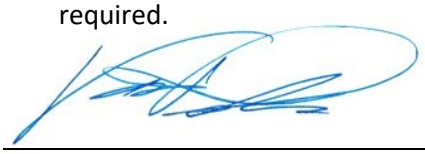
☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

■ 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 to 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 "less than significant with mitigation incorporated" 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 potential significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.



Signature

11/3/2023

Date

Vivek Damodaran

Printed Name

Senior Planner

Title

Environmental Checklist

1 Aesthetics

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
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 a 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 that would adversely affect daytime or nighttime views in the area?	☐	☐	■	☐

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

A scenic vista can generally be defined as a public viewpoint that provides expansive views of a highly valued landscape for the benefit of the public. The City of Novato's General Plan 2035 identifies hillsides and ridgelines surrounding the city as scenic resources that generally enhance the community's visual character, including views of Mount Burdell. Other scenic resources the City has identified include Little Mountain and Verissimo Hills, the hills of Indian Valley and Ignacio Valley, the Bay plains and Bay shorelines, the Rush Creek preserve, and Petaluma Marsh(City of Novato 2020a).

The City of Novato's General Plan 2035 identifies scenic resources under Environmental Stewardship policy ES-15 (Scenic Resources) and programs ES-15a (Hillside and Ridgeline Protection), ES-15b (Ridgeline Map), and ES-15c (Allowances for Pre-Existing Homes). Policy ES-15 and its accompanying programs are intended to protect visual values on hillsides, ridgelines, and other scenic resources. The General Plan includes a designation for "Scenic Hills and Ridges" (see General Plan Figure ES-5, Ridgelines and Scenic Resources, City of Novato 2020a); however, the project site is not located

within that zone. Limited views of surrounding hillsides and Mount Burdell are visible from the project site, but long-range or panoramic views are obscured by vegetation and intervening development.

The project would obstruct some views of the hillsides and Mount Burdell to the northwest of the site from the rail line and existing single-family homes to the east of the project site. However, visibility of the hillsides is already partially obscured due to the existing vegetation and intervening development along Redwood Boulevard, including the 3 to 4-story hotel building immediately north of the project site, and the Atherton Place residential development across Redwood Blvd. to the west. The buildings that would be constructed as part of the project would not break a substantial portion of the ridgeline from most of these viewpoints and views of hillsides would still be visible over and between buildings. Since the project would only partially block some views of hillsides from developments and residences east of the site, impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

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

There are no officially designated State Scenic Highways in Marin County (California Department of Transportation [Caltrans] 2019). Highway 101 is eligible for State designation for a four-mile stretch in Marin City, nearly 4.3 miles away from the project site near SR 37 where it terminates at the transition to Highway 101. These eligible stretches of highway are too distant from the project site to be affected by project implementation. Additionally, no trees, buildings or rock outcroppings would be damaged or removed from within a state scenic highway due to the construction or operation of the project. Therefore, the project would not damage scenic resources within a state scenic highway. There would be no impact.

NO IMPACT

c. Would the project, 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 a 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?

Per PRC Section 21071 (Urbanized Area; Definition) Novato is not considered an urbanized area as the population is less than 100,000 and not contiguous with San Rafael. The proposed project site is adjacent to single-story strip mall development to the west, an approved hotel development currently under construction to the north, and northeast of the Redwood Boulevard and Olive Avenue intersection. The Novato General Plan states that “ridgelines and hillsides contribute to Novato’s identity by creating a sense of separation for developed areas. These natural features establish physical boundaries for the community that are more recognizable than the jurisdictional boundaries created by the city limit” (City of Novato 2020a). Hillsides and ridgelines visible across the project site contribute to the sense of place in Novato. The implementation of the proposed project would change the existing visual charter of the project site as the project site is currently vacant. Existing nearby development, however, already contrasts with the natural landscape, integrating to varying degrees based on design and allowing those natural features to be seen by virtue of their low heights. As discussed above under Threshold a, the project site is not located within a scenic area according to the General Plan.

The General Plan anticipates increased commercial development in this area; the site is located within the North Redwood Corridor focus area. Development within the North Redwood Corridor, which is concentrated along Redwood Boulevard north of Olive Avenue is guided by Policy LU-26, which includes design guidelines (City of Novato 2020a). These guidelines include the following:

- Provide for public gathering places and ample outdoor seating throughout the area.
- Incorporate extensive landscaping with shade trees.
- Provide pedestrian and bicycle connections between retailers and public spaces to the bicycle/pedestrian facilities along the SMART corridor and along Redwood Boulevard
- Explore incorporating design features or portions of the Dairymen's Milling building into the retail development.
- Create wide pedestrian sidewalks and a bicycle path along the Redwood Boulevard frontage.
- Locate buildings near the Redwood Boulevard frontage, with shop entries and/or display windows facing the street and gathering places.
- Minimize views of parking areas from Redwood Boulevard, typically by locating parking behind buildings.

Policy LU-26 additionally lays out preferred land use concept as retail development composed of smaller shops and medium-sized retailers of 20,000-30,000 square feet each along with restaurants and entertainment facilities and second and/or third story office or recreational space.

The project would change the visual character of the site from an undeveloped vacant lot to mixed use commercial and residential development. However, a change in landscape does not necessarily create a substantial degradation of the visual quality on the site. The proposed design for the project would align with the North Redwood Corridor by including landscaping with trees, shrubs, and small grassy areas in between the buildings in a common area and trees along Redwood Boulevard frontage. These features would be consistent with the North Redwood Corridor Design Guidelines .

While the project would change the visual character of the site, this change would not substantially degrade the visual character of the site or its surroundings. Although increased development is anticipated in this area by the General Plan, design review during the permitting process would ensure impacts would be less than significant. Adherence to City of Novato regulations that govern visual quality, including the City's General Plan, the North Redwood Corridor Design Guidelines, and the City's zoning code (Chapter XIX of Novato Municipal Code), as well as design review of the project would ensure that the project would not degrade the visual quality on the site substantially. Impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

d. Would the project create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area?

For the purposes of this analysis, light refers to light emissions (brightness) generated by a source of light. Stationary sources of light include exterior parking lot and building security lighting, and interior lights emanating through windows. Moving sources of light include the headlights of vehicles driving on roadways within the project site. Streetlights and other security lighting also serve as sources of light in the evening hours.

Glare is defined as focused, intense light emanated directly from a source or indirectly when light reflects from a surface. Daytime glare is caused in large part by sunlight shining on highly reflective surfaces at or above eye level. Reflective surfaces area associated with buildings that have expanses of polished or glass surfaces, light-colored pavement, and the windshields of parked cars.

The project site is located within downtown Novato, an urban and developed part of the city, with numerous existing sources of light and glare. Existing light sources in the immediate area include lighting from the adjacent strip mall development and the hotel currently under construction immediately north of the site. Streetlights and headlights from vehicles traveling along Redwood Boulevard and Olive Avenue at night also contribute to the existing light environment. The primary source of glare in the project area is from the sun reflecting from light colored building materials and finishes and metallic and glass surfaces of parked vehicles at adjacent uses.

The project would generate new sources of light from windows associated with the residential and commercial/retail buildings, exterior safety lighting, and parking area lights. Cars entering and exiting the site at night would also temporarily increase light. When implemented, the project could generate glare from sunlight reflected on east- and west-facing windows during certain times of the day. Light-colored or reflective exterior finishes could generate glare, as could the sun's reflection on the windshields of cars parked on site.

Lighting installed on the project site would be required to comply with City of Novato regulations that include shielding or modification on outdoor lighting to prevent emission of light or glare beyond the property line and requirements to direct light sources to prevent lighting adjacent streets and shielding light sources (Novato Municipal Code Section 19.22.060). The project would be designed with a brick veneer and earth tone color schemes, which would limit glare off the sides of buildings. Headlights of vehicles entering and exiting the project site at night would be shielded by both existing and proposed buildings, fencing, and vegetation.

The project would generate more light and glare than what currently exists on the undeveloped site, but with compliance with the City ordinances that regulate light and glare, the project would not introduce substantial light or glare that would adversely affect daytime or nighttime views in the area. Therefore, impacts related to light and glare would be less than significant.

LESS THAN SIGNIFICANT IMPACT

2 Agriculture and Forestry Resources

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on 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?	☐	☐	☐	■

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

b. Would the project conflict with existing zoning for agricultural use or a Williamson Act contract?

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))?

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

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?

There are no areas of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance within Novato (California Department of Conservation 2021), and the project site is not under a Williamson Act contract (County of Marin 2021). The site is designated CG in the Novato General Plan and zoned CG and CG:AHO. The site does not contain forestland or timberland. Therefore, the project would not result in the conversion of agriculture use to non-agriculture uses, conflict with a Williamson Act contract, or existing zoning for agriculture, forest or timberland or result in the loss of such lands and there would be no impact on agricultural and forestry resources.

NO IMPACT

3 Air Quality

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
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?	☐	☐	■	☐

Overview of Air Pollution

The federal and State Clean Air Acts (CAA) mandate the control and reduction of certain air pollutants. Under these laws, the U.S. Environmental Protection Agency (U.S. EPA) and the California Air Resources Board (CARB) have established the National Ambient Air Quality Standards (NAAQS) and the California Ambient Air Quality Standards (CAAQS) for "criteria pollutants" and other pollutants. Some pollutants are emitted directly from a source (e.g., vehicle tailpipe, an exhaust stack of a factory, etc.) into the atmosphere, including carbon monoxide, volatile organic compounds (VOC)/reactive organic gases (ROG),[3] nitrogen oxides (NO_X), particulate matter with diameters of ten microns or less (PM_{10}) and 2.5 microns or less ($PM_{2.5}$), sulfur dioxide, and lead. Other pollutants are created indirectly through chemical reactions in the atmosphere, such as ozone, which is created by atmospheric chemical and photochemical reactions primarily between ROG and NO_X. Secondary pollutants include oxidants, ozone, and sulfate and nitrate particulates (smog).

Air pollutant emissions are generated primarily by stationary and mobile sources. Stationary sources can be divided into two major subcategories:

- Point sources occur at a specific location and are often identified by an exhaust vent or stack. Examples include boilers or combustion equipment that produce electricity or generate heat.

[3] CARB defines VOC and ROG similarly as, "any compound of carbon excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate," with the exception that VOC are compounds that participate in atmospheric photochemical reactions. For the purposes of this analysis, ROG and VOC are considered comparable in terms of mass emissions, and the term ROG is used in this IS-MND.

- Area sources are widely distributed and include such sources as residential and commercial water heaters, painting operations, lawn mowers, agricultural fields, landfills, and some consumer products.

Mobile sources refer to emissions from motor vehicles, including tailpipe and evaporative emissions, and can also be divided into two major subcategories:

- On-road sources that may be legally operated on roadways and highways.
- Off-road sources include aircraft, ships, trains, and self-propelled construction equipment.

Air Quality Standards and Attainment

The project site is located in the San Francisco Bay Area Air Basin, which is under the jurisdiction of the Bay Area Air Quality Management District (BAAQMD). BAAQMD has jurisdiction over much of the nine-county Bay Area, including Marin County. As the local air quality management agency, the BAAQMD is required to monitor air pollutant levels to ensure that the NAAQS and CAAQS are met and, if they are not met, to develop strategies to meet the standards. Depending on whether the standards are met or exceeded, the San Francisco Bay Area Air Basin is classified as being in "attainment" or "nonattainment." In areas designated as non-attainment for one or more air pollutants, a cumulative air quality impact exists for those air pollutants, and the human health impacts associated with these criteria pollutants, presented in Table 5, are already occurring in that area as part of the environmental baseline condition. Under state law, air districts are required to prepare a plan for air quality improvement for pollutants for which the district is in non-compliance. The San Francisco Bay Area Air Basin is designated a nonattainment area for the federal 8-hour ozone standard, federal $PM_{2.5}$ 24-hour standard, state 8-hour and 1-hour ozone standards, state PM_{10} annual and 24-hour standards, and the state $PM_{2.5}$ 24-hour standard. (BAAQMD 2017a). This nonattainment status is a result of several factors, such as mobile sources, wood burning, industrial combustion, and dust, in the San Francisco Bay Area Air Basin.

Table 5 Health Effects Associated with Non-Attainment Criteria Pollutants

Pollutant	Adverse Effects
Ozone	(1) Short-term exposures: (a) pulmonary function decrements and localized lung edema in humans and animals and (b) risk to public health implied by alterations in pulmonary morphology and host defense in animals; (2) long-term exposures: risk to public health implied by altered connective tissue metabolism and altered pulmonary morphology in animals after long-term exposures and pulmonary function decrements in chronically exposed humans; (3) vegetation damage; and (4) property damage.
Suspended particulate matter (PM_{10})	(1) Excess deaths from short-term and long-term exposures; (2) excess seasonal declines in pulmonary function, especially in children; (3) asthma exacerbation and possibly induction; (4) adverse birth outcomes including low birth weight; (5) increased infant mortality; (6) increased respiratory symptoms in children such as cough and bronchitis; and (7) increased hospitalization for both cardiovascular and respiratory disease (including asthma).[1]
Suspended particulate matter ($PM_{2.5}$)	(1) Excess deaths from short- and long-term exposures; (2) excess seasonal declines in pulmonary function, especially in children; (3) asthma exacerbation and possibly induction; (4) adverse birth outcomes, including low birth weight; (5) increased infant mortality; (6) increased respiratory symptoms in children, such as cough and bronchitis; and (7) increased hospitalization for both cardiovascular and respiratory disease, including asthma.

Source: United States Environmental Protection Agency 2018

Air Quality Management

The BAAQMD is required to implement strategies to reduce pollutant levels to achieve attainment of the NAAQS and CAAQS because the San Francisco Bay Area Air Basin currently exceeds the federal ozone and $PM_{2.5}$ standards and the state ozone, PM_{10}, and $PM_{2.5}$ standards. BAAQMD adopted the 2017 Clean Air Plan (2017 Plan) as an update to the 2010 Clean Air Plan. The 2017 Plan provides a regional strategy to protect public health and the climate. Consistent with the greenhouse gas (GHG) reduction targets adopted by the state, the 2017 Plan lays the groundwork for a long-term effort to reduce Bay Area GHG emissions to 40 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050. To fulfill state ozone planning requirements, the 2017 control strategy includes all feasible measures to reduce emissions of ozone precursors (ROG and NO_X) and reduce transport of ozone and its precursors to neighboring air basins. In addition, the 2017 Plan builds upon and enhances the BAAQMD's efforts to reduce emissions of fine particulate matter and toxic air contaminants (TAC) (BAAQMD 2017a).

Air Pollutant Emission Thresholds

The BAAQMD has adopted guidelines for quantifying and determining the significance of air quality emissions in its *California Environmental Quality Act Air Quality Guidelines* (BAAQMD 2020). BAAQMD recommends that lead agencies determine appropriate air quality emissions thresholds of significance based on substantial evidence in the record. The BAAQMD's significance thresholds in the updated April 2022 *CEQA Air Quality Guidelines* for project operations within the San Francisco Bay Area Air Basin are the most appropriate thresholds for use in determining air quality impacts of the project. BAAQMD developed screening criteria to provide lead agencies and project applicants with a conservative indication of whether a project could result in potentially significant air quality impacts.

Table 6 presents the significance thresholds for construction and operational-related criteria air pollutant and precursor emissions used for the purposes of this analysis. These represent the levels at which a project's individual emissions of criteria air pollutants or precursors would result in a cumulatively considerable contribution to the San Francisco Bay Area Air Basin's existing air quality conditions. For the purposes of this analysis, the project would result in a significant impact if construction or operational emissions would exceed any of the thresholds shown in Table 6.

Table 6 BAAQMD Air Quality Thresholds of Significance

Pollutant/Precursor	Construction: Average Daily Emissions (lbs/day)	Operation: Maximum Annual Emissions (tpy)	Operation: Average Daily Emissions (lbs/day)
ROG	54	10	54
NO_X	54	10	54
PM_{10}	82 (exhaust)	15	82
$PM_{2.5}$	54 (exhaust)	10	54

lbs/day = pounds per day; tpy = tons per year; ROG = reactive organic gases; NO_X = oxides of nitrogen; PM_{10} = respirable particulate matter with an aerodynamic resistance diameter of 10 micrometers or less.; $PM_{2.5}$ = fine particulate matter with an aerodynamic resistance diameter of 2.5 micrometers or less

Source: BAAQMD 2022, Table 3-1.

The BAAQMD does not have quantitative thresholds for fugitive dust emissions during construction. Instead, the BAAQMD recommends Best Management Practices (BMPs) be implemented to reduce fugitive dust emissions. The project would implement the BAAQMD *Basic Construction Mitigation Measures* as a project design feature. The best management practices include the following:

1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
2. All haul trucks transporting soil, sand, or other loose material off-site shall be covered or maintain at least two feet of freeboard.
3. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
4. All vehicle speeds on unpaved roads shall be limited to 15 mph.
5. Enclose, cover, water daily or apply non-toxic soil binders to exposed stockpiles (dirt, sand, etc.)
6. All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
7. Install sandbags or other erosion control measures to prevent silt runoff to public roadways.
8. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations). Clear signage shall be provided for construction workers at all access points.
9. All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified visible emissions evaluator.
10. Post a publicly visible sign with the telephone number and person to contact at the lead agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The air district's phone number shall also be visible to ensure compliance with applicable regulations.

In the absence of a qualified Community Risk Reduction Plan, BAAQMD has established the following *Thresholds of Significance* for local community risks and hazards associated with TACs and $PM_{2.5}$ for assessing individual source impacts at a local level. Impacts would be significant if:

- The project would result in an increased cancer risk of > 10 in one million
- The project would result in an increased non-cancer (i.e., Chronic or Acute) risk of > 1.0 Hazard Index
- The project would result in an ambient $PM_{2.5}$ concentration increase of > 0.3 $\mu g/m^3$ annual average

A project would be considered to have a cumulatively considerable impact if the aggregate total of current and proposed TAC sources within a 1,000 feet radius of the project fence-line in addition to the project would exceed the *Cumulative Thresholds of Significance*. Impacts would be significant if:

- The project would result in an increased cancer risk of > 100 in one million
- The project would result in an increased non-cancer (i.e., Chronic or Acute) risk of > 10 Hazard Index

- The project would result in an ambient $PM_{2.5}$ concentration increase of > 0.8 µg/m^3 annual average

Excess cancer risks are defined as those occurring in excess of or above and beyond those risks that would normally be associated with a location or activity if toxic pollutants were not present. Non-carcinogenic health effects are expressed as a hazard index, which is the ratio of expected exposure levels to an acceptable reference exposure level.

BAAQMD defines sensitive receptors as facilities or land uses that include members of the population that are particularly sensitive to the effects of air pollutants, such as children, the elderly, and the chronically ill. These facilities include residences, school playgrounds, child-care centers, retirement homes, and convalescent homes.

Methodology

Air pollutant emissions generated by project construction and operation were estimated using the California Emissions Estimator Model (CalEEMod), version 2020.4.0. CalEEMod uses project-specific information, including the project's land uses, areas for different uses (e.g., mid-rise apartments and strip mall retail), and location, to model a project's construction and operational emissions. The analysis reflects the construction and operation of the project as described under the *Project Description*.

Construction emissions modeled include emissions generated by construction equipment used on-site and emissions generated by vehicle trips associated with construction, such as worker and vendor trips. CalEEMod estimates construction emissions by multiplying the amount of time equipment is in operation by emission factors. Construction of the proposed project was analyzed based on the applicant-provided construction schedule and construction equipment list. Construction would occur over approximately 28 months from September 2024 through January 2027. During demolition, approximately 64,547 square feet of existing asphalt and concrete would be removed in addition to 40 cubic yards of material removed from onsite. Also, approximately 100 cubic yards of material would be exported from the site and imported to the site. It is assumed that all construction equipment used would be diesel-powered. This analysis assumes that the project would comply with all applicable regulatory standards. In particular, the project would comply with BAAQMD Regulation 8, Rule 3 Architectural Coatings, and would implement recommended BMPs included in BAAQMD Basic Construction Mitigation.

Operational emissions modeled include mobile source emissions (i.e., vehicle emissions), energy emissions, and area source emissions. Mobile source emissions are generated by vehicle trips to and from the project site. The daily trip generation rates were sourced from the project Traffic Impact Study (Appendix B). Area source emissions are generated by landscape maintenance equipment, consumer products and architectural coatings.

a. Would the project conflict with or obstruct implementation of the applicable air quality plan?

Project Consistency

The California Clean Air Act requires that air districts create a Clean Air Plan that describes how the jurisdiction will meet air quality standards. The most recently adopted air quality plan is the BAAQMD 2017 Plan. The 2017 Plan updates the most recent Bay Area plan, the 2010 Clean Air Plan, pursuant to air quality planning requirements defined in the California Health and Safety Code. To fulfill state ozone planning requirements, the 2017 control strategy includes all feasible measures to

reduce emissions of ozone precursors—ROG and NO_X—and reduce transport of ozone and its precursors to neighboring air basins. The CAP builds upon and enhances the BAAQMD's efforts to reduce emissions of fine particulate matter and TACs. The 2017 Plan does not include control measures that apply directly to individual development projects. Instead, the control strategy includes control measures related to stationary sources, transportation, energy, buildings, agriculture, natural and working lands, waste management, water, and super-GHG pollutants.

The 2017 CAP focuses on two paramount goals:

- Protect air quality and health at the regional and local scale by attaining all national and state air quality standards and eliminating disparities among Bay Area communities in cancer health risk from TACs
- Protect the climate by reducing Bay Area GHG emissions to 40 percent below 1990 levels by 2030, and 80 percent below 1990 levels by 2050

Under BAAQMD's methodology, a determination of consistency with the 2017 Plan should demonstrate that a project:

- Supports the primary goals of the air quality plan
- Includes applicable control measures from the air quality plan
- Does not disrupt or hinder implementation of any air quality plan control measures

A project that would not support the 2017 Plan's goals would not be considered consistent with the 2017 Plan. On an individual project basis, consistency with BAAQMD quantitative thresholds is interpreted as demonstrating support for the clean air plan's goals. As discussed under criterion (b) below, the project would not exceed BAAQMD significance thresholds related to air quality emission), the project would not result in exceedances of BAAQMD thresholds for criteria air pollutants and thus would not conflict with the 2017 Plan's goal to attain air quality standards. The 2017 Clean Air Plan includes goals and measures to increase the use of electric vehicles, promote the use of on-site renewable energy, and encourage energy efficiency. The project includes features that are consistent with these goals and measures, including meeting California Green Building Standards, providing electric vehicle parking spaces, and supplying 202 spaces of bicycle parking. Therefore, the project would not conflict with or obstruct the implementation of an applicable air quality plan and the project would have a less than significant impact.

LESS THAN SIGNIFICANT IMPACT

b. 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?

The San Francisco Bay Area Air Basin is designated nonattainment for the NAAQS for ozone and $PM_{2.5}$ and the CAAQS for ozone, $PM_{2.5}$, and PM_{10}. The following subsections discuss emissions associated with construction and operation of the project.

Construction Emissions

Project construction would generate temporary air pollutant emissions associated with fugitive dust (PM_{10} and $PM_{2.5}$) and exhaust emissions from heavy construction equipment and construction vehicles in addition to ROG emissions that would be released during the drying phase of architectural coating. Table 7 summarizes the estimated maximum daily emissions of pollutants

during project construction. As shown therein, construction-related emissions would not exceed BAAQMD thresholds. Therefore, project construction would not 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. Impacts would be less than significant.

Table 7 Maximum Daily Construction Emissions (lbs/day)

Construction Year	ROG	NO_x	PM_{10} Exhaust	$PM_{2.5}$ Exhaust
Year 1	2	13	<1	1
Year 2	2	11	1	<1
Year 3	38	12	1	1
Year 4	38	1	<1	<1
Maximum Daily Emissions (lbs/day)	**38**	**13**	**1**	**1**
BAAQMD Thresholds	54	54	82	54
Threshold Exceeded?	**No**	**No**	**No**	**No**

lbs/day = pounds per day; ROG = reactive organic gases, NO_x = nitrogen oxides, PM_{10} = particulate matter 10 microns in diameter or less, $PM_{2.5}$ = particulate matter 2.5 microns or less in diameter

Notes: All emissions modeling was completed made using CalEEMod. See Appendix C for modeling results. Some numbers may not add up due to rounding. Emission data is pulled from "mitigated" results, which account for compliance with regulations (including BAAQMD Regulation 8, Rule 3) and project design features. Emissions presented are the highest of the winter and summer modeled emissions.

Operational Emissions

Operation of the project would generate criteria air pollutant emissions associated with area sources (e.g., fireplaces, architectural coatings, consumer products, and landscaping equipment), and mobile sources (i.e., vehicle trips to and from the project site). The project would not include natural gas as an energy source; energy would be provided by electricity. Table 8 summarizes the project's annual and average daily emissions. As shown therein, operational emissions would not exceed BAAQMD regional thresholds for criteria pollutants. Therefore, project operation would not result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment, and impacts would be less than significant.

Table 8 Maximum Daily and Annual Operational Period Emissions

Emissions Source	ROG	NO_X	PM_{10}	$PM_{2.5}$
2026 Annual Emissions (tons/year)	2	1	1	<1
BAAQMD Threshold (tons/year)	10	10	15	10
Threshold Exceeded?	**No**	**No**	**No**	**No**
2026 Average Daily Emissions (lbs/day)	9	4	6	2
BAAQMD Thresholds (lbs/day)	54	54	82	54
Threshold Exceeded?	**No**	**No**	**No**	**No**

lbs/day = pounds per day; ROG = reactive organic gases, NO_X = nitrogen oxides, PM_{10} = particulate matter 10 microns in diameter or less, $PM_{2.5}$ = particulate matter 2.5 microns or less in diameter

Notes: All emissions modeling was completed made using CalEEMod. See Appendix C for modeling results. Some numbers may not add up due to rounding. Emission data is pulled from "mitigated" results, which account for compliance with regulations (including BAAQMD Regulation 8, Rule 3) and project design features. Emissions presented are the highest of the winter and summer modeled emissions.

LESS THAN SIGNIFICANT IMPACT

c. Would the project expose sensitive receptors to substantial pollutant concentrations?

Certain population groups, such as children, the elderly, and people with health problems, are particularly sensitive to air pollution. Therefore, the majority of sensitive receptor locations are schools, hospitals, and residences. The closest sensitive receptors to the project site are single-family residences located approximately 120 feet east across the railroad tracks. The project also includes the construction of new residences, and as a result, the siting of new sensitive receptors. Localized air quality impacts to sensitive receptors typically result from CO hotspots and TACs, which are discussed in the following subsections.

Carbon Monoxide Hotspots

A CO hotspot is a localized concentration of CO that is above a CO ambient air quality standard. Localized CO hotspots can occur at intersections with heavy peak hour traffic. Specifically, hotspots can be created at intersections where traffic levels are sufficiently high such that the local CO concentration exceeds the federal one-hour standard of 35.0 ppm or the federal and state eight-hour standard of 9.0 ppm (CARB 2016).

BAAQMD recommends comparing project's attributes with the following screening criteria as a first step to evaluating whether the project would result in the generation of CO concentrations that would substantially contribute to an exceedance of the *Thresholds of Significance*. The project would result in a less than significant impact to localized CO concentrations if:

1. The project is consistent with an applicable congestion management program for designated roads or highways, regional transportation plan, and local congestion management agency plans
2. The project would not increase traffic volumes at affected intersections to more than 44, 000 vehicles per hour
3. the project traffic would not increase traffic volumes at the affected intersections to more than 24,000 vehicles per hour where vertical and/or horizontal mixing is substantially limited (e.g., tunnel, parking garage).

Based on the project Traffic Impact Study, the residences would generate 564 trips and the retail use would generate 35 trips for a total of 599 trips (Appendix B). The project trip generation is far below the screening thresholds listed above. Therefore, the impact of localized CO emissions would not be significant.

Toxic Air Contaminants

TACs are defined by California law as air pollutants that may cause or contribute to an increase in mortality or an increase in serious illness, or which may pose a present or potential hazard to human health. The following subsections discuss the project's potential to result in impacts related to TAC emissions during construction and operation.

Construction

Construction-related activities would result in temporary project-generated emissions of diesel particulate matter (DPM) exhaust emissions from off-road, heavy-duty diesel equipment for site preparation, grading, building construction, and other construction activities. DPM was identified as a TAC by CARB in 1998. The potential cancer risk from the inhalation of DPM (discussed in the following paragraphs) outweighs the potential non-cancer health impacts (CARB 2020) and is therefore the focus of this analysis.

Generation of DPM from construction projects typically occurs in a single area for a short period. Construction of the proposed project would occur over approximately 28 months. The dose to which the receptors are exposed is the primary factor used to determine health risk. Dose is a function of the concentration of a substance or substances in the environment and the extent of exposure that a person has with the substance. Dose is positively correlated with time, meaning that a longer exposure period would result in a higher exposure level for the Maximally Exposed Individual. The risks estimated for a Maximally Exposed Individual are higher if a fixed exposure occurs over a longer period of time. According to the California Office of Environmental Health Hazard Assessment, health risk assessments, which determine the exposure of sensitive receptors to toxic emissions, should be based on a 70-year exposure period; however, such assessments should be limited to the period/duration of activities associated with the project. BAAQMD recommends an exposure duration of 30-years. Thus, the duration of proposed construction activities (i.e., 28 months) is approximately eight percent of the total exposure period used for 30-year health risk calculations. Current models and methodologies for conducting health-risk assessments are associated with longer-term exposure periods of 9, 30, and 70 years, which do not correlate well with the temporary and highly variable nature of construction activities, resulting in difficulties in producing accurate estimates of health risk (BAAQMD 2017b).

The maximum PM_{10} and $PM_{2.5}$ emissions would occur during site preparation activities. These activities would last for approximately 20 days. PM emissions would decrease for the remaining construction period because construction activities such as building construction and architectural coating would require less intensive construction equipment. While the maximum DPM emissions associated with demolition, site preparation, and grading activities would only occur for a portion of the overall construction period, these activities represent the worst-case condition for the total construction period. This would represent less than one percent of the total 30-year exposure period for health risk calculation. Given the aforementioned discussion, DPM generated by project construction would not create conditions where the probability is greater than one in one million of contracting cancer for the Maximally Exposed Individual or to generate ground-level concentrations of non-carcinogenic TACs that exceed a Hazard Index greater than one for the Maximally Exposed

Individual. Therefore, project construction would not expose sensitive receptors to substantial TAC concentrations, and impacts would be less than significant.

Operation

Sources of operational TACs include, but are not limited to, land uses such as freeways and high-volume roadways, truck distribution centers, ports, rail yards, refineries, chrome plating facilities, dry cleaners using perchloroethylene, and gasoline dispensing facilities. The project would not include construction of new gas stations, dry cleaners, highways, roadways, or other sources that could be considered new permitted or non-permitted source of TAC or $PM_{2.5}$ in proximity to receivers. In addition, the project would not introduce a new stationary source of emissions and the mobile emissions generated from the project would be minimal and spread over a broad geographical area. Therefore, the operation of the project would not expose nearby sensitive receivers to substantial pollutant concentrations. Impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

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

During construction activities, heavy equipment and vehicles would emit odors associated with vehicle and engine exhaust and during idling. However, these odors would be intermittent and temporary and would cease upon completion, and odors would disperse with distance. Overall, project construction would not generate other emissions, such as those leading to odors, affecting a substantial number of people. Construction-related impacts would be less than significant.

Table 3-3 in the BAAQMD 2017 *CEQA Air Quality Guidelines* provides screening distances for land uses that have the potential to generate substantial odor complaints. The uses in the table include wastewater treatment plants, landfills or transfer stations, refineries, composting facilities, confined animal facilities, food manufacturing, smelting plants, and chemical plants (BAAQMD 2017b). Multi-family residential development and retail uses are not included in this list, and operation of the project would not generate other emissions, such as those leading to odors, that would affect a substantial number of people. No operational impacts would occur.

LESS THAN SIGNIFICANT IMPACT

4 Biological Resources

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
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 Wildlife or U.S. Fish and Wildlife Service?	☐	■	☐	☐
b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife 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?	☐	☐	☐	■

WRA, Inc. prepared a Biological Constraints Assessment (BCA, November 2020), a Jurisdictional Delineation Report (September 2020), and a Tree Survey Report (October 2020) for the project, all of which were peer-reviewed by Rincon Consultants. The reports and peer review memorandum are included as Appendix D. The results and project impacts summarized below are based on findings from the BCA, Jurisdictional Delineation Report, and Tree Survey Report.

"Special status" species are those plants and animals: 1) listed, proposed for listing, or candidates for listing as Threatened or Endangered by the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) under the federal Endangered Species Act; 2) listed or proposed for listing as Rare, Threatened, or Endangered by the California Department of Wildlife (CDFW) under the California Endangered Species Act; 3) recognized as California Species of Special Concern by the CDFW; 4) afforded protection under California Fish and Game Code; and 5) occurring on Lists 1 and 2 of the CDFW California Rare Plant Rank system.

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?

The project site is a vacant parcel covered primarily in ruderal herbaceous grasslands, with 59 mixed ornamental and native trees. There is an ephemeral stream within the project site, approximately 1,300 square feet in area and 278 linear feet in length. The ruderal grasslands consist of areas that have been partially developed but are not currently in use and occupy approximately 4.62 acres or 79 percent of the project site. Plant species within ruderal grassland areas include bristly ox-tongue (*Helminthotheca echioides*), stinkwort (*Dittrichia graveolens*), slender wild oat (*Avena barbata*), and Harding grass (*Phalaris aquatica*). Of the 59 trees within the project site, five native tree species were present: coast redwood (*Sequoia sempervirens*), California bay (*Umbellularia californica*), valley oak (*Quercus lobata*), *coast live oak* (*Quercus agrifolia*), and Fremont cottonwood (*Populus fremontii*). Both the grasses and trees present on the site could provide habitat for nesting bird species, including the special-status white-tailed kite (*Elanus leucurus*) which is known to inhabit the region. During the site surveys conducted by WRA, Inc. in May and June 2019, no special status plants or special status wildlife species were observed.

Special Status Plants

The potential for special status plant species to occur in the project site was evaluated based on a literature and database search and verified during reconnaissance site surveys. The following resources were consulted to evaluate known occurrences of special status plant species within the Novato 7.5-minute United States Geological Survey (USGS) quadrangle and eight surrounding quadrangles:

- CDFW California Natural Diversity Database (CNDDB, CDFW 2020a)
- USFWS Information for Planning and Consultation (IPaC) database (USFWS 2020a)
- California Native Plant Society (CNPS) Inventory Records (CNPS 2020)

Based upon a review of these sources, 94 special status plant species have been documented in the vicinity of the project site. Of these 94 species, 93 were determined to have no potential to occur on the project site due to a lack of suitable habitat or soil types. The project site contains potentially suitable habitat for one special status plant species, pappose tarplant (*Centrose parryi* ssp*. parryi,* CNPS Rank 1B.2), however, this species was not observed during the three site surveys. Because

pappose tarplant was not observed during these three site visits during the blooming period for this species (May to November), and no occurrences have been recorded within five miles of the project site, this species is not expected to occur on the project site (CDFW 2020a). Impacts to a special-status plant species with a CRPR 1 or 2 ranking would only reach a level of significance under CEQA if there would be population level impacts to the species. No other special status plants have a potential to occur within the project site and impacts to special status plant species would be less than significant.

Special Status Wildlife and Nesting Birds

The potential for special status wildlife species to occur in the project site was evaluated through a literature and database search. The CDFW CNDDB and USFWS IPaC databases were consulted to evaluate known occurrences of special status wildlife species within the Novato 7.5-minute USGS quadrangle and eight surrounding quadrangles (CDFW 2020a, USFWS 2020a). This review determined that 38 special status wildlife species have been documented in the vicinity of the project site. Of the 38 special status wildlife species identified, nesting birds are the only species that have the potential to be impacted by the project; Mitigation Measure BIO-1 would reduce potentially significant impacts to nesting birds to a less than significant level.

No special status wildlife species were observed during the May 2019 and June 2019 site visits. Given the ruderal, urban, and disturbed nature of the plant communities within the project site, the lack of rodent burrows due to frequent tillage of grassland habitat, and the ephemeral nature of water within the identified ephemeral stream (which only holds standing water during and shortly after rain), very little suitable habitat exists for special status wildlife species in the project site. Because the project site lacks suitable habitat and no special status wildlife was observed during site surveys, impacts to special status wildlife species would be less than significant. Despite that no special status wildlife species were observed and that the site lacks suitable habitat, nesting birds still have moderate potential to nest in trees along the eastern boundary of the project site and within the shrubs in the central portion of the project site. The special status white-tailed kite, which has been documented nearby, also has moderate potential to nest in trees in the project site. Construction activities, if occurring during nesting season (February 1st through September 15th), have the potential to impact nests of the native nesting birds or lead to the abandonment of active nests by causing auditory, vibratory and/or visual disturbance. Therefore, the project would have potentially significant impacts related to nesting birds, and implementation of Mitigation Measure BIO-1 would be required.

Mitigation Measure

BIO-1 Nesting Bird Surveys and Avoidance

Initiation of construction activities during the avian nesting season (February 1st through September 15th) shall be avoided to the extent feasible. If the commencement of construction activities begins during the nesting season, pre-construction nesting bird surveys shall be conducted within 14 days of initial ground disturbance or vegetation removal to avoid disturbance to active nests, eggs, and/or young of nesting birds. Surveys shall be performed throughout the graded portions of the project site and the surrounding 500 feet where accessible to detect nests of special-status, as well as non-special-status birds. If any active avian nests are found, an exclusion zone shall be established around any active nests where no construction would be allowed until a qualified biologist has determined that all young have fledged and are independent of the nest. The suggested size of exclusion zones will differ depending on species, location, and placement of nest,

and will be at the discretion of the biologist. These surveys shall remain valid as long as construction activity is consistently occurring in a given area and shall be completed again if there is a lapse in construction activities of more than 14 consecutive days during the bird breeding season.

Implementation of Mitigation Measure BIO-1 would reduce potentially significant impacts to nesting birds to a less than significant level.

LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

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, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

CDFW provides protection for sensitive vegetation and aquatic natural communities. Sensitive natural communities include habitats that fulfill special functions or have special values. Natural communities considered sensitive are those identified in local or regional plans, policies, regulations, or by the CDFW. CDFW ranks sensitive communities as "threatened" or "very threatened" (CDFW 2020b) and keeps records of their occurrences in its CNDDB (CDFW 2020a). CNDDB vegetation alliances (natural communities) are ranked 1 through 5 based on NatureServe's (2020) methodology, with those alliances ranked globally (G) or statewide (S) as 1 through 3 considered sensitive. Any impacts to CDFW defined sensitive natural communities or communities identified in local or regional plans must be evaluated.

No sensitive natural communities defined by CDFW on their Natural Communities list and Vegetation Alliances and Associations lists occur on the project site. No riparian habitat occurs on site and riparian habitat occurring off site to the east would not be directly or indirectly altered by the project. No impacts on sensitive natural communities would occur as a result of the project. Impacts to the ephemeral stream/ditch are discussed below under checklist question c.

NO IMPACT

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?

Wetlands are sensitive environmental resources that are protected at federal, state, and local levels. As discussed in the jurisdictional delineation conducted for the project in March 2020, the project site contains one ephemeral stream/ditch which is potentially under the jurisdiction of the U.S. Army Corps of Engineers (USACE), CDFW, and/or the Regional Water Quality Control Board (RWQCB).

The ephemeral stream/ditch exhibits a mostly defined streambed and bank, with some evidence of normal flow, and inconsistent ordinary high-water mark (OHWM) indicators. According to the USFWS *National Wetland Inventory* (NWI) this feature is classified as R4SBAx for riverine (R), intermittent (4), streambed (SB), temporarily flooded (A), excavated (x) (USFWS 2020b). Surface water was not observed during either the May 2019 or June 2019 site surveys; however, this feature supports seasonal wetland vegetation, including sparse cover of tall cyperus (*Cyperus eragrostis*), Italian ryegrass (*Festuca perennis*), common toad rush (*Juncus bufonius*), and curly dock (*Rumex crispus*). The formal jurisdictional delineation identified the ephemeral stream/ditch (approximately 0.03 acres in area and 278 linear feet long) as potentially under the jurisdiction of the U.S. Army Corps of Engineers [USACE] pursuant to Section 404 of the Clean Water Act (CWA) and Regional Water Quality Control Board (RWQCB) jurisdictional under Section 401 of the CWA. Additionally,

CDFW may claim jurisdiction over this feature as a stream under Section 1600 et seq. of the California Fish and Game Code (CFGC) (Appendix D).

Construction of the project would result in filling and grading of the ephemeral stream/ditch feature onsite, which would result in approximately 0.03 acre of impacts to State and federally protected waters. Therefore, the project applicant would be required to apply for a permit under Section 404 of the CWA for impacts to waters of the U.S. Additionally, the RWQCB would require a Section 401 Water Quality Certification and CDFW would require a Section 1602 Lake and Streambed Alternation Agreement. Because project activities would result in fill to the ephemeral stream/ditch, compensatory mitigation for loss of this feature would be required at the ratio described in Mitigation Measure BIO-2. Therefore, with obtainment of the applicable aquatic resources permits, and implementation of Mitigation Measure BIO-2 requiring compensatory mitigation, impacts to State and federally protected waters would be reduced to less than significant.

Mitigation Measures

BIO-2 Compensatory Mitigation

Impacts to jurisdictional aquatic features shall be offset through purchase of wetland/waters mitigation credits at a USACE, RWQCB, and/or CDFW-approved mitigation bank for creation or enhancement of wetlands at a minimum 1:1 ratio. Additional mitigation may be required under agency permits.

Implementation of Mitigation Measure BIO-2 would offset impacts to the ephemeral stream/ditch in the project site by requiring compensatory mitigation for loss of aquatic resources at an off-site agency approved mitigation bank. Impacts would be less than significant with mitigation.

LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

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?

Wildlife movement includes migration (i.e., usually one way per season), inter-population movement (i.e., long-term genetic flow) and small travel pathways (i.e., daily movement corridors within an animal's territory). While small travel pathways usually facilitate movement for daily home range activities such as foraging or escape from predators, they also provide connection between outlying populations and the main corridor, permitting an increase in gene flow among populations.

The project site is surrounded by existing developments, including Redwood Boulevard, Olive Avenue, and US Highway 101 to the east of the project site. The project site is not located within natural landscape blocks or essential connectivity areas, and due to surrounding development and major barriers to movement, the project site does not provide a critical connectivity function for wildlife (Appendix D). While there is hydrologic connectivity between Rush Creek, located northeast of the site, and the ephemeral stream/ditch within the project site, aquatic species are unlikely to inhabit the stream/ditch due to its short and variable inundation period. Therefore, the impacts on the movement of native resident or migratory species would be less than significant.

LESS THAN SIGNIFICANT IMPACT

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

General Plan 2035 and the Novato Municipal Code contain policies, development standards, and permitting procedures applicable to sites containing wetlands, waterways and riparian habitat, hillsides, and woodland resources. Applicable ordinances are as follows: City of Novato Wetland Protection Ordinance, City of Novato Waterways and Riparian Protection Ordinance, and City of Novato Woodland and Tree Preservation Ordinance.

The City of Novato regulates the protection of wetlands through its Wetland Protection Ordinance (Division 19.36 of Novato Municipal Code). The project site contains one ephemeral stream/ditch that is potentially under the jurisdiction of the USACE, RWQCB, and/or CDFW. Although this feature would be impacted during project implementation, Mitigation Measure BIO-2 would require the applicant to off-set losses of aquatic resources by purchasing compensatory mitigation credits at an agency approved mitigation bank. Therefore, the project would not conflict with the City of Novato Wetland Protection Ordinance with implementation of Mitigation Measure BIO-2.

The City of Novato defines a Stream Protection Zone as part of the City of Novato Waterways and Riparian Protection Ordinance (Division 19.35 of Novato Municipal Code). The project site is located outside the boundaries of an area that requires a Stream Protection Zone as shown in 1996 General Plan EN Map 1 (City of Novato 1996).[4] Thus, the project would not conflict with the City of Novato Waterways and Riparian Protection Ordinance.

The project would involve removal of trees. There are approximately 59 trees within the project site, 47 of which would be removed under the proposed project. The City of Novato Woodland and Tree Preservation Ordinance (Chapter 17 of Novato Municipal Code) regulates the removal of trees within the city and requires a tree permit for the removal of any heritage tree on private parcels or removal of one or more trees on undeveloped private parcels. The ordinance defines a heritage tree as any native or non-native woody plant 1) with a trunk diameter of 24 inches or 2) any other tree designated as a heritage tree by the city. The ordinance also requires a tree permit for removal of any street tree within city right-of-way (Appendix D). The arborist site survey, completed in October 2020, determined that 11 trees within the project site meet the definition of a heritage tree, and nine trees are considered street trees. The project would require removal of 47 trees within the project site, which would involve removal of a total of 11 heritage trees. However, the project would involve planting approximately 112 new trees throughout the project site, resulting in a net increase of 65 trees within the project site. This would result in double the number of trees currently existing on the site.

Therefore, the project would not conflict with local policies and ordinances. Impacts would be less than significant with the implementation of Mitigation Measure BIO-2.

LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

[4] Consistent with the City of Novato Municipal Code Section 19.35.020, the EN Map 1 from the 1996 General Plan is used to identify the steam protection zone.

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?

The project site is not located within the boundaries of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan. As such, the project would not conflict with the provisions of an applicable plan, and no impact would occur.

NO IMPACT

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5 Cultural Resources

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
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?	☐	■	☐	☐

This section provides an analysis of the project's impacts on cultural resources, including historical and archaeological resources, as well as human remains, and is based on the Cultural Resource Assessment attached as Confidential Appendix D.

CEQA requires a lead agency to determine whether a project may have a significant effect on historical resources (Public Resources Code [PRC] Section 21084.1). A historical resource is a resource listed in, or determined to be eligible for listing, in the California Register of Historical Resources (CRHR), a resource included in a local register of historical resources, or any object, building, structure, site, area, place, record, or manuscript that a lead agency determines to be historically significant (*CEQA Guidelines* Section 15064.5[a][1-3]).

A resource shall be considered historically significant if it:

1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
2. Is associated with the lives of persons important in our past;
3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
4. Has yielded, or may be likely to yield, information important in prehistory or history.

In addition, if it can be demonstrated that a project would cause damage to a unique archaeological resource, the lead agency may require reasonable efforts be made to permit any or all of these resources to be preserved in place or left in an undisturbed state. To the extent that resources cannot be left undisturbed, mitigation measures are required (PRC Section 21083.2[a-b]).

PRC Section 21083.2(g) 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:

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

Existing Setting

This section analyzes the project's potential impacts related to cultural resources, including historical and archaeological resources as well as human remains. The analysis in this section is based, in part, on the Cultural Resources Assessment prepared for the Village at Novato Project by Rincon in June 2023. The investigation consisted of background and archival research, a California Historical Resources Information System (CHRIS) records search at the Northwest Information Center (NWIC) of the project site as well as a 0.5-mile radius around the project site, a search of the Sacred Lands File (SLF) with the Native American Heritage Commission (NAHC), and a pedestrian field survey conducted on October 19, 2021. Following consultation with the Federated Indians of Graton Rancheria, a canine detection survey was also completed as part of the study.

Background and archival research identified the project site as in general proximity to a previously recorded Native American village. Additionally, The NWIC records search identified that 78 previously conducted cultural resources studies within the 0.5-mile radius of the project site. Of these, three studies have been completed within a portion of the current project site. The NWIC search further identified 12 previously recorded cultural resources within a 0.5-mile radius of the project site, none of which are located within the project site. On November 8, 2021, the NAHC responded to Rincon's SLF request, stating the results of the SLF search were negative. The NWIC and SLF results are within Confidential Appendix D.

The pedestrian survey resulted in the identification of a cultural resource within the project site, this resource was assigned a temporary designation of TJ-1. Archaeological subsurface testing was completed between July 11 and July 13, 2022 and the methodology and results are detailed in confidential Appendix D. The results of the archaeological testing, in conjunction with the results of a geotechnical investigation conducted within the project site, indicate that TJ-1 is not eligible for inclusion in the CRHR and is not a historical resource or a unique archaeological resource under CEQA as it exists within fill layers and is out of context. Finally, the canine detection survey was conducted on February 21, 2023, and identified an area with possible displaced grave soils and/or fragments of human remains.

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

As detailed above, the records search and field survey confirmed that there are no built environment cultural resources recorded within the project site. Therefore, the project would not cause a substantial adverse change in the significance of a historical resource pursuant to Section 15064.5 and the proposed project would have no impact on historic resources.

NO IMPACT

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

As a result of the Cultural Resources Assessment (CRS), one archaeological resource was identified within the project site. However, Rincon recommended the resource as ineligible for the CRHR due to the sparse distribution of artifacts, lack of diagnostic features, and the disturbed context in which the resource was located.

However, the project site is considered sensitive for containing subsurface archaeological resources due to general proximity to previously recorded archaeological resources, proximity to Novato Creek, and general proximity to a previously recorded Native American village. Additionally, the alluvial soils below the top one to five feet of fill have higher sensitivity for containing in context subsurface archaeological resources due to the episodic nature of alluvial sedimentation. Thus, archaeological sensitivity is limited to below the initial top-fill layer, within the alluvial sediments. Adherence to Mitigation Measures TCR-1 and TCR-2 and to the following mitigation measures for a Worker's Environmental Awareness Program, Discovery and Treatment Plan, archaeological monitoring, and unanticipated discoveries during construction would reduce project impacts to archaeological resources to less than significant levels under CEQA.

Mitigation Measure

CUL-1 Worker's Environmental Awareness Program

The applicant shall conduct a Worker's Environmental Awareness Program for all project personnel working in the project site. The City shall retain a qualified archaeologist who meets the Secretary of Interior's *Professional Qualification Standards* for archaeology (National Park Service 1983) to conduct a training for all construction personnel on archaeological sensitivity prior to the commencement of any project work activities. The Worker's Environmental Awareness Program training will include a description of the types of cultural material that may be encountered, cultural sensitivity issues, the regulatory environment, and the proper protocol for treatment of the materials in the event of a find.

CUL-2 Discovery and Treatment Plan

Prior to the start of construction, the applicant shall ensure a Discovery and Treatment Plan (Plan) is completed specific to this project. The applicant shall retain a qualified archaeologist who meets the Secretary of Interior's *Professional Qualification Standards* for archaeology (National Park Service 1983) to prepare a Plan. The Plan will be prepared in consultation with the Federated Indians of Graton Rancheria and the City and shall be implemented in the event of an unanticipated discovery of Tribal cultural resources or human remains during construction. The Plan shall include City of Novato ordinance 4.7-3(b) regarding archaeological resources and is subject to review and acceptance by the City of Novato. The plan will discuss the methodology and procedures to be undertaken should cultural resources or human remains be identified during project activities. The Plan shall include, at minimum, an overview of background context, a description of potential discoveries/cultural resources, protocols to be followed (including suspension of all earth-disturbing work in the vicinity of the find), appropriate treatment methods, a timeline of notification, guidance on significance evaluation, and reporting requirements.

CUL-3 Archaeological Monitoring

Archaeological monitoring of project-related ground-disturbing activities shall be conducted by a qualified archaeologist. Archaeological monitoring should be performed under the direction of an archaeologist meeting the Secretary of the Interior's *Professional Qualification Standards* for archaeology (National Park Service 1983). Monitors will have the authority to halt and redirect work should any archaeological resources be identified during monitoring. If archaeological resources are encountered during ground-disturbing activities, work in the immediate area must halt and the find evaluated for listing in the CRHR in accordance with the Plan detailed in CUL-2. Archaeological monitoring may be reduced to spot-checking or eliminated at the discretion of the monitors, in consultation with the lead agency, as warranted by conditions such as encountering bedrock, or sediments being excavated are fill. If monitoring is reduced to spot-checking, spot-checking shall occur when ground-disturbance moves to a new location within the project site and when ground disturbance will extend to depths not previously reached (unless those depths are in bedrock).

CUL-4 Unanticipated Discovery of Cultural Resources

In the event that archaeological resources are unexpectedly encountered during ground-disturbing activities, work within the immediate vicinity of the find shall halt and an archaeologist meeting the Secretary of the Interior's Professional Qualifications Standards for archaeology (National Park Service 1983) shall be contacted immediately to evaluate the resource in accordance with the treatment plan. If the resource is determined by the qualified archaeologist to be prehistoric, then a Native American representative shall also be contacted to participate in the evaluation of the resource. If the qualified archaeologist and/or Native American representative determines it to be appropriate, archaeological testing for CRHR eligibility shall be completed if the resource cannot be avoided. If the resource is eligible for the CRHR and significant impacts to the resource cannot be avoided via project redesign, a qualified archaeologist shall prepare a data recovery plan tailored to the physical nature and characteristics of the resource, per the requirements of the California Code of Regulations (CCR) Guidelines Section 15126.4(b)(3)(C) and any relevant protocols included in the Discovery and Treatment Plan, prepared for this project. The data recovery plan shall identify data recovery excavation methods, measurable objectives, and data thresholds to reduce any significant impacts to cultural resources related to the resource. Pursuant to the data recovery plan, the qualified archaeologist and Native American representative, as appropriate, shall recover and document the scientifically consequential information that justifies the resource's significance. The City shall review and approve any data recovery plan as appropriate, and the resulting documentation shall be submitted to the regional repository of the California Historical Resources Information System, per CCR Guidelines Section 15126.4(b)(3)(C).

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

A canine detection survey undertaken at the request of the Federated Indians of Graton Rancheria returned results indicative of the presence of scattered or dissipated human remains or grave soils in one location on the project site. Additionally, two known Native American burials are within the general vicinity of the project site. Further, the presence of underlying alluvial deposits and the presence of non-sterile fill with Native American artifacts increases the likelihood that ground disturbing activities will result in the identification of human remains. Regardless of the current condition of any potential human remains within the project site, excavation and other ground disturbing activities may have an adverse impact on human remains by disturbing or destroying them.

If human remains are found, the State of California Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the County Coroner has made a determination of origin and disposition pursuant to PRC Section 5097.98. In the event of an unanticipated discovery of human remains, the County Coroner must be notified immediately. If the human remains are determined to be of Native American origin, the Coroner will notify the Native American Heritage Commission, which will determine and notify the Most Likely Descendant (MLD). The MLD has 48 hours from being granted site access to make recommendations for the disposition of the remains. If the MLD does not make recommendations within 48 hours, the landowner shall reinter the remains in an area of the property secure from subsequent disturbance. With adherence to CUL-1 through CUL-4 and TCR-1 and TCR-2, project impacts reduce to a less than significant level.

LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

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6 Energy

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Result in a 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?	☐	☐	■	☐

As a state, California is one of the lowest per capita energy users in the United States, ranked 48th in the nation, due to its energy efficiency programs and mild climate (United States Energy Information Administration 2021). Electricity and natural gas are primarily consumed by the built environment for lighting, appliances, heating and cooling systems, fireplaces, and other uses such as industrial processes in addition to being consumed by alternative fuel vehicles. Most of California's electricity is generated in state with approximately 28 percent imported from the Northwest and Southwest in 2019. However, the state relies on out-of-state natural gas imports for nearly 90 percent of its supply (California Energy Commission [CEC] 2021a and 2021b). In addition, approximately 32 percent of California's electricity supply comes from renewable energy sources, such as wind, solar photovoltaic, geothermal, and biomass (CEC 2021a). In 2018, Senate Bill 100 accelerated the state's Renewable Portfolio Standards Program, codified in the Public Utilities Act, by requiring electricity providers to increase procurement from eligible renewable energy and zero-carbon resources to 33 percent of total retail sales by 2020, 60 percent by 2030, and 100 percent by 2045. Electricity service would be provided to the project by Marin Clean Energy (MCE). MCE is a community choice aggregation program in Northern California that provides consumers to the choice to utilize electricity that is sourced from a higher percentage of eligible renewables through Pacific Gas and Electric (PG&E) infrastructure. Table 9 summarizes the electricity consumption for Marin County, in which the project site would be located, and for PG&E, as compared to statewide consumption.

Table 9 2019 Electricity Consumption

Energy Type	Marin County	PG&E	California	Proportion of PG&E Consumption	Proportion of Statewide Consumption[1]
Electricity (GWh)	1,355	78,071	279,402	1.7%	0.5%

GWh = gigawatt-hours

[1] For reference, the population of Marin County (257,774 persons) is approximately 0.7 percent of the population of California (39,466,855 persons) (California Department of Finance 2021).

Source: CEC 2021c

Petroleum fuels are primarily consumed by on-road and off-road equipment in addition to some industrial processes, with California being one of the top producers of petroleum in the nation (CEC 2021d). Gasoline, which is used by light-duty cars, pickup trucks, and sport utility vehicles, is the most used transportation fuel in California with 15.4 billion gallons sold in 2019 (CEC 2020). Diesel, which is used primarily by heavy duty-trucks, delivery vehicles, buses, trains, ships, boats and barges, farm equipment, and heavy-duty construction and military vehicles, is the second most used fuel in California with 1.8 billion gallons sold in 2019 (CEC 2020). Table 10 summarizes the petroleum fuel consumption for Marin County, in which the project site would be located, as compared to statewide consumption.

Table 10 2019 Annual Gasoline and Diesel Consumption

Fuel Type	Marin County (millions of gallons)	California (millions of gallons)	Proportion of Statewide Consumption[1]
Gasoline	96	15,365	0.6%
Diesel	4	1,756	0.2%

[1] For reference, the population of Marin County (257,774 persons) is approximately 0.7 percent of the population of California (39,466,855 persons) (California Department of Finance 2021).

Source: CEC 2020

Energy consumption is directly related to environmental quality in that the consumption of nonrenewable energy resources releases criteria air pollutant and greenhouse gas (GHG) emissions into the atmosphere. The environmental impacts of air pollutant and GHG emissions associated with the project's energy consumption are discussed in detail in Section 3, *Air Quality*, and Section 8, *Greenhouse Gas Emissions*, respectively.

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

The project would use nonrenewable and renewable energy resources for construction and operation of the project. The anticipated use of these resources is detailed in the following subsections. Applicant-provided information, the CalEEMod outputs for the air pollutant and GHG emissions modeling (Appendix C) were used to estimate energy consumption associated with the project.

Construction Energy Demand

The project would require site preparation and grading, including hauling material off-site; pavement and asphalt installation; building construction; architectural coating; and landscaping and hardscaping. During project construction, energy would be consumed in the form of petroleum-based fuels used to power off-road construction vehicles and equipment on the project site, construction worker travel to and from the project site, and vehicles used to deliver materials to the site. As shown in Table 11, project construction would require approximately 60,935 gallons of gasoline and approximately 85,425 gallons of diesel fuel.

Table 11 Estimated Fuel Consumption during Construction

	Fuel Consumption (gallons)	
Source	**Gasoline**	**Diesel**
Construction Equipment & Hauling Trips	N/A	85,425
Construction Worker Vehicle Trips	60,935	N/A

N/A = not applicable

See Appendix E for energy calculation sheets.

Energy use during construction would be temporary in nature, and construction equipment used would be typical of similar-sized construction projects in the region. In addition, construction contractors would be required to comply with the provisions of California Code of Regulations Title 13 Sections 2449 and 2485, which prohibit diesel-fueled commercial motor vehicles and off-road diesel vehicles from idling for more than five minutes and would minimize unnecessary fuel consumption. Construction equipment would be subject to the U.S. EPA Construction Equipment Fuel Efficiency Standard, which would also minimize inefficient, wasteful, or unnecessary fuel consumption. Furthermore, pursuant to applicable regulatory requirements, such as CALGreen, the project would comply with construction waste management practices to divert a minimum of 65 percent of construction debris. These practices would result in efficient use of energy necessary to construct the project. In the interest of cost-efficiency, construction contractors also would not utilize fuel in a manner that is wasteful or unnecessary. Overall, project construction would be temporary and typical of similar types of projects. Therefore, the project would not involve the inefficient, wasteful, and unnecessary use of energy during construction, and the construction-phase impact related to energy consumption would be less than significant.

Operational Energy Demand

Operation of the project would contribute to regional energy demand by consuming electricity, and gasoline and diesel fuels. Electricity would be used for heating and cooling systems, lighting, appliances, and water and wastewater conveyance, among other purposes. Gasoline and diesel consumption would be associated with vehicle trips generated by residents and employees. Table 12 summarizes estimated operational energy consumption for the project. As shown therein, project operation would require approximately 118,980 gallons of gasoline and 18,603 gallons of diesel for transportation fuels, and 0.88 GWh of electricity. Vehicle trips associated with future residents and employees would represent the greatest operational use of energy associated with the project.

Table 12 Estimated Project Annual Operational Energy Consumption

Source	Energy Consumption[1]	
Transportation Fuels		
Gasoline	118,980 gallons	13,062 MMBtu
Diesel	18,603 gallons	2,371 MMBtu
Electricity	0.88 GWh	3,014 MMBtu

MMBtu = million metric British thermal units; GWh = gigawatt-hours

[1] Energy consumption is converted to MMBtu for each source

See Appendix E for energy calculation sheets and Appendix C for CalEEMod output results for electricity usage.

The project would be required to comply with all standards set in the latest iteration of the California Building Standards Code (California Code of Regulations Title 24), which would minimize the wasteful, inefficient, or unnecessary consumption of energy resources by the built environment during operation. California's CALGreen standards (California Code of Regulations Title 24, Part 11) require implementation of energy-efficient light fixtures and building materials into the design of new construction projects. Furthermore, the current Building Energy Efficiency Standards (California Code of Regulations Title 24, Part 6) require newly constructed buildings to meet energy performance standards set by the CEC. These standards are specifically crafted for new buildings to result in energy efficient performance so that the buildings do not result in wasteful, inefficient, or unnecessary consumption of energy. In addition, per CALGreen, all plumbing fixtures used for the project would be high-efficiency fixtures, which would minimize the potential the inefficient or wasteful consumption of energy related to water and wastewater.

Furthermore, the project would increase housing density in proximity to the Novato Downtown SMART station (0.3 miles south), which would facilitate the use of transit and alternative transportation modes such as walking and biking. Therefore, project operation would not result in potentially significant environmental effects due to the wasteful, inefficient, or unnecessary consumption of energy. Impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

c. *Would the project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?*

Table 13 lists applicable Novato Climate Change Action Plan Greenhouse Gas Reduction Measures that are included as Appendix E to the City's General Plan 2035 energy efficiency goals and policies and summarizes the project's compliance with these policies. As shown in Table 13, the project would be compliant with applicable energy efficiency goals and policies from the Novato Climate Change Action Plan (included as Appendix E to the City's General Plan). Therefore, potential impacts associated with renewable energy and energy efficiency would be less than significant.

Table 13 Project Compliance with Energy Efficiency Goals and Policies

Energy Efficiency Goal or Policy	Project Consistency
RM 4: *Energy Efficient Programs (Community)*. Continue and expand residential and commercial energy efficiency programs.	**Consistent.** The project would be served by MCE and residential developments would include energy-efficient appliances and lighting.
RM 6: *Clean Electricity.* Encourage residences and businesses to switch to GHG-free electricity and encourage MCE Clean Energy to reach its goal to provide 100 percent GHG-free by 2025.	**Consistent.** The project would utilize electricity provided PG&E and have the option for service through MCE, which is subject to requirements per SB 100 and required to procure more electricity from renewable energy sources over time. Currently the 2020 Light Green power (the program residents and commercial business are automatically opted into) is sourced from 60 percent carbon-free renewables, which exceeds the SB 100 target goals.
RM 9. *Renewable Energy*: Identify and remove barriers to small-scale, distributed renewable energy production within the community. This can be accomplished through: 1) adoption of incentives, such as permit streamlining and fee waivers, as feasible; 2) amendments to development codes, design guidelines, and zoning ordinances, as necessary; 3) installation of solar panels on carports and over parking areas on municipal facilities, commercial projects, and new large-scale residential developments, and; 4) implementation of Property Assessed Clean Energy (PACE) financing programs for residential and commercial projects	**Consistent.** The project would include a source of renewable energy onsite. The type of and size are to be determined.
RM 12: *Urban Forest.* Increase tree cover and increase shade of structures and other improvements within the city.	**Consistent.** The project would remove 47 existing trees and proposes to plant approximately 112 new trees. The new trees would be planted along the new internal pathways, by the residential buildings, in the parking lots, and in the outdoor common space areas.
RM 17: *Low-Emissions Vehicle Infrastructure* Improve infrastructure for low emission vehicles.	**Consistent**. The project will include EV parking spaces consistent with CALGreen Tier 2 requirements, which states that 40 percent of the total number of parking spaces be electric vehicle ready (EV ready) with low power Level 2 EV charging receptables, and 15 percent of the total number of parking spaces will be equipped with Level 2 electric vehicle supply equipment (EVSE).
RM 21. *Affordable Housing*. Reduce community vehicles miles traveled through development of affordable housing for lower-income households.	**Consistent.** The project would provide 25 residences for low-income and very-low-income households. The project is in proximity to public transit options (0.3 miles north of Novato Downtown SMART) and is within downtown Novato. There is also a bus stop at the corner of Redwood Boulevard and Olive Avenue that is served by Marin Transit and Golden Gate Transit buses. The Marin Transit routes include 35, 57, 71,and 654 bus services, which provide connections through all of Marin County. The Golden Gate Transit provides bus services for route 101, which provide stops through Marin County and to San Francisco and Sonoma County as far north as Santa Rosa.

Energy Efficiency Goal or Policy	Project Consistency
RM 22: *Pedestrian Infrastructure.* Promote walking through design standards and amenities that concentrate uses, reduce the need for vehicular travel, and enhance the pedestrian experience.	**Consistent.** Approximately 202 bike parking spaces would be provided for residences and office employees. There would also be open space areas, common-use amenities, pathways, and community garden, onsite for resident use. Furthermore, the project site is within downtown Novato, which provides access to restaurants, entertainment, and commercial services within walking or biking distance.
RM 23-24: *Bicycle Infrastructure (Commercial and Residential).* Increase the number of Novato workers who commute by bicycle. Increase the number of multi-family residents who bike to work and for other utilitarian purposes.	**Consistent.** The project would provide 192 bicycle parking spaces for residents and 10 bicycle parking spaces for the retail development, which exceeds the City's parking code requirements. Providing bicycle parking spaces would allow residents and employees to store their bicycles onsite and encourage people to travel by bike, which would reduce VMT and transportation fuel consumption.

Source: City of Novato 2020

LESS THAN SIGNIFICANT IMPACT

7 Geology and Soils

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				
1. 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?	☐	☐	■	☐
2. Strong seismic ground shaking?	☐	☐	■	☐
3. Seismic-related ground failure, including liquefaction?	☐	☐	■	☐
4. 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 wastewater disposal systems where sewers are not available for the disposal of wastewater?	☐	☐	■	☐
f. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	■	☐	☐

A geotechnical investigation report was prepared for the project by Miller Pacific Engineering Group in December 2020 (Appendix F). The report summarized the current geologic site conditions, identified geologic hazards, and recommended specific project-design features that would need to be incorporated to reduce risk from geological hazards. The contents of this investigation inform the following discussion.

a.1. *Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving 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?*

a.2. *Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking?*

a.3. *Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction?*

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?*

The project site is located in a seismically active region of California. The nearest fault is the Burdell Mountain fault, located approximately 0.6 miles northeast of the project site (USGS 2019). No known active faults run through the project site. Furthermore, the project site is not located within an Alquist-Priolo Earthquake Fault Zone and the nearest active fault site is Rodgers Creek Fault, located seven miles northeast of the site (Appendix F). Therefore, the potential for surface rupture resulting from the movement of nearby major faults is considered to be low.

Ground shaking refers to movement of the Earth's surface during a seismic event. Ground shaking is normally the major cause of damage in earthquakes. Because the project site is located in a seismically active region, it may be subject to strong seismic groundshaking. Liquefaction is the process by which soil is temporarily transformed to fluid form during intense and prolonged ground shaking or because of a sudden shock or strain. 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. The project site is located in an area with high liquefaction potential (City of Novato 2020a) and the site was determined to have a high probability of liquefaction (Appendix F).

Pursuant to Novato Municipal Code Section 4-1.3, the City of Novato has adopted the California Building Code (CBC), as incorporated by reference into Title 24 of the California Code of Regulations. Section 1803.1.1.3 of the CBC states that the building department of each locality (in this case the Novato Building Division) shall approve the soil investigation (included as Appendix F) if it determines that the recommended action is likely to prevent structural damage in dwellings. Further, as a condition of the building permit, the approved recommended action would be required to be incorporated in the construction of each dwelling. Therefore, pursuant to Novato Municipal Code and the CBC, the recommendations included in the geotechnical investigation (Appendix F) would be incorporated into the design of the project and each residential building and verified by the City prior to issuance of a building permit.

Geotechnical recommendations are discussed in detail in Section 5 of the Geotechnical Investigation Report prepared by Miller Pacific Engineering Group in December 2020 (included as Appendix F). Recommendations include but are not limited to:

- Clearing all trees, roots, and debris from areas that would be graded. Loose soils or rock at subgrade should be excavated to expose firm natural soils or bedrock. Rocks larger than six inches and vegetation should be removed from the site as they are not suitable for structural fill.
- High plasticity soils encountered during site grading should be separated and used in landscaped areas, or removed from the site. On-site and imported soils should be free of organic material, have a liquid limit less than 40 and a plasticity index of less than 20, have a maximum particle size of 6 inches, and have more than 50 percent retained on the No. 200 sieve. Fill material should be tested and inspected by the project geotechnical engineer.
- On-site fill, backfill, and scarified subgrades of eight inches or deeper should be conditioned to within 3 percent of the optimum moisture content. Soil moisture content should be increased depending on soil compaction and plasticity.
- Settlement and consolidation of clays beneath the project site may be mitigated by load-balancing the project site, which would include removing existing soil from the site and replacing it with lightweight fill. This loss of weight should equal the new anticipated structural and/or new fill loads.
- Due to the presence of variable loose granular soils, the proposed buildings should be supported on a foundation system that can prevent or withstand future potential post-liquefaction settlement. A deep foundation system that extends to the stiff residual soil/weathered bedrock with torque down piles, augercast piles, drilled piles, or drilled displacement piles is recommended.
- Building areas should be raised slightly and adjoining landscaped areas should be sloped downward to facilitate site drainage. Where hard surfaces abut building foundations, surfaces should be sloped at least two percent. Area drains for landscape planters should be provided adjacent to buildings and parking areas, and downspout discharges should be collected into a tight pipe collection system.
- Underground utilities should include automatic and manual emergency shutoff valves at key connection points and service tie-ins. Bedding materials for utility pipes should be non-corrosive sand and conform with sieve and compaction recommendations.
- Pavement should include flexible pavement design and appropriate thicknesses depending on anticipated vehicle weight and traffic.

With incorporation of geotechnical recommendations as required by Novato Municipal Code and the CBC, impacts related to seismic ground shaking and seismic-related ground failure would be less than significant.

LESS THAN SIGNIFICANT IMPACT

a.4. Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving landslides?

The project site is relatively flat and is not located in an identified landslide hazard zone (City of Novato 2020a). Therefore, the project would not expose people or structures to risk of loss, injury, or death involving landslides; impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

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

Implementation of the proposed project includes grading and drainage improvements, including bioretention basins, and associated hardscaping. Proposed construction activities would be required to comply with Novato Municipal Code Section 7-4.10(c), which requires construction plans to include erosion control best management practices (BMPs). Erosion control BMPs include silt fences, straw waddles, and hydroseeding. Additionally, as described in more detail in Section 10, *Hydrology and Water Quality*, the project would be required to comply with National Pollutant Discharge Elimination System (NPDES) Construction General Permit requirements and prepare a Stormwater Pollution Prevention Plan (SWPPP), which includes BMPs for erosion control. Impacts from soil erosion or loss of topsoil would be less than significant.

LESS THAN SIGNIFICANT IMPACT

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?

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?

Expansive soils are soils that have a potential to undergo significant changes in volume, in the form of either shrinking or swelling due to their composition and moisture content. Periodic shrinking and swelling of expansive soils can cause extensive damage to buildings, other structures and roads. Granular soils were observed during the subsurface exploration done by the Miller Pacific Engineering Group in December 2020. However, there is potentially the presence of expansive soils at the project site based on previous subsurface explorations performed by Herzog Associates in 2005, which indicated high plasticity, expansion soils near the existing strip mall development (Appendix F). Therefore, there is low to moderate risk that the expansive soil could affect the project. The Geotechnical Investigation provided recommendations to avoid or minimize impacts related to expansive soils, as described above and discussed in detail in Appendix F. The City of Novato has adopted the CBC, and the CBC requires implementation of geotechnical recommendations if the geotechnical investigation determines that the recommended action is likely to prevent structural damage in dwellings. Therefore, with implementation of recommendations made in the Geotechnical Report (Appendix F) pursuant to Novato Municipal Code and compliance with the CBC, impacts related to expansive soils would be less than significant.

LESS THAN SIGNIFICANT IMPACT

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

No septic tanks or alternative wastewater disposal systems are proposed as part of the project. No impact would occur.

NO IMPACT

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

The project site is in an area of low paleontological sensitivity (City of Novato 2020b). As the project site is located in a low sensitivity geologic unit, the project is unlikely to encounter paleontological resources. However, the possibility exists that construction may uncover previously undiscovered paleontological resources. Impacts would be less than significant with incorporation of Mitigation Measure GEO-1.

Mitigation Measure

GEO-1 Discovery of Previously Unidentified Paleontological Resources

The following measures than be implemented during ground disturbing activities:

- **Paleontological Worker Environmental Awareness Program.** Prior to the start of construction, a Qualified Professional Paleontologist (as defined by SVP [2010]) or their designee shall conduct a paleontological Worker Environmental Awareness Program (WEAP) training for construction personnel regarding the appearance of fossils and the procedures for notifying paleontological staff should fossils be discovered by construction staff.
- **Unanticipated Discovery of Paleontological Resources.** In the event a fossil is discovered during construction of the project, excavations within 50 feet of the find shall be temporarily halted or delayed until the discovery is examined by a Qualified Professional Paleontologist. The project applicant shall include a standard inadvertent discovery clause in every construction contract to inform contractors of this requirement. If the find is determined to be significant, the applicant shall retain a Qualified Professional Paleontologist to direct all mitigation measures related to paleontological resources. The Qualified Professional Paleontologist shall design and carry out a data recovery plan consistent with the SVP (2010) standards.

Implementation of Mitigation Measure GEO-1 requires a paleontological Worker Environmental Awareness Program training and implementation of measures in the event paleontological resources are encountered. Should such resources be discovered, they would be salvaged, evaluated for significance, and curated in a scientific institution, if appropriate. Therefore, Mitigation Measure GEO-1 would reduce project impacts to paleontological resources to a less-than-significant level.

LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

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8 Greenhouse Gas Emissions

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
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?	☐	☐	■	☐

Overview of Climate Change and Greenhouse Gases

Climate change is the observed increase in the average temperature of the Earth's atmosphere and oceans along with other substantial changes in climate (such as wind patterns, precipitation, and storms) over an extended period of time. Climate change is the result of numerous, cumulative sources of greenhouse gas (GHG) emissions contributing to the "greenhouse effect," a natural occurrence which takes place in Earth's atmosphere and helps regulate the temperature of the planet. The majority of radiation from the sun hits Earth's surface and warms it. The surface, in turn, radiates heat back towards the atmosphere in the form of infrared radiation. Gases and clouds in the atmosphere trap and prevent some of this heat from escaping into space and re-radiate it in all directions.

GHG emissions occur both naturally and as a result of human activities, such as fossil fuel burning, decomposition of landfill wastes, raising livestock, deforestation, and some agricultural practices. GHGs produced by human activities include carbon dioxide (CO_2), methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Different types of GHGs have varying global warming potentials (GWP). The GWP of a GHG is the potential of a gas or aerosol to trap heat in the atmosphere over a specified timescale (generally, 100 years). Because GHGs absorb different amounts of heat, a common reference gas (CO_2) is used to relate the amount of heat absorbed to the amount of the gas emitted, referred to as "carbon dioxide equivalent" (CO_2e), which is the amount of GHG emitted multiplied by its GWP. Carbon dioxide has a 100-year GWP of one. By contrast, methane has a GWP of 30, meaning its global warming effect is 30 times greater than CO_2 on a molecule per molecule basis (Intergovernmental Panel on Climate Change [IPCC] 2021).[5]

The United Nations IPCC expressed that the rise and continued growth of atmospheric CO_2 concentrations is unequivocally due to human activities in the IPCC's Sixth Assessment Report (2021). Human influence has warmed the atmosphere, ocean, and land, which has led the climate to

[5] The Intergovernmental Panel on Climate Change's (2021) *Sixth Assessment Report* determined that methane has a GWP of 30. However, the 2017 Climate Change Scoping Plan published by the California Air Resources Board uses a GWP of 25 for methane, consistent with the Intergovernmental Panel on Climate Change's (2007) *Fourth Assessment Report*. Therefore, this analysis utilizes a GWP of 25.

warm at an unprecedented rate in the last 2,000 years. It is estimated that between the period of 1850 through 2019, that a total of 2,390 gigatonnes of anthropogenic CO_2 was emitted. It is likely that anthropogenic activities have increased the global surface temperature by approximately 1.07 degrees Celsius between the years 2010 through 2019 (IPCC 2021). Furthermore, since the late 1700s, estimated concentrations of CO_2, methane, and nitrous oxide in the atmosphere have increased by over 43 percent, 156 percent, and 17 percent, respectively, primarily due to human activity (United States Environmental Protection Agency 2020). Emissions resulting from human activities are thereby contributing to an average increase in Earth's temperature. Potential climate change impacts in California may include loss of snowpack, sea level rise, more extreme heat days per year, more high ozone days, more large forest fires, and more drought years (State of California 2018).

Regulatory Framework

In response to climate change, California implemented Assembly Bill (AB) 32, the "California Global Warming Solutions Act of 2006." AB 32 required the reduction of statewide GHG emissions to 1990 emissions levels (essentially a 15 percent reduction below 2005 emission levels) by 2020 and the adoption of rules and regulations to achieve the maximum technologically feasible and cost-effective GHG emissions reductions. On September 8, 2016, the Governor signed Senate Bill 32 into law, extending AB 32 by requiring the State to further reduce GHG emissions to 40 percent below 1990 levels by 2030 (the other provisions of AB 32 remain unchanged). On December 14, 2017, the California Air Resources Board (CARB) adopted the 2017 Scoping Plan, which provides a framework for achieving the 2030 target. The 2017 Scoping Plan relies on the continuation and expansion of existing policies and regulations, such as the Cap-and-Trade Program and the Low Carbon Fuel Standard, and implementation of recently adopted policies and legislation, such as SB 1383 (aimed at reducing short-lived climate pollutants including methane, hydrofluorocarbon gases, and anthropogenic black carbon) and SB 100 (discussed further below). The 2017 Scoping Plan also puts an increased emphasis on innovation, adoption of existing technology, and strategic investment to support its strategies. As with the 2013 Scoping Plan Update, the 2017 Scoping Plan does not provide project-level thresholds for land use development. Instead, it recommends local governments adopt policies and locally-appropriate quantitative thresholds consistent with a statewide per capita goal of six metric tons (MT) of CO_2e by 2030 and two MT of CO_2e by 2050 (CARB 2017).

Other relevant state laws and regulations include:

- **SB 375**: The Sustainable Communities and Climate Protection Act of 2008 (SB 375), signed in August 2008, enhances the state's ability to reach AB 32 goals by directing the CARB to develop regional GHG emission reduction targets to be achieved from passenger vehicles by 2020 and 2035. Metropolitan Planning Organizations are required to adopt a Sustainable Communities Strategy (SCS), which allocates land uses in the Metropolitan Planning Organization's Regional Transportation Plan (RTP). On March 22, 2018, CARB adopted updated regional targets for reducing GHG emissions from 2005 levels by 2020 and 2035. On March 22, 2018, CARB adopted updated regional targets for reducing GHG emissions from 2005 levels by 2020 and 2035. The Metropolitan Transportation Commission (MTC)/Association of Bay Area Governments (ABAG) was assigned targets of a 10 percent reduction in per capita GHG emissions from passenger vehicles from 2005 levels by 2020 and a 19 percent reduction in per capita GHG emissions from passenger vehicles from 2005 levels by 2035. MTC/ABAG adopted Plan Bay Area 2050 in October 2021, which meets the requirements of SB 375.

- **SB 100**: Adopted on September 10, 2018, SB 100 supports the reduction of GHG emissions from the electricity sector by accelerating the state's Renewables Portfolio Standard Program. SB 100 requires electricity providers to increase procurement from eligible renewable energy resources to 33 percent of total retail sales by 2020, 60 percent by 2030, and 100 percent by 2045.
- **California Building Standards Code (California Code of Regulations Title 24)**: The California Building Standards Code consists of a compilation of several distinct standards and codes related to building construction including plumbing, electrical, interior acoustics, energy efficiency, and handicap accessibility for persons with physical and sensory disabilities. The current iteration is the 2019 Title 24 standards. Part 6 is the Building Energy Efficiency Standards, which establishes energy-efficiency standards for residential and non-residential buildings in order to reduce California's energy demand. Part 12 is the California Green Building Standards Code (CALGreen), which includes mandatory minimum environmental performance standards for all ground-up new construction of residential and non-residential structures.

Significance Thresholds

Individual projects do not generate sufficient GHG emissions to influence climate change directly. However, physical changes caused by a project can contribute incrementally to significant cumulative effects, even if individual changes resulting from a project are limited. The issue of climate change typically involves an analysis of whether a project's contribution towards an impact would be cumulatively considerable. "Cumulatively considerable" means the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, other current projects, and probable future projects (*CEQA Guidelines* Section 15064[h][1]).

According to *CEQA Guidelines* Section 15183.5(b), projects can tier from a qualified GHG reduction plan, which allows for project-level evaluation of GHG emissions through the comparison of the project's consistency with the GHG reduction policies included in a qualified GHG reduction plan. This approach is considered by the Association of Environmental Professionals (2016) in its white paper, *Beyond Newhall and 2020*, to be the most defensible approach presently available under CEQA to determine the significance of a project's GHG emissions.

The 2022 BAAQMD *CEQA Thresholds for Evaluating the Significance of Climate Impacts From Land Use Projects and Plans* guidance document contains two approaches for determining significance of GHGs (BAAQMD 2022). The two approaches are as follows:

1. Projects must include, at a minimum, the following project design elements:

- Buildings
- The project will not include natural gas appliances or natural gas plumbing (in both residential and nonresidential development).
- The project will not result in any wasteful, inefficient, or unnecessary energy usage as determined by the analysis required under CEQA Section 21100(b)(3) and Section 15126.2(b) of the State CEQA Guidelines.
- Transportation
- Achieve a reduction in project-generated vehicle miles traveled (VMT) below the regional average consistent with the current version of the California Climate Change Scoping Plan (currently 15 percent) or meet a locally adopted Senate Bill 743 VMT target, reflecting the recommendations provided in the Governor's Office of Planning and Research's Technical Advisory on Evaluating Transportation Impacts in CEQA:

- Residential projects: 15 percent below the existing VMT per capita
- Office projects: 15 percent below the existing VMT per employee
- Retail projects: no net increase in existing VMT
- Achieve compliance with off-street electric vehicle requirements in the most recently adopted version of CALGreen Tier 2.

2. Projects must be consistent with a local GHG reduction strategy that meets the criteria under State CEQA Guidelines Section 15183.5(b).

According to the BAAQMD CEQA Thresholds for Evaluating the Significance of Climate Impacts From Land Use Projects and Plans, a qualified GHG reduction strategy must:

- Quantify GHG emissions, both existing and projected over a specified period, resulting from activities in a defined geographic area
- Establish a level, based on substantial evidence, below which the contribution to GHG emissions from activities covered by the plan would not be cumulatively considerable
- Identify and analyze the GHG emissions resulting from specific actions or categories of actions anticipated in the geographic area
- Specify measures or a group of measures, including performance standards, that substantial evidence demonstrates, if implemented on a project-by-project basis, would collectively achieve the specified emissions level
- Establish a mechanism to monitor the plan's progress toward achieving the level and to require amendment if the plan is not achieving specified levels
- Be adopted in a public process following environmental review

This analysis will evaluate the project in terms of the required project design elements for buildings listed under criterion 1 above.

Impact Analysis

a. Would the project generate GHG 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?

To determine if a project's GHG emissions are significant under CEQA, BAAQMD recommends completing a "fair share" analysis to determine how a new land use development project should be "designed and built to ensure it will be consistent with the goal of carbon neutrality by 2045" (BAAQMD 2022). The BAAQMD has only recommended thresholds for evaluating a project's operational emissions because "GHG emissions from construction represent a very small portion of a project's lifetime GHG emissions" (BAAQMD 2022). In order for a project's GHG emissions to be determined less than significant, a project must be consistent with a local GHG reduction strategy that meets the criteria of CEQA Guidelines Section 15183.5(b) or incorporate the following project design elements (BAAQMD 2022):

- Not include natural gas appliances or natural gas plumbing;
- Not result in wasteful, inefficient, or unnecessary energy usage as determined by the analysis required under PRC Section 21100(b)(3) and CEQA Guidelines Section 15126.2(b);

- Achieve a reduction in project-generated VMT below the regional average consistent with the 2017 Climate Change Scoping Plan (currently 15 percent) or meet a locally adopted SB 743 VMT target reflecting the recommendations provided in the Governor's Office of Planning and Research's *Technical Advisory on Evaluating Transportation Impacts in CEQA* (2018); and
- Achieve compliance with off-street electric vehicle requirements in the most recently adopted version of California Green Building Standards Code Tier 2.

The proposed project would not include natural gas appliances or natural gas plumbing. As discussed in Section 6, *Energy*, the proposed project would not result in wasteful, inefficient, or unnecessary energy usage as determined by the analysis required under PRC Section 21100(b)(3) and CEQA Guidelines Section 15126.2(b).

AS discussed further in Section 17, *Transportation,* the project would be expected to generate approximately 7.1 VMT per capita. The existing citywide average VMT per capita is 17.0; therefore, the project would have a significant impact if it would result in a VMT per capita that exceeds 15 percent below this level, or 14.5 VMT per capita. 7.1 VMT is below 14.5 VMT; therefore, the project would achieve a reduction in VMT of at least 15 percent below the regional average.

The most recently adopted version of the California Green Building Code Standards specifies Tier 2 electric vehicle requirements and requires 40 percent of the total number of parking spaces on a building site be EV charging-ready, 15 percent of which would include a Level 2 Charger installation. The proposed project would provide 268 on-site parking spaces; the project would be required to comply with the California Green Building Code, and 40 percent of these spaces (107 spaces) would be EV-ready charging spaces.

The proposed project would be consistent with the project design criteria listed above. Therefore, the project would not generate GHG emissions that may have a significant impact on the environment. Impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

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9 Hazards and Hazardous Materials

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
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 0.25 mile of an existing or proposed school?	☐	☐	☐	■
d. Be located on a site that is included on a list of hazardous material 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?	☐	☐	■	☐
e. For a project located in 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?	☐	☐	■	☐

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

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?

Construction

Project construction may include the temporary transport, storage, and use of potentially hazardous materials including fuels, lubricating fluids, cleaners, or solvents. As the project may involve the disturbance of soil, grading and excavation could also result in the upset of hazardous materials at the site. Project construction would also require heavy construction equipment, the operation of which could result in a spill or accidental release of hazardous materials, including fuel, engine oil, engine coolant, and lubricants. The transport, storage, labeling, use and disposal of any hazardous materials would be subject to federal, state, and local regulations, which would minimize risks associated with hazardous materials used during construction. Therefore, the potential to create a significant hazard to the public or environment from the use of fuels, engine oil, engine coolant, and lubricants during construction would be less than significant. Additionally, the NPDES permit requirements would ensure that impacts related to hazardous materials from spills would be reduced through the Construction General Permit BMPs, including use of straw wattles and other features.

Operation

Potential hazardous materials, such as fuels/oils, paint products, lubricants, solvents, cleaning products, and pesticides/herbicides may be used and/or stored on-site during operation of the proposed project. Operation of the proposed project would likely involve an incremental increase in the use of common household and commercial hazardous materials, such as cleaning and degreasing solvents, fertilizers, pesticides, and other materials used in residential and retail property and landscaping maintenance. Transport, use, and storage of hazardous materials during operation of the proposed project would be conducted pursuant to all applicable local, state, and federal laws, including Title 49 of the Code of Federal Regulations implemented by CCR Title 13. As required by California Health and Safety Code Section 25507, a business shall establish and implement a Hazardous Materials Business Emergency Plan for emergency response to a release or threatened release of a hazardous material. As required, the hazardous materials would be stored in locations according to compatibility and in storage enclosures (i.e., flammable material storage cabinets and biological safety cabinets) or in areas or rooms specially designed, protected, and contained for such storage, in accordance with applicable regulations.

Under the California Hazard Communication Regulation, chemical manufacturers, distributors, or importers must provide Safety Data Sheets (formerly Material Safety Data Sheets) for each hazardous chemical to downstream users to communicate information on these hazards. Businesses are also required to train employees on protocols in the event of a chemical spill or a leak from a sealed container (California Department of Industrial Relations 2020). Additionally, adherence to programs and regulations established by Marin County Public Works (the Certified Unified Program Agency for Marin County) would reduce the potential for contamination from hazardous materials through proper cleanup, disposal, and remediation. Marin County Public Works regulates and enforces the provisions of the Uniform Fire Code relating to hazardous materials, including the use and storage of hazardous materials that are ignitable, reactive, corrosive, or toxic. Businesses using

such materials are subject to permitting and inspection. Therefore, impacts due to reasonably foreseeable upset and accident conditions during operation of the project would be less than significant. However, due to the limited quantities of these materials to be used by the project, they are not considered hazardous to the public at large.

Therefore, impacts associated with construction and/or operation of the project would be less than significant.

LESS THAN SIGNIFICANT IMPACT

c. Would the project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school?

The project is not located within 0.25 mile of the any existing or proposed schools. Further, as described above under item (b), the transport, use and disposal of any hazardous materials would be subject to federal, state, and local regulations, which would minimize risks associated with hazardous materials used during construction. In operation, residential and retail uses would be unlikely to emit hazardous emissions and would not handle hazardous substances that would impact nearby schools. There would be no impact.

NO IMPACT

d. Would the project be located on a site that is included on a list of hazardous material 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?

The following databases and listings compiled pursuant to Government Code Section 65962.5 were queried on July 11, 2022, for known hazardous materials contamination at the project site:

- **United States Environmental Protection Agency (USEPA)**
  - Envirofacts database (2022)
- **State Water Resources Control Board (SWRCB)**
  - GeoTracker database (2022)
- **California Department of Toxic Substances Control (DTSC)**
  - EnviroStor database (2022a)
  - Cortese Hazardous Waste and Substances Site List (2022b)

According to a search of the USEPA Envirofacts database, the DTSC EnviroStor database, and a review of the Cortese list conducted in November 2022, the project site is not located on or within 0.25 mile of a hazardous materials site (USEPA 2022; DTSC 2022a; DTSC 2022b). Additionally, according to a search of the SWRCB GeoTracker database conducted in November 2022, the project site is not located on a hazardous materials site; however, there are nine listed hazardous materials sites within 0.25 mile of the project site (SWRCB 2022).

Of the nine sites, six have a listed status of “Completed – Case Closed,” which indicates that required remediation occurred and the project is no longer a hazards or hazardous materials concern. The remaining three active sites are described below:

- The Novato Bus Facility site, located approximately 150 feet northeast of the project site across the SMART tracks, is a bus storage and refueling station. Two leaking diesel underground storage tanks (USTs) were identified in 1977, and removal and remediation activities began in 1993. Site cleanup work began in 2006, and verification monitoring is ongoing as of June 2021.
- The Novato Unified School District Maintenance Facility, located approximately 1,000 feet south of the project site along Mulligan Boulevard, is a facility used for school district vehicle maintenance and refueling. One diesel UST, two gasoline USTs, and one oil UST were removed from the site in 1989, and petroleum hydrocarbons were observed on the groundwater surface. The site has been under assessment since 2001.
- The Unocal site, located approximately 750 feet southwest of the project site across Olive Avenue and Redwood Boulevard, operated as a vehicle service station until 1992. Three gasoline USTs were removed from the site in 1982. Several groundwater wells have been used to monitor the site, and in 2018 the SWRCB issued a Site Closure Report. Remediation was completed in 2020.

The project site is not immediately adjacent to these three active hazardous materials sites, and project construction and operation would not disturb these sites. Therefore, implementation of the proposed project would not create a significant hazard to the public or the environment due to hazardous material sites compiled pursuant to Government Code Section 65962.5. Impacts would be less than significant.

LESS THAN SIGNIFICANT 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?

The nearest public airport is Gnoss Field, located approximately two miles north of the project site. The project site is within the Gnoss Field area of influence, and is located in Aviation Safety Zone 5 – Referral Area Boundary as identified in the Marin County Airport Gnoss Field Airport Land Use Plan (County of Marin 1991). As discussed under the Planning Considerations section in the Airport Land Use Plan, lands within the Referral Area require a consistency review but the risks at this distance from the airport are minimal. Additionally, as discussed in Section 13, *Noise*, the project is within a conditionally compatible noise contour, and the project would include noise easements and sound insulation as part of the project design to decrease noise from aircrafts. Thus, construction and operation of the project would not expose people residing or working in the project area to airport-related safety hazards or excessive noise. Impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

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

Novato is a participant in the Marin County Multi-Jurisdictional Hazard Plan (2018). The project would not interfere with this adopted emergency response plan or the City of Novato Emergency Operations Plan. The project would not result in closure, rerouting or substantial alteration of streets or property access points during or after construction. Redwood Boulevard, which is an evacuation route, would not be closed during project construction or operation. Fire and emergency vehicle access would be provided from a private driveway off of Redwood Boulevard and Olive Avenue. Construction would occur solely on the site. Impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

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

As discussed further in Section 20, *Wildfire,* the project site is not located within a Very High Fire Hazard Severity Zone (VHFHSZ) or a State Responsibility Area. The nearest VHFHSZ is approximately three miles south of the site, within the Indian Valley, Ignacio Valley, and Pacheco Valley Preserves (CAL FIRE 2021). Further, the footprint of the project site is generally flat, and its topography would not enhance the spread of wildfire. The project would not involve the construction of new utility infrastructure that could exacerbate fire risk, such as overhead power lines, or roadways. Therefore, the project would not expose people or structures to a significant risk of loss, injury, or death involving wildland fires, and impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

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10 Hydrology and Water Quality

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
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 off-site;	☐	☐	■	☐
(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?	☐	☐	■	☐

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
e. Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	■	☐

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

Temporary site preparation, grading, and paving activities associated with construction of the project could result in soil erosion that may degrade water quality. However, on-site construction activities would be required to comply with the requirements of the City of Novato Municipal Code Chapter 7-4 (the City's Urban Runoff Pollution Prevention Ordinance) and National Pollutant Discharge Elimination System (NPDES) permit requirements. In addition, all of Marin County, including Novato, is under the jurisdiction of the Marin County Flood Control and Water Conservation District, which is responsible for managing stormwater and flooding problems in the County. The City adheres to the Marin County Stormwater Pollution Prevention Program (MCSTOPPP) to minimize the negative impacts of storm runoff. Specifically, proposed construction activities would be required to comply with Novato Municipal Code 7-4.10(c), which requires construction plans to include construction, erosion, and sediment control Best Management Practices (BMPs). Because the project would disturb more than one acre of land, the applicant would be required to obtain coverage under the NPDES Construction General Permit. The Construction General Permit requires the preparation and implementation of a SWPPP, which must be prepared before construction begins. The SWPPP includes specifications for BMPs implemented during construction to minimize or prevent sediment or pollutants in stormwater runoff, including but not limited to straw wattles, drain inlet protection, and anti-tracking strips. Compliance with NPDES permit requirements and erosion and sedimentation control measures included in the required SWPPP would prevent and minimize sediments and pollution in stormwater runoff to the extent feasible.

Although the project would increase the amount of impervious surface on the site, the site would be designed for runoff from impervious areas to be routed to biorientation facilities proposed on the site prior to being discharged into the existing stormwater drain systems. Additionally, the project would be required to comply with the City of Novato Municipal Code Sections 7-4.6 and 7-4.10(d), which requires the project site to be designed to control pollutants, pollutant loads, and runoff volume to the maximum extent feasible by minimizing impervious surface area and controlling runoff from impervious surfaces through infiltration, evapotranspiration, bioretention, and/or rainfall harvest and use. Adherence to these regulations would ensure that pollutants do not affect water quality. Therefore, impacts to water quality would be less than significant.

LESS THAN SIGNIFICANT IMPACT

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?

The North Marin Water District (NMWD) supplies water to the City of Novato from the Russian River, Stafford Lake and recycled water. The NMWD has no local, developed groundwater supply source (NMWD 2016). The project would not involve or require the use of groundwater and as discussed in Section 18, *Utilities and Service Systems,* the NMWD has an existing water supply available to serve the project.

The project site overlies Novato Valley Groundwater Basin, which is a low priority basin according to the Department of Water Resources (DWR) Sustainable Groundwater Management Act Basin Prioritization dashboard (DWR 2020). The proposed bioretention basins within the project would allow groundwater recharge and thus would not impede groundwater management of the basin. Impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

c.(i) 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 result in substantial erosion or siltation on- or off-site?

c.(ii) 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 substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?

c.(iii) 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 that would 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?

c.(iv) 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 impede or redirect flood flows?

As discussed in Section 4, Biological Resources, the project site contains an ephemeral stream/ditch in the central portion of the project site. The nearest water bodies to the project site include Rush Creek, located approximately 550 feet northeast of the project site, and John Slough, located approximately one mile northeast of the project site.

Construction of the project would result in filling and grading of the ephemeral stream/ditch, which would remove approximately 0.03 acre (1,300 square feet) of existing drainage features on the site. The project would add a net increase of 252,106 square feet of impervious surfaces to the project site, which would alter existing site drainage patterns (Appendix G). However, the project would include a stormwater system designed to maintain historical flows on the project site. The project proposes to construct 15 drainage management areas and bioretention facilities throughout the site in proposed landscaped areas. Stormwater from the buildings' roofs would be directed toward bioretention facilities via downspouts and a series of storm drain networks. The stormwater from the parking lots and other hardscaped areas would be directed toward bioretention facilities via

storm drain networks. As shown in the Preliminary Stormwater Control Plan (Appendix G), implementation of stormwater management features would ensure compliance with Chapter 7, Section 7-4 of Novato Municipal Code, which requires that development projects maintain or reduce the volume, velocity, and rate of runoff as compared to pre-development conditions.

Implementation of these project design features would capture and treat stormwater runoff, reduce the quantity and level of pollutants in runoff leaving the site, and would ensure project runoff does not exceed the capacity of stormwater drainage systems. The project would not increase the rate or amount of surface runoff in a manner that would result in on- or off-site flooding or exceed the capacity of the stormwater drainage system. This impact would be less than significant.

As discussed further under item (d), the project site is located within a 0.2 percent annual chance flood hazard zone (Federal Emergency Management Agency [FEMA] 2016). The project would redirect existing flood flows on the project site; however, implementation of stormwater and drainage management features as part of the project would direct flood flows such that runoff rates do not exceed pre-development conditions. Therefore, this impact would be less than significant.

LESS THAN SIGNIFICANT IMPACT

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

The project site is located within a 0.2 percent annual chance flood hazard zone, as mapped by FEMA (FEMA 2016). As discussed in Section 9, *Hazards and Hazardous Materials,* potential hazardous materials stored on site would be stored and used in accordance with federal, state, and local regulations, and would not substantially increase risk of pollutants due to project inundation.

The project site is not located in a tsunami hazard zone (California Department of Conservation 2022). The project site is located approximately 4.2 miles west of San Pablo Bay and 3.7 miles east of Stafford Lake, the nearest large bodies of water that would be subject to seiche. Due to the distance between the project site and San Pablo Bay and Stafford Lake, it is unlikely that flooding as a result of seiche would impact the project site.

Therefore, impacts resulting in flood hazard, tsunami, or seiche release of pollutants due to project inundation would be less than significant.

LESS THAN SIGNIFICANT IMPACT

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

The project site overlies the Novato Valley Groundwater Basin, which is a low priority basin according to the Department of Water Resources (DWR) Sustainable Groundwater Management Act Basin Prioritization dashboard (DWR 2020). Low priority basins are not required to adopt a groundwater sustainability plan. Additionally, the NMWD, which would provide water service to the project site, does not utilize the Novato Valley Groundwater Basin as a water source. Therefore, the project would not conflict or obstruct implementation of a sustainable groundwater management plan.

Construction of the proposed project could affect water quality through construction and operational activities. The project would be subject to the San Francisco Bay Basin Water Quality Control Plan (Basin Plan) (SWRCB 2018). The Basin Plan is the San Francisco Bay RWQCB's master water quality control planning document and identifies beneficial uses for surface water and

groundwater and establishes water quality objectives to attain those beneficial uses. The identified beneficial uses and the water quality objectives to maintain or achieve those uses are together known as water quality standards. Waterways within the project vicinity have many beneficial uses protected by the Basin Plan. A conflict with the Basin Plan would occur if the project would degrade the water quality of surface water or groundwater within the planning area such that the designated beneficial uses are no longer attainable.

As discussed under item (a), compliance with relevant water quality regulations and policies, including the City's NPDES Construction General Permit, would reduce the risk of water degradation from soil erosion and other pollutants related to project construction and operational activities. Therefore, the proposed project would not result in water quality impacts to nearby surface waters protected by the Basin Plan, would maintain the identified beneficial uses of nearby surface and groundwater, and would not conflict with the Basin Plan during construction or operation. Impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

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11 Land Use and Planning

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
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?	☐	☐	■	☐

a. Would the project physically divide an established community?

The project site is located north of the downtown Novato area and the surrounding area is developed with residential and commercial developments. Adjacent uses include a retail development to the south and an approved hotel and retail development to the north. South of Olive Avenue are commercial and retail developments and west of Redwood Boulevard are single-family and multi-family residences. Across Highway 101 to the east is a residential neighborhood with single-family residences. The project would not involve constructing bridges, roadways, or other linear features that would divide an established community. Neither would it result in the removal of existing roadways that could prevent access within an established community. Therefore, development of the site would not physically divide an established community and no impact would occur.

NO IMPACT

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?

The project site has a General Plan land use designation of CG. The proposed project includes a request for a General Plan Amendment to modify the site's land use designation from CG to MU. The northern parcel of the project site is currently zoned CG and the southern parcel is zoned CG:ADO. The project requires the rezoning of the entirety of the project site to MU but will retain the existing AHO overlay designation for the southern parcel.

The project would be consistent with the MU land use designation, which would allow for 10.0 to 20.0 dwelling units per gross acre in a mixed-use development. Housing development is only permitted in conjunction with either commercial and/or office uses. The project would include 14,000 square feet of commercial development and 178 dwelling units. Additionally, the project would develop 25 below-market-rate residential units, which would be consistent with the AHO overlay designation.

Plans, policies, or regulations adopted for the purpose of avoiding or mitigating an environmental effect include the City of Novato General Plan 2035, Novato Municipal Code, and the Marin County Airport Gnoss Field Airport Land Use Plan. The project's consistency with applicable goals, policies, and regulations of these applicable plans is demonstrated below in Table 14

Table 14 Project Consistency with Land Use Plans

Policy/Regulation	Consistency
City of Novato General Plan 2035	
ES 2a: NPDES Compliance. Ensure that new development complies with the requirements of the National Pollutant Discharge Elimination System (NPDES) and the applicable Urban Runoff Pollution Prevention Ordinance.	**Consistent.** As discussed in Section 10, *Hydrology and Water Quality,* the project would be required to comply with the requirements of the City's NPDES permit, which includes preparation of a Stormwater Pollution Prevention Plan.
ES 23: Trees in New Development. Require that the site planning, construction and maintenance of development preserve existing healthy trees and native vegetation on site to the maximum extent feasible. Replace trees and vegetation not able to be saved.	**Consistent.** As discussed in Section 4, *Biological Resources,* the project would include planting of approximately 112 trees, which would replace the 47 trees that would be required to be removed.
ES 25a: Reduce Resource Use in Buildings. Require new development to minimize impacts on the environment, including use of energy and water-efficient design features and materials consistent with local building codes and Water District regulations. Strive to achieve sustainable development that, through on-site conservation and renewable energy generation or off-site offsets, has no increased demand on energy and water resources pursuant to the Water District's Urban Water Management Plan.	**Consistent.** As discussed in Section 6, *Energy*, the project would be required to comply with all standards set in the latest iteration of the California Building Standards Code (California Code of Regulations Title 24), which would minimize the wasteful, inefficient, or unnecessary consumption of energy resources by the built environment during operation. California's CALGreen standards (California Code of Regulations Title 24, Part 11) require implementation of energy-efficient light fixtures and building materials into the design of new construction projects. Furthermore, the current Building Energy Efficiency Standards (California Code of Regulations Title 24, Part 6) require newly constructed buildings to meet energy performance standards set by the CEC. These standards are specifically crafted for new buildings to result in energy efficient performance so that the buildings do not result in wasteful, inefficient, or unnecessary consumption of energy.
NS 1: Compatibility of New Development. Protect people in new development from excessive noise by applying the Land Use Compatibility Standards in Figure LW-5 in locating and designing new development.	**Consistent.** As discussed in Section 13, *Noise,* the project would not expose future project residents and users to excessive noise and would be consistent with land use compatibility standards.
Novato Municipal Code	
Chapter 4-1 Building Code [etc]. This section adopts the California Building Code by reference.	**Consistent.** As described in Section 6, *Energy,* the project would be consistent with the California Green Building Standards Code.

Policy/Regulation	Consistency
Chapter 7-4, Urban Runoff Pollution Prevention. This section intends to facilitate the health and safety of Novato's citizens and to protect and enhance watercourses, fish, and wildlife habitat by minimizing discharges other than storm runoff to storm drains or water courses.	**Consistent.** As discussed in Section 10, *Hydrology and Water Quality,* the project would be required to comply with the requirements of the City's NPDES permit, which includes preparation of a Stormwater Pollution Prevention Plan. Additionally, the project would include drainage management areas and bioretention basins, which would ensure that stormwater is treated prior to discharge into storm drain systems. The project would be required to comply with the provision of this ordinance that requires development projects to maintain or reduce stormwater volumes as compared to pre-development conditions. Therefore, the project would be consistent with this ordinance.
Division 19.28, Landscaping. This section establishes landscaping standards to mitigate the effects of urbanization on the environment.	**Consistent.** The vegetation planned for project landscaping are designated as medium to low water use plants. The project would be required to comply with landscaping water efficiency regulations as established by this division.
Marin County Airport Gnoss Field Airport Land Use Plan	
4.1.3 Aircraft Noise Compatibility. New residential development should not be allowed within the 60 dB CNEL contour.	**Consistent.** As discussed in Section 9, *Hazards and Hazardous Materials,* and Section 13, *Noise,* the project site is not within noise contours established by the airport land use plan.

Sources: City of Novato 1996 and 2015; Marin County Land Use Commission 1991

As demonstrated above in Table 14, the project would be consistent with plan goals, policies, and regulations adopted for the purpose of avoiding or mitigating an environmental effect. Impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

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12 Mineral Resources

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
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?	☐	☐	☐	■

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?

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?

The project site is in an urbanized area of Novato where there are no active mining operations or known mineral resources present. The project site is not located within a Mineral Resource Zone (Stinson et al. 1982). In addition, Novato's General Plan 2035 does not identify mineral resources within the vicinity of the project area (City of Novato 2020a). No mineral resources would be altered or displaced by the project. There would be no impact.

NO IMPACT

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13 Noise

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
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?	☐	☐	■	☐
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?	☐	☐	■	☐

Overview of Noise and Vibration

Noise

Sound is a vibratory disturbance created by a moving or vibrating source, which is capable of being detected by the hearing organs. Noise is defined as sound that is loud, unpleasant, unexpected, or undesired and may therefore be classified as a more specific group of sounds. The effects of noise on people can include general annoyance, interference with speech communication, sleep disturbance, and, in the extreme, hearing impairment (California Department of Transportation [Caltrans] 2013).

HUMAN PERCEPTION OF SOUND

Noise levels are commonly measured in decibels (dB) using the A-weighted sound pressure level (dBA). The A-weighting scale is an adjustment to the actual sound pressure levels so that they are consistent with the human hearing response. Decibels are measured on a logarithmic scale that quantifies sound intensity in a manner similar to the Richter scale used to measure earthquake magnitudes. A doubling of the energy of a noise source, such as doubling of traffic volume, would increase the noise level by 3 dB; dividing the energy in half would result in a 3 dB decrease (Caltrans 2013).

Human perception of noise has no simple correlation with sound energy: the perception of sound is not linear in terms of dBA or in terms of sound energy. Two sources do not "sound twice as loud" as one source. It is widely accepted that the average healthy ear can barely perceive changes of 3 dBA, increase or decrease (i.e., twice the sound energy); that a change of 5 dBA is readily perceptible (8 times the sound energy); and that an increase (or decrease) of 10 dBA sounds twice (half) as loud (10.5 times the sound energy) (Caltrans 2013).

SOUND PROPAGATION AND SHIELDING

Sound changes in both level and frequency spectrum as it travels from the source to the receiver. The most obvious change is the decrease in the noise level as the distance from the source increases. The manner by which noise reduces with distance depends on factors such as the type of sources (e.g., point or line), the path the sound will travel, site conditions, and obstructions.

Sound levels are described as either a "sound power level" or a "sound pressure level," which are two distinct characteristics of sound. Both share the same unit of measurement, the dB. However, sound power (expressed as L_{pw}) is the energy converted into sound by the source. As sound energy travels through the air, it creates a sound wave that exerts pressure on receivers, such as an eardrum or microphone, which is the sound pressure level. Sound measurement instruments only measure sound pressure, and noise level limits are typically expressed as sound pressure levels.

Noise levels from a point source (e.g., construction, industrial machinery, air conditioning units) typically attenuate, or drop off, at a rate of 6 dBA per doubling of distance. Noise from a line source (e.g., roadway, pipeline, railroad) typically attenuates at about 3 dBA per doubling of distance (Caltrans 2013). Noise levels may also be reduced by intervening structures; the amount of attenuation provided by this "shielding" depends on the size of the object and the frequencies of the noise levels. Natural terrain features, such as hills and dense woods, and man-made features, such as buildings and walls, can significantly alter noise levels. Generally, any large structure blocking the line of sight will provide at least a 5-dBA reduction in source noise levels at the receiver (Federal Highway Administration [FHWA] 2011). Structures can substantially reduce exposure to noise as well. The FHWA's guidance indicates that modern building construction generally provides an exterior-to-interior noise level reduction of 10 dBA with open windows and an exterior-to-interior noise level reduction of 20 to 35 dBA with closed windows (FHWA 2011).

DESCRIPTORS

The impact of noise is not a function of loudness alone. The time of day when noise occurs and the duration of the noise are also important factors of project noise impact. Most noise that lasts for more than a few seconds is variable in its intensity. Consequently, a variety of noise descriptors have been developed. The noise descriptors used for this study are the equivalent noise level (L_{eq}), Day-Night Average Level (DNL; may also be symbolized as L_{dn}), and the community noise equivalent level (CNEL; may also be symbolized as L_{den}). The L_{90} is the sound level exceeded 90 percent of the time. The L_{max} is the maximum noise level reached during a single noise event.

L_{eq} is one of the most frequently used noise metrics; it considers both duration and sound power level. The L_{eq} is defined as the single steady-state A-weighted sound level equal to the average sound energy over a time period. When no time period is specified, a 1-hour period is assumed. The L_{max} is the highest noise level within the sampling period, and the L_{min} is the lowest noise level within the measuring period. Normal conversational levels are in the 60 to 65-dBA L_{eq} range; ambient noise levels greater than 65 dBA L_{eq} can interrupt conversations (Federal Transit Administration [FTA] 2018).

Noise that occurs at night tends to be more disturbing than that occurring during the day. Community noise is usually measured using Day-Night Average Level (L_{DN}), which is the 24-hour average noise level with a +10 dBA penalty for noise occurring during nighttime hours (10:00 p.m. to 7:00 a.m.). Community noise can also be measured using Community Noise Equivalent Level (CNEL or L_{DEN}), which is the 24-hour average noise level with a +5 dBA penalty for noise occurring from 7:00 p.m. to 10:00 p.m. and a +10 dBA penalty for noise occurring from 10:00 p.m. to 7:00 a.m. (Caltrans 2013).[6] The relationship between the peak-hour L_{eq} value and the L_{DN}/CNEL depends on the distribution of noise during the day, evening, and night; however noise levels described by L_{DN} and CNEL usually differ by 1 dBA or less. Quiet suburban areas typically have CNEL noise levels in the range of 40 to 50 CNEL, while areas near arterial streets are in the 50 to 60+ CNEL range (FTA 2018).

Groundborne Vibration

Groundborne vibration of concern in environmental analysis consists of the oscillatory waves that move from a source through the ground to adjacent buildings or structures and vibration energy may propagate through the buildings or structures. Vibration may be felt, may manifest as an audible low-frequency rumbling noise (referred to as groundborne noise), and may cause windows, items on shelves, and pictures on walls to rattle. Although groundborne vibration is sometimes noticeable in outdoor environments, it is almost never annoying to people who are outdoors. The primary concern from vibration is that it can be intrusive and annoying to building occupants at vibration-sensitive land uses and may cause structural damage.

Typically, groundborne vibration generated by manmade activities attenuates rapidly as distance from the source of the vibration increases. Vibration amplitudes are usually expressed in peak particle velocity (PPV) or root mean squared (RMS) vibration velocity. The PPV and RMS velocity are normally described in inches per second (in/sec). PPV is defined as the maximum instantaneous positive or negative peak of a vibration signal. PPV is often used as it corresponds to the stresses that are experienced by buildings (Caltrans 2020).

High levels of groundborne vibration may cause damage to nearby buildings or structures; at lower levels, groundborne vibration may cause minor cosmetic (i.e., non-structural damage) such as cracks. These vibration levels are nearly exclusively associated with high impact activities such as blasting, pile-driving, vibratory compaction, demolition, drilling, or excavation. The American Association of State Highway and Transportation Officials (AASHTO) has determined vibration levels with potential to damage nearby buildings and structures; these levels are identified in Table 15.

Table 15 AASHTO Maximum Vibration Levels for Preventing Damage

Type of Situation	Limiting Velocity (in/sec)
Historic sites or other critical locations	0.1
Residential buildings, plastered walls	0.2–0.3
Residential buildings in good repair with gypsum board walls	0.4–0.5
Engineered structures, without plaster	1.0–1.5

Source: Caltrans 2020

[6] Because DNL and CNEL are typically used to assess human exposure to noise, the use of A-weighted sound pressure level (dBA) is implicit. Therefore, when expressing noise levels in terms of DNL or CNEL, the dBA unit is not included.

Numerous studies have been conducted to characterize the human response to vibration. The vibration annoyance potential criteria recommended for use by Caltrans, which are based on the general human response to different levels of groundborne vibration velocity levels, are described in Table 16.

Table 16 Vibration Annoyance Potential Criteria

	Vibration Level (in/sec PPV)	
Human Response	Transient Sources	Continuous/ Frequent Intermittent Sources[1]
Severe	2.0	0.4
Strongly perceptible	0.9	0.10
Distinctly perceptible	0.25	0.04
Barely perceptible	0.04	0.01

in/sec = inches per second; PPV = peak particle velocity

[1] Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Source: Caltrans 2020

Project Noise Setting

Sensitive Receivers

Noise exposure goals for various types of land uses reflect the varying noise sensitivities associated with those uses. The City of Novato General Plan 2035 states that noise-sensitive receivers generally include schools, hospitals, libraries, group care facilities, and convalescent homes (City of Novato 2020). The closest sensitive receivers to the project site are single-family homes located approximately 120 feet east across the railroad tracks.

Noise Measurements

To characterize ambient sound levels at and near the project site, noise measurements were conducted by Rincon Consultants. The most prevalent source of noise in the project site vicinity is vehicular traffic on Redwood Boulevard to the west and Olive Avenue to the south. Two 15-minute sound level measurements were conducted on October 13, 2021, between 12:34 p.m. through 1:28 p.m. The first noise measurement (ST-1) was conducted near the southeast corner of the project site, approximately 175 feet east of the railroad tracks and 20 feet north of Olive Avenue. The second noise measurement (ST-2) was conducted on the western boundary of the project site across from Pinheiro Circle, approximately 500 feet north of the Redwood Boulevard and Olive Avenue intersection and 10 feet east of Redwood Boulevard. Table 17 summarizes the results of the short-term noise measurements.

Table 17 Project Site Vicinity Sound Level Monitoring Results- Short-Term

Measurement Location/Height Above Ground		Sample Times	L_{eq} (dBA)	L_{max} (dBA)
ST-1	5 feet	12:34 – 12:49 p.m.	61.6	72.7
ST-2	5 feet	1:13 – 1:28 p.m.	65.7	81.0

ST = short term; L_{eq} = average noise level equivalent; dBA = A-weighted decibel; L_{min} = minimum instantaneous noise level; L_{max} = maximum instantaneous noise level

Regulatory Setting

City of Novato General Plan 2035

The City of Novato's General Plan 2035 Noise Element contains goals and policies that are designed to include noise control in the planning process in order to maintain compatible land uses with acceptable environmental noise levels and protect Novato residents from excessive noise. The Noise Element establishes the following goals and policies that would apply to the project:

Goal N 1: Maintain a Quiet Community

Objective NS 1: Compatibility of New Development

Protect people in new development from excessive noise by applying the Land use Compatibility Standards in Figure LW-5 in locating and designing new development.

NS 1a: **Acoustical Compatibility Study**. Require an acoustical study for all new residential projects with a future exterior noise exposure of 60 dBA L_{dn} or greater as shown on Figure LW-6 and consider mitigation measures to lower noise exposure.

NS 1b: Indoor Noise Standard. The maximum acceptable interior noise level for all new residential development, including hotels and motels, is 45 dBA L_{dn}.

NS 1c: Residential Near Gnoss Field. An acoustical investigation and noise mitigation should be considered for residential development within the 55 dBA CNEL contour. For any residential development where outdoor noise exceeds 60 dBA L_{dn} require deed disclosure to all residents of the noise levels anticipated.

NS 1d: Exterior Noise Standard. New residential development should be located in areas where outdoor noise levels are no greater than 60 dBA L_{dn} in areas where outdoor use is a major consideration, such as backyards in single family developments and recreation areas in multifamily developments. This standard should not be applied to outdoor areas such as small decks and balconies typically associated with multifamily residential developments, which can have a higher standard of 65 dBA L_{dn}. This standard shall not apply to outdoor areas for residences in mixed use developments. Additional standards may be applied on a case-by-case basis where supported by acoustical analysis to mitigate the effects of single-event noise sources such as aircraft noise.

Objective NS 2: Noise Impacts of Development

Prevent land uses which increase surrounding noise levels above acceptable standards.

NS 2a: Acoustic Impact Study. Require acoustical studies and mitigation measures for new developments and transportation improvements which affect sensitive receptors such as schools, hospitals, libraries, group care facilities, and convalescent homes

NS 2b: Noise Mitigation. Consider mitigation measures for new projects or land uses that would cause a substantial increase in noise (i.e., cause an increase above 60 dBA L_{dn} or cause an increase in 5 dBA L_{dn} or more in the noise ambient noise levels) in adjacent residential areas or in residential areas affected by traffic generated by the proposed project.

Objective NS 3: Noise Mitigation – Sound Walls

To minimize noise impacts, consider site planning options prior to consideration of sound wall construction, such as increasing the distance from the noise source and receiver, careful building placement and taking advantage of the natural shape and terrain of the landscape. Avoid sound walls where possible, but where necessary, reduce visual impacts with interesting wall design and extensive landscaping.

The City of Novato General Plan 2035's Noise Element also contains Noise and Land Use Compatibility Guidelines which dictates noise exposure levels from normally acceptable to clearly unacceptable for different land uses.

Table 18 Land Use Compatibility Standards

	Community Noise Exposure—dBA Ldn						
Land Use Category	**50**	**55**	**60**	**65**	**70**	**75**	**80**
Residential, hotels and motels[1]							
Outdoor sports and recreation, neighborhood parks and playgrounds, golf courses, riding stables, cemeteries							
Schools, libraries, churches, hospitals, nursing homes, museums, meeting halls							
Office buildings, business commercial and professional, mixed use							
Industrial, manufacturing, utilities, agriculture							
Auditoriums, concert halls, amphitheaters, sports arenas							

Normally Acceptable. Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Conditionally Acceptable. New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features are included in the design.

Unacceptable. New construction or development should generally not be undertaken because mitigation is usually not feasible.

Source: City of Novato 2020

City of Novato Municipal Code

NMC Section 19.22.070 prohibits exterior noise that exceeds 45 dBA between 10:00 p.m. and 6:00 a.m. and exterior noise that exceeds 60 dBA between 6:00 a.m. and 10:00 p.m. at residential land uses and exterior noise that exceeds 60 dBA between 10:00 p.m. and 6:00 a.m. and exterior noise that exceeds 70 dBA between 6:00 a.m. and 10:00 p.m. at commercial land uses, as shown in

Table 19. These maximum noise levels may not be exceeded for an aggregate period of more than three minutes within a one-hour time period or by more than 20 dBA at any time. Section 19.22.070(B) exempts authorized construction activities from these noise level requirements between 7:00 a.m. and 6:00 p.m. on weekdays and between 10:00 a.m. and 5:00 p.m. on Saturdays.

Table 19 City of Novato Municipal Code Table 3-5: Allowable Exterior Noise Levels[1]

Type of Land Use	Time Interval	Maximum Noise Level (dBA)[2]
Commercial[4]	10:00 p.m. to 6:00 a.m.	60
	6:00 a.m. to 10:00 p.m.	70
Industrial or Manufacturing	Any time	70

[1] Each of the noise limits specified shall be reduced by 5 dBA for impulse or simple tone noises. If the ambient noise exceeds the resulting standard, the ambient shall be thestandard.

[2] Maximum noise levels shall not be exceeded for an aggregate period of more than three minutes within a one-hour time period or by more than 20 dBA at anytime.

[3] Residential standards apply to sensitive receivers such as schools, hospitals, libraries, group care facilities, and convalescent homes. These uses may require specialmitigation.

[4] Commercial standards apply to Mixed Use Districts

Source: City of Novato Municipal Code Section 19.22.070, Table 3-5

Construction is not allowed at any time on Sunday or a federal holiday unless authorized in writing by the Community Development Director. Construction and grading are not allowed to occur between 6:00 p.m. to 7:00 a.m. on weekdays. Construction and grading are permitted on Saturdays between 10:00 a.m. and 5:00 p.m.

NMC Section 19.22.090 prohibits groundborne vibration that is perceptible without instruments to the average person along or beyond the property line of a subject parcel, and exempts vibrations from temporary construction, demolition, and vehicles that enter or leave the parcel.

Marin County Gnoss Field Airport Land Use Plan

The project site is within the influence area of the Marin County Gnoss Field Airport Land Use Plan (1991), which is the area that is within two miles of the future boundary of the Gnoss Field Airport. The following policies would apply to the project (Marin County Airport Land Use Commission 1991):

- **Policy NC-1.4: Residential Land Use**. New residential development should be prohibited within the 60 dB CNEL noise contour.
- **Policy NC-1.5: Noise Easements**. As a condition of approval, noise easements should be granted to the County or any zoning changes or new residential development within the 55 dB or higher CNEL noise contour.
- **Policy NC-2.6: Acoustical Study**. As a condition of approval, an acoustical study shall be required for any proposed new residential development within the 55 dB CNEL noise contour. Recommendations in the study regarding sound insultation shall be implemented.

Noise Level Increases over Ambient Noise Levels

The operational and construction noise limits used in this analysis are set at reasonable levels at which a substantial noise level increase as compared to ambient noise levels would occur. Operational noise limits are lower than construction noise limits to account for the fact that

permanent noise level increases associated with continuous operational noise sources typically result in adverse community reaction at lower magnitudes of increase than temporary noise level increases associated with construction activities that occur during daytime hours and do not affect sleep. Furthermore, these noise limits are tailored to specific land uses; for example, the noise limits for residential land uses are lower than those for commercial land uses. The difference in noise limits for each land use indicates that the noise limits inherently account for typical ambient noise levels associated with each land use. Therefore, an increase in ambient noise levels that exceeds these absolute limits would also be considered a substantial increase above ambient noise levels. As such, a separate evaluation of the magnitude of noise level increases over ambient noise levels would not provide additional analytical information regarding noise impacts and therefore is not included in this analysis.

Impact Analysis

a. 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?

Construction Noise

Construction activity would generate temporary noise in the project site vicinity, exposing surrounding sensitive receivers to increased noise levels during project construction. Construction noise would be generated by heavy-duty diesel construction equipment used for site preparation, grading, building construction, and paving activities. Each phase of construction has a specific equipment mix and associated noise characteristics, depending on the equipment used during that phase. Construction noise would typically be higher during the more equipment-intensive phases of initial construction (i.e., site preparation, and grading work) and would be lower during the later construction phases (i.e., building construction and paving). Construction noise was estimated using reference noise levels and equipment use factors from the FHWA Roadway Construction Noise Model (RCNM; 2006).

Noise impacts from construction equipment are typically assessed from the center of the equipment activity area over the time period of a construction day (e.g., construction site, site preparation area, grading area, etc.). Maximum hourly construction noise levels were estimated to be 75.6 dBA L_{eq} at a distance of 120 feet (see Appendix H).

Pursuant to NMC Section 19.22.070, noise generated by construction activities is exempt from compliance with the noise level limits contained in NMC Section 19.22.070 if construction occurs between the hours of 7:00 a.m. to 6:00 p.m., Monday through Friday and 10:00 a.m. to 5:00 p.m. on Saturday. However, for purposes of analyzing impacts from this project, the FTA *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018) criteria were used. The FTA provides reasonable criteria for assessing construction noise impacts based on the potential for adverse community reaction. For commercial and residential uses, the daytime noise threshold is 85 dBA L_{eq} and 80 dBA $L_{eq,}$ respectively, for an 8-hour period (FTA 2018).

The closest sensitive receivers to project construction would be single-family residences approximately 120 feet east of the project site at its closest point. The townhomes on the west side of Redwood Boulevard. are approximately 200 feet from the project site. Over the course of a typical construction day, the construction equipment would be mobile and is estimated to operate at an average distance of 150 feet from the nearest sensitive receivers. Therefore, construction

noise levels would be approximately 75.6 dBA L_{eq} at the nearest sensitive receivers, which not exceed the daytime construction noise threshold for residential land uses of 80 dBA L_{eq}. Construction noise levels at other nearby sensitive receivers would be substantially lower than the noise levels at the single-family residences due to distance attenuation. Therefore, construction noise impacts would be less than significant.

Operational Noise

The project would generate operational noise that would be typical of residential uses, including heating, ventilation, and air conditioning (HVAC) equipment, parking lot activities, and solid waste collection and recycling operations. Noises produced by the project would be similar in character to the existing noise environment associated with surrounding residential uses.

HVAC Noise

The primary source of on-site operational noise from the project would be heating, ventilation, and air conditioning equipment (HVAC) equipment. Noise levels generated by a five-ton HVAC equipment system can reach up to 70 dBA L_{eq} at a distance of five feet from the source (Illingworth & Rodkin, Inc. 2009). Assuming approximately one ton of cooling capacity would be required for every 600 square feet, the project would require approximately 77 five-ton units. HVAC equipment would mostly be located on the rooftop of the proposed buildings. Table 20 shows the distribution of square footage between Building A, B, and C shown on the project site plans. These assumptions were used to evaluate the project's potential to result in on-site operational noise impacts. To account for the varying distance of HVAC units from the nearest sensitive receiver, HVAC unit noise was measured from the center of each building to the nearest sensitive receiver. The nearest sensitive receiver (i.e., the residence to the northwest of the project site) is located approximately 240 feet from the center of proposed Building A. The calculation assumes 16 HVAC units on Building A. At this distance, HVAC units on Building A would generate a noise level of approximately 48 dBA L_{eq} at the nearest sensitive receivers. The nearest sensitive receiver (residential) to the east of the project site is located approximately 350 feet from the center of proposed Building C. The calculation assumes 24 HVAC units on Building C. At 350 feet, HVAC units on Building C would generate a noise level of approximately 47 dBA L_{eq} at the noise sensitive receivers to the southeast of the project site. The nearest commercial building (i.e., Trader Joe's to the southwest of the project site) is located approximately 205 feet, 260 feet, and 225 feet from the center of Building A, B, and C, respectively. The combined noise level due to HVAC units on Building A, B, and C would generate a noise level of approximately 55 dBA $L_{eq.}$ Operational noise impacts would exceed the City's 45 dBA exterior noise limit between 10 p.m. and 6 a.m. for residential uses and would require mitigation. The project would not exceed the City's 60 dBA exterior noise limit for commercial uses.

Table 20 Operational HVAC Noise

Receiver Group	Operational Noise Source	Number of HVAC Units (5 Ton)	Distance (feet)	Noise Levels (dBA L_{eq})	Combined Noise Levels (dBA L_{eq})	Exceed Threshold?[1]
Residence to the northwest of the project site	Building A	16	240	48	48	Yes
Residence to the southeast of the project site	Building C	24	350	47	47	Yes
Commercial Building southwest of the project parcel lot	Building A	16	205	50	55	No
	Building B	37	260	51		
	Building C	24	225	51		

dBA=A-weighted decibels; L_{eq}=equivalent continuous noise level over a stated period of time

[1]In accordance with City of Novato Municipal Code, Section 19.22.070, the operational noise level limits impacting residential uses are 60 dBA L_{eq} during the daytime hours (6:00 a.m. to 10:00 p.m.) and 45 dBA L_{eq} during the nighttime hours (10:00 p.m. to 6:00 a.m.). The operational noise limits impaction commercial uses are 70 dBA L_{eq} during daytime hours (6:00 a.m. to 10:00 p.m.) and 60 dBA L_{eq} during the nighttime hours (10:00 p.m. to 6:00 a.m.).

Mitigation Measure

NOI-1 HVAC Noise Reduction

The project applicant shall reduce HVAC equipment noise levels at noise-sensitive uses through noise control measures such as, but not limited to:

- Mechanical equipment screening (e.g., parapet walls of sufficient height to block line of sight)
- Equipment setbacks
- Silencers
- Acoustical louvers
- And other sound attenuation devices as made available

If a method other than mechanical equipment screening (e.g., parapet walls) is chosen, a project-specific design plan demonstrating that the noise level from operation of HVAC units would not generate noise levels that exceed 45 dBA L_{eq} at noise-sensitive receivers shall be completed.

Generally, blocking the line of sight from a noise source to a receiver will provide at least a 5 dBA reduction in source noise levels at the receiver (FHWA 2011). Therefore, with the implementation of Mitigation Measure NOI-1, operational HVAC noise levels would be reduced to below 45 dBA L_{eq} at adjacent exterior use areas of noise-sensitive receivers. Impacts would be less than significant with mitigation.

Off-Site Roadway Noise

As discussed in Section 17, *Transportation*, project operation would add approximately 1,349 average daily trips (ADT) to the nearby roadways. Traffic noise impacts are evaluated in accordance with the City's Noise and Land Use Compatibility Guidelines (see Table 17-3) (City of Novato 2015) and community response to changes in ambient noise levels. As discussed under *Overview of Noise and Vibration*, the average healthy ear can barely perceive an increase of up to 3 dBA in noise levels, and a change of 5 dBA is readily perceptible. Based on this information, off-site traffic noise impacts would be significant if project-related traffic would result if one of the following would occur:

- A noise level increase of 5 dBA or greater if noise levels remain within the same land use compatibility classification at the sensitive receiver;
- A noise level increase of 3 dBA or greater if noise levels change the land use compatibility classification of the sensitive receiver;
- Any increase in noise levels if existing noise levels fall within the "normally unacceptable" or "clearly unacceptable" ranges at the sensitive receiver.

The project would generate new vehicle trips that would increase noise levels on nearby roadways. As discussed in the project Traffic Impact Study, the project is anticipated to generate 1,349 daily vehicle trips. The TIA study area includes roadway segments along Redwood Boulevard and San Marin Dr-Atherton Avenue, Golden Gate PI-Ranch Drive, Olive Avenue, Vallejo Avenue West, Vallejo Avenue East, and Grant Avenue (Appendix B). Roadway segment volumes with and without project-generated traffic are shown in Table 21.

Table 21 Off-Site Traffic Volume Increases

Roadway Segment	Existing Traffic Volumes (ADT)	Existing Traffic Noise (L_{dn})	Future Plus Project Traffic Volumes (ADT)	Future Plus Project Traffic Noise (L_{dn})
Redwood Boulevard to San Marin Dr-Atherton Avenue	11,840	68.5	17,590	70.2
Redwood Boulevard to Golden Gate Pi-Ranch Drive	11,210	68.3	17,020	70.1
Redwood Boulevard to Olive Avenue	15,180	69.6	19,940	70.8
Redwood Boulevard to Vallejo Avenue (West)	5,130	64.9	8,300	67.0
Redwood Boulevard to Vallejo Avenue (East)	6,420	65.8	9,450	67.5
Redwood Boulevard to Grant Avenue	14,950	69.5	21,770	71.1

The project would not result in alterations to roadway alignments or substantially change the vehicle classifications mix on local roadways. Therefore, the primary factor affecting off-site noise levels would be increased traffic volumes. Noise levels with and without project generated traffic were developed based on algorithms and reference levels from the FHWA's Traffic Noise Model. Noise levels with and without project-generated traffic are shown in Table 21. As shown, traffic noise increases would not exceed the 3 dBA criterion for offsite traffic noise impacts. Impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

b. Would the project result in generation of excessive groundborne vibration or groundborne noise levels?

Construction

Project construction would not involve activities typically associated with excessive groundborne vibration such as pile driving or blasting. The equipment utilized during project construction that would generate the highest levels of vibration would include rollers, loaded trucks, and bulldozers. The City of Novato has not adopted standards to assess vibration impacts during construction and operation. However, Caltrans has developed limits for the assessment of vibrations from transportation and construction sources. The Caltrans vibration limits are reflective of standard practice for analyzing vibration impacts on structures from continuous and intermittent sources. The thresholds of significance used in this analysis to evaluate vibration impacts are based on these impact criteria, as summarized in Table 22.

Project construction may require the operation of vibratory equipment such as jackhammers, vibratory rollers, loaded trucks, and bulldozers within 120 feet of the single-family residences during construction. As shown in Table 22, vibration levels from individual pieces of construction equipment would not exceed the threshold at which damage can occur to residential structures, 0.20 PPV, or the threshold at which transient vibration sources would be distinctly perceptible to 0.25 PPV. Construction vibration levels at all other buildings in the immediate vicinity, including residences to the east, would be less than the levels shown in Table 22 because vibration levels would attenuate with distance. Furthermore, in accordance with NMC Section 19.22.070 and Section 5-16.02(i), project construction would be required to occur during daytime hours and would not disturb adjacent residences during sensitive hours of sleep. Therefore, construction vibration impacts would be less than significant.

Table 22 Vibration Levels at Sensitive Receivers

Equipment	Estimated PPV at Nearest Building (48 feet)
Vibratory Roller	0.01
Hoe Ram	0.04
Large Bulldozer	0.04
Caisson Drilling	0.04
Loaded Trucks	0.03
Jackhammer	0.01
Small Bulldozer	<0.01
Threshold	**0.25**
Threshold Exceeded?	No

PPV = peak particle velocity

See Appendix H for vibration analysis worksheets.

Operation

As a residential development, the proposed project would not generate significant stationary sources of vibration, such as manufacturing or heavy equipment operations. No operational vibration impact would occur.

LESS THAN SIGNIFICANT 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?

The airport closest to the project site is the Gnoss Field Airport, which is located approximately two miles northeast of the project site. Although the project site is located within the influence area of the airport, it is outside of the noise contours as shown in Figure 3.2 of the Marin County Gnoss Field Airport Land Use Compatibility Plan (Marin County Planning Department 1991). Therefore, due to the noise contours and project design, project construction and operation would not expose workers nor future users of the project to excessive noise levels from the airport. Impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

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14 Population and Housing

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Induce substantial unplanned population growth in an area, either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through extension of roads or other infrastructure)?	☐	☐	■	☐
b. Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	■

a. 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)?

The project would directly induce population growth in the area through the proposed construction of 178 dwelling units, which would result in approximately 454 new residents.[7] Novato's current population is approximately 53,486 persons (California Department of Finance 2021). Plan Bay Area anticipates that the population of Novato will grow to 56,295 by 2040 (Association of Bay Area Governments and Metropolitan Transportation Commission 2018). The Novato General Plan 2035 anticipates that the population of Novato will grow to 55,360 by 2035 (City of Novato 2020a). The population increase that the project would generate, therefore, falls within the growth projected by Plan Bay Area and General Plan 2035. Therefore, the proposed project would not directly or indirectly induce substantial, unplanned population growth. Impacts would be less than significant.

LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

b. Would the project displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?

The project site does not currently contain housing or habitable structures, and the project would not result in the removal of housing. Therefore, the project would not displace people or housing. There would be no impact.

NO IMPACT

[7] 178 dwelling units multiplied by 2.55 persons per household rate equates to approximately 454 residents (California Department of Finance 2021).

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15 Public Services

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a.	Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the 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:				
	1 Fire protection?	☐	☐	■	☐
	2 Police protection?	☐	☐	■	☐
	3 Schools?	☐	☐	■	☐
	4 Parks?	☐	☐	■	☐
	5 Other public facilities?	☐	☐	■	☐

a.1. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered fire protection facilities, or the need for new or physically altered fire protection facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives?

The Novato Fire Protection District (NFPD) provides fire protection services, emergency medical services, and fire and rescue response for vehicle and hazardous materials incidents to Novato. The City of Novato and the NFPD operate a joint Emergency Operations Center in the NFPD Administrative office at 95 Rowland Way (City of Novato 2020a). Based on the 2009-2013 NFPD Strategic Plan, the district provides emergency services to the area from five stations, comprising of 88 personnel (66 firefighters, 9 command staff and 13 administrative staff) (NFPD 2009).

Station 61 is the nearest fire station to the project site, approximately one mile south of the site at 7025 Redwood Boulevard. This is the largest station in the district housing six firefighting personnel and the Battalion Chief responsible for training and education. The station also has a three-person paramedic engine company and paramedic staff that offer advanced life support (NFPD 2021).

According to the City of Novato Emergency Operations Plan, the NFPD's goal is to maintain overall total response time of eight minutes or less 80 percent of the time for all dispatch emergencies and

have five fire stations with adequate equipment to meet local needs (NFPD 2009). No future plans for expansion or renovation of NFPD facilities are in place.

As discussed in Section 14, *Population and Housing*, the project would involve the construction of 178 new multi-family housing units to accommodate 454 persons. The project site is located in the NFPD service area and approximately one mile from a NFPD fire station. Therefore, the NFPD would respond to demands associated with the project and retain an 8-minute response time, which would be adequate to serve demands potentially generated by the project. As discussed in Section 14, *Population and Housing*, the population that would be accommodated by the project would not exceed population growth anticipated by Plan Bay Area and the Novato General Plan. It is not anticipated that the project would increase response times for the NFPD or impact other NFPD standards. The project would not require the construction of additional fire protection facilities. Impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

a.2. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered police protection facilities, or the need for new or physically altered police protection facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives?

The Novato Police Department (NPD) serves the city of Novato, providing professional and proactive street patrol, investigative services, traffic enforcement, narcotics enforcement, a 911 dispatch center, and emergency and preparedness services. The police department is staffed by approximately 80 staff, including 60 sworn personnel and volunteers (City of Novato 2021a).

The NPD would service the project site and receive auxiliary support from the Marin County Sheriff's Office and California Highway Patrol (City of Novato 2021a). The nearest police station is approximately one-half miles south of the project site at 909 Machin Avenue. Police units are more often mobile and dispatch to emergency calls from where they are in the service area, rather than from the police station. The distance between the facility and the location of the emergency, therefore, does not usually determine response times. Instead, response times correlate more closely with the number of police officers on the street.

When occupied, the project would add approximately 454 new residents to the city, which would slightly increase demand for police protection services. The Novato Police Department currently maintains a ratio of 1.13 sworn officers per 1,000 residents and does not have a standard for staffing levels (City of Novato 2020b). As discussed in Section 14, *Population and Housing*, the population that would be accommodated by the project would not exceed population growth anticipated by Plan Bay Area and the Novato General Plan. With an additional 454 new residents to Novato's existing population of 53,486, the ratio of officers per officers per 1,000 residents would not exceed 1.13 per 1,000 residents.[8] The project would not require construction of new or expanded police facilities. Therefore, impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

[8] 60 sworn officers divided by 53.94 per 1,000 residents (53,940 residents/1,000 residents) equals 1.11 officers per 1,000 residents.

a.3. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered schools, or the need for new or physically altered schools, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios or other performance objectives?

The project site is located within the boundaries of the following neighborhood public schools: Olive Elementary School (0.6 miles east of the project site at 629 Plum Street), Sinaloa Middle School (2.4 miles southwest at 2045 Vineyard Road) and San Marin High School (3.5 miles west of the project site at 15 San Marin Drive) (Novato Unified School District [NUSD] 2021).

The additional residents that the project generates would increase the number of students attending schools in the Novato Unified School District. The project would add approximately 46 new students, based on a generation rate of 0.259 students per multi-family dwelling unit (NUSD 2020). Although 46 new students would be considered a nominal increase, the applicant for the project would be required to pay school development fees prior to the issuance of building permits, as dictated by State law. According to Government Code Section 65996 (3)(h), payment of such fees constitutes full mitigation of any school impacts under CEQA. Therefore, impacts from the increase in school enrollment would be offset by the required payment of development fees. This impact would be less than significant.

LESS THAN SIGNIFICANT IMPACT

a.4. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered parks, or the need for new or physically altered parks, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios or other performance objectives?

Within five miles of the project site, there are 17 local community parks and two nature preserves/open space areas (Mount Burdell Preserve and Deer Island Open Space Preserve). The nearest parks within 0.5-mile of the project site include Olive Tot Lot, Novato Civic Green/Flex Space, Hamann Little League Field, Stafford Grove Park, and Downtown Recreation Center Pocket Park (City of Novato 2021). The Olompali State Historic Park is also about 2.6 miles north of the project site.

The project would include approximately 42,750 square feet of on-site open space amenities that would include a central open space with pathways and gathering areas along the perimeter. On-site amenities may include residential courtyards with firepit lounges, barbeques, community garden, dining areas, and a bocce ball court. Site plans presented in Figure 3 and Figure 5 identify some of the on-site amenities for the proposed open space proposed as part of the project. The final design of the on-site open space amenities would be determined during the design process. These facilities would be expected to supplement the local recreational facilities available to the 454 new residents on the project site.

As discussed in Section 14, *Population and Housing*, the population that would be accommodated by the project would not exceed population growth anticipated by Plan Bay Area and the Novato General Plan. Therefore, the population growth associated with the project would not require new or physically altered parks. Additionally, the City of Novato requires new residential developments to pay development fees for the purpose of maintaining existing parks and developing new parks to serve increased demand for recreational land, though it is not anticipated that new recreational facilities or parks would be required to satisfy increased demand from new residents. Therefore, the

project would have a less than significant impact on the physical deterioration of existing recreational facilities.

LESS THAN SIGNIFICANT IMPACT

a.5. Would the project result in substantial adverse physical impacts associated with the provision of other new or physically altered public facilities, or the need for other new or physically altered public facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives?

The Marin County Free Library District provides library services for Novato along with Corte Madera, Ross, and Fairfax and the unincorporated areas of Marin County. The district includes 11 facilities and one bookmobile for a total of 12 locations. The Novato Main Branch is the closest to the project site, at 1.2 miles southwest, on 1720 Novato Boulevard. The *2007 Marin County Free Library Vision Plan* found the South Novato Branch to need additional space to accommodate its service population (City of Novato 2014). An agreement between the Novato Unified School District and the Marin County Free Library would double the size of the South Novato branch, ostensibly offloading the demand on the Novato Branch as well. The 6,000 square foot South Novato Library Complex opened on November 18, 2015 (County of Marin 2015).

The project would add 454 new residents to Novato, increasing demand for library services. However, as described in Section 14, *Population and* Housing, the population of Novato is anticipated to grow to 56,295 persons by 2040 (ABAG 2020), and the increase in residences due to the project accounts for less than one percent of the overall increase. Thus, the number of residents introduced by the project would not be a substantial percentage of the growth and as such, would not constitute significant or unplanned growth. Furthermore, the expanded South Novato Library Complex would accommodate the needs of an increased population. Therefore, the impact related to the provision of library services or other public facilities under the proposed project would be less than significant.

LESS THAN SIGNIFICANT IMPACT

16 Recreation

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
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?	☐	☐	■	☐
a. 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?	☐	☐	■	☐

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?

As discussed in Section 15, *Public Services,* the proposed project would not require new or expanded recreational facilities. The project would accommodate an additional 454 persons, which would not exceed population growth anticipated by Plan Bay Area and the City's General Plan. Additionally, the City of Novato requires new residential developments to pay development fees for the purpose of maintaining existing parks and developing new parks to serve increased demand for recreational land, though it is not anticipated that new recreational facilities or parks would be required to satisfy increased demand from new residents. Therefore, the project would not increase the use of existing parks or recreational facilities such that physical deterioration would be accelerated and would not require construction or expansion of recreational facilities. Impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

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17 Transportation

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☐	☐	■	☐
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 use (e.g., farm equipment)?	☐	☐	■	☐
d. Result in inadequate emergency access?	☐	☐	■	☐

The transportation analysis provided herein is based on a Traffic Impact Study (TIS) completed by W-Trans. W-Trans prepared the TIS in March 2021, and was peer-reviewed by Kittelson & Associates in October 2021. W-Trans prepared a revised TIS in September 2022. The TIS and peer review memorandum are included as Appendix B.

The road network surrounding the proposed mixed-use development analyzed as part of the project includes the following intersections:

1. Redwood Boulevard/San Marin Drive/Atherton Avenue
2. Redwood Boulevard/Golden Gate Place-Ranch Drive
3. Redwood Boulevard/Olive Avenue
4. Redwood Boulevard/Vallejo Avenue (west)
5. Redwood Boulevard/Vallejo Avenue (east)
6. Redwood Boulevard/Grant Avenue
7. Redwood Boulevard/Diablo Avenue-DeLong Avenue

Additionally, the following streets provide alternative modes of transportation in the form of pedestrian and bicycle facilities.

Pedestrian Facilities

A network of sidewalks, crosswalks, pedestrian signals, and curb ramps provide access for pedestrians in the vicinity of the project site. Intermittent sidewalk coverage is provided on Redwood Boulevard north of Olive Avenue. Along the east side of the street, sidewalks exist along

developed property frontages, including the shopping center north of Olive Avenue. Along the west side of the street, sidewalks are present south of Escallonia Drive. South of Olive Avenue, the sidewalk network is complete along both sides of the street. At the intersection of Redwood Boulevard and Olive Avenue, there are marked crosswalks, curb extensions, and a median refuge crossing Redwood Boulevard. Sidewalks are present on both sides of Olive Avenue west of Redwood Boulevard. There is not a sidewalk along the project site frontage.

Bicycle Facilities

The Caltrans Highway Design Manual classifies bikeways in four categories:

- **Class I** bikeways consist of a completely separated right-of-way for the exclusive use of bicycles and pedestrians with cross flows of motorized traffic minimized.
- **Class II** bike lanes are striped and signed lanes for one-way bike travel on a street or highway.
- **Class III** bike routes are bikeways with signing only for shared use with motor vehicles within the same travel lane on a street or highway.
- **Class IV** bikeways are separated bikeways for the exclusive use of bicycles, and include a separation between the bikeway and the motor vehicle traffic lane.

In the project area, Class II bike lanes exist on Redwood Boulevard between Wood Hollow Drive and the downtown area. Bike lanes are also proposed on Olive Avenue from Redwood Boulevard to Railroad Avenue, which would connect to existing bike lanes east of Railroad Avenue. Additional Class II and Class III bicycle facilities are planned along Olive Avenue and Grant Avenue.

Transit Facilities

The Sonoma Marin Rail Transit (SMART) rail system includes two stations that are accessible from the project site. the Novato Downtown station is located approximately 0.3 mile southeast of the project site, and the Novato San Marin station is located approximately 0.6 mile north of the project site. SMART operates between the City of Larkspur and the Sonoma County Airport station and typically operates seven days a week during peak commute hours.

Marin Transit provides fixed route bus service in Novato. Routes 35, 57, 71, and 654 can be accessed at the bus stops located within ¼ mile of the site. Routes 35 and 57 provide service between the City of San Rafael and Novato; Route 35 operates seven days a week from 7:00 a.m. to 11:00 p.m., with buses approximately every 30 minutes, and Route 57 operates seven days a week from 6:00 a.m. to 9:00 p.m. with buses approximately every 30 minutes during peak commuting hours. Route 71 provides service between Novato and Marin City via San Rafael at 30-minute intervals during peak hours. Route 654 is a supplemental school route that provides limited services associated with school hours.

Golden Gate Transit also serves the bus stops along Redwood Boulevard and Olive Avenue. Golden Gate Transit provides regional bus service between Novato, Sonoma County, and San Francisco. Route 101 operates seven days a week from 4:00 a.m. until 12:00 a.m., providing hourly service between San Francisco and Santa Rosa. Route 154 currently operates Monday thought Friday from 5:42 a.m. to 7:03 p.m., providing service between Novato (Atherton Ave Bus Pad) and San Francisco (Golden Gate Transit 2023).

Dial-A-Ride, also known as paratransit, is also available for those who are unable to independently use the transit system.

a. Would the project conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?

Pedestrian and Bicycle Facilities

In the project area, Class II bike lanes exist along Redwood Boulevard from the project site south into Downtown Novato. The project would not disrupt or interfere with existing bike lanes and would provide 202 new bike parking spaces.

In accordance with Mobility Policy MO-20a in the City's General Plan, all new development projects are required to include a sidewalk, path, or shoulder on all property frontages. There are existing sidewalks in the project vicinity; however, there is no sidewalk on the western side of the project site on its frontage with Redwood Boulevard. As described in the *Project Description,* sidewalks would be added along the project frontage on Redwood Boulevard and Olive Avenue. However, the sidewalk improvements along Olive Avenue would be completed by the City as part of a City-sponsored Capital Improvement Program. The project would also involve sidewalks and pedestrian crossings within the project site to facilitate pedestrian access between proposed buildings and off-site. Development of the proposed project would not impair bicycle or pedestrian facilities. Therefore, the project would have less than significant impacts to pedestrian or bicycle facilities.

Transit Facilities

The SMART rail stations, located 0.3 mile southeast and 0.6 mile north of the project site, would remain accessible to future project residents via auto, bicycle, or ridesharing services. Marin Transit bus Route 49 and Route 57 also provides access to the Novato Downtown SMART and San Marin SMART stations,.. accessible from the Redwood Boulevard/Olive Avenue bus stops, approximately 350 feet miles of the project site. Golden Gate Transit Route 101 provides access to Santa Rosa and San Francisco, which is also accessible at the Redwood Boulevard/Olive Avenue bus stops.

Existing train and bus routes are adequate to support the project, given that future residences would not result in a substantial demand for transit service with the proposed location and supply of parking spaces (Appendix B). The project would have no significant impact on transit facilities. Development of the proposed project would not impair roadways or conflict with planned pedestrian, bicycle, and transit facilities in the vicinity. This impact would be less than significant.

LESS THAN SIGNIFICANT IMPACT

b. Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?

CEQA Guidelines Section 15064.3 establishes thresholds for Vehicle Miles Traveled (VMT), a metric used to calculate the total annual miles of vehicle travel in a defined area. The City of Novato has not yet adopted a standard of significance for evaluating VMT; therefore, guidance provided by the Governor's Office of Planning and Research's (OPR) in the publication *Transportation Impacts (SB 743) CEQA Guidelines Update and Technical Advisory (2018)* is used. According to OPR's guidance, a project would have a less than significant impact to VMT if VMT generated by that project does not exceed a level of 15 percent below existing regional VMT per capita. Additionally, the 2018 OPR technical advisory and *CEQA Guidelines* Section 15064.3(b)(1) indicate that projects within one-half mile of either an existing major transit stop or a stop along an existing high-quality transit corridor should be presumed to cause a less than significant transportation impact. The TIS analyzed the project's potential impacts to VMT in terms of VMT per capita as well as proximity to transit.

The VMT per capita projected to be generated by the project was compared to the existing citywide average VMT per capita, using data from the Transportation Authority of Marin's (TAM) Demand Model. The existing citywide average VMT per capita is 17.0; therefore, the project would have a significant impact if it would result in a VMT per capita that exceeds 15 percent below this level, or 14.5 VMT per capita.

The TAM Demand Model analyzes travel patterns based on established traffic analysis zones (TAZs) that cover geographic areas of Marin County. The project site is within TAZ 182, which includes nearby residential development; therefore, the existing VMT per capita of the project site TAZ was used in the TAM Model, which is 9.0 VMT per capita.

The project would add new uses to an undeveloped site, which would increase VMT per capita. However, project density has been demonstrated to reduce project VMT compared to expected project VMT levels. The California Air Pollution Control Officers Association has defined a calculation that determines the percent reduction in VMT that could occur when considering a site's proposed residential density, existing residential density, and the elasticity of VMT with respect to residential density.[9] For the proposed project, which would have a residential density of 30.6 units per acre, a 21.2 percent reduction in expected VMT is projected (Appendix B). Applying these expected reductions, the project VMT per capita would be reduced from 9.0 to 7.1. Because 7.1 is below the significance threshold of 14.5 VMT per capita, the project's VMT impacts would be less than significant.

Furthermore, the project would be located approximately 0.3 mile from the Downtown Novato SMART station and 350 feet from Marin Transit bus routes. Therefore, the project is within a half mile of existing transit stops and would result in a VMT per capita below the significance threshold, the project would have a have less than significant impact with regards to VMT.

LESS THAN SIGNIFICANT IMPACT

c. Would the project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible use (e.g., farm equipment)?

The project would be required to comply with applicable federal, state, and City codes and regulations and as such would not be expected to introduce any new hazards in terms of its design. Sight distances were evaluated at the locations of proposed project driveways and were determined to be adequate based on the speed of approaching vehicles (Appendix B). Proposed project driveways and internal drive aisles would not substantially increase hazards due to design or use. Therefore, impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

[9] Elasticity refers to how one variable changes in response to another variable, or in this case, how VMT would change in response to increased residential density. A variable with low elasticity does not change substantially in value in response to another variable. The elasticity of VMT in this calculation is 0.22, representing a low elasticity. Accordingly, this describes how an increase in residential density would not result in a proportionate increase in VMT. Refer to Appendix B for further information.

d. Would the project result in inadequate emergency access?

No lane closures are anticipated to be required for project construction. The project site would be accessible via two proposed, two-way driveways on Redwood Boulevard. These driveways would be designed to meet the City's requirements for emergency access. Site plans show that drive aisles throughout the site would be 26 feet wide, which would be adequate to provide emergency access for ladder trucks and other emergency vehicles. Therefore, the proposed project would have adequate emergency access. Impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

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18 Tribal Cultural Resources

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in a Public Resources Code Section 21074 as either a site, feature, place, or 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)?	☐	■	☐	☐
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.	☐	■	☐	☐

California Assembly Bill 52 of 2014

California Assembly Bill 52 (AB 52) expanded CEQA by defining a new resource category, "tribal cultural resources." AB 52 establishes 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" (PRC Section 21084.2). It further states the lead agency shall establish measures to avoid impacts that would alter the significant characteristics of a tribal cultural resource, when feasible (PRC Section 21084.3).

PRC Sections 21074(a)(1)(A) and (B) define tribal cultural resources as "sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe" and are:

1. Listed or eligible for listing in the CRHR, or in a local register of historical resources as defined in PRC Section 5020.1(k), or
2. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in PRC Section 5024.1(c). In applying these criteria, the lead agency shall consider the significance of the resource to a California Native American tribe.

AB 52 also establishes a formal consultation process for California tribes regarding tribal cultural resources. The consultation process must be completed before a CEQA document can be adopted or certified. Under AB 52, lead agencies are required to begin consultation with California Native American tribes that are "traditionally and culturally affiliated with the geographic area of the proposed project." Native American tribes to be included in the process are those that have requested notice of projects proposed within the jurisdiction of the lead agency.

California Senate Bill 18 of 2004

California Government Code Section 65352.3 (adopted pursuant to the requirements of Senate Bill [SB] 18) requires local governments to contact, refer plans to, and consult with tribal organizations prior to making a decision to adopt or amend a general or specific plan. The tribal organizations eligible to consult have traditional lands in a local government's jurisdiction, and are identified, upon request, by the NAHC. As noted in the California Office of Planning and Research's Tribal Consultation Guidelines (2005), "The intent of SB 18 is to provide California Native American tribes an opportunity to participate in local land use decisions at an early planning stage, for the purpose of protecting, or mitigating impacts to, cultural places." SB 18 refers to PRC Sections 5097.9 and 5097.995 to define cultural places as a Native American sanctified cemetery, place of worship, religious or ceremonial site, or sacred shrine (PRC Section 5097.9)and Native American historic, cultural, or sacred site that is listed or may be eligible for listing in the CRHR pursuant to PRC Section 5024.1, including any historic or prehistoric ruins, any burial ground, and any archaeological or historic site (PRC Section 5097.995).

Assembly Bill 52 and SB 18 Consultation

The City mailed letters on July 9, 2020 to local Native Americans who requested notification under AB 52 and SB 18. Under AB 52, tribes have 30 days to respond and request consultation. Under SB 18, tribes have 90 days to respond and request consultation. On August 12, 2020, the City received a response from the Federated Indians of Graton Rancheria (FIGR) Tribal Historic Preservation Officer requesting formal consultation with the City as well as receipt of any cultural resources assessments or other assessments completed for the project.

Consultation meetings between the City and FIGR took place on January 1, 2022, November 7, 2022, and April 10, 2023. During these meetings FIGR requested a canine detection survey and a ground penetrating radar survey and the City agreed to undertake a canine detection survey. The canine detection survey was conducted on February 21, 2023, and identified an area with possible displaced grave soils and/or small fragments of human remains. During the following consultation meeting in April, 2023, the City and FIGR discussed the results of the cultural resources study and the canine detection survey and the City presented five drafted mitigation measures based on the findings of the archaeological testing and the canine detection survey. The City's proposed mitigation measures are summarized below:

1. Workers Environmental Awareness Training
2. Discovery and Treatment Plan
3. Archaeological and Tribal Monitoring during all ground disturbing portions of the project.
4. An Environmentally Sensitive Area (ESA) to be established around the area identified by the canine detection survey
5. Protocols for unanticipated discoveries

During the meeting, the City discussed the parameters of the above mitigation measures and requested FIGR's participation in defining mitigation measure 4, particularly in reference to establishing a buffer around the sensitive area to protect the resource from any impact as a result of construction activities. FIGR recommended a variety of buffers that the Tribe felt were appropriate ranging from 100 feet to 300 feet around areas containing potential tribal cultural resources. FIGR stated that an avoidance or conservation area, which may be limited in allowable uses, may be considered.

Following completion of the cultural resources assessment, provided in Confidential Appendix D, the City provided the Final Cultural Resources Report which included mitigation measure recommendations to FIGR on July 3, 2023 and requested a response by July 17, 2023. FIGR responded on July 3, 2023 requesting an extension and that the City schedule the next consultation meeting in 30 days with the provision that FIGR will provide comments prior to the meeting. On July 12, 2023, the City responded in an email and extended the deadline to July 24, 2023. On July 26, 2023, the City sent a letter to FIGR acknowledging that no responses have been received and that the City considers consultation to have closed. On July 28, 2023, FIGR responded stating they did not wish to close consultation and disagree with the project moving forward as it is currently proposed. The City has not received further correspondence from FIGR since this time and has concluded that, after a good faith effort, mutual agreement with FIGR could not be reached as FIGR did not respond in a timely fashion to the mitigation measures presented by the City.

Impact Analysis

a. Would the project cause a substantial adverse change in the significance of a tribal cultural resource as defined in Public Resources Code Section 21074 that is 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)?

b. Would the project cause a substantial adverse change in the significance of a tribal cultural resource as defined in Public Resources Code Section 21074 that is 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?

During consultation meetings conducted between the City and FIGR, FIGR identified the project site as a tribal cultural resource. The project site is not listed on nor eligible for inclusion in the CRHR, or in a local register as defined in Public Resources Code Section 5020.1(k). Resource TJ-1 and the area identified as sensitive during the canine detection survey, discussed further in Section 5*, Cultural Resources*, are not eligible for inclusion in the CRHR or local register.

Further, the City concluded, in its discretion and based on a lack of substantial evidence, that there is not a known significant tribal cultural resource within the property. There is however always potential to uncover buried tribal cultural resources during ground disturbing activities, such as the

excavation and grading that would be required for project construction. Should project construction activities encounter and damage or destroy a Tribal Cultural Resource, impacts would be potentially significant. Implementation of Mitigation Measure TCR-1 for an environmentally sensitive area consistent with Public Resources Code (PRC) Section 21084.3(b), described below, and Mitigation Measure CUL-1 through Mitigation Measure CUL-4 outlined in Section 5, *Cultural Resources*, above, would ensure that potential impacts to tribal cultural resources would be reduced to a less than significant level.

Mitigation Measure

TCR-1 Environmentally Sensitive Area Delineation (ESA)

An ESA shall be delineated around the area determined sensitive by the canine detection survey conducted on February 21, 2023 inclusive of an 8-foot buffer to account for the canine survey's margin of error. The ESA shall be marked with high visibility material to prevent any unauthorized construction equipment and/or personnel from disturbing the area. To ensure confidentiality, no specific identification will be made other than where the area is environmentally sensitive. Avoiding any ground disturbing work within the ESA as feasible, is the preferred option. One of the two following options shall be selected:

1) **Preferred Option.** The site plan shall be modified to establish the ESA as an undisturbed landscape element, avoiding any excavation work within all areas of the ESA. Any excavation within 25-feet of the ESA shall be limited to constructing necessary for emergency vehicular access and circulation and shall be monitored by a qualified archaeologist and locally affiliated Native American monitor. If human remains and/or associated funerary items are identified, they shall be retained, treated, and repatriated as specified in Mitigation Measure CUL-2 (Discovery and Treatment Plan) and following NAGPRA guidelines. No further site treatment or investigations are required for areas left undisturbed or where only fill materials are imported for ground cover and no excavation occurs.
2) **Alternate Option.** No modifications made to the site plan, and all ground disturbing work conducted within the ESA (such as excavation) shall be done with manual equipment and monitored by a qualified archaeologist and locally affiliated Native American monitor. Soils subject to disturbance within the ESA shall be screened through a 1/8" mesh by a qualified archaeologist to confirm the presence/absence of any cultural resources, including fragmented human remains. If human remains and/or associated funerary items are identified, they shall be collected, treated, and repatriated as specified in Mitigation Measure CUL-2 (Discovery and Treatment Plan) and following NAGPRA guidelines. No further site treatment or investigations are required for areas left undisturbed or where only fill materials are imported for ground cover and no excavation occurs.

TCR-2 Native American Monitoring

Native American monitoring of project-related ground-disturbing activities shall be conducted by a local Native American consultant. Native American monitoring should be provided by a locally affiliated tribe. Monitors will have the authority to halt and redirect work should any tribal cultural resources be identified during monitoring. If tribal cultural resources are encountered during ground-disturbing activities, work in the immediate area must halt and the find evaluated for listing in the CRHR. Native American monitoring may be reduced to spot-checking or eliminated at the discretion of the monitors, in consultation with the lead agency, as warranted by conditions such as

encountering bedrock, or sediments being excavated are fill. If monitoring is reduced to spot-checking, spot-checking shall occur when ground-disturbance moves to a new location within the project site and when ground disturbance will extend to depths not previously reached (unless those depths are in bedrock).

LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

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19 Utilities and Service Systems

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
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?	☐	☐	■	☐
e. Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	☐	☐	■	☐

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?

Water

Water for the project would be provided by the NMWD via existing utilities on and adjacent to the project site. Approximately two-thirds of the Novato water supply is sourced from the Russian River provided by the Sonoma County Water Agency, and the remaining third comes from local runoff

into Stafford Lake that is treated at the NMWD Stafford Water Treatment Plant (NMWD 2021). Water supply is discussed further under criterion (b) below.

Novato's water supply system includes roughly 6,034-acre feet (AF) of imported water, a storage capacity of 37 million gallons, and two water rights permits for diversion of surface water from Stafford Lake for the annual diversion of 8,454 AF. Novato's total water supply contracted volume is 14,100 AF per year. NMWD projects that future supplies would be sufficient to meet forecasted demand under normal year and multiple-dry year scenarios (NMWD 2021).

The project's estimated water demand would be approximately 12.63 million gallons per year for the indoor water use and approximately 7.95 million gallons per year for outdoor water use (Appendix C), or approximately 56,384 gallons per day, which is approximately 0.6 percent of Novato's water supply during a normal year, approximately 0.7 percent of Novato's water supply during a dry year and approximately four percent of Novato's water supply system surplus capacity by 2040.

Existing supplies may be insufficient to meet forecasted demand for a single dry year scenario; however, the NMWD contingency plan would allow for the reduction of water supplied by up to 50 percent if needed (NMWD 2021). New development would offset new water demand through NMWD's water connection rate structure, which funds water infrastructure maintenance. In addition, the project would comply with the City's General Plan Policy PF-3a and NMWD Regulation No. 15, which require water-saving landscaping and related water conservation measures. Therefore, impacts would be less than significant.

Wastewater

The Novato Sanitary District (NSD) provides wastewater collection, treatment, and disposal services for the Novato Community. Wastewater is transported to the Novato Treatment Plant (NTP) where most of the water undergoes primary and secondary treatment and is either discharged to San Pablo Bay or used for pasture irrigation. The NTP is designed for an average dry weather flow of 7.0 million gallons per day (MGD) and peak wet weather flow of 30.7 MGD. The NTP has a remaining processing capacity of approximately 3.5 MGD for dry weather flow and 17.9 MGD for peak wet weather flow (NSD 2019a).

The project's estimated wastewater generation would be approximately 10.5 million gallons per year (assuming water use equivalent to the indoor water use predicted in the CalEEMod Output [Appendix C] is approximately 120 percent of wastewater generation), or approximately 28,767 gallons per day. This would represent approximately 0.41 percent of the NTP wastewater treatment plant remaining capacity for average dry weather flow and 0.09 percent remaining capacity for peak wet weather flow. Therefore, the NTP has the capacity to meet the wastewater treatment demands that would be generated from the project. Impacts associated with the project's incremental wastewater generation would be less than significant.

Stormwater

The project would be designed and engineered with drainage features appropriate to accommodate the needs of the project and mimic the historical flow patterns. As discussed in Section 10, *Hydrology and Water Quality*, the project would not require an expansion of existing or new stormwater infrastructure to the site. On-site stormwater generated by the project's impervious surfaces would drain into one of four bioretention areas and undergo treatment prior to discharge into the existing sanitary sewer. Overflow of the bioretention areas would be directed to the

existing storm drains. As detailed in the Preliminary Stormwater Control Plan (Appendix G), the overflow from the bioretention areas would match the existing runoff volumes and not outlet across property lines. In addition, based on hydraulic capacity calculations performed by Adobe Associates in the Preliminary Stormwater Control Plan (Appendix G), the proposed drainage systems are sufficiently sized to meet 25- and 100-year flood flows.

Thus, the volume of stormwater runoff would not exceed the capacity of the storm drain system serving the site. The proposed project would not require the construction of new off-site stormwater drainage facilities or expansion of existing facilities. Impacts would be less than significant.

Electricity, Natural Gas, and Telecommunications

The project would not connect to or utilize natural gas as a source of energy and would use electricity provided by MCE through PG&E infrastructure. A significant impact to electricity and telecommunications facilities may occur if a project's demand for these services exceeds the capacity of local providers. PG&E maintains the electricity distribution lines and substations that serve the project area. Telecommunications are generally available in the project area, and facility upgrades would not be necessary.

As described in Section 6, *Energy*, the project would require approximately 883 megawatt-hours (MWh) of electricity per year. PG&E maintains power lines along Redwood Boulevard (Circuit Identification Novato 1102) and along the SMART rail line (Circuit Identification Novato 1104). Both power lines may serve the project site. The Novato 1102 circuit is connected to a substation that has a capacity of 6.6 megawatts (MW) and a peak load of 2.4 MW with a remaining capacity of 4.2. The Novato 1104 circuit is connected to a substation with a capacity of 15.84 MW and a peak load of 10.87 MW with a remaining capacity of 5.0 MW. The project would require approximately 0.1 MW, which is less than one percent of the remaining capacity of the PG&E substations that serve the project sites. Accordingly, the project would be accommodated adequately by existing electricity and telecommunication facilities and would not require improvements to existing facilities, or the provision of new facilities, that would cause significant environmental effects. Impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

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?

As described above under criterion (a), the City of Novato is serviced by the NMWD, which provides potable and recycled water service to the city and surrounding unincorporated areas. Approximately 80 percent of the Novato water supply comes from the Russian River through the NMWD wholesale water supplier, the Sonoma County Water Agency. The remaining 20 percent comes from local runoff into Stafford Lake. The NMWD has no local, developed groundwater sources (NMWD 2021).

The NMWD's 2020 Urban Water Management Plan (UWMP) addresses NMWD's water system and includes descriptions of water supply sources, water use, comparisons of supply and demand during dry years, etc.

Pursuant to the UWMP, normal year, single dry year, and multiple dry year supply and demand comparisons are shown below in Table 23.

Table 23 NMWD Water Supply and Demand in Acre-Feet for Normal, Single Dry, and Multiple Dry Years

	Year				
	2025	2030	2035	2040	2045
Normal Year					
Supply Totals	15,913	15,926	15,940	15,954	15,968
Demand Totals	10,679	10,857	11,085	11,108	11,152
Difference	5,234	5,069	4,855	4,846	4,816
Single Dry Year					
Supply Totals	15,913	13,684	13,585	13,472	13,345
Demand Totals	10,679	10,857	11,085	11,108	11,152
Difference	5,234	2,827	2,500	2,364	2,194
Multiple Dry Years	**Year**				
	2025	**2030**	**2035**	**2040**	**2045**
First Year					
Supply Totals	15,913	15,926	15,940	15,954	15,968
Demand Totals	10,679	10,857	11,085	11,108	11,152
Difference	5,234	5,069	4,855	4,846	4,816
Second Year					
Supply Totals	15,913	15,926	15,940	15,954	15,968
Demand Totals	10,679	10,857	11,085	11,108	11,152
Difference	5,234	5,069	4,855	4,846	4,816
Third Year					
Supply Totals	15,913	15,926	15,940	15,954	15,968
Demand Totals	10,679	10,857	11,085	11,108	11,152
Difference	5,234	5,069	4,855	4,846	4,816

Notes: Parentheses denote a negative number

Source: NMWD 2021

Table 23 shows that NMWD's projected water supplies are sufficient to meet projected demands during normal and multiple dry year conditions. During a single dry year scenario, NMWD would not have adequate supplies and would need to impose mandatory water use restrictions (NMWD 2016). A single dry year represents the lowest water supply available, while a multiple dry year represents the lowest average water supply available for a three-year period. The NMWD's water supply volume would be sufficient during a multiple dry year scenario since the volume is based on an average, while the single dry year represents the lowest volume available and is the worst-case scenario.

NMWD currently serves the project site through existing utilities and services would continue to do so during project operation. The project's estimated water demand would be approximately 56,384 gallons per day, or 20.58 million gallons per year (Appendix C).

The project's water demand would represent less than 0.6 percent of the projected available NMWD supply. Based on the project's incremental contribution to future demand, new sources of

water supply would not be required to meet project water needs. The project would be required to comply with this ordinance to conserve water. Impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

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?

The Novato Sanitary District (NSD) provides wastewater collection, treatment, and disposal services for the Novato Community. Wastewater is transported to the Novato Treatment Plant (NTP) where most of the water undergoes primary and secondary treatment and is either discharged to San Pablo Bay or used for pasture irrigation. The NTP is designed for an average dry weather flow of 7.0 million gallons per day (MGD) and peak wet weather flow of 30.7 MGD. The NTP has a remaining processing capacity of approximately 3.5 MGD for dry weather flow and 17.9 MGD for peak wet weather flow (NSD 2019a).

As described in response to criterion (a), above, the project's estimated wastewater generation would be approximately 10.5 million gallons per year (assuming water use equivalent to the indoor water use predicted in the CalEEMod Output [Appendix C] is approximately 120 percent of wastewater generation), or approximately 28,767 gallons per day. This would represent approximately 0.1 percent of the NTP wastewater treatment plant's remaining capacity for average dry weather flow and 1.3 percent remaining capacity for peak wet weather flow. This would represent approximately 0.41 percent of the NTP wastewater treatment plant's remaining capacity for average dry weather flow and 0.09 percent remaining capacity for peak wet weather flow. Therefore, the NTP has the capacity to meet the wastewater treatment demands that would be generated from the proposed project. As discussed under criterion (a), NSD has indicated that the existing sewer force main in Rowland Boulevard is not anticipated to have capacity deficiency issues and none of the sewer gravity pipelines in the area have a risk priority above "very low" (NSD 2019b). Therefore, impacts associated with project's incremental wastewater generation would be less than significant.

LESS THAN SIGNIFICANT IMPACT

d. 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?

e. Would the project comply with federal, state, and local management and reduction statutes and regulations related to solid waste?

Solid waste from the City of Novato is taken to the Redwood Landfill and Recycling Center located north of the Novato city limit. The landfill is permitted to accept 2,300 tons of material per day and has a design capacity of about 26 million cubic yards (CalRecycle 2020). The estimated closure date of the landfill is 2036 (City of Novato 2020a).

The Novato Sanitary District and its franchise service provider Recology provide solid waste and recycling disposal services in the project vicinity for the provision of trash, recycling and organics services to the project. In 2011, NSD amended its franchise agreement to make major progress toward achieving zero waste goals. The contract requires Recology (the recycling, composting, and

garbage collection provider) to achieve an 80 percent diversion of waste to recycling by 2025 (NSD 2011).

Using an estimated solid waste generation rate provided by CalRecycle for residential land uses of 12.23 pounds of waste per household per day, the project would result in an increase of approximately 2,177 pounds of solid waste per day, or 397 tons per year (CalRecycle 2020a). This would represent approximately 0.03 percent of the permitted daily throughput of the Redwood Landfill and Recycling Center. This would not represent a substantial increase in waste and the project would not be served by a landfill without sufficient capacity. The project would comply with state and local statues and regulations related to solid waste regarding increased recycling efforts pursuant to Assembly Bill 341 by providing recycling services to residents. Impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

20 Wildfire

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
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?	☐	☐	■	☐
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 downslopes or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	■	☐

a. If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project substantially impair an adopted emergency response plan or emergency evacuation plan?

b. If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project, 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. If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, 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?

d. If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project expose people or structures to significant risks, including downslopes or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?

The project site is not located within a State Responsibility Area or a Very High Fire Hazard Severity Zone (VHFHSZ) as mapped by CAL FIRE (CAL FIRE 2021). The nearest VHFHSZ is located approximately three miles south of the site in the Indian Valley, Ignacio Valley, and Pacheco Valley Preserves (CAL FIRE 2021). The project would be served by NFPD, and is not within a Wildland Urban Interface area, an area subject to high fire hazard, as mapped by the NFPD. Furthermore, the footprint of the project site is generally flat, and its topography would not enhance the spread of wildfire. The project would not involve the construction of new utility infrastructure that could exacerbate fire risk, such as overhead power lines, or roadways. Emergency vehicle access would be provided through the four private driveways off of Redwood Boulevard and Olive Avenue. Therefore, the project would not expose people or structures to a significant risk involving wildfire, nor would it exacerbate the risk of wildfire. Impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

21 Mandatory Findings of Significance

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Does the project:				
a. 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. 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. 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?

As discussed throughout this Initial Study, the project would have no impact, a less than significant impact, or a less than significant impact after mitigation with respect to all environmental issues. Regarding biological resources, the existing habitat onsite does not currently support special status species. Therefore, there is low potential for special-status species to occur, except for nesting birds. Implementation of mitigation measures BIO-1 and BIO-2 would reduce potential impacts to nesting birds and special status species to a less-than-significant level by requiring pre-construction surveys to determine the presence of nesting birds and implementing necessary avoidance measures if they

are found. In addition, Mitigation Measure BIO-3 would offset impacts related to filling the ephemeral stream/ditch through purchase of wetland/waters mitigation credits at a USACE, RWQCB, and/or CDFW-approved mitigation bank for creation or enhancement of wetlands at a minimum 1:1 ratio. Therefore, impacts would be less than significant.

As described in Section 5, there are no historic resources identified within the site. However, the site is considered sensitive for containing subsurface archaeological resources and tribal cultural resources. In the event of unanticipated discovery of cultural resources, the project would comply with Mitigation Measures TCR-1, TCR-2 and to Mitigation Measures CUL-1 through CUL-4 for a Worker's Environmental Awareness Program, Discovery and Treatment Plan, archaeological monitoring, and unanticipated discoveries during construction which would reduce project impacts to archaeological resources to less than significant levels. Therefore, the proposed project would not eliminate an important example of major periods of California history or prehistory.

LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

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)?

As described in Sections 1 through 20, the proposed project would not result in significant and unmitigable impacts to the environment with respect to all environmental issues. Cumulative impacts could occur if the construction of other projects occurs at the same time as the proposed project and in the same geographic scope, such that the effects of similar impacts of multiple projects combine to create greater levels of impact than would occur at the project-level. For example, if the construction of other projects in the area occurs at the same time as project activities, combined air quality and noise impacts may be greater than at the project-level.

Ten development projects are planned to occur within approximately one mile of the project, which are summarized in Table 24. The exact implementation timing of these projects is not known at this time; therefore, it is conservatively assumed that construction of these planned projects could overlap with construction of the proposed project.

Table 24 Cumulative Development Projects

No.	Project Name	Project Location	Project Components	Status
1	7711 Redwood Boulevard Residences	7711 Redwood Boulevard, 1 mile north of project site	Development of 4-acre site with 80 for-sale residential units	Under construction
2	Valley Oaks	Redwood Blvd near Pinkston Road (adjacent to 7711 Redwood)	Development of 36-acre site with 81 for-sale residential units	CEQA environmental review in progress
3	Habitat Redwood Blvd	8161 Redwood Blvd	80 for-sale residential units; 2,200 square-foot office building	Grading permit issued. Construction to commence soon.
4	777 San Marin	777 San Marin Drive	Redevelopment of office park. Approximately 1,300 residential units proposed	Under review. Pending design review approval.
5	Atherton Place	7533/7537 Redwood Boulevard, 350 feet east of project site	Development of 3.6-acre site with 50 townhomes and 1,360 square feet of retail space	Construction complete.
6	Residence Inn – Novato	7546 Redwood Boulevard, immediately north of project site	Construction of 77,532 square foot, 103 room hotel with a separate 8,000 square foot commercial structure	Under construction
7	1301 Grant Avenue Mixed Use and HenHouse Brewing Company	1301 Grant Avenue, 0.45 mile southwest of project site	Conversion of existing office structure into mixed-use building with tap room on ground floor and offices on upper floor	Construction complete.
8	4th Street & Grant Avenue Mixed Use Project	1316 Grant Avenue, 0.5 mile southwest of project site	Demolition of existing office structure and construction of six story mixed use structure with 6,790 square feet of ground floor commercial space and five stories of 207 residential units	Application under City review
9	3rd Street & Grant Avenue Mixed Use Project	1212 & 1214 Grant Avenue, 0.45 mile southwest of project site	Demolition of existing structures and constructure of five story mixed use structure with 1,345 square feet of ground floor commercial space and four stories of 60 residential units.	Application under City review
10	1st Street & Grant Avenue Mixed Use Project	1107 & 1119 Grant Avenue, 0.45 mile southwest of project site	Demolition of existing structures and construction of six story mixed use structure with 6,205 square feet of ground floor commercial space and five stories of 173 residential units	Application under City review

Source: City of Novato 2023

Project impacts are primarily temporary, localized effects that would occur during construction activities. Therefore, the potential for the project to contribute to cumulative impacts would be limited to the infrequent periods of project activities and the following issue areas:

- **Air Quality.** Because the San Francisco Area Air Basin is designated a nonattainment area for the federal 8-hour ozone standard, federal $PM_{2.5}$ 24-hour standard, state 8-hour and 1-hour ozone standards, state PM_{10} annual and 24-hour standards, and the state $PM_{2.5}$ 24-hour standard, cumulative air quality impacts currently exist for these pollutants. As discussed in Section 3, *Air Quality*, project construction activities would not generate emissions of this air pollutant exceeding BAAQMD significance thresholds, which are intended to assess whether a project's contribution to existing cumulative air quality impacts is considerable. Therefore, the project's contribution to cumulative air quality impacts would not be cumulatively considerable.
- **Biological Resources.** Most cumulative impacts to biological resources occur when a disproportionate number of development projects occur at once and regionally impact a local population of a special status species, riparian habitat, sensitive natural communities, wetlands, or other locally protected biological resources. In this case, Project Nos. 1 and 3 would occur in undeveloped areas and Project Nos. 2, and 4 through 10 would occur within partially developed or previously developed areas. Due to the nature of these projects and the discretionary approvals required for each one, these development projects would be required to undergo CEQA review to identify the extent of these biological resources impacts and to mitigate those impacts appropriately. Given the uncertainty in the extent of impacts associated with these projects, this analysis conservatively assumes a significant cumulative impact to biological resources would occur. Nevertheless, the proposed project would be required to implement Mitigation Measures BIO-1 through BIO-3 to reduce its impacts to biological resources to a less-than-significant level such that project-level impacts would not result in a cumulatively considerable contribution to this cumulative impact.
- **Cultural and Tribal Cultural Resources.** Cumulative development in the region would continue to disturb areas with the potential to contain cultural and tribal cultural resources. Project Nos. 3 through 8 would occur within developed sites with low potential to impact cultural resources (City of Novato 2022). In addition, as mentioned above, the cumulative development projects have undergone or would be required to undergo CEQA review, which would determine the extent of potential cultural and tribal cultural resources impacts and mitigate those impacts appropriately. If these cumulative projects would result in impacts to known or unknown cultural or tribal cultural resources, impacts to such resources would be addressed on a case-by-case basis. Given the uncertainty in the extent of impacts associated with these projects, this analysis conservatively assumes a significant cumulative impact to cultural and tribal cultural resources would occur. Nevertheless, the proposed project would be required to implement Mitigation Measures CUL-1 through CUL-3 and TCR-1 to reduce its impacts to cultural and tribal cultural resources to a less-than-significant level such that project-level impacts would not result in a cumulatively considerable contribution to this cumulative impact.
- **Greenhouse Gas Emissions.** GHG emissions and climate change are, by definition, cumulative impacts. As discussed in Section 8, *Greenhouse Gas Emissions*, the adverse environmental impacts of cumulative GHG emissions, including sea level rise, increased average temperatures, more drought years, and more large forest fires, are already occurring. As a result, cumulative impacts related to GHG emissions are significant. Thus, the issue of climate change involves an analysis of whether a project's contribution towards an impact is cumulatively considerable. As discussed in Section 8, *Greenhouse Gas Emissions*, project emissions would be below the identified threshold of significance and would therefore not be cumulatively considerable.

- **Hazards and Hazardous Materials.** Similar to the proposed project, cumulative projects would be required to comply with regulations applicable to the use, disposal, and transportation of hazardous materials during construction activities, and compliance with applicable regulations would reduce potential cumulative impacts to less-than-significant levels. With respect to the use and accidental release of hazardous materials in the environment at construction, effects are generally limited to site-specific conditions. Therefore, cumulative impacts related to accidental release of hazardous materials would be less than significant.
- **Noise.** Overlapping construction activities associated with cumulative development projects in conjunction with proposed project activities could result in cumulative noise impacts related to a temporary increase in ambient noise levels at the same noise-sensitive receivers located throughout the area, especially during construction activities. However, similar to the proposed project, cumulative development projects would be subject to compliance with the noise level limits established in Novato Municipal Code Section 19.22.070. Therefore, cumulative construction noise impacts would be less than significant.
- **Transportation.** Overlapping construction schedules associated with cumulative development projects in conjunction with proposed project activities could result in cumulative transportation impacts. The proposed project is not anticipated to require roadway lane closures; if cumulative projects would require lane or roadway closures, they would be required to prepare traffic control plans as part of the encroachment permitting process for construction within City right-of-way, which would minimize impacts to transportation hazards and emergency access. The project would require fewer maintenance trips in operation compared to existing conditions; accordingly, there would be no cumulative operational impact. Therefore, cumulative transportation impacts would be less than significant.

Given the above discussion, the proposed project would not result in a cumulatively considerable contribution to a significant cumulative impact with mitigation incorporated.

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c. Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?

Effects on human beings are generally associated with impacts related to issue areas such as air quality, geology and soils, hazards and hazardous materials, noise, and transportation. As discussed in this Initial Study, the project would have a less than significant impact or a less than significant impact with mitigation in each of these resource areas. Therefore, the project would not cause substantial adverse effects on human beings, either directly or indirectly and impacts associated with the project would be less than significant with mitigation incorporated.

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Rincon Consultants, Inc. prepared this IS-MND under contract to the City of Novato. Persons involved in data gathering analysis, project management, and quality control are listed below.

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Appendix A

Arborist Report, Biological Constraints Assessment, and Peer Review

October 30, 2020

Chris Cole
Retail Opportunity Investments Corp (ROIC)
11250 El Camino Real
Suite 200
San Diego, CA 92130

Re: Tree Survey Report, The Village at Novato Project, Novato, Marin County, CA.

Dear Mr. Cole:

This letter summarizes the methods and results of an arborist survey performed on October 8, 2020 at the site of the proposed Village at Novato Development Project (Project) at 7530 and 7506 Redwood Boulevard (Study Area; APNs: 143-011-05, and -08) in downtown Novato, Marin County, California (Study Area). The survey was conducted by ISA-Certified Arborist, Scott Yarger (ISA #WE-9300A), for the purpose of identifying and documenting the presence of all trees greater than or equal to four inches diameter, including "heritage trees" as defined by Chapter 17, "Trees and Shrubs", of the City of Novato Municipal Code within the Study Area.

The Study Area is a pair of undeveloped parcels totaling approximately 6 acres, west of Hwy 101, north of Olive Avenue and east of Redwood Boulevard, in downtown Novato. The Study Area is bordered in all directions by commercial, residential, and light industrial land uses. To the east, the Study Area is bounded active railroad track operated by Sonoma-Marin Area Rail Transit (SMART). The majority of the site is characterized by ruderal disturbed areas. The proposed project consists of mixed use, residential and retail development.

Regulatory Background

Chapter 17, "Trees and Shrubs" of the Novato Municipal Code regulates the alteration and/or removal of certain trees and shrubs on private and City-owned or controlled properties within the city limits. A tree permit is required for the removal or alteration of any "heritage tree" on any private parcel or removal of one or more trees on any undeveloped private parcel in the city. A "heritage tree" is defined as: "any native or non-native woody plant: (1) characterized by having a major trunk or trunks of a diameter of 24 inches (circumference of 75 inches) or measured at 24 inches above grade; or (2) any other so designated by the city council based upon a finding that it has special historical associations due to its age, character, species, or location. A "tree" is defined as any woody native or non-native plant characterized by having a major trunk or trunks of a diameter of six inches (circumference of 19 inches) or more measured at 24 inches above existing grade. A tree permit is also required to cut, trim, prune, spray, brace, plant, move, remove, or replace any street tree or shrub within the city right-of-way. An encroachment permit shall also be obtained for work to be done in the public right-of-way.

Because the Study Area does not support natural woodlands, it is WRA's assessment that Chapter 19, Division 19.30 "Woodland and Tree Preservation" of the Novato Municipal Code does not apply the proposed Project; however, WRA recommends that ROIC consult with the city to confirm if this is indeed the case.

Methods

On October 8, 2020, the Study Area was traversed on foot to inventory all trees greater than or equal to 4 inches diameter at 24 inches above grade, as specified per the Tree Ordinance. WRA's ISA-Certified Arborist surveyed the area and recorded relevant tree information for each surveyed tree including species, diameter, estimated crown radius, estimated height, and health, condition and structure ratings.

Locations of trees within the Study Area were recorded using a handheld GPS unit with sub-meter accuracy. Diameter was calculated for surveyed trees by measuring the trunk diameter at 24 inches above grade. Diameter for multi-trunked trees was calculated by measuring each individual trunk and calculating the sum total of trunk diameters. In cases where multi-trunked trees had more than five main trunks, only the five largest trunks were measured. In cases where an irregular buttress or bulge, or trunk union occurred at two feet above ground, measurements were taken above the irregular feature in order to best represent the size of the tree.

General notes on the condition of trees were taken, including health, structure, and overall condition. Assessment of the health, structure, and overall condition of each tree was conducted according to the narratives listed in Table 1.

Table 1. Rating Narratives for Tree Assessment

Health	
Good	Tree is free from symptoms of disease and stress.
Fair	Tree shows some symptoms of disease or stress including twig and small branch dieback, evidence of fungal / parasitic infection, thinning of crown, or poor leaf color.
Poor	Tree shows symptoms of severe decline.
Structure	
Good	Tree is free from major structural defects.
Fair	Tree shows some structural defects in branches but overall structure is stable.
Poor	Tree shows structural failure of a major branch or co-dominant trunk.
General Condition	
Good	Tree shows condition of foliage, bark, and overall structure characteristic of the species and lacking obvious defect, or disease.
Fair	Tree shows condition of foliage, bark, and overall structure characteristic of the species with some evidence of stress, defect, or disease.
Poor	Tree shows condition of foliage, bark, and overall structure uncharacteristic of the species with obvious evidence of stress, defect, or disease.

Results

A total of 59 trees were identified within the Study Area, including 11 trees which are large enough to be considered heritage trees per the Tree Ordinance, and 48 trees which are non-heritage trees per the ordinance. Nine of the aforementioned trees are also considered street trees, as they are within the public right-of-way along Redwood Boulevard. A complete list of all trees surveyed is presented in Attachment A. A map showing the location of surveyed trees is provided in Attachment B. Representative photographs are provided in Attachment C.

Heritage trees within the Study Area were composed of five native tree species, coast redwood (*Sequoia sempervirens*), California bay (*Umbellularia californica*), valley oak (*Quercus lobata*), coast live oak (*Q. agrifolia*), and Fremont cottonwood (*Populus fremontii*). Other tree species surveyed within this Study Area included Northern California black walnut (*Juglans hindsii*), cork oak (*Quercus suber*), cherry plum (*Prunus cerasifera*), pear (*Pyrus* sp.), and the non-native invasive silver wattle (*Acacia dealbata*). The largest surveyed tree was a multi-trunk valley oak (tree #160) which measured approximately 59.9 inches aggregate diameter. The largest single-trunk tree, was an approximately 35.8-inch diameter coast redwood (tree #157).

Observed maladies and defects affecting trees within the Study Area included codominant trunks with included bark, epicormics sprouts indicitave of stress, poorly pruned trees (e.g., topped for overhead power lines), trunk wounds with bleeding sap, and moderate to significant crown dieback.

The observed maladies and considerations of severity, along with species characteristics guided the assignment of the structural condition, health, and overall condition score for each tree. The overall condition, structural condition, health of inventoried trees was found to be generally fair. Table 2 below summarizes the assessment results of all inventoried trees in the Study Area.

Table 2. Tree Assessment Results Summary

Criteria Assessed/Rating	Condition	Health	Structure
Good	0 (0%)	1 (2%)	0 (0%)
Fair	52 (88%)	54 (91%)	42 (71%)
Poor	7 (12%)	4 (7%)	17 (29%)

Based on the most recent Project plans, it appears that all trees within the Study Area will be removed to facilitate the development. As per Chapter 17, “Trees and Shrubs” of the Novato Municipal Code, a tree permit is required for the removal or alteration of any “heritage tree” on any private parcel or removal of one or more trees (6 inches or greater) on any undeveloped private parcel in the city. A tree permit is also required to remove any street tree or shrub within the city right-of-way. An encroachment permit shall also be obtained for work to be done in the public right-of-way. Per the proposed plans, and the results of the tree survey, a total of eight heritage trees, nine street trees, and 30 additional trees (6 inches diameter or greater) require removal, for a total of 47 tree removals requiring permits from the City of Novato. An encroachment permit will also be required for work on the street trees along Redwood Boulevard.

Summary and Recommendations

A total of 59 trees were identified within the Study Area, including 11 trees which are of large enough to be considered heritage trees per the Tree Ordinance, and 48 trees which are non-

heritage trees per the ordinance. Nine of the aforementioned trees are also considered street trees, as they are within the public right-of-way along Redwood Boulevard.

Per the proposed plans, and the results of the tree survey, a total of eight heritage trees, nine street trees, and 30 additional trees (6 inches diameter or greater) require removal, for a total of 47 tree removals requiring permits from the City of Novato. An encroachment permit will also be required for work on the street trees along Redwood Boulevard.

A complete list of all trees surveyed within the Study Area is presented in Attachment A. A figure displaying the locations of all protected trees is presented in Attachment B. Representative photographs are provided in Attachment C.

Please feel free to contact me by email at yarger@wra-ca.com, or our project manager, Leslie Allen at allen@wra-ca.com, if you have any questions or concerns.

Sincerely yours,



Scott Yarger
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Enclosures:

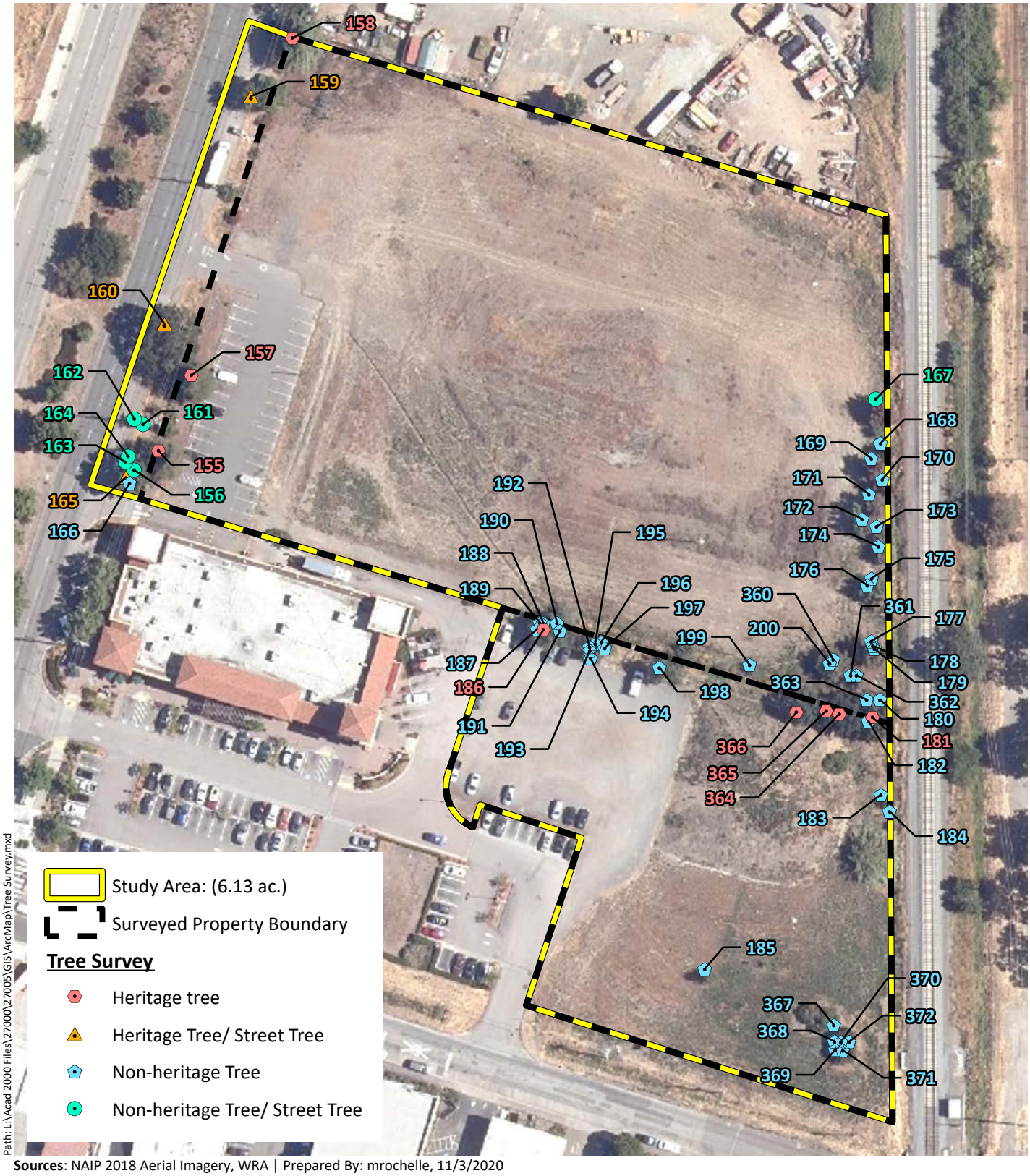
Attachment A – Tree Survey Table
Attachment B – Tree Survey Map
Attachment C – Representative Photographs

Attachment A. The Village at Novato Arborist Survey, Novato, California, October 2020

Tag ID	Species	Common Name	Multi-trunk	Diameter 1	Diameter 2	Diameter 3	Diameter 4	Diameter 5	Total Diameter (inches)	Approximate Dripline Radius (feet)	Approximate Height (feet)	Ordinance Status	Condition	Health	Structure
155	*Sequoia sempervirens*	Coast redwood	Yes	17.5	15.2	15.2	0.0	0.0	47.9	18	55	Heritage tree	Fair	Fair	Fair
156	*Quercus lobata*	Valley oak	No	5.5	0.0	0.0	0.0	0.0	5.5	9	16	Non-heritage Tree / Street tree	Poor	Fair	Poor
157	*Sequoia sempervirens*	Coast redwood	No	35.8	0.0	0.0	0.0	0.0	35.8	16	50	Heritage tree	Fair	Fair	Fair
158	*Sequoia sempervirens*	Coast redwood	Yes	27.5	27.0	0.0	0.0	0.0	54.5	20	50	Heritage tree	Fair	Fair	Fair
159	*Umbellularia californica*	California bay	No	32.1	0.0	0.0	0.0	0.0	32.1	25	28	Heritage tree / Street tree	Poor	Poor	Fair
160	*Quercus lobata*	Valley oak	Yes	12.5	17.5	17.0	12.9	0.0	59.9	28	38	Heritage tree / Street tree	Fair	Good	Fair
161	*Quercus lobata*	Valley oak	Yes	2.5	2.5	0.0	0.0	0.0	5.0	2	13	Non-heritage Tree / Street tree	Fair	Fair	Fair
162	*Quercus lobata*	Valley oak	Yes	5.0	4.8	0.0	0.0	0.0	9.8	6	15	Non-heritage Tree / Street tree	Fair	Fair	Fair
163	*Populus fremontii*	Fremont cottonwood	Yes	6.0	5.8	0.0	0.0	0.0	11.8	10	26	Non-heritage Tree / Street tree	Fair	Fair	Fair
164	*Populus fremontii*	Fremont cottonwood	Yes	8.2	4.1	0.0	0.0	0.0	12.3	0	20	Non-heritage Tree / Street tree	Fair	Fair	Fair
165	*Populus fremontii*	Fremont cottonwood	Yes	9.5	9.3	6.9	0.0	0.0	25.7	14	28	Heritage tree / Street tree	Fair	Fair	Fair
167	*Acacia dealbata*	Silver wattle	Yes	7.9	5.4	0.0	0.0	0.0	13.3	12	20	Non-heritage Tree / Street tree	Fair	Fair	Poor
168	*Acacia dealbata*	Silver wattle	No	5.5	0.0	0.0	0.0	6.0	11.5	8	15	Non-heritage Tree	Fair	Fair	Fair
169	*Acacia dealbata*	Silver wattle	Yes	4.8	5.9	4.8	0.0	0.0	15.5	10	22	Non-heritage Tree	Fair	Fair	Poor
170	*Acacia dealbata*	Silver wattle	No	7.4	0.0	0.0	0.0	0.0	7.4	9	21	Non-heritage Tree	Fair	Fair	Fair
171	*Acacia dealbata*	Silver wattle	Yes	5.5	5.2	4.2	0.0	0.0	14.9	8	22	Non-heritage Tree	Fair	Fair	Poor
172	*Acacia dealbata*	Silver wattle	Yes	5.1	4.5	0.0	0.0	0.0	9.6	6	18	Non-heritage Tree	Fair	Fair	Poor
173	*Acacia dealbata*	Silver wattle	Yes	3.9	3.7	3.7	0.0	0.0	11.3	8	20	Non-heritage Tree	Fair	Fair	Poor
174	*Acacia dealbata*	Silver wattle	Yes	4.5	5.0	4.0	4.0	0.0	17.5	8	18	Non-heritage Tree	Fair	Fair	Poor
175	*Acacia dealbata*	Silver wattle	Yes	4.5	4.5	6.0	0.0	0.0	15.0	8	18	Non-heritage Tree	Fair	Fair	Poor
176	*Acacia dealbata*	Silver wattle	No	4.2	0.0	0.0	0.0	0.0	4.2	5	14	Non-heritage Tree	Fair	Fair	Fair
177	*Acacia dealbata*	Silver wattle	No	9.3	0.0	0.0	0.0	0.0	9.3	12	18	Non-heritage Tree	Fair	Fair	Fair
178	*Acacia dealbata*	Silver wattle	No	5.3	0.0	0.0	0.0	0.0	5.3	8	18	Non-heritage Tree	Poor	Poor	Fair
179	*Acacia dealbata*	Silver wattle	Yes	5.0	4.7	0.0	0.0	0.0	9.7	9	16	Non-heritage Tree	Fair	Fair	Poor
180	*Acacia dealbata*	Silver wattle	Yes	4.1	3.0	3.0	2.0	2.0	14.1	8	18	Non-heritage Tree	Fair	Fair	Poor
181	*Quercus lobata*	Valley oak	Yes	9.5	7.2	7.0	7.0	6.0	36.7	12	22	Heritage tree	Fair	Fair	Fair
182	*Quercus lobata*	Valley oak	Yes	6.6	6.6	0.0	0.0	0.0	13.2	9	18	Non-heritage Tree	Fair	Fair	Fair
183	*Juglans hindsii*	Northern California black walnut	Yes	4.0	2.5	0.0	0.0	0.0	6.5	6	10	Non-heritage Tree	Fair	Fair	Fair
184	*Prunus cerasifera*	Cherry plum	Yes	2.0	1.0	1.0	1.0	1.0	6.0	4	10	Non-heritage Tree	Poor	Poor	Poor
185	*Pyrus sp.*	Pear	Yes	3.5	2.0	2.0	2.0	2.0	11.5	6	10	Non-heritage Tree	Poor	Poor	Poor
166	*Quercus lobata*	Valley oak	No	4.5	0.0	0.0	0.0	0.0	4.5	9	12	Non-heritage Tree	Fair	Fair	Poor
186	*Quercus lobata*	Valley oak	Yes	11.0	5.5	5.5	6.7	6.5	35.2	14	22	Heritage tree	Fair	Fair	Fair
187	*Quercus suber*	Cork oak	Yes	7.5	8.0	5.0	0.0	0.0	20.5	10	18	Non-heritage Tree	Fair	Fair	Fair
188	*Quercus suber*	Cork oak	Yes	7.0	4.0	0.0	0.0	0.0	11.0	8	18	Non-heritage Tree	Fair	Fair	Fair
189	*Quercus suber*	Cork oak	No	4.2	0.0	0.0	0.0	0.0	4.2	5	18	Non-heritage Tree	Fair	Fair	Fair
190	*Acacia dealbata*	Silver wattle	No	7.5	0.0	0.0	0.0	0.0	7.5	10	10	Non-heritage Tree	Poor	Fair	Poor
191	*Quercus lobata*	Valley oak	Yes	4.5	4.5	3.0	1.0	0.0	13.0	12	12	Non-heritage Tree	Poor	Fair	Poor
192	*Quercus lobata*	Valley oak	No	5.0	0.0	0.0	0.0	0.0	5.0	9	14	Non-heritage Tree	Fair	Fair	Fair
193	*Quercus lobata*	Valley oak	Yes	4.9	2.5	0.0	0.0	0.0	7.4	7	16	Non-heritage Tree	Fair	Fair	Fair
194	*Quercus lobata*	Valley oak	No	4.6	0.0	0.0	0.0	0.0	4.6	6	13	Non-heritage Tree	Fair	Fair	Fair
195	*Quercus lobata*	Valley oak	Yes	6.4	5.0	0.0	0.0	0.0	11.4	10	18	Non-heritage Tree	Fair	Fair	Fair
196	*Quercus lobata*	Valley oak	No	6.2	0.0	0.0	0.0	0.0	6.2	8	16	Non-heritage Tree	Fair	Fair	Fair
197	*Quercus lobata*	Valley oak	No	5.1	0.0	0.0	0.0	0.0	5.1	9	16	Non-heritage Tree	Fair	Fair	Fair
198	*Quercus lobata*	Valley oak	Yes	10.8	11.2	0.0	0.0	0.0	22.0	18	26	Non-heritage Tree	Fair	Fair	Fair
199	*Quercus lobata*	Valley oak	No	5.0	0.0	0.0	0.0	0.0	5.0	4	12	Non-heritage Tree	Fair	Fair	Fair
200	*Acacia dealbata*	Silver wattle	No	11.0	0.0	0.0	0.0	0.0	11.0	12	18	Non-heritage Tree	Fair	Fair	Fair
360	*Acacia dealbata*	Silver wattle	No	5.1	0.0	0.0	0.0	0.0	5.1	8	15	Non-heritage Tree	Fair	Fair	Fair
361	*Acacia dealbata*	Silver wattle	No	6.1	0.0	0.0	0.0	0.0	6.1	9	15	Non-heritage Tree	Fair	Fair	Fair
362	*Acacia dealbata*	Silver wattle	Yes	5.0	5.0	0.0	0.0	0.0	10.0	8	17	Non-heritage Tree	Fair	Fair	Poor

Attachment A. The Village at Novato Arborist Survey, Novato, California, October 2020

Tag ID	Species	Common Name	Multi-trunk	Diameter 1	Diameter 2	Diameter 3	Diameter 4	Diameter 5	Total Diameter (inches)	Approximate Dripline Radius (feet)	Approximate Height (feet)	Ordinance Status	Condition	Health	Structure
363	*Acacia dealbata*	Silver wattle	Yes	5.5	4.2	3.8	0.0	0.0	13.5	10	12	Non-heritage Tree	Fair	Fair	Poor
364	*Quercus lobata*	Valley oak	Yes	11.2	10.0	8.0	8.0	8.0	45.2	10	22	Heritage tree	Fair	Fair	Fair
365	*Quercus lobata*	Valley oak	Yes	8.5	6.4	6.4	6.4	0.0	27.7	12	22	Heritage tree	Fair	Fair	Fair
366	*Quercus lobata*	Valley oak	Yes	12.0	7.2	7.0	7.0	6.0	39.2	14	22	Heritage tree	Fair	Fair	Fair
367	*Quercus agrifolia*	Coast live oak	No	15.0	0.0	0.0	0.0	0.0	15.0	10	22	Non-heritage Tree	Fair	Fair	Fair
368	*Quercus agrifolia*	Coast live oak	No	4.0	0.0	0.0	0.0	0.0	4.0	8	15	Non-heritage Tree	Fair	Fair	Fair
369	*Quercus agrifolia*	Coast live oak	No	5.0	0.0	0.0	0.0	0.0	5.0	6	15	Non-heritage Tree	Fair	Fair	Fair
370	*Quercus agrifolia*	Coast live oak	No	6.0	0.0	0.0	0.0	0.0	6.0	6	15	Non-heritage Tree	Fair	Fair	Fair
371	*Quercus agrifolia*	Coast live oak	No	7.0	0.0	0.0	0.0	0.0	7.0	6	15	Non-heritage Tree	Fair	Fair	Fair
372	*Quercus lobata*	Valley oak	No	4.0	0.0	0.0	0.0	0.0	4.0	5	15	Non-heritage Tree	Fair	Fair	Fair



Sources: NAIP 2018 Aerial Imagery, WRA | Prepared By: mrochelle, 11/3/2020

Attachment B. Tree Survey Results

ROIC The Village at Novato Development
Novato, Marin County, California

0 50 100 Feet

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wra
ENVIRONMENTAL CONSULTANTS



Tree #155, a multi-trunk coast redwood (*Sequoia sempervirens*) heritage tree located on the western edge of the Study Area.



Tree #159, a California bay (*Umbellularia californica*) street tree along Redwood Boulevard. The tree is exhibiting significant crown dieback and internal decay, contributing to its poor condition ranking.



Tree #169, a non-native invasive silver wattle (*Acacia dealbata*) non-heritage tree exhibiting poor structure, i.e. codominant trunks with weak attachments.



Photograph depicting tree #181 a multiple trunk valley oak (*Quercus lobata*) heritage tree in the background.



Tree #185, a non-heritage pear (*Pyrus* sp.) tree in poor condition.

Biological Constraints Assessment

THE VILLAGE AT NOVATO, NOVATO, MARIN COUNTY, CALIFORNIA

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WRA Project: 27005

Date: November 2020

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TABLE OF CONTENTS

EXECUTIVE SUMMARY iii

1.0 INTRODUCTION 1

2.0 REGULATORY BACKGROUND 1
2.2 Special-Status and Protected Species 3

3.0 METHODS 4
3.1 Biological Communities 4
4.1.1 Terrestrial Natural Communities 5
4.1.2 Aquatic Natural Communities 5
3.2 Special-Status Species 5
3.2.1 Literature Review 5
3.2.2 Site Assessment 6

4.0 RESULTS 6
4.1 Biological Communities 7
4.1.1 Non-Sensitive Biological Communities 7
4.1.2 Sensitive Biological Communities 8
4.2 Special-Status Species 8
4.2.1 Plants 8
4.2.2 Wildlife 9

6.0 REFERENCES 11

LIST OF APPENDICES

Appendix A – List of Observed Plant and Wildlife Species
Appendix B – List of Special-Status Species in the Vicinity of the Study Area
Appendix C – Site Photographs
Appendix D – Figures
Figure 1. Study Area Location
Figure 2. Biological Communities
Figure 3. Special-status Plant Species Documented within 5-miles of the Study Area
Figure 4. Special-status Wildlife Species Documented within 5-miles of the Study Area

LIST OF TABLES

Table 1. Description of CNPS Ranks and Threat Codes 4
Table 2. Summary of Biological Communities in the Study Area 7

LIST OF ACRONYMS AND ABBREVIATIONS

APN	Assessor's Parcel Number
BCA	Biological Constraints Assessment
CCR	California Code of Regulations
CDFG	California Department of Fish and Game
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFGC	California Fish and Game Code
CFR	Code of Federal Regulations
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
Corps	U.S. Army Corps of Engineers
CSRL	California Soil Resources Lab
CWA	Clean Water Act
ESA	Federal Endangered Species Act
Inventory	CNPS Inventory of Rare and Endangered Plants
MBTA	Migratory Bird Treaty Act
MMPA	Marine Mammal Protection Act
NWI	National Wetland Inventory
OHWM	Ordinary High Water Mark
Rank	California Rare Plant Rank
RHA	Rivers and Harbors Act
RWQCB	Regional Water Quality Control Board
SMART	Sonoma-Marin Area Rail Transit
SWRCB	State Water Resources Control Board
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WBWG	Western Bat Working Group
WRA	WRA, Inc.

EXECUTIVE SUMMARY

The purpose of this report is to provide an analysis of biological community and special-status species issues for a proposed development called The Village at Novato Development (Project) in Novato, Marin County, California.

On May 28 and June 3, 2019, WRA, Inc. (WRA) conducted a biological constraints assessment within the Study Area, an approximately 6-acre parcel (Assessor's Parcel Numbers [APNs] 143-011-05 and 143-011-08) west of Hwy 101, north of Olive Avenue and east of Redwood Boulevard. A brief follow-up assessment was performed on October 8, 2020. WRA observed four biological communities. One sensitive biological community with potential to be impacted by the Project was identified: an ephemeral stream/ditch, which encompasses 278 linear feet (0.03 acre) within the Study Area.

One special-status wildlife species has a moderate potential to occur within the Study Area: white-tailed kite (*Elanus leucurus*). Although suitable habitat for one special-status plant species, pappose tarplant (*Centromadia parryi* ssp. *parryi*), is present on site, it was not observed during multiple site visits conducted during the blooming period for this species and has been determined to be absent. No other special-status plant or wildlife species have a moderate or high potential to occur within the Study Area.

1.0 INTRODUCTION

On May 28 and June 3, 2019, WRA, Inc. performed an assessment of biological constraints on an approximately 6-acre parcel (Assessor's Parcel Numbers [APNs] 143-011-05 and 143-011-08; Study Area) west of Hwy 101, north of Olive Avenue and east of Redwood Boulevard in Novato, Marin County, California (Appendix D, Figure 1). An additional site visit was conducted by a wildlife biologist on October 8, 2020. The purpose of the assessment was to gather information necessary to complete a review of biological constraints to support an evaluation of any future proposed activities within the Study Area under the California Environmental Quality Act (CEQA). This report describes the results of the site visit, which assessed the Study Area for the (1) potential to support special-status species; and (2) presence of other sensitive biological resources protected by local, state, and federal laws and regulations. Specific findings on the habitat suitability or presence of special-status species or sensitive habitats may require that protocol-level surveys be conducted.

A biological constraints assessment (BCA) provides general information on the potential presence of sensitive species and habitats. The BCA does not constitute a formal aquatic resources delineation or protocol-level survey for listed species that may be required for project approval by local, state, or federal agencies. This assessment is based on information available at the time of the study and on site conditions that were observed on the dates of the site visits.

2.0 REGULATORY BACKGROUND

The following sections explain the regulatory context of the biological assessment, including applicable laws and regulations that were applied to the field investigations and analysis of potential project impacts.

2.1 Sensitive Biological Communities

CEQA provides protections for particular vegetation types defined as sensitive by the California Department of Fish and Game (CDFW), and aquatic communities protected by laws and regulations administered by the U.S Army Corps of Engineers (Corps), State Water Resources Control Board (SWRCB), and Regional Water Quality Control Boards (RWQCB). The laws and regulations that provide protection for these resources are summarized below.

Sensitive Natural Communities. Sensitive natural communities include habitats that fulfill special functions or have special values. Natural communities considered sensitive are those identified in local or regional plans, policies, regulations, or by the CDFW. CDFW ranks sensitive communities as "threatened" or "very threatened" (CDFW 2020a) and keeps records of their occurrences in its California Natural Diversity Database (CNDDB; CDFW 2020b). CNDDB vegetation alliances are ranked 1 through 5 based on NatureServe's (2020) methodology, with those alliances ranked globally (G) or statewide (S) as 1 through 3 considered sensitive. Impacts to sensitive natural communities identified in local or regional plans, policies, or regulations or those identified by the CDFW or U.S. Fish and Wildlife Service (USFWS) must be considered and evaluated under CEQA (CCR Title 14, Div. 6, Chap. 3, Appendix G). In addition, this general class includes oak woodlands that are protected by local ordinances under the Oak Woodlands Protection Act.

Waters of the United States, Including Wetlands. The Corps regulates "Waters of the United States" under Section 404 of the Clean Water Act (CWA). Waters of the United States are defined

in the Code of Federal Regulations (CFR) as including the territorial seas, and waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, such as tributaries, lakes and ponds, impoundments of waters of the U.S., and wetlands that are hydrologically connected with these navigable features (33 CFR 328.3). Potential wetland areas, according to the three criteria used to delineate wetlands as defined in the Corps Wetlands Delineation Manual (Environmental Laboratory 1987), are identified by the presence of (1) hydrophytic vegetation, (2) hydric soils, and (3) wetland hydrology. Unvegetated waters including lakes, rivers, and streams may also be subject to Section 404 jurisdiction and are characterized by an ordinary high water mark (OHWM) identified based on field indicators such as the lack of vegetation, sorting of sediments, and other indicators of flowing or standing water. The placement of fill material into Waters of the United States generally requires a permit from the Corps under Section 404 of the CWA.

The Corps also regulates construction in navigable waterways of the U.S. through Section 10 of the Rivers and Harbors Act (RHA) of 1899 (33 USC 403). Section 10 of the RHA requires Corps approval and a permit for excavation or fill, or alteration or modification of the course, location, condition, or capacity of, any port, roadstead, haven, harbor, canal, lake, harbor or refuge, or enclosure within the limits of any breakwater, or of the channel of any navigable water of the United States. Section 10 requirements apply only to navigable waters themselves, and are not applicable to tributaries, adjacent wetlands, and similar aquatic features not capable of supporting interstate commerce.

Waters of the State, Including Wetlands. The term “Waters of the State” is defined by the Porter-Cologne Act as “any surface water or groundwater, including saline waters, within the boundaries of the state.” The SWRCB and nine RWQCBs protect waters within this broad regulatory scope through many different regulatory programs. Waters of the State in the context of a CEQA Biological Resources evaluation include wetlands and other surface waters protected by the State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State. The SWRCB and RWQCB issue permits for the discharge of fill material into surface waters through the State Water Quality Certification Program, which fulfills requirements of Section 401 of the CWA and the Porter-Cologne Water Quality Control Act. Projects that require a Clean Water Act permit are also required to obtain a Water Quality Certification. If a project does not require a federal permit, but does involve discharge of dredge or fill material into surface waters of the State, the SWRCB and RWQCB may issue a permit in the form of Waste Discharge Requirements.

Sections 1600-1616 of California Fish and Game Code. Streams and lakes, as habitat for fish and wildlife species, are regulated by CDFW under Sections 1600-1616 of California Fish and Game Code (CFGC). Alterations to or work within or adjacent to streambeds or lakes generally require a 1602 Lake and Streambed Alteration Agreement. The term “stream”, which includes creeks and rivers, is defined in the California Code of Regulations (CCR) as “a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports fish or other aquatic life [including] watercourses having a surface or subsurface flow that supports or has supported riparian vegetation” (14 CCR 1.72). The term “stream” can include ephemeral streams, dry washes, watercourses with subsurface flows, canals, aqueducts, irrigation ditches, and other means of water conveyance if they support aquatic life, riparian vegetation, or stream-dependent terrestrial wildlife (CDFG 1994). Riparian vegetation has been defined as “vegetation which occurs in and/or adjacent to a stream and is dependent on, and occurs because of, the stream itself” (CDFG 1994). Removal of riparian vegetation also requires a Section 1602 Lake and Streambed Alteration Agreement from CDFW. Sensitive biological communities include habitats that fulfill special functions or have special values, such as wetlands, streams, or riparian

habitat. These habitats are protected under federal regulations such as the Clean Water Act; state regulations such as the Porter-Cologne Act, the CDFW Streambed Alteration Program, and CEQA; or local ordinances or policies such as city or county tree ordinances, Special Habitat Management Areas, and General Plan Elements.

City of Novato Tree Ordinance. Chapter 17 of the City of Novato Municipal Code states that the alteration or removal of trees having a major trunk or trunks of a diameter of 24 inches or greater, or any other tree designated by the City Council to have special historic associations, will require a tree permit. Furthermore, the City of Novato requires the removal or alteration of native trees and woodlands to comply with the woodland and tree preservation provisions outlined in Chapter 19, Section 19.39 of the City of Novato Municipal Code.

2.2 Special-Status and Protected Species

Special-status species include those plants and wildlife species that have been formally listed, are proposed as endangered or threatened, or are candidates for such listing under the Federal Endangered Species Act (ESA) or California Endangered Species Act (CESA). These acts afford protection to both listed species and those that are formal candidates for listing. The federal Bald and Golden Eagle Protection Act also provides broad protections to both eagle species that in some regards are similar to those provided by ESA. Additionally, CDFW Species of Special Concern and CDFW California Fully Protected species are considered special-status species. Although these aforementioned species generally have no special legal status, they are given special consideration under CEQA. Bat species are also evaluated for conservation status by the Western Bat Working Group (WBWG), a non-governmental entity; bats named as a "High Priority" or "Medium Priority" species for conservation by the WBWG are typically considered special-status and are also considered under CEQA. In addition to regulations for special-status species, most native birds in the United States (including non-status species) are protected by the federal Migratory Bird Treaty Act of 1918 (MBTA) and CFGC sections 3503, 3503.5 and 3513. Under these laws, deliberately destroying active bird nests, eggs, and/or young is illegal. Although not all marine mammals are considered special-status species, all marine mammals are protected under the Marine Mammal Protection Act of 1972 as amended (MMPA), and unauthorized take including harassment is prohibited.

Plant species on the California Native Plant Society (CNPS) Rare and Endangered Plant Inventory (Inventory) with California Rare Plant Ranks (Rank) of 1 and 2 are also considered special-status plant species and must be considered under CEQA. Rank 3 and Rank 4 species are afforded little or no protection under CEQA, but are included in this analysis for completeness. A description of the CNPS Ranks is provided below in Table 1.

Table 1. Description of CNPS Ranks and Threat Codes

California Rare Plant Ranks (formerly known as CNPS Lists)	
Rank 1A	Presumed extirpated in California and either rare or extinct elsewhere
Rank 1B	Rare, threatened, or endangered in California and elsewhere
Rank 2A	Presumed extirpated in California, but more common elsewhere
Rank 2B	Rare, threatened, or endangered in California, but more common elsewhere
Rank 3	Plants about which more information is needed - A review list
Rank 4	Plants of limited distribution - A watch list
Threat Ranks	
0.1	Seriously threatened in California
0.2	Moderately threatened in California
0.3	Not very threatened in California

Critical Habitat. Critical habitat is a term defined in the ESA as a specific and designated geographic area that contains features essential for the conservation of a threatened or endangered species and that may require special management and protection. The ESA requires federal agencies to consult with the USFWS to conserve listed species on their lands and to ensure that any activities or projects they fund, authorize, or carry out will not jeopardize the survival of a threatened or endangered species. In consultation for those species with critical habitat, federal agencies must also ensure that their activities or projects do not adversely modify critical habitat to the point that it will no longer aid in the species' recovery. In many cases, this level of protection is similar to that already provided to species by the ESA jeopardy standard. However, areas that are currently unoccupied by the species but which are needed for the species' recovery are protected by the prohibition against adverse modification of critical habitat.

3.0 METHODS

On May 28 and June 3, 2019, the Study Area was traversed on foot to determine (1) plant communities present within the Study Area, (2) if existing conditions provided suitable habitat for any special-status plant species, and (3) if sensitive habitats are present. Additionally, a WRA wildlife biology visited the site on October 8, 2020 to assess the site for its potential to provide habitat for special-status and common species documented in the vicinity. All plant and wildlife species encountered were recorded and are summarized in Appendix A. Plant nomenclature follows Baldwin et al. (2012) and subsequent revisions by the Jepson Flora Project (2020), except where noted. Because of recent changes in classification for many of the taxa treated by Baldwin et al. and the Jepson Flora Project, relevant synonyms are provided in brackets. For cases in which regulatory agencies, CNPS, or other entities base rarity on older taxonomic treatments, precedence was given to the treatment used by those entities.

3.1 Biological Communities

Prior to conducting field surveys, available reference materials were reviewed, including online soil survey data for the Study Area (California Soil Resources Lab [CSRL] 2020), the USFWS

National Wetland Inventory (NWI) data (USFWS 2020a), and available aerial photographs of the site (Google Earth 2020).

Following the remote assessment, biologists traversed the entire Study Area on foot to document: (1) terrestrial natural communities, (2) existing conditions and whether such provide suitable habitat for any special-status plant or wildlife species, and (3) if and what type of aquatic natural communities (e.g., wetlands) are present. No formal wetland delineation was conducted during the site visit.

4.1.1 Terrestrial Natural Communities

Natural communities were delineated based on distinct shifts in plant assemblage (vegetation), and follow the *California Natural Community List* (CDFW 2020a), *Preliminary Descriptions of the Terrestrial Natural Communities of California* (Holland 1986), and/or *A Manual of California Vegetation, Online Edition* (CNPS 2020a). However, in some cases it is necessary to identify variants of community types or to describe non-vegetated areas that are not described in the literature. Biological communities were classified as sensitive or non-sensitive as defined by CEQA and other applicable laws and regulations.

Vegetation alliances (natural communities) with a CDFW Rank of 1 through 3 (globally critically imperiled (S1/G1), imperiled (S2/G2), or vulnerable (S3/G3), were considered as part of this evaluation, as were any vegetation associations ranked as "Y" on the *California Natural Community List.*

4.1.2 Aquatic Natural Communities

Aquatic natural resources include Waters of the U.S., Waters of the State, and Streams, Lakes, and Riparian Habitat as defined in the CWA, Porter-Cologne Act, and CFGC, respectively.

This site assessment does not constitute a formal wetland delineation; however, superficial indicators of wetlands such as hydrophytic vegetation (i.e., plant communities dominated by wetland species), evidence of inundation or flowing water, saturated soils and seepage, and topographic depressions/swales were assessed. The methods used in the study to assess wetlands and other waters were based on the *U.S. Army Corps of Engineers Wetlands Delineation Manual* ("Corps Manual"; Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* ("Arid West Supplement"; Corps 2008). The routine method for wetland delineation described in the Corps Manual was used to identify areas potentially subject to Corps Section 404 jurisdiction within the Study Area.

3.2 Special-Status Species

3.2.1 Literature Review

Potential occurrence of special-status species in the Study Area was evaluated by first determining which special-status species occur in the vicinity of the Study Area through a literature and database search. Database searches for known occurrences of special-status species focused on the Novato 7.5 minute U.S. Geological Survey (USGS) quadrangle and the eight surrounding USGS quadrangles. The following sources were reviewed to determine which special-status plant and wildlife species have been documented to occur in the vicinity of the Study Area:

- CDFW records (CDFW 2020b)
- USFWS Information for Planning and Consultation Species Lists (USFWS 2020b)
- CNPS Inventory records (CNPS 2020b)

3.2.2 Site Assessment

A site visit was made to the Study Area to search for suitable habitats for special-status species. Habitat conditions observed at the Project Site were used to evaluate the potential for presence of special-status species based on these searches and the professional expertise of the investigating biologists. The potential for each special-status species to occur in the Study Area was then evaluated according to the following criteria:

- No Potential. Habitat on and adjacent to the site is clearly unsuitable for the species requirements (foraging, breeding, cover, substrate, elevation, hydrology, plant community, site history, disturbance regime).
- Unlikely. Few of the habitat components meeting the species requirements are present, and/or the majority of habitat on and adjacent to the site is unsuitable or of very poor quality. The species is not likely to be found on the site.
- Moderate Potential. Some of the habitat components meeting the species requirements are present, and/or only some of the habitat on or adjacent to the site is unsuitable. The species has a moderate probability of being found on the site.
- High Potential. All of the habitat components meeting the species requirements are present and/or most of the habitat on or adjacent to the site is highly suitable. The species has a high probability of being found on the site.
- Present. Species is observed on the site or has been recorded (i.e. CNDDB, other reports) on the site recently.

The site assessment is intended to identify the presence or absence of suitable habitat for each special-status species known to occur in the vicinity in order to determine its potential to occur in the Study Area. The site visit does not constitute a protocol-level survey and is not intended to determine the actual presence or absence of a species; however, if a special-status species is observed during the site visit, its presence will be recorded and discussed.

In cases where little information is known about species occurrences and habitat requirements, the species evaluation was based on best professional judgment of WRA biologists with experience working with the species and habitats. If necessary, recognized experts in individual species biology were contacted to obtain the most up to date information regarding species biology and ecology.

If a special-status species was observed during the site visit, its presence is recorded and discussed below in Section 4.2. For some species, a site assessment visit at the level conducted for this report may not be sufficient to determine presence or absence of a species to the specifications of regulatory agencies. In these cases, a species may be assumed to be present or further protocol-level special-status species surveys may be necessary.

4.0 RESULTS

The Study Area is an undeveloped plot of land located in an urban retail and residential matrix within the City of Novato. The Study Area is bordered to the south, west, and north by paved and

gravel surfaces associated with Redwood Boulevard, Olive Avenue, and retail spaces along these streets. To the east, the Study Area is bounded by active an railroad owned by Sonoma-Marin Area Rail Transit (SMART). The majority of the site is characterized by ruderal and non-native grassland. Elevations of the Study Area range from 9 to 13 feet (WGS 84). A review of historic aerials determined that the Study Area has been surrounded by an urban or heavily developed matrix since at least the early 1950s. The northern half of the Study Area was formerly occupied by residential homes, until they were removed sometime in the late 1990s. In general, the site has been heavily impacted by current and historical anthropogenic modifications and is substantially disturbed by development both within the Study Area and in the areas surrounding the Study Area. The following sections present the results and discussion of the biological assessment within the Study Area.

4.1 Biological Communities

Table 2 summarizes the area of each biological community type observed in the Study Area. Non-sensitive biological communities in the Study Area include developed land, non-native annual grassland, and ruderal herbaceous grassland. Four sensitive biological communities are found in the Study Area: freshwater emergent wetland, ephemeral stream, riparian non-native annual grassland, and riparian ruderal herbaceous grassland. Descriptions for each biological community are contained in the following sections. Biological communities within the Study Area are shown in Appendix D, Figure 2.

Table 2. Summary of Biological Communities in the Study Area

Community Type	**Area (acres)**
Developed land	0.96
Ruderal herbaceous grassland	4.62
Mixed ornamental and native trees	0.24
Ephemeral stream/ditch	0.03 (278 linear feet)
Total Study Area Size	**5.85**

4.1.1 Non-Sensitive Biological Communities

Developed Land

Developed land within the Study Area comprises gravel and asphalt surfaces currently used as parking lots. These areas are highly disturbed and do not contain vegetation.

Ruderal herbaceous grassland

Although not described in the literature, ruderal herbaceous grassland includes areas that have been partially developed or have been used in the past for agriculture or development. However, these areas are not currently in use, and have been allowed to revert to a semi-natural condition. The Study Area is composed primarily of ruderal herbaceous grassland consisting of a frequently disced vacant lot. Ruderal herbaceous grassland within the Study Area is dominated by bristly ox-tongue (*Helminthotheca echioides*), stinkwort (*Dittrichia graveolens*), slim oat (*Avena barbata*), and Harding grass (*Phalaris aquatica*). Himalayan blackberry (*Rubus armeniacus*), California wild rose (*Rosa californica*), and a rose cultivar (*Rosa* sp.) also occur in small concentrated areas within this community, mostly along the northern edge of the Study Area. Low densities of coyote

brush (*Baccharis pilularis*) and non-native trees, such as acacia (*Acacia* spp.), also occur within this community.

Mixed ornamental and native trees

Linear occurrences of mixed ornamental and oak trees parallel the railroad and the top-of-bank of the unnamed ditch that bisects the Study Area running east to west. This community is dominated by acacia, coast live oak (*Quercus agrifolia*), and valley oak (*Quercus lobata*) with other native and non-native trees occurring at low density. A review of historic aerials suggests that adventitious oaks colonized Study Area within the past decade, while the acacia was planted along the southern and eastern perimeter of a former housing development. Some areas of this community support dense, monotypic patches of English ivy (*Hedera helix*), Himalayan blackberry, or periwinkle (*Vinca major*). The herbaceous layer is dominated by wild radish (*Raphanus sativus*), Harding grass (*Phalaris aquatica*), curly dock (*Rumex crispus*), and cleavers (*Galium aparine*). Although mixed ornamental and oak woodland is not a described community or vegetation alliance, vegetation in this community does not meet the requirements to be considered coast live oak woodland, as cover by coast live oak was less than 50 percent, or mixed oak forest, as there were only two species of oak present.

4.1.2 Sensitive Biological Communities

Ephemeral Stream/Ditch

The Study Area encompasses one ephemeral stream/ditch that exhibits a mostly defined bed and bank, some evidence of normal flow, and inconsistent OHWM indicators. The ephemeral stream/ditch did not contain surface water during any of the three site visits. The ephemeral stream/ditch is approximately 7 feet wide at the top-of-bank, and approximately 3 feet wide at the OHWM. The OHWM was characterized by a distinct break in slope and scouring. Top-of-bank of the ephemeral drainages was determined based on a break in slope and shift in vegetation. Water that passes through the ephemeral stream/ditch within the Study Area flows off-site and under the SMART railroad prism to the east via a culvert beneath the tracks, and is assumed to ultimately drain into the Petaluma River and San Pablo Bay.

This feature also supports seasonal wetland vegetation, including sparse cover of tall cyperus (*Cyperus eragrostis*), Italian ryegrass (*Festuca perennis*), common toad rush (*Juncus bufonius*), and curly dock (*Rumex crispus*). Most unvegetated areas within the ditch are coated with some algal matting.

4.2 Special-Status Species

4.2.1 Plants

Based upon a review of the resources and databases given in Section 3.2.1, 94 special-status plant species have been documented in the vicinity of the Study Area (Appendix D, Figure 3). Many species were considered to have no potential to occur either because these species are restricted to areas with serpentinite, volcanic, rocky, sandy or clay soils and these substrates are lacking within the Study Area, or the species occurs in habitats not present within the Study Area such as chaparral, lower montane coniferous forest, North Coast coniferous forest, coastal bluff scrub, coastal prairie, coastal scrub and vernal pools. No special-status plants were noted during the May 28 and June 3, 2019 site visits. Plant species that have the potential to occur in the Study Area, based on the presence of potential grassland and freshwater emergent wetland

habitat, are not expected or likely to occur given the ruderal, urban and disturbed nature of the plant communities, which are dominated by non-native and weedy species. Potentially suitable habitat for one special-status species, pappose tarplant (*Centromadia parryi* ssp. *parryi*, CNPS Rank 1B.2), is present on site; however, it was not observed during the May 28 or June 3 site visits, nor was it observed during site visits conducted for a tree survey in October of 2020. Because pappose tarplant was not observed during multiple site visits conducted during the blooming period for this species (May to November), WRA assumes it to be absent from the Study Area. Appendix B lists the special-status plant species with documented occurrences in the vicinity of the Study Area.

Aside from pappose tarplant, which has been determined to be absent, no other special-status plants have a high or moderate potential to occur within the Study Area.

4.2.2 Wildlife

Based upon a review of the resources and databases mentioned in Section 3.2.1, 38 special-status wildlife species have been documented in the vicinity of the Study Area (Appendix D, Figure 4). No special-status wildlife species were noted during the May 28 and June 3, 2019 site visits, nor were any observed on October 8, 2020. No perennial or tidal aquatic habitat exists on the Study Area, which precludes listed fish and marine species from occurring. Given the ruderal, urban and disturbed nature of the plant communities, the lack of rodent burrows due to frequent tillage of grassland habitat, and the ephemeral nature of water within drainages (these features only hold standing water during and shortly after rain events), very little suitable habitat exists for any special status species within the Study Area. Appendix B lists the special-status wildlife species with documented occurrences in the vicinity of the Study Area.

Nesting birds, including the special status species white-tailed kite (*Elanus leucurus*; California fully protected species) which is documented nearby, have moderate potential to nest in trees along the eastern boundary of the Study Area, as well as in shrubs in more central portions of the Study Area. Most native birds in the United States including common species are protected by the MBTA and the CFGC sections 3503, 3503.5 and 3513. Under these laws/codes, the deliberate take of birds and their nests, eggs, and young is prohibited. Should active nests be discovered on the Study Area, species-specific exclusion buffers will be required to ensure nests are not abandoned. White-tailed kite would be included as a focal species in pre-construction nesting bird surveys, and would receive special consideration during the establishment of exclusion buffers.

The project location is considered to be within the Central Coast Ecoregion of the California Essential Habitat Connectivity Project (Spencer et al. 2010). No Natural Landscape Blocks (i.e., large, relatively natural habitat blocks that support native biodiversity), or Essential Connectivity Areas (i.e., areas essential for ecological connectivity between Natural Landscape Blocks) are identified in this portion of Marin County, based on the Study Area being located within the City of Novato (Spencer et al. 2010). Rush Creek is not identified as a Key Riparian Corridor (Penrod et al. 2013).

The Study Area does not provide a critical connectivity function for wildlife using nearby open space habitats due to the dense urbanization of the immediate vicinity. Urban adapted species, such as raccoon or opossum, may use the Study Area during short distance movements. For more sensitive wildlife species, major barriers to movement are present in the form of Highway 101 to the east and Redwood Boulevard to the west. There is hydrologic connectivity between Rush Creek and the ephemeral drainage ditch on-site, with no barriers to movement along this

corridor; however, aquatic species are unlikely to migrate to the Study Area due to the short inundation period of the drainage ditch, and would not be able to use the Study Area to move between other more suitable aquatic habitats. Additionally, to the north of the Study Area, 784 linear feet of pipe connect Rush Creek on the west side of Highway 101 and Rush Creek on the east side of Binford Road, where it becomes saline emergent wetland. Given that Rush Creek is a freshwater creek and is separated from saline habitats by several manmade conveyances, there is no suitable habitat for aquatic species coming from the saline emergent wetland of Jack Slough and no habitat in Jack Slough for freshwater aquatic species.

SECTION 5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the Site assessment, the Study Area includes one aquatic feature that be subject to the jurisdictions of the Corps, RWQCB, and/or CDFW. It is unlikely that any special-status plant species occurs within the Study Area due to lack of suitable habitat and high levels of substrate disturbance. Although potentially suitable habitat for one special-status plant species, pappose tarplant (*Centromadia parryi* ssp. *parryi*), is present on site, this species was not observed during multiple site visits conducted during the blooming period for this species and has been determined to be absent. Therefore, no special-status plant surveys are recommended. Only one special-status wildlife species, white-tailed kite, has moderate potential to occur within the Study Area. Given the potential presence of white-tailed kite, as well as the potential for birds protected by the MBTA and CFGC to nest within the Study Area, any Project impacts should also be preceded by a nesting bird survey focusing on potential substrates suitable for nesting. Because the Project would likely require removal of trees, a tree survey was completed by WRA in 2020 to inventory the size, species and health of the existing trees (WRA 2020a). Removal of any trees having a major trunk or trunks of a diameter of 24 inches or greater, or any other tree designated by the City Council to have special historic associations, will require a tree permit from the City. If RWQCB and CDFW were to claim jurisdiction of the ephemeral stream/ditch in the Study Area, they may also consider the ornamental trees growing next to the ditch to constitute riparian vegetation; in which case these two agencies would likely also require mitigation for removing riparian trees that are at least 6 inches DBH.

A formal wetland delineation was conducted by WRA (WRA 2020b), which identified the ephemeral stream/ditch within the Study Area as potentially jurisdictional by the Corps under Section 404 of the CWA, and by the RWQCB under Section 401 of the CWA and the Porter-Cologne Water Quality Control Act. Additionally, CDFW may claim jurisdiction over this feature as a stream under Section 1600 of the CFGC. If the ephemeral ditch/stream is impacted by Project activities, permits and compensatory mitigation from one or more of these agencies would likely be required.

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APPENDIX A

LIST OF OBSERVED PLANT AND WILDLIFE SPECIES

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Appendix A-1. List of plant species observed in the Project Area on May 28 and June 3, 2019.

Scientific Name	Common Name	Origin	Form	Rarity Status[1]	CAL-IPC Status[2]	Wetland Status (AW 2018)[3]
Acacia baileyana	Cootamundra wattle	non-native	tree, shrub	-	Watch	-
Acacia melanoxylon	Blackwood acacia	non-native (invasive)	tree	-	Limited	-
Anthemis cotula	Dog fennel	non-native	annual herb	-	-	FACU
Arundo donax	Giant reed	non-native (invasive)	perennial grass	-	High	FACW
Atriplex prostrata	Fat-hen	non-native	annual herb	-	-	FACW
Avena barbata	Slim oat	non-native (invasive)	annual, perennial grass	-	Moderate	-
Baccharis pilularis	Coyote brush	native	shrub	-	-	-
Bromus diandrus	Ripgut brome	non-native (invasive)	annual grass	-	Moderate	-
Bromus hordeaceus	Soft chess	non-native (invasive)	annual grass	-	Limited	FACU
Bromus madritensis	Foxtail chess, foxtail brome	non-native	annual grass	-	-	UPL
Calendula officinalis	Pot marigold	non-native	annual herb	-	-	-
Carduus pycnocephalus ssp. *pycnocephalus*	Italian thistle	non-native (invasive)	annual herb	-	Moderate	-
Centaurea solstitialis	Yellow starthistle	non-native (invasive)	annual herb	-	High	-
Cirsium vulgare	Bullthistle	non-native (invasive)	perennial herb	-	Moderate	FACU
Conium maculatum	Poison hemlock	non-native (invasive)	perennial herb	-	Moderate	FACW
Convolvulus arvensis	Field bindweed	non-native	perennial herb, vine	-	-	-
Cotula coronopifolia	Brass buttons	non-native (invasive)	perennial herb	-	Limited	OBL
Cynodon dactylon	Bermuda grass	non-native (invasive)	perennial grass	-	Moderate	FACU
Cyperus eragrostis	Tall cyperus	native	perennial grasslike herb	-	-	FACW
Daucus carota	Carrot	non-native	perennial herb	-	-	UPL
Dipsacus sp.	Teasel	-	perennial herb	-	-	-
Dittrichia graveolens	Stinkwort	non-native (invasive)	annual herb	-	Moderate	-
Epilobium brachycarpum	Willow herb	native	annual herb	-	-	-
Erigeron canadensis	Canada horseweed	native	annual herb	-	-	FACU

Scientific Name	Common Name	Origin	Form	Rarity Status[1]	CAL-IPC Status[2]	Wetland Status (AW 2018)[3]
Erodium cicutarium	Red stemmed filaree	non-native (invasive)	annual herb	-	Limited	-
Erodium moschatum	Whitestem filaree	non-native	annual herb	-	-	-
Eschscholzia californica	California poppy	native	annual, perennial herb	-	-	-
Festuca perennis	Italian rye grass	non-native (invasive)	annual, perennial grass	-	Moderate	FAC
Foeniculum vulgare	Fennel	non-native (invasive)	perennial herb	-	High	-
Galium aparine	Cleavers	native	annual herb	-	-	FACU
Geranium molle	Crane's bill geranium	non-native	annual, perennial herb	-	-	-
Hedera helix	English ivy	non-native (invasive)	vine, shrub	-	High	FACU
Helminthotheca echioides	Bristly ox-tongue	non-native (invasive)	annual, perennial herb	-	Limited	FAC
Hirschfeldia incana	Short-podded mustard	non-native (invasive)	perennial herb	-	Moderate	-
Hordeum murinum	Foxtail barley	non-native (invasive)	annual grass	-	Moderate	FACU
Hypochaeris radicata	Hairy cats ear	non-native (invasive)	perennial herb	-	Moderate	FACU
Juglans hindsii	Northern California black walnut	native	tree	-	-	FAC
Juncus bufonius	Common toad rush	native	annual grasslike herb	-	-	FACW
Juncus sp.	rush	-	perennial grasslike herb	-	-	-
Lactuca serriola	Prickly lettuce	non-native	annual herb	-	-	FACU
Lathyrus tingitanus	Tangier pea	non-native	annual herb	-	-	-
Lepidium latifolium	Perennial pepperweed	non-native (invasive)	perennial herb	-	High	FAC
Lotus corniculatus	Bird's foot trefoil	non-native	perennial herb	-	-	FAC
Lupinus nanus	Sky lupine	native	annual herb	-	-	-
Malva sp.	cheeseweed	non-native	-	-	-	-
Medicago polymorpha	California burclover	non-native (invasive)	annual herb	-	Limited	FACU
Melilotus indicus	Annual yellow sweetclover	non-native	annual herb	-	-	FACU
Mentha pulegium	Pennyroyal	non-native (invasive)	perennial herb	-	Moderate	OBL
Nerium oleander	Oleander	non-native	tree	-	-	-
Opuntia ficus-indica	Tuna cactus	non-native	shrub (stem succulent)	-	-	-

Scientific Name	Common Name	Origin	Form	Rarity Status[1]	CAL-IPC Status[2]	Wetland Status (AW 2018)[3]
Phalaris aquatica	Harding grass	non-native (invasive)	perennial grass	-	Moderate	FACU
Plantago lanceolata	Ribwort	non-native (invasive)	perennial herb	-	Limited	FAC
Poa annua	Annual blue grass	non-native	annual grass	-	-	FAC
Polygonum aviculare	Prostrate knotweed	non-native	annual, perennial herb	-	-	FAC
Polypogon monspeliensis	Annual beard grass	non-native (invasive)	annual grass	-	Limited	FACW
Populus sp.	Poplar	-	tree	-	-	-
Prunus cerasifera	Cherry plum	non-native (invasive)	tree	-	Limited	-
Prunus persica	Peach	non-native	tree	-	-	-
Pseudognaphalium luteoalbum	Jersey cudweed	non-native	annual herb	-	-	FAC
Quercus agrifolia	Coast live oak	native	tree	-	-	-
Quercus lobata	Valley oak	native	tree	-	-	FACU
Raphanus raphanistrum	Jointed charlock	non-native	annual, perennial herb	-	-	-
Raphanus sativus	Wild radish	non-native (invasive)	annual, biennial herb	-	Limited	-
Robinia pseudoacacia	Black locust	non-native (invasive)	tree	-	Limited	FACU
Rosa californica	California wild rose	native	shrub	-	-	FAC
Rosa sp.	Rose cultivar	-	shrub	-	-	-
Rubus armeniacus	Himalayan blackberry	non-native (invasive)	shrub	-	High	FAC
Rubus ursinus	California blackberry	native	vine, shrub	-	-	FAC
Rumex crispus	Curly dock	non-native (invasive)	perennial herb	-	Limited	FAC
Senecio vulgaris	Common groundsel	non-native	annual herb	-	-	FACU
Silybum marianum	Milk thistle	non-native (invasive)	annual, perennial herb	-	Limited	-
Sonchus oleraceus	Common sow thistle	non-native	annual herb	-	-	UPL
Torilis arvensis	Field hedge parsley	non-native (invasive)	annual herb	-	Moderate	-
Tragopogon porrifolius	Salsify	non-native	perennial herb	-	-	-
Vicia sativa	Spring vetch	non-native	annual herb, vine	-	-	FACU
Vinca major	Vinca	non-native (invasive)	perennial herb	-	Moderate	-

Scientific Name	Common Name	Origin	Form	Rarity Status[1]	CAL-IPC Status[2]	Wetland Status (AW 2018)[3]
Xanthium strumarium	Cocklebur	native	annual herb	-	-	FAC

All species identified using the *Jepson Flora Project* (Jepson eFlora 2020*)*; nomenclature follows Jepson eFlora. Sp.: "species", intended to indicate that the observer was confident in the identity of the genus but uncertain which species.

[1]Rare Status: The CNPS Inventory of Rare and Endangered Plants (CNPS 2020)

- FE: Federal Endangered
- FT: Federal Threatened
- SE: State Endangered
- ST: State Threatened
- SR: State Rare
- Rank 1A: Plants presumed extirpated in California and either rare or extinct elsewhere
- Rank 1B: Plants rare, threatened, or endangered in California and elsewhere
- Rank 2A: Plants presumed extirpated in California, but more common elsewhere
- Rank 2B: Plants rare, threatened, or endangered in California, but more common elsewhere
- Rank 3: Plants about which we need more information – a review list
- Rank 4: Plants of limited distribution – a watch list

[2]Invasive Status: California Invasive Plant Inventory (Cal-IPC 2020)

- High: Severe ecological impacts; high rates of dispersal and establishment; most are widely distributed ecologically.
- Moderate: Substantial and apparent ecological impacts; moderate-high rates of dispersal, establishment dependent on disturbance; limited-moderate distribution ecologically
- Limited: Minor or not well documented ecological impacts; low-moderate rate of invasiveness; limited distribution ecologically
- Assessed: Assessed by Cal-IPC and determined to not be an existing current threat

[3]Wetland Status: National List of Plant Species that Occur in Wetlands, Arid West Region (2018)

- OBL: Almost always a hydrophyte, rarely in uplands
- FACW: Usually a hydrophyte, but occasionally found in uplands
- FAC: Commonly either a hydrophyte or non-hydrophyte
- FACU: Occasionally a hydrophyte, but usually found in uplands
- UPL: Rarely a hydrophyte, almost always in uplands
- NL: Rarely a hydrophyte, almost always in uplands
- NI: No information; not factored during wetland delineation

Appendix A-2. List of wildlife species observed in and around the Project Area on May 28, 2019; June 3, 2019; and October 8, 2020.

Scientific name	Common Name	Status
Invertebrates		
Bombus vosnesenskii	Yellow-faced bumble bee	No status
Halictus ligatus	Sweat bee	No status
Pieris rapae	Cabbage white butterfly	No status
Birds		
Ardea alba	Great egret	Breeding sites protected by CDFW
Zonotrichia leucophrys	White-crowned sparrow	No status
Melozone crissalis	California towhee	No status
Setophaga occidentalis	Hermit warbler	No status
Psaltriparus minimus	Bushtit	No status
Corvus brachyrhynchos	American crow	No status

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APPENDIX B

LIST OF SPECIAL-STATUS SPECIES IN THE VICINITY OF THE STUDY AREA

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Appendix B. List of Special-Status Species in the Vicinity of the Study Area

SCIENTIFIC NAME	COMMON NAME	STATUS*
Plants		
Allium peninsulare var. *franciscanum*	Franciscan onion	Rank 1B.2
Alopecurus aequalis var. *sonomensis*	Sonoma alopecurus	FE, Rank 1B.1
Amorpha californica var. *napensis*	Napa false indigo	Rank 1B.2
Amsinckia lunaris	bent-flowered fiddleneck	Rank 1B.2
Arabis blepharophylla	coast rockcress	Rank 4.3
Arctostaphylos franciscana	Franciscan manzanita	FE, Rank 1B.1
Arctostaphylos hookeri var. ravenii	Presido manzanita	FE, SE, Rank 1B.1
Arctostaphylos montana ssp. *montana*	Mt. Tamalpais manzanita	Rank 1B.3
Arctostaphylos virgata	Marin manzanita	Rank 1B.2
Arenaria paludicola	marsh sandwort	FE, SE Rank 1B.1
Aspidotis carlotta-halliae	Carlotta Hall's lace fern	Rank 4.2
Astragalus breweri	Brewer's milk-vetch	Rank 4.2
Astragalus pycnostachyus var. *pycnostachyus*	coastal marsh milk-vetch	Rank 1B.2
Astragalus tener var. *tener*	alkali milk-vetch	Rank 1B.2
Blennosperma bakeri	Sonoma sunshine	FE, SE, Rank 1B.1

SCIENTIFIC NAME	COMMON NAME	STATUS*
Calamagrostis crassiglumis	Thurber's reed grass	Rank 2B.1
Calamagrostis ophitidis	serpentine reed grass	Rank 4.3
Calandrinia breweri	Brewer's calandrinia	Rank 4.2
Calochortus tiburonensis	Tiburon mariposa lily	FT, ST, Rank 1B.1
Calochortus umbellatus	Oakland star-tulip	Rank 4.2
Cardamine angulata	seaside bittercress	Rank 2B.2
Carex lyngbyei	Lyngbye's sedge	Rank 2B.2
Castilleja affinis var. *neglecta*	Tiburon paintbrush	FE, ST, Rank 1B.2
Castilleja ambigua var. *ambigua*	johnny-nip	Rank 4.2
Ceanothus decornutus	Nicasio ceanothus	Rank 1B.2
Ceanothus gloriosus var. *exaltatus*	glory brush	Rank 4.3
Ceanothus gloriosus var. *gloriosus*	Point Reyes ceanothus	Rank 4.3
Ceanothus masonii	Mason's ceanothus	SR, Rank 1B.2
Ceanothus pinetorum	Kern ceanothus	Rank 4.3
Ceanothus rigidus	Monterey ceanothus	Rank 4.2
Centromadia parryi ssp. *parryi*	pappose tarplant	Rank 1B.2

SCIENTIFIC NAME	COMMON NAME	STATUS*
Chloropyron maritimum ssp. *palustre*	Point Reyes bird's-beak	Rank 1B.2
Chloropyron molle ssp. *molle*	soft bird's-beak	FE, SR, Rank 1B.2
Chorizanthe cuspidata var. *cuspidata*	San Francisco Bay spineflower	Rank 1B.2
Chorizanthe valida	Sonoma spineflower	FE, SE, Rank 1B.1
Cirsium hydrophilum var. *vaseyi*	Mt. Tamalpais thistle	Rank 1B.2
Cistanthe maritima	seaside cistanthe	Rank 4.2
Clarkia franciscana	Presidio clarkia	FE, Rank 1B.1
Collinsia corymbosa	round-headed Chinese-houses	Rank 1B.2
Cordylanthus mollis ssp. *mollis*	soft bird’s-beak	FE, Rank 1B.2
Cypripedium californicum	California lady's-slipper	Rank 4.2
Delphinium bakeri	Baker's larkspur	FE, SE, Rank 1B.1
Delphinium luteum	golden larkspur	FE, SR, Rank 1B.1
Dirca occidentalis	western leatherwood	Rank 1B.2
Downingia pusilla	dwarf downingia	Rank 2B.2
Eleocharis parvula	small spikerush	Rank 4.3
Elymus californicus	California bottle-brush grass	Rank 4.3

SCIENTIFIC NAME	COMMON NAME	STATUS*
Entosthodon kochii	Koch's cord moss	Rank 1B.3
Erigeron biolettii	streamside daisy	Rank 3
Eriogonum luteolum var. *caninum*	Tiburon buckwheat	Rank 1B.2
Erysimum franciscanum	San Francisco wallflower	Rank 4.2
Fissidens pauperculus	minute pocket moss	Rank 1B.2
Fritillaria lanceolata var. *tristulis*	Marin checker lily	Rank 1B.1
Fritillaria liliacea	fragrant fritillary	Rank 1B.2
Gilia capitata ssp. *chamissonis*	blue coast gilia	Rank 1B.1
Gilia capitata ssp. *tomentosa*	woolly-headed gilia	Rank 1B.1
Gilia millefoliata	dark-eyed gilia	Rank 1B.2
Grindelia hirsutula var. *maritima*	San Francisco gumplant	Rank 3.2
Helianthella castanea	Diablo helianthella	Rank 1B.2
Hemizonia congesta ssp. *congesta*	congested-headed hayfield tarplant	Rank 1B.2
Hesperolinon congestum	Marin western flax	FT, ST, Rank 1B.1
Holocarpha macradenia	Santa Cruz tarplant	FT, SE, Rank 1B.1
Horkelia tenuiloba	thin-lobed horkelia	Rank 1B.2

SCIENTIFIC NAME	COMMON NAME	STATUS*
Kopsiopsis hookeri	small groundcone	Rank 2B.3
Lasthenia conjugens	Contra Costa goldfields	FE, Rank 1B.1
Layia carnosa	beach layia	FE, SE, Rank 1B.1
Leptosiphon acicularis	bristly leptosiphon	Rank 4.2
Leptosiphon croceus	coast yellow leptosiphon	SS, Rank 1B.1
Leptosiphon grandiflorus	large-flowered leptosiphon	Rank 4.2
Lessingia germanorum var. *germanorum*	San Francisco Lessingia	FE, SE, Rank 1B.1
Lessingia hololeuca	woolly-headed lessingia	Rank 3
Lessingia micradenia var. *micradenia*	Tamalpais lessingia	Rank 1B.2
Lilium pardalinum ssp. *pitkinense*	Pitkin Marsh lily	FE, SE, Rank 1B.1
Limnanthes vinculans	Sebastapool meadoefoam	FE
Micropus amphibolus	Mt. Diablo cottonweed	Rank 3.2
Microseris paludosa	marsh microseris	Rank 1B.2
Mielichhoferia elongata	elongate copper moss	Rank 4.3
Navarretia leucocephala ssp. *bakeri*	Baker's navarretia	Rank 1B.1
Navarretia rosulata	Marin County navarretia	Rank 1B.2

SCIENTIFIC NAME	COMMON NAME	STATUS*
Pentachaeta bellidiflora	white-rayed pentachaeta	FE, SE, Rank 1B.1
Perideridia gairdneri ssp. *gairdneri*	Gairdner's yampah	Rank 4.2
Piperia michaelii	Michael's rein orchid	Rank 4.2
Plagiobothrys glaber	hairless popcornflower	Rank 1A
Plagiobothrys mollis var. *vestitus*	Petaluma popcornflower	Rank 1A
Pleuropogon hooverianus	North Coast semaphore grass	ST, Rank 1B.1
Pleuropogon refractus	nodding semaphore grass	Rank 4.2
Polygonum marinense	Marin knotweed	Rank 3.1
Quercus parvula var. *tamalpaisensis*	Tamalpais oak	Rank 1B.3
Ranunculus lobbii	Lobb's aquatic buttercup	Rank 4.2
Ribes victoris	Victor's gooseberry	Rank 4.3
Sidalcea calycosa ssp. *rhizomata*	Point Reyes checkerbloom	Rank 1B.2
Sidalcea hickmanii ssp. *viridis*	Marin checkerbloom	Rank 1B.1
Spergularia macrotheca var. *longistyla*	long-styled sand-spurrey	Rank 1B.2
Stebbinsoseris decipiens	Santa Cruz microseris	Rank 1B.2
Streptanthus batrachopus	Tamalpais jewelflower	Rank 1B.3

SCIENTIFIC NAME	COMMON NAME	STATUS*
Streptanthus glandulosus ssp. *niger*	Tiburon jewelflower	FE, SE, Rank 1B.1
Streptanthus glandulosus ssp. *pulchellus*	Mt. Tamalpais bristly jewelflower	Rank 1B.2
Symphyotrichum lentum	Suisun Marsh aster	Rank 1B.2
Trifolium amoenum	two-fork clover	FE, Rank 1B.1
Trifolium hydrophilum	saline clover	Rank 1B.2
Trifolium polyodon	Pacific Grove clover	SR, Rank 1B.1
Triquetrella californica	coastal triquetrella	Rank 1B.2
Mammals		
Antrozous pallidus	pallid bat	SSC, WBWG High
Aplodontia rufa phaea	Point Reye's mountain beaver	SSC
Corynorhinus townsendii	Townsend's big-eared bat	SSC, WBWG High
Lasiurus cinereus	hoary bat	WBWG Medium
Microtus californicus sanpabloensis	San Pablo vole	SSC
Reithrodontomys raviventris	salt-marsh harvest mouse	FE, SE, CFP
Sorex ornatus sinuosus	Suisun shrew	SSC
Sorex vagrans halicoetes	salt-marsh wandering shrew	SSC
Taxidea taxus	American badger	SSC
Birds		
Agelaius tricolor	tricolored blackbird	ST, SSC

SCIENTIFIC NAME	COMMON NAME	STATUS*
Ardea alba	great egret	Breeding sites protected by CDFW
Ardea herodias	great blue heron	Breeding sites protected by CDFW
Asio flammeus	short-eared owl	SSC
Athene cunicularia	burrowing owl	SSC
Buteo swainsoni	Swainson's hawk	ST
Circus hudsonius	northern harrier	SSC
Charadrius alexandrinus nivosus	western snowy plover	FT, SSC
Cypseloides niger	black swift	SSC
Egretta thula	snowy egret	Breeding sites protected by CDFW
Elanus leucurus	white-tailed kite	CFP
Geothlypis trichas sinuosa	saltmarsh common yellowthroat	SSC
Laterallus jamaicensis coturniculus	California black rail	ST, CFP
Melospiza melodia samuelis	San Pablo song sparrow	SSC
Nycticorax nycticorax	black-crowned night heron	Breeding sites protected by CDFW
Phalacrocorax auritus	double-crested cormorant	Breeding sites protected by CDFW
Rallus obsoletus obsoletus	California Ridgway's rail	FE, SE, CFP
Riparia riparia	bank swallow	ST
Sterna antillarum browni	California least tern	FE, SE, CFP
Strix occidentalis caurina	Northern spotted owl	FT, ST
Fish		
Eucyclogobius newberryi	tidewater goby	FE, SSC

SCIENTIFIC NAME	COMMON NAME	STATUS*
Hypomesus transpacificus	Delta smelt	FT, SE
Lavinia symmetricus ssp. *2*	Tomales roach	SSC
Oncorhynchus kisutch pop. *4*	coho salmon – central California coast ESU	FE, SE
Oncorhynchus mykiss irideus pop. *8*	steelhead - central California coast DPS	FT
Pogonichthys macrolepidotus	Sacramento splittail	SSC
Spirinchus thaleichthys	longfin smelt	FC, ST
Thaleichthys pacificus	eulachon	FT
Amphibians and Reptiles		
Ambystoma californiense	California tiger salamander	FT, ST
Chelonia mydas	Green sea turtle	FT
Dicamptodon ensatus	California giant salamander	SSC
Emys marmorata	western pond turtle	SSC
Rana boylii	foothill yellow-legged frog	SE, SSC
Rana draytonii	California red-legged frog	FT, SSC
Taricha rivularis	red-bellied newt	SSC
Invertebrates		
Bombus occidentalis	western bumble bee	SC
Callophrys mossii bayensis	San Buno elfin butterfly	FE
Danaus plexippup pop. *1*	monarch – California overwintering population	Winter roosts protected by CDFW
Euphydryas editha bayensis	Bay checkerspot butterfly	FT
Icaricia icarioides missionensis	Mission blue butterfly	FE

SCIENTIFIC NAME	COMMON NAME	STATUS*
Speyeria callippe callippe	Callippe silverspot butterfly	FE
Speyeria zerene myrtleae	Myrtle's silverspot butterfly	FE
Syncaris pacifica	California freshwater shrimp	FE, SE

*Status abbreviations:

FE	Federal Endangered
FT	Federal Threatened
FC	Federal Candidate
SC	State Candidate
SE	State Endangered
ST	State Threatened
SSC	CDFW Species of Special Concern
CFP	CDFW Fully Protected Animal
WBWG	Western Bat Working Group Medium/High Priority Species
Rank 1A	CRPR Rank 1A: Presumed extirpated in California and either rare or extinct elsewhere
Rank 1B	CRPR Rank 1B: Plants rare, threatened or endangered in California and elsewhere
Rank 2B	CRPR Rank 2B: Plants rare, threatened, or endangered in California, but more common elsewhere
Rank 3	CRPR Rank 3: Plants about which CNPS needs more information (a review list)

APPENDIX C

SITE PHOTOGRAPHS

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Photograph 1. Photo of ruderal herbaceous grassland, dominated by bristly ox-tongue (*Helminthotheca* echioides), facing east.



Photograph 2. Photo of ruderal herbaceous grassland in a recently disced portion of the Study Area, facing southwest.



Photograph 3. Photo of an unvegetated asphalt parking lot, facing northwest.



Photograph 4. Photo of a seasonal wetland vegetation occurring within an unnamed ephemeral stream/ditch, facing west (June 3, 2019).



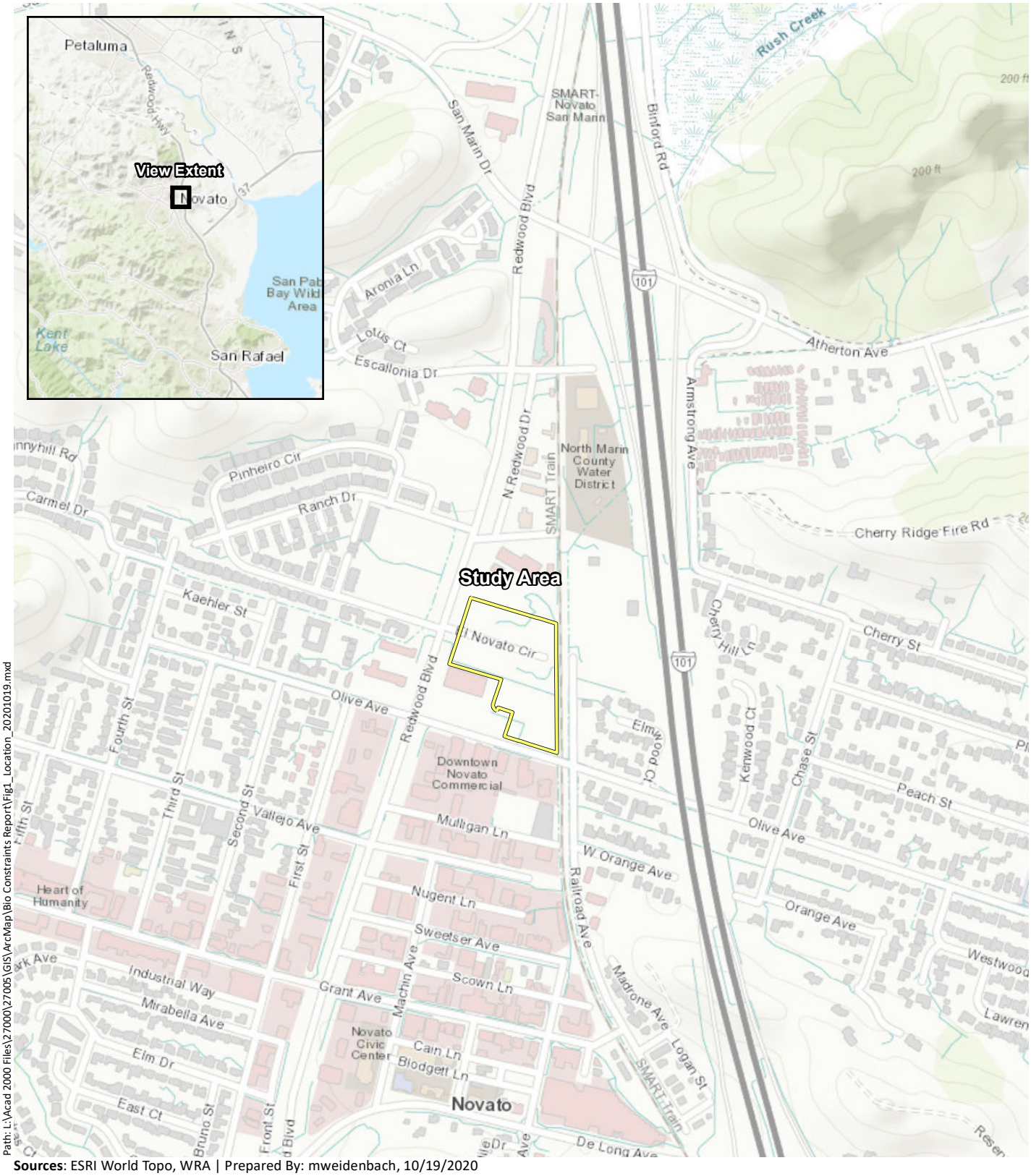
Photograph 5. Photo of mixed ornamental and native trees, dominated by acacia, facing south. The ephemeral stream/ditch adjacent to the SMART railroad is located outside the Study Area (March 31, 2020).



Photograph 6. Photo of mixed ornamental and native trees, dominated by valley oak, growing along the top-of-bank of an ephemeral stream/ditch. Photo taken facing north.

APPENDIX D FIGURES

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Path: L:\Acad 2000 Files\27000\27005\GIS\ArcMap\Bio Constraints Report\Fig1_Location_20201019.mxd

Sources: ESRI World Topo, WRA | Prepared By: mweidenbach, 10/19/2020

Figure 1. Study Area Location

ROIC The Village at Novato Development
Novato, Marin County, California

0 500 1,000 Feet

N

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Sources: 2018 DigitalGlobe Aerial, WRA | Prepared By: mweidenbach, 10/19/2020

Figure 2. Biological Communities

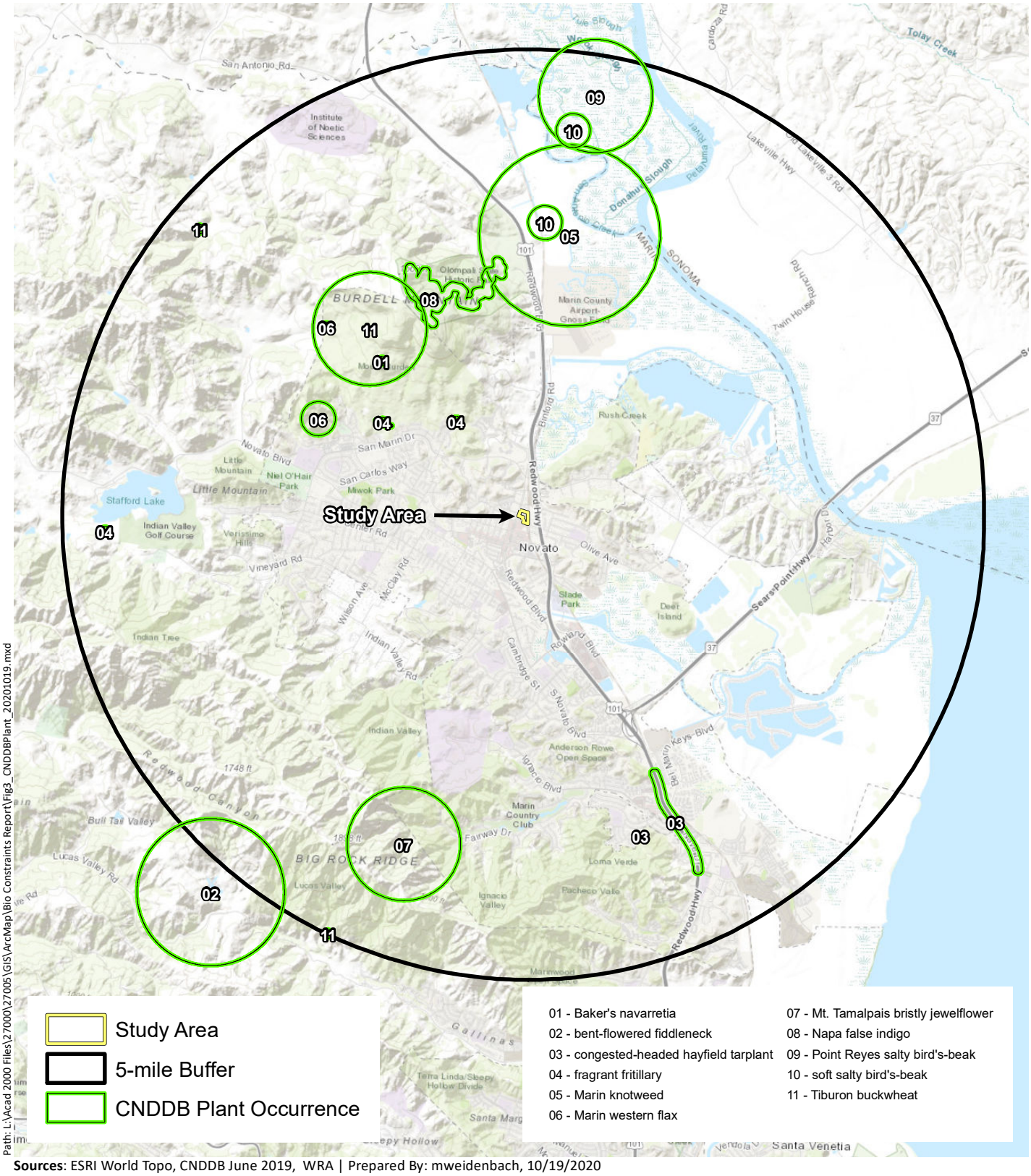
ROIC The Village at Novato Development
Novato, Marin County, California

0 75 150 Feet

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ENVIRONMENTAL CONSULTANTS

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Sources: ESRI World Topo, CNDDB June 2019, WRA | Prepared By: mweidenbach, 10/19/2020

Figure 3. Special-status Plant Species Documented within 5-miles of the Study Area

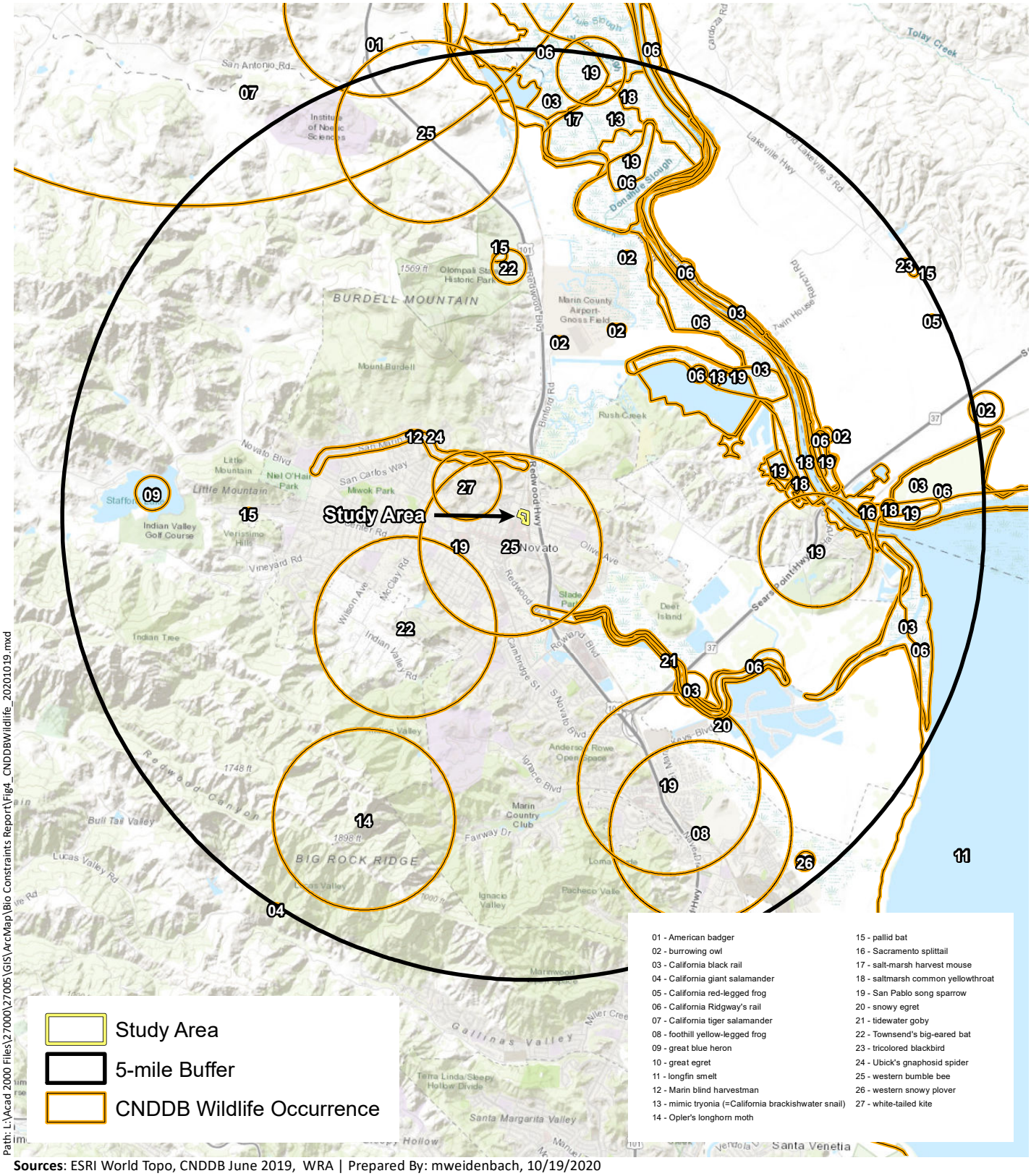
ROIC The Village at Novato Development
Novato, Marin County, California

0 1 2 Miles

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Sources: ESRI World Topo, CNDDB June 2019, WRA | Prepared By: mweidenbach, 10/19/2020

Figure 4. Special-Status Wildlife Species Documented within 5-miles of the Study Area

ROIC The Village at Novato Development
Novato, Marin County, California

0 1 2 Miles

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Attachment E
Project Site Plans

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PROJECT DESCRIPTION

PROJECT ADDRESS: 7530 and 7506 REDWOOD BLVD, NOVATO, CA, 94945
APNS: 143-011-05 AND 143-011-01

SCOPE OF WORK:

- PROPOSED NEW CONSTRUCTION OF THREE MIXED-USE RESIDENTIAL AND COMMERCIAL BUILDINGS WITH 183 APARTMENTS AND 14,000 SQUARE FEET OF RETAIL.
- NO CHANGES TO THE EXISTING "TRADER JOE'S" BUILDING.

DRAWING LIST

SHEET NO. & TITLE	
ARCHITECTURAL	
A0.0	GENERAL INFORMATION
A0.1	SITE CONTEXT PLAN
A0.2	PARKING INFORMATION
A1.0	EXISTING CONDITIONS / SURVEY
A2.1	PLANS
A2.2	PLANS
A2.3	PLANS
A3.1	BUILDING ELEVATIONS
A3.2	BUILDING ELEVATIONS
A3.3	MATERIALS AND COLORS
A3.4	PERSPECTIVE VIEWS
A3.5	PERSPECTIVE VIEWS
A3.6	PERSPECTIVE VIEWS
A3.7	COURTYARD AND PLAZA PRECEDENT IMAGES
A4.1	BUILDING SECTIONS

NOVATO - ZONING TABLE

	ALLOWABLE	PROPOSED
LOT SIZE (SF)	254,769	254,769
LOT SIZE (ACRES)	5.85	5.85
SETBACK - REDWOOD	0'	1'
SETBACK - OLIVE	0'	90'
SETBACK - SIDE (NORTH)	10'	78'
SETBACK - REAR (RAIL)	15'	81'
COVERAGE (%)	100%	25%
COVERAGE (AREA)		64,574
FAR (W/HOUSING)	2	0.91
TOTAL FLOOR AREA	509,538	232,662
HEIGHT LIMIT	35' / 45'	35'/45'
OPEN SPACE	27,450	27,450
BASE DENSITY PER ACRE	23	NA
BASE DENSITY	135	NA
WITH 35% DENSITY BONUS	183	183

PROJECT DATA

BUILDING A

	TOTAL GSF	RES. GSF	RETAIL GSF		STUDIO	1-BR	2-BR	TOTAL
LEVEL 4	-							0
LEVEL 3	13,667	13,667			3	5	5	13
LEVEL 2	13,667	13,667			3	5	5	13
LEVEL 1	18,608	4,608	14,000					0
TOTAL	**45,942**	**31,942**	**14,000**		**6**	**10**	**10**	**26**

BUILDING B

	TOTAL GSF	RES. GSF	RETAIL GSF		STUDIO	1-BR	2-BR	TOTAL
LEVEL 4	26,891	27,191			1	12	10	23
LEVEL 3	28,041	28,041			2	13	10	25
LEVEL 2	28,041	28,041			2	13	10	25
LEVEL 1	27,191	27,191			1	12	8	21
TOTAL	**110,164**	**110,464**	**-**		**6**	**50**	**38**	**94**

BUILDING C

	TOTAL GSF	RES. GSF	RETAIL GSF		STUDIO	1-BR	2-BR	TOTAL
LEVEL 4	17,975	18,775			2	5	8	15
LEVEL 3	19,353	19,353			3	6	8	17
LEVEL 2	19,353	19,353			3	6	8	17
LEVEL 1	18,775	18,775			2	5	7	14
TOTAL	**75,456**	**76,256**	**-**		**10**	**22**	**31**	**63**

TOTAL PROJECT

	TOTAL GSF	RES. GSF	RETAIL GSF		STUDIO	1-BR	2-BR	TOTAL
TOTAL PROJECT	**232,662**	**218,662**	**14,000**		**22**	**82**	**79**	**183**
UNIT MIX					12%	45%	43%	100%
	0.91							

OPEN SPACE TABLE

		QNTY	PER	REQ'D	PROVIDED
UNITS		183	150	27,450	27,450

PARKING TABLE

* SEE SHEET A0.2

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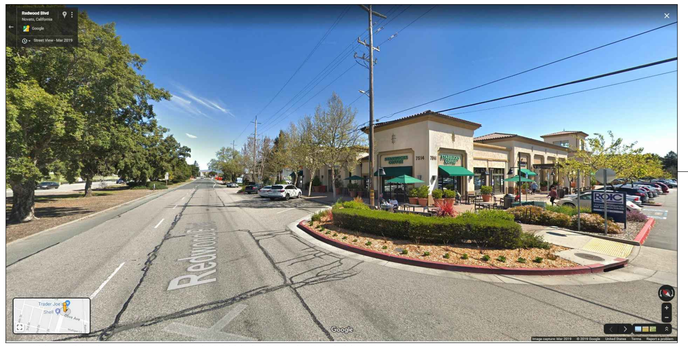
SHEET:

NOVATO CONTEXT PLAN

A0.0



PROPOSED NEW MIXED USE PROJECT



EXISTING RETAIL AT REDWOOD BLVD AND OLIVE AVE



EXISTING RETAIL ALONG REDWOOD BLVD



DOWNTOWN COMMERCIAL AREA



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SHEET:

SITE CONTEXT PLAN

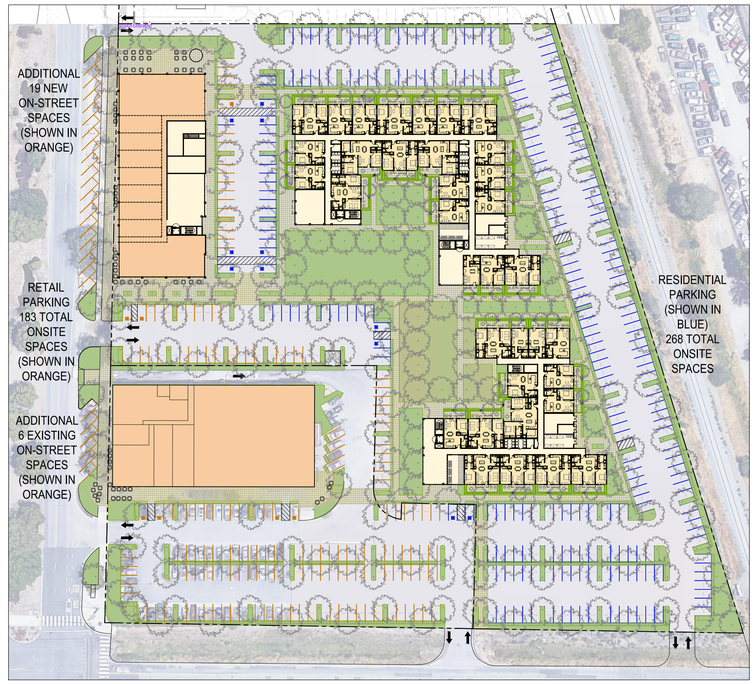
A0.1



4 - ZONING MAP



3 - MAJOR TRANSIT STOP MAP



2 - PARKING DIAGRAM

A: BASE ZONING REQUIREMENTS (MIX OF DOWNTOWN AND AHO OVERLAYS)

MULTI-FAMILY IN DOWNTOWN OVERLAY (NON-AHO)	UNITS	BEDROOMS	REQUIREMENT	REQUIRED	PROVIDED	EXCESS
TOTAL UNITS	120					
STUDIO	12	12	1 PER UNIT	12		
1-BEDROOM	60	60	1 PER UNIT	60		
2-BEDROOM	48	96	1.5 PER UNIT	72		
GUEST	30		1 PER 4 UNITS	30		
SUBTOTAL				**174**		
MULTI-FAMILY IN AHO OVERLAY	**UNITS**	**BEDROOMS**	**REQUIREMENT**	**REQUIRED**		
TOTAL UNITS	63					
STUDIO	10	10	1 PER UNIT	10		
1-BEDROOM	22	22	1 PER UNIT	22		
2-BEDROOM	31	62	2 PER UNIT	62		
GUEST	NA					
SUBTOTAL				**94**		
RESIDENTIAL SUBTOTAL				**268**	268	0
NEW RETAIL	14,000		1 PER 300	47		
EXISTING RETAIL (TRADER JOE'S BUILDING)	20,043		1 PER 300	67		
RETAIL SUBTOTAL				**113**	183	70
PROJECT TOTAL				**381**	**451**	**70**
			TOTAL WITH ON-STREET PARKING	381	476	95

B: DENSITY BONUS REQUIREMENTS

MULTI-FAMILY PER DENSITY BONUS REQUIREMENTS*	UNITS	BEDROOMS	REQUIREMENT	REQUIRED	PROVIDED	EXCESS
TOTAL UNITS	183					
STUDIO	22	22	.5 PER BEDROOM*	11		
1-BEDROOM	82	82	.5 PER BEDROOM*	41		
2-BEDROOM	79	158	.5 PER BEDROOM*	79		
GUEST	NA			NA		
RESIDENTIAL SUBTOTAL				**131**	268	137
NEW RETAIL	14,000		1 PER 300	47		
EXISTING RETAIL (TRADER JOE'S BUILDING)	20,043		1 PER 300	67		
RETAIL SUBTOTAL				**113**	183	70
PROJECT TOTAL				**244**	**451**	**207**
			TOTAL WITH ON-STREET PARKING	244	476	232

* ANY PORTION OF PROPERTY WITHIN A HALF-MILE OF THE PROPERTY OF A MAJOR TRANSIT STOP
21064.3. "Major transit stop" means a site containing any of the following:
(a) An existing rail or bus rapid transit station.
(b) A ferry terminal served by either a bus or rail transit service.
(c) The intersection of two or more major bus routes with a frequency of service interval of 15 minutes or less during the morning

1 - PARKING TABLES

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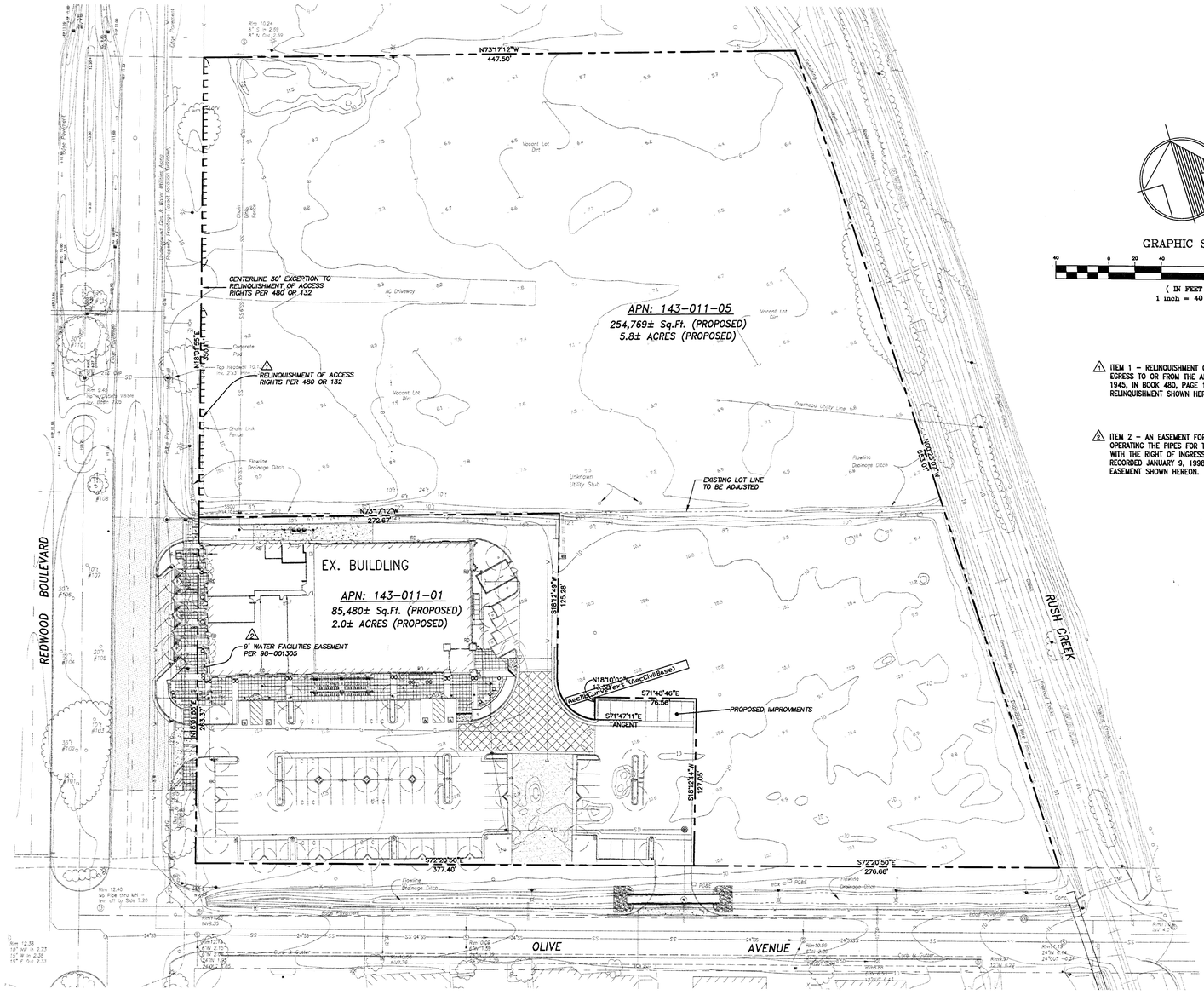
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SHEET:

PARKING TABLES

A0.2

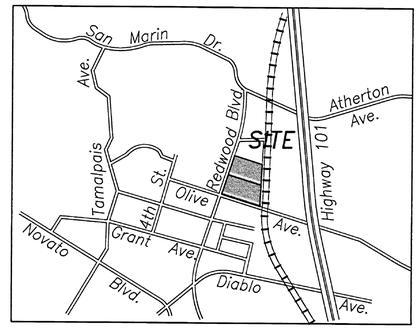


GRAPHIC SCALE

(IN FEET)
1 inch = 40 ft.

⚠1 ITEM 1 – RELINQUISHMENT OF THE ABUTTER'S RIGHTS OF INGRESS AND EGRESS TO OR FROM THE ADJOINING HIGHWAY RECORDED FEBRUARY 28, 1945, IN BOOK 480, PAGE 132 OF OFFICIAL RECORDS. LOCATION OF RELINQUISHMENT SHOWN HEREON.

⚠2 ITEM 2 – AN EASEMENT FOR CONSTRUCTING, RECONSTRUCTING, MAINTAINING, OPERATING THE PIPES FOR THE TRANSMISSION AND DISTRIBUTION OF WATER WITH THE RIGHT OF INGRESS AND EGRESS TO MAINTAIN SUCH WATER PIPES RECORDED JANUARY 9, 1998 AS INSTRUMENT NO. 98-001305. LOCATION OF EASEMENT SHOWN HEREON.



Vicinity Map

Not to Scale

APN	143-011-01	143-011-05
EXISTING	163,325±	176,924±
PROPOSED	86,613±	253,636±

LEGEND

- Proposed Boundary Line
- Existing Boundary Line
- Centerline
- Curb & Gutter (C&G)
- Tree Drip Line
- Air Release Valve
- Catch Basin
- Curb Inlet with Access Manhole
- Electrical Utility Box
- Electrolier
- Fire Department Connection Valve
- Fire Hydrant
- Gas Valve
- Monitoring Well
- Pacific Bell Utility Manhole
- Sanitary Sewer Manhole
- Sanitary Sewer Cleanout
- Sign
- Site Light
- Storm Drain Manhole
- Street Light Utility Box
- Traffic Light
- Utility Pole
- Utility Box – Type Unknown
- Utility Vault – Type Unknown
- Water Meter
- Water Valve

APPROVED
CITY OF NOVATO
BY CDD
DATE 9/26/05

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SHEET:

EXISTING CONDITIONS / SURVEY

A1.0



1 / - SITE PLAN / GROUND LEVEL PLAN

1" = 80'-0" @ 11 x 17" 1" = 40'-0" @ 24 x 36"

0 20 40 80

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JOB: 1923

SHEET:

SITE PLAN /
GROUND LEVEL PLAN

A2.1



1
-

PLAN AT LEVELS 2 & 3

1" = 80'-0" @ 11 x 17" 1" = 40'-0" @ 24 x 36"

0 20 40 80

N

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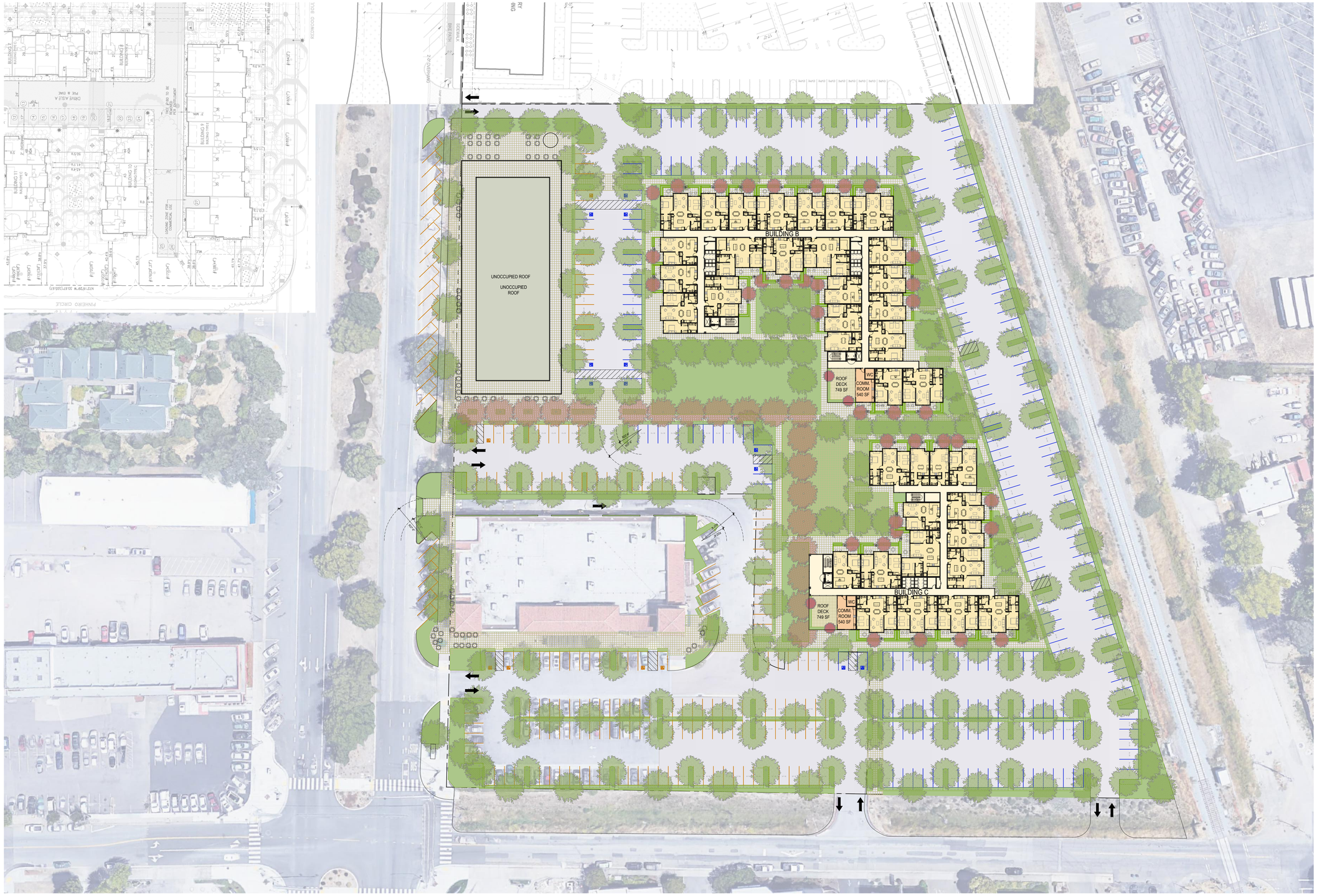
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JOB: 1923

SHEET:

PLAN AT
LEVELS 2 & 3

A2.2



1
-

PLAN AT LEVEL 4

1" = 80'-0" @ 11 x 17" 1" = 40'-0" @ 24 x 36"

0 20 40 80

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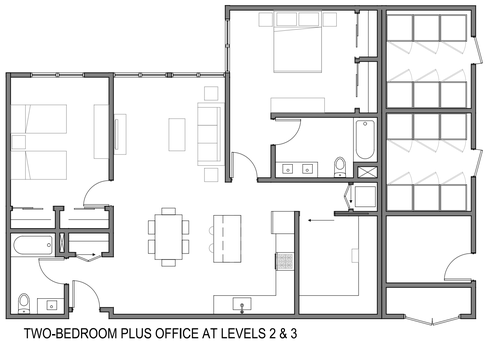
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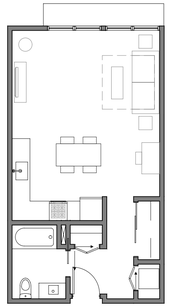
SHEET:

PLAN AT LEVEL 4

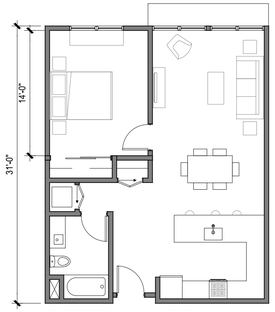
A2.3



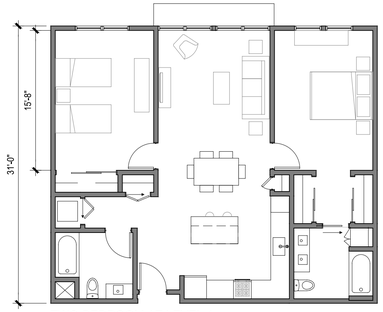
TWO-BEDROOM PLUS OFFICE AT LEVELS 2 & 3
1,282 SF



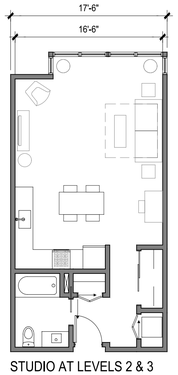
STUDIO AT LEVEL 4
540 SF



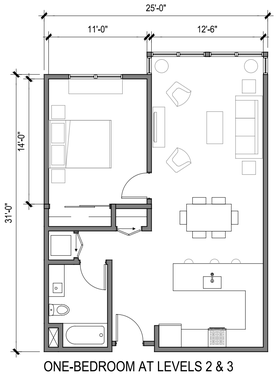
ONE-BEDROOM AT LEVEL 4
771 SF



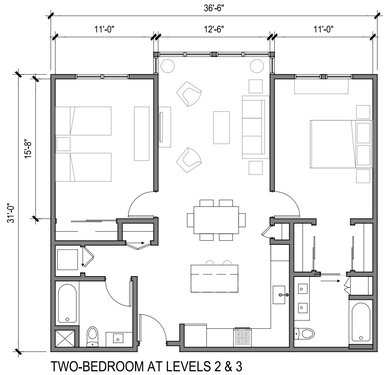
TWO-BEDROOM AT LEVEL 4
1,126 SF



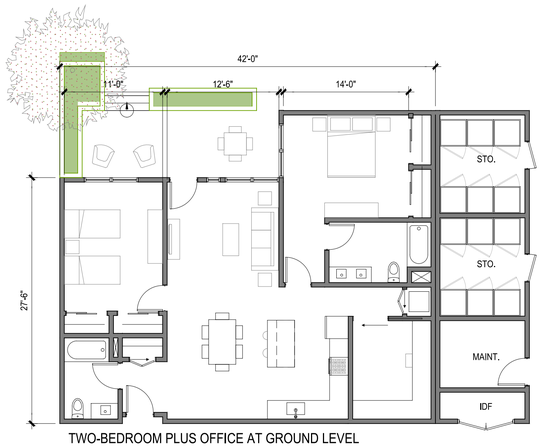
STUDIO AT LEVELS 2 & 3
573 SF



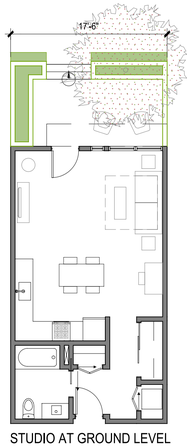
ONE-BEDROOM AT LEVELS 2 & 3
805 SF



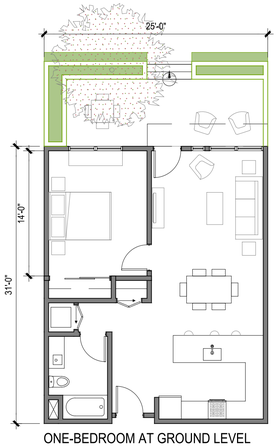
TWO-BEDROOM AT LEVELS 2 & 3
1,162 SF



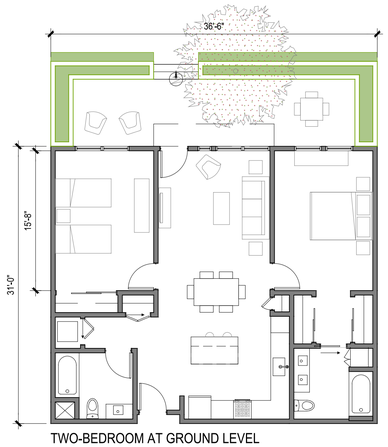
TWO-BEDROOM PLUS OFFICE AT GROUND LEVEL
1,282 SF



STUDIO AT GROUND LEVEL
532 SF



ONE-BEDROOM AT GROUND LEVEL
771 SF



TWO-BEDROOM AT GROUND LEVEL
1,126 SF

1
-

UNIT PLANS

1/16" = 1'-0" @ 11 x 17" 1/8" = 1'-0" @ 24 x 36"

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UNIT PLANS

A2.5



2 - NORTH ELEVATION



1 - WEST ELEVATION

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BUILDING ELEVATIONS

A3.1



1
-

EAST ELEVATION



2
-

SOUTH ELEVATION

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BUILDING
ELEVATIONS

A3.2



2
-

DETAIL OF THE REDWOOD ELEVATION



1
-

DETAIL OF THE OLIVE ELEVATION

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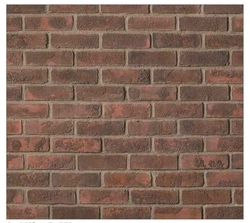
SHEET:

BUILDING
ELEVATIONS

A3.2b



(A) HARDIEPLANK - LAP SIDING
COLONIAL SMOOTH, PTD.



(B) BRICK VENEER



(C) CAST IN PLACE CONCRETE PLANTERS



(D) BENJAMIN MOORE
WARM & TOASTY CSP-915



(E) BENJAMIN MOORE
INDIAN RIVER 985



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JOB: 1923

SHEET:

MATERIALS & COLORS

A3.3

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1
-

VIEW 2 ALONG REDWOOD BLVD LOOKING SOUTH-EAST

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SHEET:

CONCEPTUAL
RENDERING

A3.4

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2 VIEW 2 ALONG REDWOOD BLVD LOOKING NORTH-EAST

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JOB: 1923

SHEET:

CONCEPTUAL RENDERING

A3.5

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3
-

VIEW 3 ALONG REDWOOD BLVD LOOKING NORTH-EAST - WITH TRADER JOE'S IN THE FOREGROUND

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SHEET:

CONCEPTUAL RENDERING

A3.6























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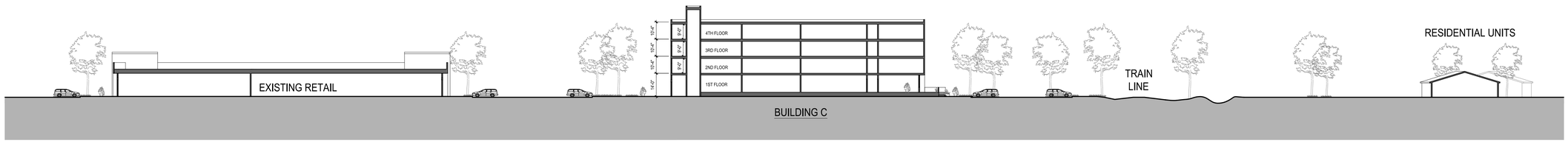
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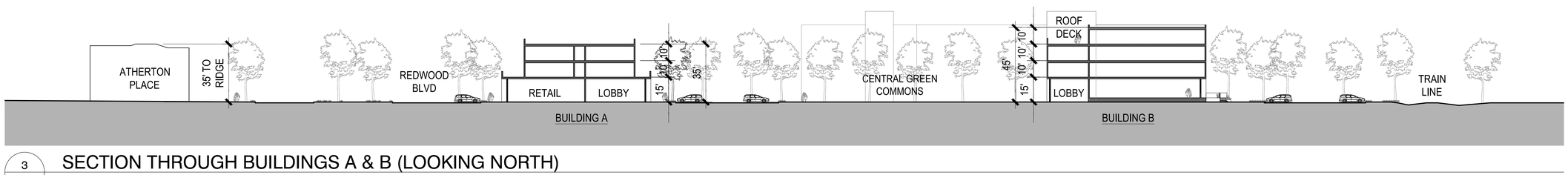
COURTYARD
AND PLAZA
PRECEDENT IMAGES

A3.7



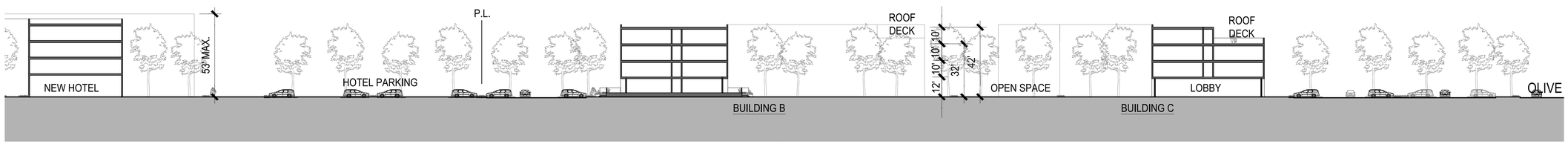
4 - SECTION THROUGH (E) RETAIL & BUILDING C (LOOKING NORTH)

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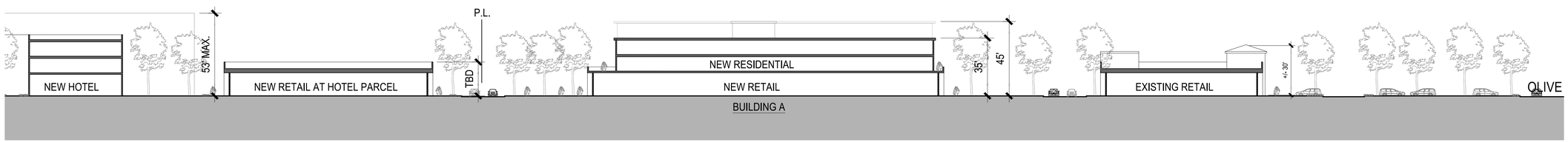
3 - SECTION THROUGH BUILDINGS A & B (LOOKING NORTH)

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2 - SECTION THROUGH BUILDINGS B & C (LOOKING WEST)

1/64" = 1'-0" @ 24 x 36" 1/32" = 1'-0" @ 24 x 36"



1 - SECTION ALONG REDWOOD BLVD (LOOKING WEST)

1/64" = 1'-0" @ 24 x 36" 1/32" = 1'-0" @ 24 x 36"

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October 12, 2021
Project No. 21-11735

Vivek Damodaran
Planner II
City of Novato, Community Development Department
922 Machin Avenue
Novato, California 94945
Via email: vdamodaran@novato.org

Subject: **Peer Review of the Biological Resources Assessment, Jurisdictional Delineation, and Arborist Report for the Village at Novato Mixed-Use Project, City of Novato, Marin County, California**

Dear Mr. Damodaran:

This letter provides the results of Rincon Consultants, Inc. (Rincon) review of the Biological Constraints Assessment (BCA) prepared by WRA, Inc. (WRA) dated November 2020, the Jurisdictional Delineation Report (JD) prepared by WRA dated September 2020, and the Tree Survey Report prepared by WRA dated October 30, 2020 for the proposed Village at Novato Mixed-Use Project (proposed project), Novato, Marin County, California. This peer review was completed as part of the environmental analysis being conducted in conformance with the California Environmental Quality Act (CEQA) by the City of Novato and considers if the BCA, JD, and Tree Survey completed for the proposed project are both complete and adequate for the purposes of preparing an Initial Study – Mitigated Negative Declaration (IS-MND).

Rincon reviewed the BCA to ascertain the degree to which the evaluation considered existing information (e.g., literature, databases, and other publicly available resources), the accuracy of existing conditions documentation (e.g., vegetation communities, soil types), adequacy of the special-status species habitat assessments, and completeness of the evaluation for all biological resource checklist items required by CEQA. Rincon also reviewed the JD for completeness and adequacy with emphasis on methodology and project-related impacts to jurisdictional features. The Tree Survey was reviewed with respect to methodology, adequacy, and adherence to requirements of the City of Novato Tree Ordinance as outlined in Chapter 17 (Trees and Shrubs) and Chapter 19 (Woodland and Tree Preservation) of the Novato Municipal Code.

Biological Constraints Assessment

Rincon has determined that the BCA is adequate in characterizing the existing conditions on the proposed project site and analyzing the potential impacts to special-status biological resources. While the BCA does not provide project-specific mitigation measures, the methodology, level of analysis and conclusions of the BCA are adequate and of sufficient detail to allow Rincon to easily develop implementable mitigation measures to reduce potential impacts to biological resources to less than significant. The BCA requires no further revisions or changes.

Jurisdictional Delineation Report

Rincon found the JD report to be well written with clearly defined methodology, an appropriately detailed regulatory context discussion and results accurately documenting the presence of 0.03 acre (278 linear feet) of ephemeral drainage potentially subject to U.S. Army Corps of Engineers, Regional Water Quality Control Board and California Department of Fish and Wildlife jurisdiction. Therefore, no further revisions or changes are recommended.

Tree Survey Report

The Tree Survey Report appropriately reflects the required information necessary to address compliance with the City of Novato Tree Ordinance regarding tree removal, therefore, no further revisions or changes are recommended.

Conclusions

Rincon concurs with the findings of the BCA and has no further recommendations. Additionally, the JD and Tree Survey reports were determined to be complete and adequate to support the CEQA analysis as written, and no further changes or revisions are recommended at this time.

Sincerely,
Rincon Consultants, Inc.

Craig Lawrence, M.S.
Senior Biologist/Project Manager

Sherri Miller, MS
Principal Biologist

Appendix B

Traffic Impact Study

Draft Report

Traffic Impact Study for the Village at Novato Project

Prepared for the
City of Novato

March 3, 2021

490 Mendocino Avenue, Suite 201 **SANTA ROSA**, CA 95401 707.542.9500
7901 Oakport Street, Suite 1500 **OAKLAND**, CA 94621 510.444.2600
w-trans.com

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Table of Contents

Executive Summary 1

Introduction 2

Transportation Setting 4

Capacity Analysis 9

Alternative Modes 24

Access and Circulation 25

Parking 27

CEQA Checklist 29

Conclusions and Recommendations 32

Study Participants and References 33

Figures

1. Study Area and Existing Lane Configurations 3
2. Existing Traffic Volumes 12
3. Baseline Traffic Volumes 14
4. Future Traffic Volumes 16
5. Site Plan 18
6. Project Traffic Volumes 21

Tables

1. Collision Rates at the Study Intersections 5
2. Bicycle Facility Summary 7
3. Intersection Level of Service Criteria 10
4. Existing Peak Hour Intersection Levels of Service 11
5. Baseline Peak Hour Intersection Levels of Service 13
6. Future Peak Hour Intersection Levels of Service 17
7. Trip Generation Summary 19
8. Trip Distribution Assumptions 20
9. Existing and Existing plus Project Peak Hour Intersection Levels of Service 20
10. Baseline and Baseline plus Project Peak Hour Intersection Levels of Service 22
11. Future and Future plus Project Peak Hour Intersection Levels of Service 23
12. Parking Analysis per City of Novato Code 27
13. Bicycle Parking Requirements 28
14. Vehicle Miles Traveled Analysis Summary 30

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Appendices

A. Collision Rate Calculations
B. Intersection Level of Service Calculations

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Executive Summary

As proposed, the Village at Novato would include three buildings at 7514 Redwood Boulevard in Novato providing 14,000 square feet of retail and 178 resident units, 25 of which would be affordable units. The project site would be accessed via two driveways on Redwood Boulevard and two driveways on Olive Avenue, as well as through the parking lots for the adjacent retail development on the northeast corner of Redwood Boulevard/Olive Avenue and the approved hotel development north of the site.

Based on standard trip generation rates for residential and retail uses, and assuming that some of the retail trips would be pass-by trips or captured from the residential portion of the project, the project would be expected to generate an average of 1,349 trips per day, including 77 during the a.m. peak hour and 103 during the p.m. peak hour.

Under Existing and Baseline conditions, all seven study intersections are or would be expected to continue operating acceptably at LOS D or better and they would be expected to continue doing so with the addition of project-related traffic. Under Future conditions, the intersection of Redwood Boulevard/San Marin Drive-Atherton Avenue is expected to operate at LOS F during the p.m. peak hour. This intersection is expected to operate acceptably with the implementation of the lane modifications identified in the General Plan. The unsignalized Redwood Boulevard/Golden Gate Place-Ranch Drive intersection would operate acceptably overall but at LOS F on the westbound approach during the p.m. peak hour. The westbound approach would be expected to operate acceptably with the addition of a traffic signal.

Upon the addition of project trips to the Future scenario, all intersections would continue to operate at the same service levels as without the project. With the addition of planned improvements, the intersection of Redwood Boulevard/San Marin Drive-Atherton Avenue would be expected to operate acceptably. With the addition of a traffic signal at the Redwood Boulevard/Golden Gate Plan-Ranch Drive intersection, acceptable operation would be achieved; however, as the project would not add trips to this approach, its effect on traffic operation is considered acceptable.

Transit facilities are adequate to serve the project as it is located within walking distance of the Novato Downtown SMART rail station and bus stops served by several routes. Bicycle facilities would be adequate with the inclusion of bike lanes along Olive Avenue to be provided by the project. The project would provide sidewalks along the Redwood Boulevard frontage and should work with the City to identify the project's proportional share of the cost of constructing pedestrian improvements along the Olive Avenue frontage.

The proposed parking supply would exceed the City's parking requirements and those of the Density Bonus Law, which applies to the project. Bicycle parking provided by the project would be adequate to serve the residential and retail uses.

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Introduction

This report presents an analysis of the potential traffic impacts that would be associated with the Village at Novato project, which would consist of the development of residential housing – including one building with ground floor retail – on two parcels totaling 5.82 acres located at 7514 Redwood Boulevard in the City of Novato. The traffic study was completed in accordance with the criteria established by the City and is consistent with standard traffic engineering techniques.

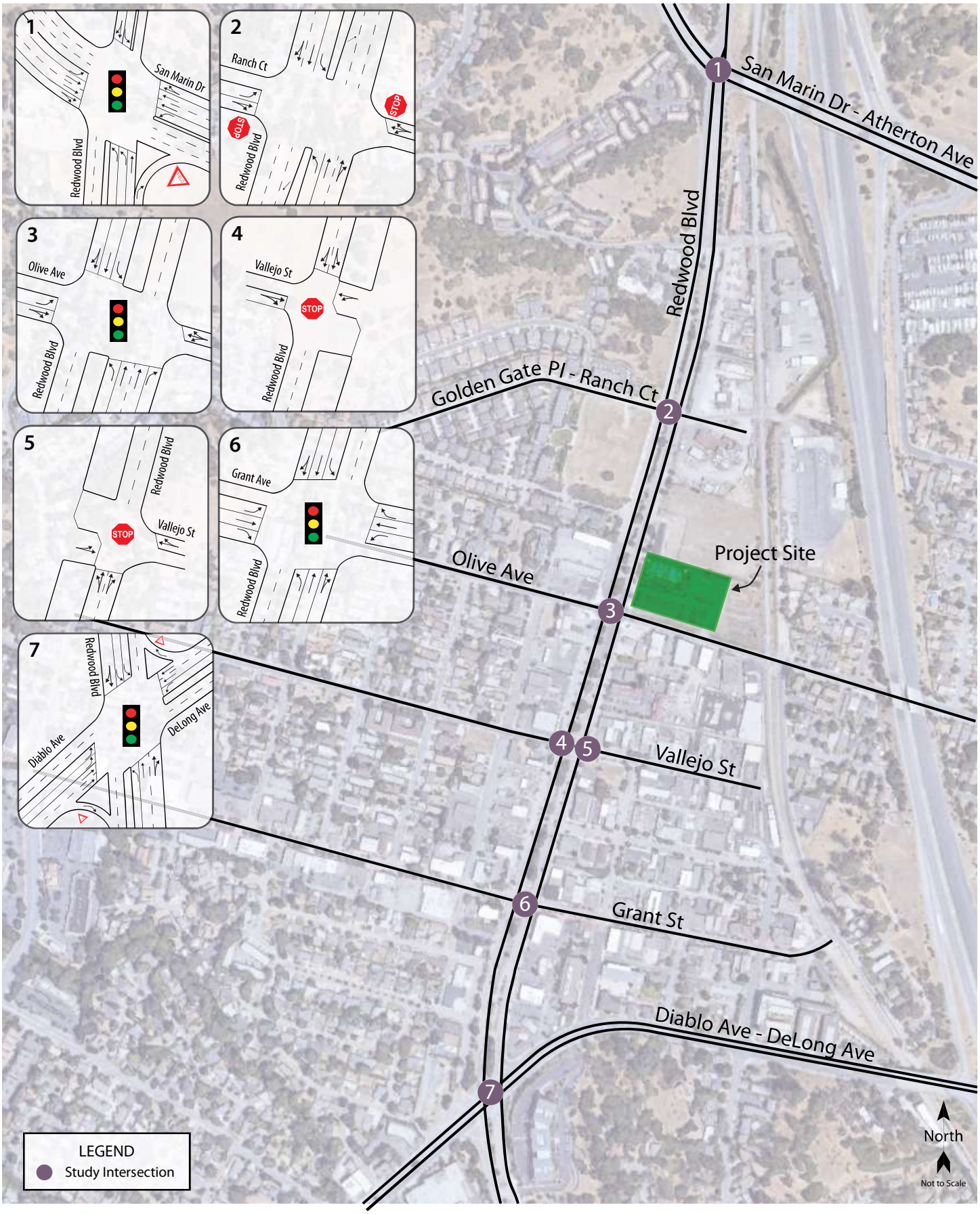
Prelude

The purpose of a traffic impact study is to provide City staff and policy makers with data they can use to make an informed decision regarding the potential traffic impacts and adverse effects of a proposed project, and any associated improvements that would be required to mitigate these impacts to a level of insignificance as defined by the City's General Plan or other policies and address adverse effects. Vehicular traffic is typically evaluated by determining the number of new trips that the proposed use would be expected to generate, distributing these trips to the surrounding street system based on existing travel patterns or anticipated travel patterns specific to the proposed project, then analyzing if the new traffic would be expected to have an adverse effect on operation of critical intersections or roadway segments. Impacts relative to access for pedestrians, bicyclists, and to transit are also addressed.

Project Profile

The proposed Village at Novato would be located on two parcels totaling 5.82 acres. One parcel is 4.06 acres and would include 120 residential units in two buildings. One of the buildings is proposed to have four stories with 92 units while the second building would have three stories with 28 residential units and 14,000 square feet of ground floor retail. The second parcel is 1.76 acres in size and would accommodate 58 residential units, including 25 affordable units, in a four-story building. Access to the combined residential and retail parcel would be provided via two driveways on Redwood Boulevard. There would be two driveways on Olive Avenue providing access to the residential-only parcel on the southern side of the project site. Both parcels would have cross-access and would connect to the parcel to the north which is to be occupied by an approved hotel development. There would also be a connection to the existing retail development at the northeast corner of the Redwood Boulevard/Olive Avenue intersection. The project site is located at 7514 Redwood Boulevard in the City of Novato as shown in Figure 1.

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Traffic Impact Study for the Village at Novato Project

Figure 1 – Study Area and Existing Lane Configurations

Transportation Setting

Operational Analysis

Study Area and Periods

The study area consists of the following intersections:

1. Redwood Boulevard/San Marin Drive-Atherton Avenue
2. Redwood Boulevard/Golden Gate Place-Ranch Drive
3. Redwood Boulevard/Olive Avenue
4. Redwood Boulevard/Vallejo Avenue (west)
5. Redwood Boulevard/Vallejo Avenue (east)
6. Redwood Boulevard/Grant Avenue
7. Redwood Boulevard/Diablo Avenue-De Long Avenue

Operating conditions during the a.m. and p.m. peak periods were evaluated to capture the highest potential impacts for the proposed project as well as the highest volumes on the local transportation network. The morning peak hour occurs between 7:00 and 9:00 a.m. and reflects conditions during the home to work or school commute, while the p.m. peak hour occurs between 4:00 and 6:00 p.m. and typically reflects the highest level of congestion during the homeward bound commute.

Study Intersections

Redwood Boulevard/San Marin Drive-Atherton Avenue is a four-legged signalized intersection with protected left-turn phasing on all four approaches. There are bike lanes on all four legs of the intersection. Crosswalks exist on the west leg of San Marin Drive and south leg of Redwood Boulevard.

Redwood Boulevard/Golden Gate Place-Ranch Drive is a two-way stop-controlled intersection with stop signs on Golden Gate Place-Ranch Drive. Bike lanes are present on Redwood Boulevard and a marked crosswalk is present on the west Ranch Drive leg.

Redwood Boulevard/Olive Avenue is a four-legged signalized intersection with protected left-turn phasing on all four approaches. There are striped crosswalks on all four legs of the intersection. Bike lanes are present on Redwood Boulevard.

Redwood Boulevard/Vallejo Avenue (east) is an all-way stop-controlled intersection. The stop sign on the west leg is located in the break in the Redwood Boulevard median. Crosswalks exist on the north, south, and east approaches. There are bike lanes on Redwood Boulevard.

Redwood Boulevard/Vallejo Avenue (west) is an all-way stop-controlled intersection. The stop sign on the east leg is located in the break in the Redwood Boulevard median. Crosswalks exist on the north, south, and west legs of the intersection. There are bike lanes on Redwood Boulevard.

Redwood Boulevard/Grant Avenue is a four-legged signalized intersection with protected left-turn phasing on the northbound and southbound Redwood Boulevard approaches. Crosswalks exist on all four approaches and bike lanes are present only on Redwood Boulevard.

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Redwood Boulevard/Diablo Avenue-De Long Avenue is a four-legged signalized intersection with protected left-turn phasing on all four approaches. Crosswalks are present on all four approaches and bike lanes exist on Redwood Boulevard.

The locations of the study intersections and the existing lane configurations and controls are shown in Figure 1.

Collision History

The collision history for the study area was reviewed to determine any trends or patterns that may indicate a safety issue. Collision rates were calculated based on records available from the California Highway Patrol as published in their Statewide Integrated Traffic Records System (SWITRS) reports. The most current five-year period available is August 1, 2015 through July 30, 2020.

As presented in Table 1, the calculated collision rates for the study intersections were compared to average collision rates for similar facilities statewide, as indicated in *2016 Collision Data on California State Highways*, California Department of Transportation (Caltrans). Based on the available collision data, all six study intersections have collision rates higher than the statewide average. The collision rate calculations are provided in Appendix A.

Table 1 – Collision Rates for the Study Intersections

Study Intersection	Number of Collisions (2015-2020)	Calculated Collision Rate (c/mve)	Statewide Average Collision Rate (c/mve)
1. Redwood Blvd/San Marin Dr-Atherton Ave	15	**0.28**	0.24
2. Redwood Blvd/Golden Gate Pl-Ranch Dr	3	**0.14**	0.13
3. Redwood Blvd/Olive Ave	16	**0.44**	0.24
4/5. Redwood Blvd/Vallejo Ave*	12	**0.45**	0.19
6. Redwood Blvd/Grant Ave	18	**0.50**	0.24
7. Redwood Blvd/Diablo Ave-De Long Ave	31	**0.54**	0.24

Notes: c/mve = collisions per million vehicles entering; **Bold** = collision rate higher than the Statewide average; * The Redwood Boulevard/Vallejo Avenue east and west intersections were analyzed as a single intersection due to their proximity

All six study intersections were reviewed for any potential collision patterns. The intersection at Redwood Boulevard/San Marin Drive-Atherton Avenue had a total of 15 collisions, which included six hit object, three rear-end, two broadside, one head-on, one sideswipe, one vehicle/pedestrian, and one vehicle/bicycle collision. The primary collision factors for hit object collisions included improper turning and driving under the influence. The City may wish to review this intersection for objects that could be involved in the collisions, such as the location of signs installed on the median islands. The vehicle/pedestrian collision occurred between an eastbound vehicle and northbound pedestrians crossing in the western leg (San Marin Drive) crosswalk, which is nearly 138 feet long. Since the collision was due to a pedestrian right-of-way violation, the pedestrian crossing signal timing could be reviewed to ensure compliance with current recommended practice.

The collision rate at Redwood Boulevard/Golden Gate Place-Ranch Drive is slightly above the statewide average. The three collisions at this intersection included two broadside and one rear-end collisions. The two broadside collisions occurred between westbound and southbound vehicles due to automobile right-of-way. Because the intersection is two-way stop controlled, westbound and eastbound drivers on Golden Gate Place-Ranch Drive are required to cross three lanes of traffic and the median to make left turns onto Redwood Boulevard. The City may wish to monitor the collision history for this intersection to determine if measures are warranted to potentially

reduce the collision rate. Regular maintenance of the landscaping along the median would be helpful in ensuring that adequate sight lines are maintained.

For Redwood Boulevard/Olive Avenue, there were 16 collisions including five broadside, five rear-end, and two pedestrian collisions. The remaining four collision types include sideswipe, hit object, and other. Four out of five broadside collisions involved northbound drivers colliding with either westbound or eastbound drivers due to right-of-way conflicts, traffic signal violations, or unsafe speed. Because of the width of this intersection, the City may wish to review signal timing to see if the combined yellow and red clearance intervals are sufficient for drivers to traverse the intersection after entering legally. For rear-end collisions, four out of five occurred on Redwood Boulevard due to unsafe speed or unsafe starting or backing, although the posted speed limit is 25 mph. The two vehicle/pedestrian collisions at Redwood Boulevard/Olive Avenue involved collisions between eastbound vehicles and a northbound pedestrian in a crosswalk and an illegally crossing pedestrian. Both collisions occurred on Olive Avenue despite having clear sight lines and visible crosswalks. Therefore, increased enforcement to reduce excessive vehicle speeds and illegal crossings are suggested to potentially reduce the collisions.

The twelve collisions that were recorded at Redwood Boulevard/Vallejo Avenue included four hit object, three rear-end, two bicycle-involved, two broadside, and one moving/parked vehicle collision. The four hit object collisions have primary collision factors including improper turning, unsafe speed, and unsafe lane change. Two bicycle collisions occurred due to unsafe vehicle speeds, though one of the bicyclists was under the influence of alcohol. It is suggested that the City review this intersection for potential obstacles to sight lines and increase speed enforcement.

For Redwood Boulevard/Grant Avenue, there were 18 collisions including four rear-end, four sideswipe, four vehicle/pedestrian, two broadside, two hit object, one bicycle/vehicle, and one moving/parked vehicle collision. All the rear-end collisions that occurred on Redwood Boulevard were due to factors such as unsafe lane change, unsafe starting or backing, and driving under the influence. Three out of four vehicle/ pedestrian collisions occurred between westbound pedestrians in the crosswalk with either northbound or southbound vehicles. This shows that in addition to the increased speed enforcement, the City may wish to review the signal phasing to determine if pedestrians have adequate time to cross at this location.

Out of 31 collisions at Redwood Boulevard/Diablo Avenue-De Long Avenue, there were eight broadside, seven rear-end, seven sideswipe, four hit object, four other, and one vehicle/pedestrian collision. Six out of eight broadside collisions were caused by factors such as automobile right-of-way and traffic signal and sign violations. Five out of seven rear-end collisions were due to unsafe speed and unsafe starting or backing. Additionally, the primary collision factors for seven sideswipe collisions were unsafe lane change, improper turning, automobile right-of-way, and driving under the influence. The vehicle/pedestrian collision occurred between a westbound driver and a southbound pedestrian in the crosswalk due to a pedestrian right-of-way violation. Signal timing could be reviewed to determine if there are adequate clearance intervals and additional speed enforcement may be desirable at this location.

Alternative Modes

Pedestrian Facilities

Pedestrian facilities include sidewalks, crosswalks, pedestrian signal phases, curb ramps, curb extensions, and various streetscape amenities such as lighting, benches, etc. In general, a network of sidewalks, crosswalks, pedestrian signals, and curb ramps provide access for pedestrians in the vicinity of the proposed project site; however, sidewalk gaps can be found along some of the roadways connecting to the project site. Existing gaps and obstacles along the connecting roadways impact convenient and continuous access for pedestrians and present safety concerns in those locations where appropriate pedestrian infrastructure would address potential conflict points.

Intermittent sidewalk coverage is provided on Redwood Boulevard north of Olive Avenue. Along the east side of the street, sidewalks exist along the developed property frontages, including the shopping center north of Olive Avenue. Along the west side of the street, sidewalks are present south of Escallonia Drive. South of Olive Avenue, the sidewalk network is complete along both sides of the street. Where sidewalks are present, there are curb ramps and crosswalks on side street approaches. At the intersection of Redwood Boulevard/Olive Avenue, there are marked crosswalks, curb extensions, and a median refuge for pedestrians crossing Redwood Boulevard. Street lighting is present in the project vicinity.

There are no sidewalks along the Olive Avenue project frontage, but sidewalks are provided along the south side of the street. Sidewalks are present on both sides of the street west of Redwood Boulevard. Street lighting is present along Olive Avenue on both sides of Redwood Boulevard.

Bicycle Facilities

The *Highway Design Manual*, Caltrans, 2020, classifies bikeways into four categories:

- **Class I Multi-Use Path** – a completely separated right-of-way for the exclusive use of bicycles and pedestrians with cross flows of motorized traffic minimized.
- **Class II Bike Lane** – a striped and signed lane for one-way bike travel on a street or highway.
- **Class III Bike Route** – signing only for shared use with motor vehicles within the same travel lane on a street or highway.
- **Class IV Bikeway** – also known as a separated bikeway, a Class IV Bikeway is for the exclusive use of bicycles and includes a separation between the bikeway and the motor vehicle traffic lane. The separation may include, but is not limited to, grade separation, flexible posts, inflexible physical barriers, or on-street parking.

In the project area, Class II bike lanes exist on Redwood Boulevard, extending from Wood Hollow Drive through the downtown area. Bike lanes are proposed on Olive Avenue from Redwood Boulevard to Railroad Avenue, and there are existing bike lanes east of Railroad Avenue. The SMART path is proposed adjacent to the rail line and will extend along its entire length within Novato as well as to points north and south of the City. Bicyclists may ride in the roadway along all other streets within the project study area. Table 2 summarizes the existing and planned bicycle facilities in the project vicinity, as contained in the *City of Novato Bicycle/Pedestrian Plan*, Alta Planning + Design, 2015.

Table 2 – Bicycle Facility Summary

Status Facility	Class	Length (miles)	Begin Point	End Point
Existing				
Redwood Blvd	II	2.50	Rowland Blvd	Wood Hollow Dr
Olive Ave	II	1.15	Railroad Ave	Samrose Dr
Planned				
SMART path	I	7.50	City limits	City limits
Olive Ave	II	0.15	Redwood Blvd	Railroad Ave
Grant Ave	III	0.74	Railroad Ave	7th St

Source: *City of Novato Bicycle/Pedestrian Plan*, Alta Planning + Design, 2015

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Transit Facilities

The Sonoma Marin Rail Transit (SMART) rail system includes two stations that can be accessed from the project site. The Novato Downtown station is located at Grant Avenue and Railroad Avenue, approximately 0.3 miles from the project site. The Novato San Marin station is located on Redwood Boulevard, 0.6 miles north of the site. SMART currently operates between Larkspur and the Sonoma County Airport station. SMART typically operates seven days a week, primarily serving a.m. and p.m. peak our commuters, but has reduced service in response to the Covid-19 outbreak.

Marin Transit provides fixed route bus service in Novato. Routes 35, 49, and 171 can be accessed at the stops located at the northeast and southwest corners of the Redwood Boulevard/Olive Avenue intersection. Routes 35 and 49 provide service between San Rafael and Novato. Route 35 operates seven days a week from 7:00 a.m. to 11:00 p.m. approximately every 30 minutes. Route 49 provides daily service with buses every 30 minutes, operating from 6:00 a.m. to 9:00 p.m. Monday through Friday and 7:00 a.m. to 10:00 p.m. on weekends.

Golden Gate Transit also serves the Redwood Boulevard/Olive Avenue bus stops, providing regional bus service connecting Novato to Sonoma County and San Francisco. Route 101 operates seven days a week from 4:00 a.m. until 12:00 a.m., providing hourly service between San Francisco and Santa Rosa. Route 70 operates seven days a week between Novato and San Francisco, providing service every 30 minutes from 5:00 a.m. to 1:00 a.m.

Marin Transit and Golden Gate Transit buses all include bike racks that can accommodate two or three bicycles. Bike rack space is on a first come, first served basis. Additional bicycles are allowed on buses at the discretion of the driver.

Dial-a-ride, also known as paratransit, or door-to-door service, is available for those who are unable to independently use the transit system due to a physical or mental disability. Marin Transit is designed to serve the needs of individuals with disabilities within Novato and the surrounding area.

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Capacity Analysis

Intersection Level of Service Methodologies

Level of Service (LOS) is used to rank traffic operation on various types of facilities based on traffic volumes and roadway capacity using a series of letter designations ranging from A to F. Generally, Level of Service A represents free flow conditions and Level of Service F represents forced flow or breakdown conditions. A unit of measure that indicates a level of delay generally accompanies the LOS designation.

The study intersections were analyzed using methodologies published in the *Highway Capacity Manual* (HCM), Transportation Research Board, 6th Edition. This source contains methodologies for various types of intersection control, all of which are related to a measurement of delay in average number of seconds per vehicle.

The Levels of Service for the intersections with side street stop controls, or those which are unsignalized and have one or two approaches stop controlled, were analyzed using the "Two-Way Stop-Controlled" intersection capacity method from the HCM. This methodology determines a Level of Service for each minor turning movement by estimating the average delay in seconds per vehicle. Results are presented for individual movements together with the weighted overall average delay for the intersection.

The study intersections with stop signs on all approaches were analyzed using the "All-Way Stop-Controlled" Intersection methodology from the HCM. This methodology evaluates delay for each approach based on turning movements, opposing and conflicting traffic volumes, and the number of lanes. Average vehicle delay is computed for the intersection as a whole, and is then related to a Level of Service.

The study intersections that are currently controlled by a traffic signal, or may be in the future, were evaluated using the signalized methodology from the HCM. This methodology is based on factors including traffic volumes, green time for each movement, phasing, whether the signals are coordinated or not, truck traffic, and pedestrian activity. Average stopped delay per vehicle in seconds is used as the basis for evaluation in this LOS methodology. For purposes of this study, delays were calculated using signal timing obtained from the City of Novato.

The ranges of delay associated with the various levels of service are indicated in Table 3.

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Table 3 – Intersection Level of Service Criteria			
LOS	**Two-Way Stop-Controlled**	**All-Way Stop-Controlled**	**Signalized**
A	Delay of 0 to 10 seconds. Gaps in traffic are readily available for drivers exiting the minor street.	Delay of 0 to 10 seconds. Upon stopping, drivers are immediately able to proceed.	Delay of 0 to 10 seconds. Most vehicles arrive during the green phase, so do not stop at all.
B	Delay of 10 to 15 seconds. Gaps in traffic are somewhat less readily available than with LOS A, but no queuing occurs on the minor street.	Delay of 10 to 15 seconds. Drivers may wait for one or two vehicles to clear the intersection before proceeding from a stop.	Delay of 10 to 20 seconds. More vehicles stop than with LOS A, but many drivers still do not have to stop.
C	Delay of 15 to 25 seconds. Acceptable gaps in traffic are less frequent, and drivers may approach while another vehicle is already waiting to exit the side street.	Delay of 15 to 25 seconds. Drivers will enter a queue of one or two vehicles on the same approach, and wait for vehicle to clear from one or more approaches prior to entering the intersection.	Delay of 20 to 35 seconds. The number of vehicles stopping is significant, although many still pass through without stopping.
D	Delay of 25 to 35 seconds. There are fewer acceptable gaps in traffic, and drivers may enter a queue of one or two vehicles on the side street.	Delay of 25 to 35 seconds. Queues of more than two vehicles are encountered on one or more approaches.	Delay of 35 to 55 seconds. The influence of congestion is noticeable, and most vehicles have to stop.
E	Delay of 35 to 50 seconds. Few acceptable gaps in traffic are available, and longer queues may form on the side street.	Delay of 35 to 50 seconds. Longer queues are encountered on more than one approach to the intersection.	Delay of 55 to 80 seconds. Most, if not all, vehicles must stop and drivers consider the delay excessive.
F	Delay of more than 50 seconds. Drivers may wait for long periods before there is an acceptable gap in traffic for exiting the side streets, creating long queues.	Delay of more than 50 seconds. Drivers enter long queues on all approaches.	Delay of more than 80 seconds. Vehicles may wait through more than one cycle to clear the intersection.

Reference: *Highway Capacity Manual,* Transportation Research Board, 2018

Traffic Operation Standards

In the *1996 Novato General Plan*, the City of Novato adopted the following policy and program:

> ***TR Policy 4: Level of Service Standards*** *– Establish traffic Level of Service (LOS) standards for use in (1) evaluating the impacts of proposed development projects so the project can be redesigned or effective mitigation measures can be implemented, (2) making improvements to the roadway system, and (3) determining appropriate traffic impact fees.*
>
> ***TR Program 4.1*** *– Establish traffic Level of Service standards as follows:*
>
> *a. At intersections with signals or four-way stop signs: operation at LOS D*
> *b. At intersections with stop signs on side streets only: operation at LOS E.*
>
> *Mitigation measures which reduce side street delay, such as traffic signals, all-way stops and/or center two-way left turn lanes will be considered when LOS F conditions are projected for side street traffic. The volume of traffic should also be considered when evaluating the severity of side street traffic operations.*

Existing Conditions

The Existing Conditions scenario provides an evaluation of current operation based on existing traffic volumes during the a.m. and p.m. peak periods. This condition does not include project-generated traffic volumes. Due to the Covid-19 outbreak, new turning movement counts would have been unreliable; therefore current volumes were estimated based on data collected prior to the beginning of the stay-at-home order. The volume data for Redwood Boulevard/San Marin Drive–Atherton Avenue, Redwood Boulevard/Olive Avenue, Redwood Boulevard/Grant Avenue, Redwood Boulevard/Diablo Avenue–De Long Avenue was retrieved from *Novato General Plan 2035 Final Environmental Impact Report (EIR),* City of Novato, February 2020, whereas the volume for Redwood Boulevard/Golden Gate Place-Ranch Drive was from *Focused Traffic Study for the Residence Inn at 7546 Redwood Boulevard,* W-Trans, May 2018. The traffic volumes for these intersections were factored to approximate current 2020 volumes under typical conditions. Since recent turning movement counts were not available for the two Redwood Boulevard/Vallejo Avenue intersections, counts were collected on November 11, 2020; to estimate current volumes at this location, 2020 counts were also collected at the Grant Avenue intersection and the ratio of the General Plan counts to the 2020 counts at that location was applied to the Vallejo Avenue intersections.

Under Existing Conditions, all study intersections are currently operating acceptably at LOS D overall or better with the minor approaches operating acceptably at LOS B during both the a.m. and p.m. peak hours. As previously noted, the intersection of Redwood Boulevard/Vallejo Avenue was analyzed as two intersections as there are stop signs at the break in the median for the westbound and eastbound through/left-turn movements. Therefore, Redwood Boulevard/Vallejo Avenue (west) includes the southbound approach on Redwood Boulevard, while Redwood Boulevard/Vallejo Avenue (east) includes the northbound approach on Redwood Boulevard. A summary of the intersection Level of Service calculations is contained in Table 4, and copies of the Level of Service calculations are provided in Appendix B. The existing traffic volumes are shown in Figure 2.

Table 4 – Existing Peak Hour Intersection Levels of Service

	Study Intersection *Approach*	**AM Peak**		**PM Peak**	
		Delay	**LOS**	**Delay**	**LOS**
1.	Redwood Blvd/San Marin Dr-Atherton Ave	33.0	C	36.4	D
2.	Redwood Blvd/Golden Gate Pl-Ranch Dr	1.1	A	0.8	A
	Eastbound (Ranch Dr) Approach	*11.8*	*B*	*12.7*	*B*
	Westbound (Golden Gate Pl) Approach	*12.4*	*B*	*14.9*	*B*
3.	Redwood Blvd/Olive Ave	21.1	C	24.2	C
4.	Redwood Blvd/Vallejo Ave (West)	10.0	A	12.3	B
5.	Redwood Blvd/Vallejo Ave (East)	9.0	A	12.7	B
6.	Redwood Blvd/Grant Ave	20.3	C	21.0	C
7.	Redwood Blvd/Diablo Ave-De Long Ave	36.2	D	37.5	D

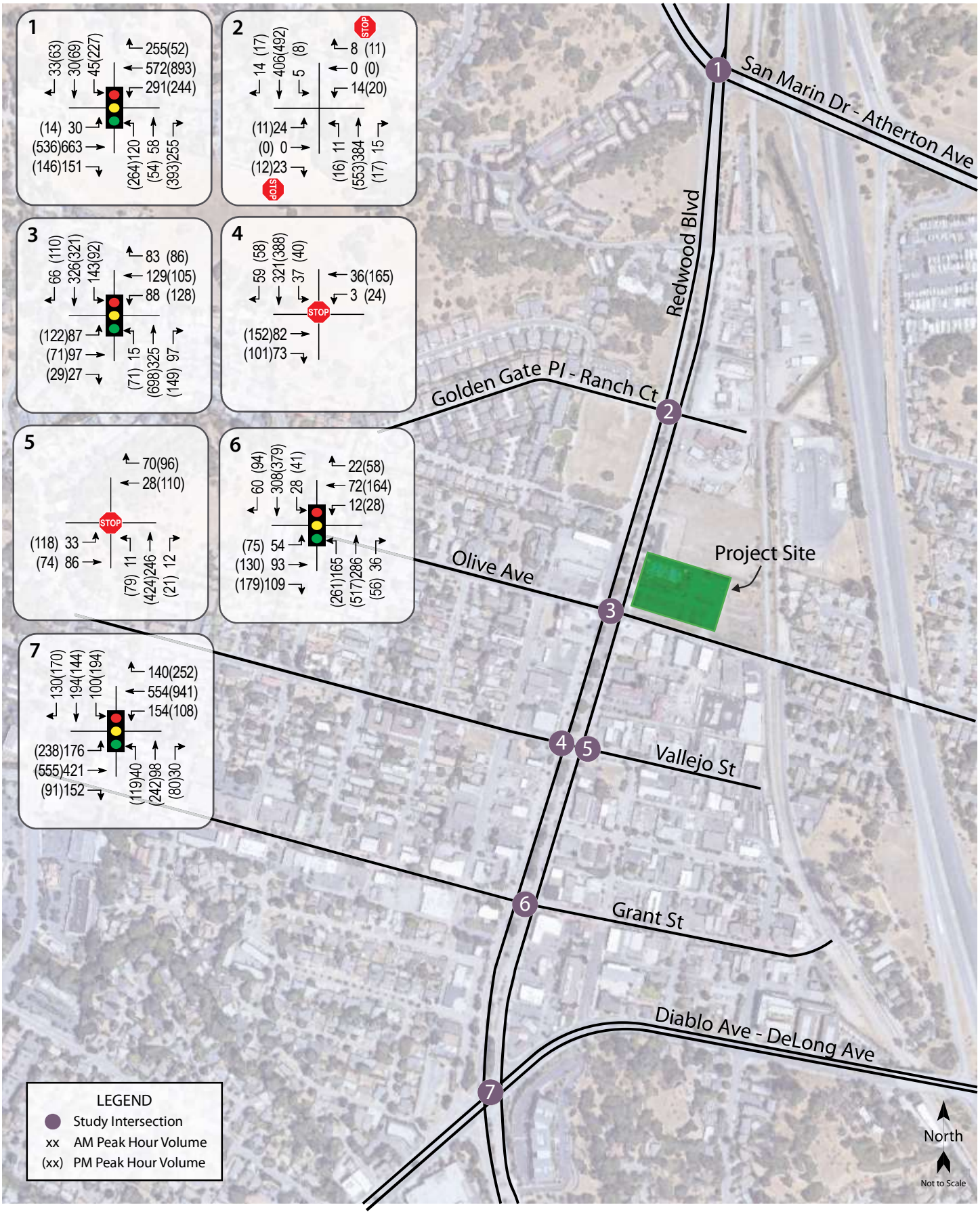
Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*

Finding – The study intersections are operating acceptably at LOS D or better under Existing Conditions

Baseline Conditions

The Baseline traffic scenario reflects conditions with traffic from projects that City staff deems likely to be constructed and generating traffic in a similar timeframe to the opening of the proposed project. There are eleven projects that are anticipated to affect traffic in the study area and were included in the Baseline scenario:

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nov138.ai 2/21

Traffic Impact Study for the Village at Novato Project

Figure 2 – Existing Traffic Volumes

- Atherton Place – 50 townhome units and 1,360-square-feet of commercial space on the west side of Redwood Boulevard, across from the project site
- Buck Center Housing – 128 housing units at the Buck Center on North Redwood Boulevard
- First and Grant Mixed-Use – 32-unit condominium building with 13,300 square feet of ground-floor commercial on Grant Avenue west of Redwood Boulevard
- Grant Avenue Mixed-Use – Mixed-use building consisting of 8,190 square feet of ground floor commercial space with 227 residential units at Grant Avenue and 4th Street
- Habitat for Humanity – 80 residential units and 2,154 square feet of commercial uses at 8161 Redwood Boulevard
- Park-A-Pup – Dog boarding facility occupying a 12,123-square-foot building at 7586 Redwood Boulevard
- Residence Inn – 103-room hotel with a separate 8,000 square feet of commercial space at 7546 Redwood Boulevard
- Springbrook Green Homes – Nine attached residential homes at 1602 Vallejo Avenue
- Wood Hollow Hotel – 87-room hotel to be located at 7701 Redwood Boulevard
- 1787 Grant Avenue Residences – 35 residential units on Grant Avenue west of Redwood Boulevard
- 7711 Redwood Boulevard Residences – 80 residential units on a four-acre site

The traffic associated with these eleven projects was added to existing traffic volumes to obtain Baseline volumes. Under Baseline conditions, all study intersections are expected to continue operating acceptably at LOS D or better during the a.m. and p.m. peak periods. A summary of the intersection Levels of Service is contained in Table 5 and the baseline traffic volumes are shown in Figure 3.

Table 5 – Baseline Peak Hour Intersection Levels of Service

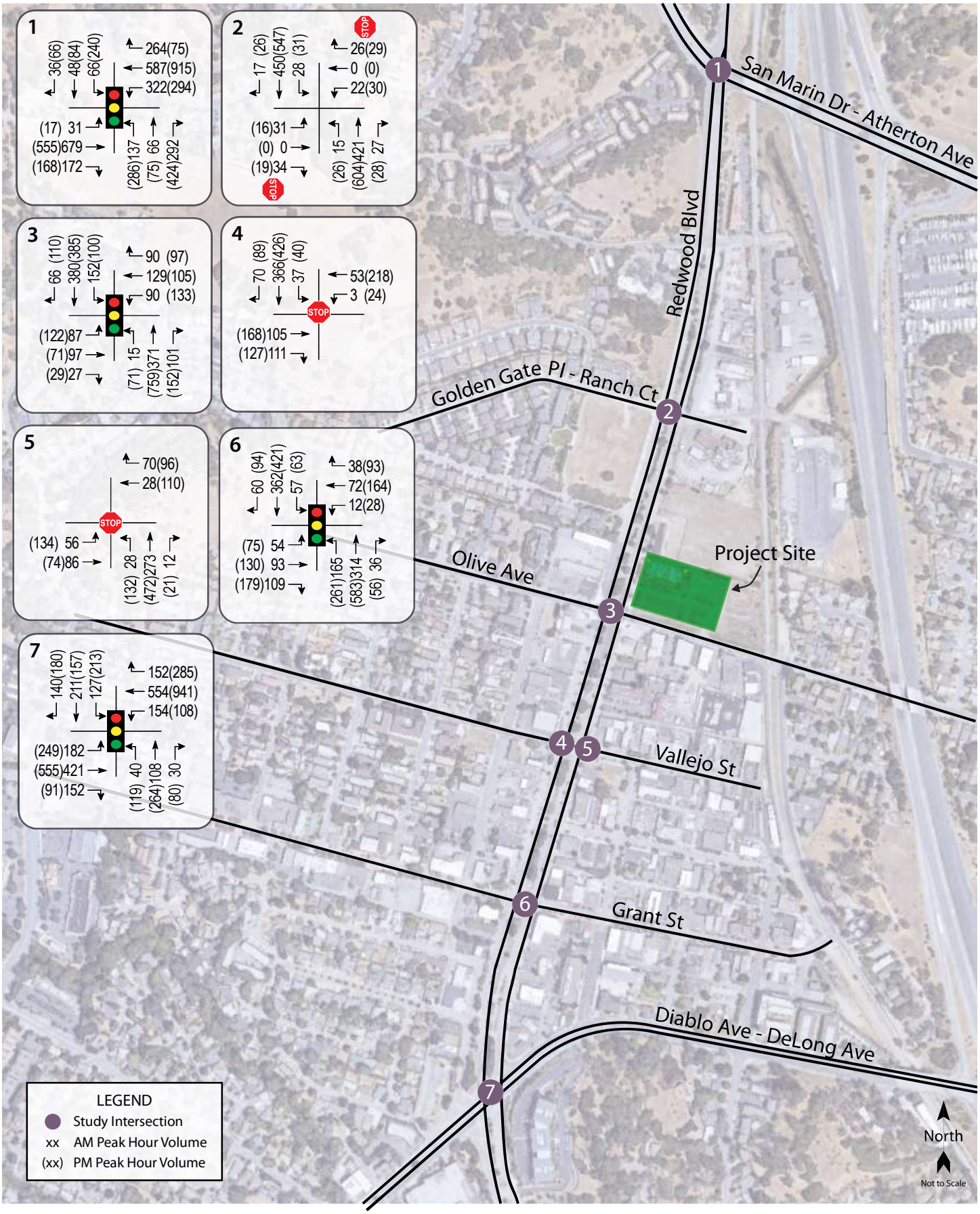
Study Intersection ***Approach***	AM Peak		PM Peak	
	Delay	**LOS**	**Delay**	**LOS**
1. Redwood Blvd/San Marin Dr-Atherton Ave	34.3	C	39.2	D
2. Redwood Blvd/Golden Gate Pl-Ranch Dr	1.7	A	1.4	A
Eastbound (Ranch Dr) Approach	*12.7*	*B*	*14.1*	*B*
Westbound (Golden Gate Pl) Approach	*12.9*	*B*	*16.4*	*C*
3. Redwood Blvd/Olive Ave	21.7	C	26.0	C
4. Redwood Blvd/Vallejo Ave (West)	11.2	B	14.6	B
5. Redwood Blvd/Vallejo Ave (East)	9.6	A	15.3	C
6. Redwood Blvd/Grant Ave	20.6	C	21.3	C
7. Redwood Blvd/Diablo Ave-De Long Ave	37.0	D	38.4	D

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*

Finding – All study intersections are expected to continue operating acceptably at the same Levels of Service upon the addition of eleven projects planned near the proposed project site.

Future Conditions

The Future scenario represents cumulative traffic conditions that would be expected upon build-out of the land uses identified in the General Plan. Future volume projections for all the study intersections except for Redwood Boulevard/Golden Gate Place-Ranch Drive and Redwood Boulevard/Vallejo Avenue were taken from the build-out analysis in the *Novato General Plan 2035 Final Environmental Impact Report (EIR),* City of Novato, 2020. Because



nov138.ai 2/21

Traffic Impact Study for the Village at Novato Project

Figure 3 – Baseline Traffic Volumes

W-Trans

the intersections of Redwood Boulevard/Golden Gate Place-Ranch Drive and Redwood Boulevard/Vallejo Avenue were not analyzed in the previous studies, the same methodology used in the General Plan EIR was applied to these intersections to estimate future volumes. It is noted that the General Plan analysis assumed that development on the project site would consist entirely of commercial land uses. Trips associated with the commercial development were subtracted from future volumes to evaluate the Future (without project) operating conditions.

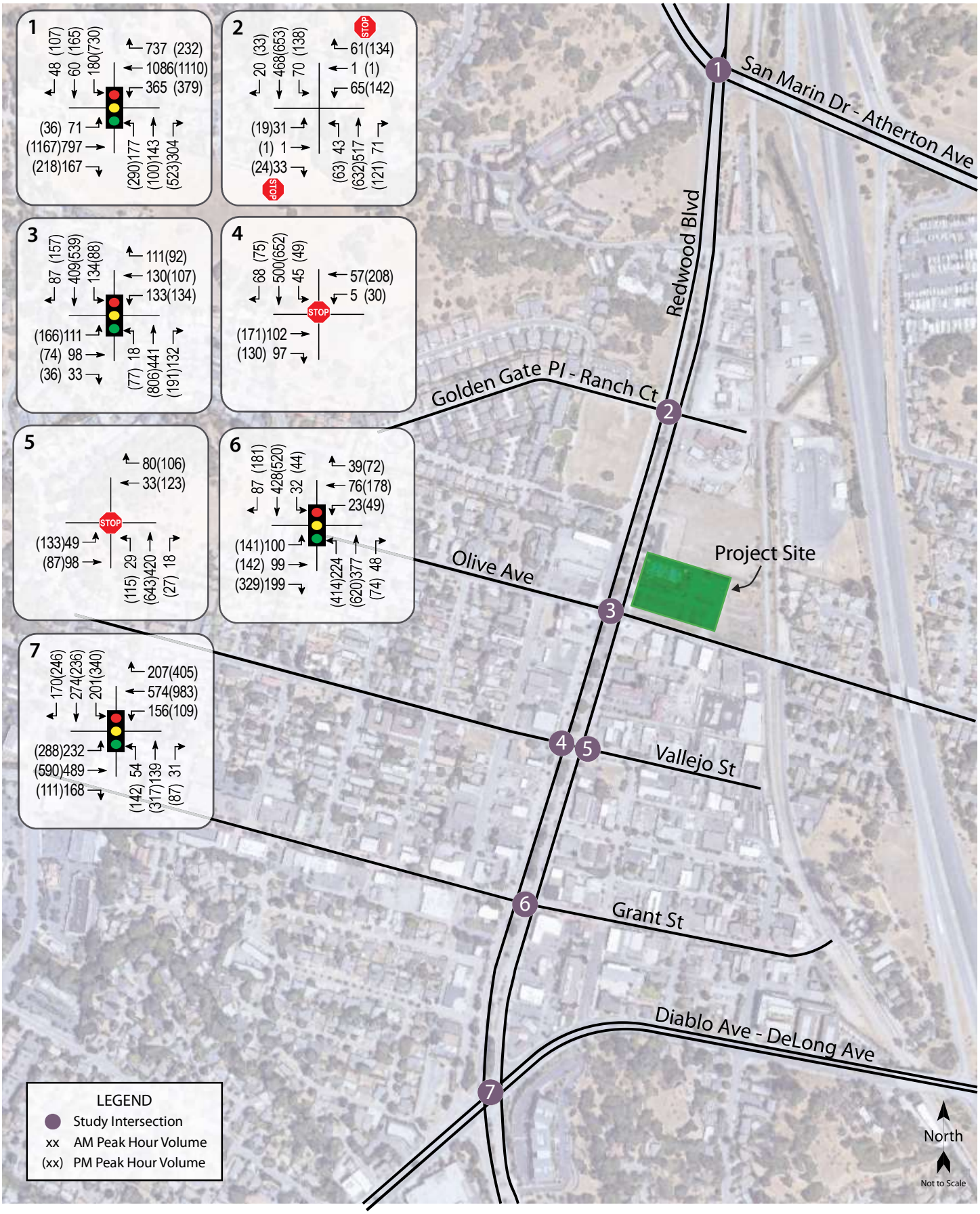
The General Plan EIR traffic analysis identified the following improvements for the intersection of Redwood Boulevard/San Marin Drive-Atherton Avenue to achieve the City's Level of Service (LOS) standards, maintain efficient traffic flow, and support build-out of the General Plan:

- Widen the westbound San Marin Drive approach (the SMART railroad overpass) to accommodate two left-turn lanes, two through lanes, and one right-turn lane, as well as bike lanes and a widened sidewalk on the south side of the overpass.
- Widen the southbound Redwood Boulevard approach to include a left-turn lane, shared left-turn/ through lane, and right-turn lane.
- Restripe the northbound Redwood Boulevard approach to include a left-turn lane, left-turn/through lane, and two right-turn lanes.
- Add right-turn overlap signal phasing on the northbound and westbound approaches.

Under the anticipated Future volumes, the study intersections are expected to operate acceptably at LOS D or better except for Redwood Boulevard/San Marin Drive-Atherton Avenue and the westbound approach on Redwood Boulevard/Golden Gate Place-Ranch Drive during the p.m. peak hour. However, with the improvements identified in the General Plan, Redwood Boulevard/San Marin Drive-Atherton Avenue is expected to operate at LOS C during the a.m. peak hour and LOS D during the p.m. peak hour. The Redwood Boulevard/Golden Gate Place-Ranch Drive intersection would meet warrants for a traffic signal under Future volumes due to the volume of traffic on the westbound approach, which would primarily be associated with an anticipated hotel and commercial development on Golden Gate Place.

Operating conditions are summarized in Table 6 and Future volumes are shown in Figure 4.

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nov138.ai 2/21

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Figure 4 – Future Traffic Volumes

Table 6 – Future Peak Hour Intersection Levels of Service				
Study Intersection ***Approach***	**AM Peak**		**PM Peak**	
	Delay	**LOS**	**Delay**	**LOS**
1. Redwood Blvd/San Marin Dr-Atherton Ave	37.7	D	**86.3**	**F**
With Improvements: Change lane configurations	29.4	C	44.9	D
2. Redwood Blvd/Golden Gate Pl-Ranch Dr	3.2	*A*	19.0	C
Eastbound (Ranch Dr) Approach	*14.6*	*B*	*20.9*	*C*
Westbound (Golden Gate Pl) Approach	*19.2*	*C*	***123.8***	***F***
With traffic signal	12.8	B	18.2	B
3. Redwood Blvd/Olive Ave	22.7	C	25.2	C
4. Redwood Blvd/Vallejo Ave (west, includes SB Redwood)	11.3	B	17.4	C
5. Redwood Blvd/Vallejo Ave (east, includes NB Redwood)	10.1	B	17.3	C
6. Redwood Blvd/Grant Ave	21.0	C	32.1	C
7. Redwood Blvd/Diablo Ave-De Long Ave	39.0	D	44.5	D

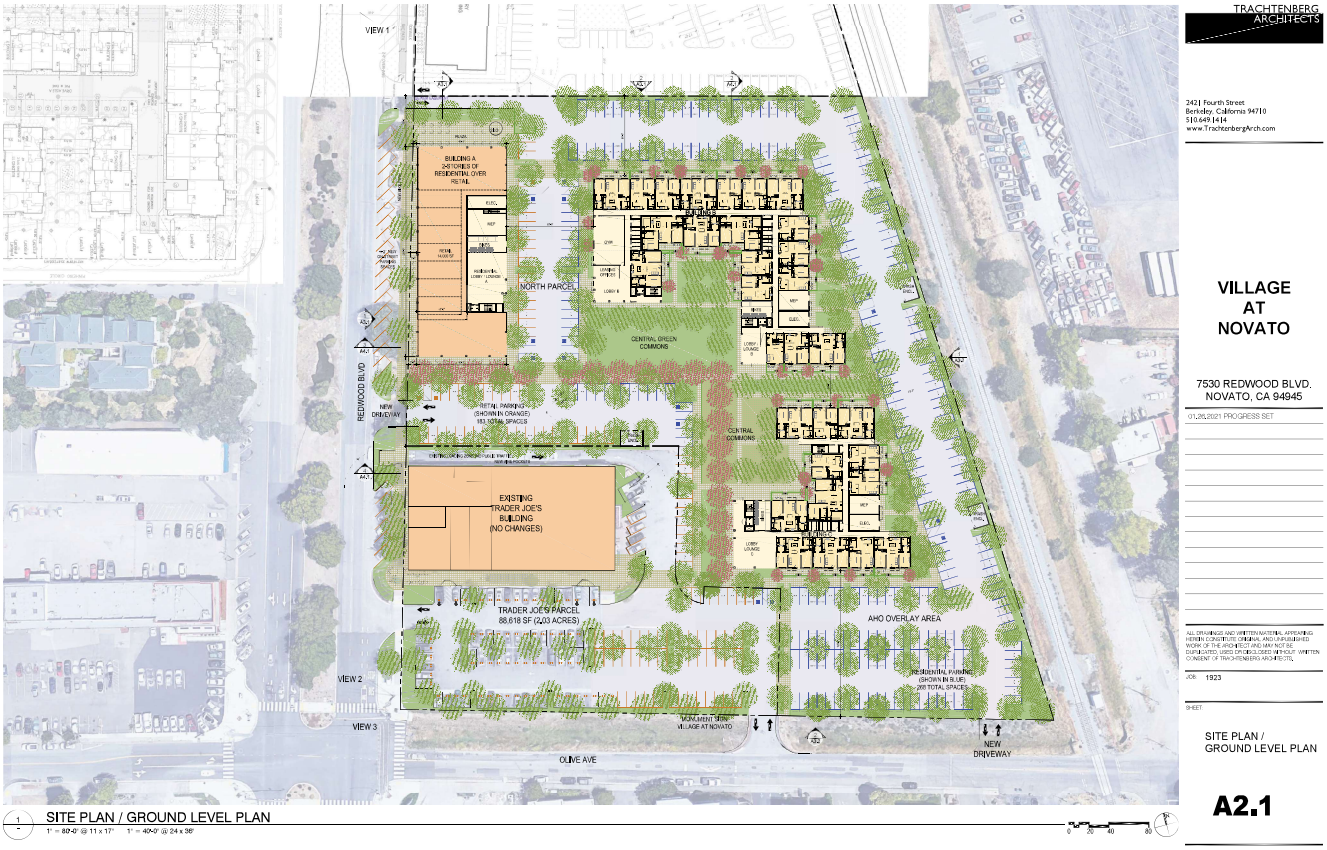
Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics;* **Bold** text = deficient operation; Shaded cells = conditions with potential improvements

Finding – All the intersections except for Redwood Boulevard/San Marin Drive-Atherton Avenue and Redwood Boulevard/Golden Gate Place-Ranch Drive are anticipated to operate acceptably overall at LOS D or better under Future conditions. Redwood Boulevard/San Marin Drive-Atherton Avenue is projected to operate at LOS F during p.m. the peak hour but would improve to LOS D with changes to lane configurations as recommended in the General Plan EIR. A traffic signal at the intersection of Redwood Boulevard/Golden Gate Place-Ranch Drive would reduce the delay on the westbound approach during the p.m. peak hour and achieve acceptable operation.

Project Description

The proposed Village at Novato project would be located at 7514 Redwood Boulevard in the City of Novato on two parcels totaling 5.82 acres, and includes residential and retail components. It is noted that the proposed 178 total units is higher than what would generally be permitted under the current zoning due to the inclusion of affordable units. While the zoning would allow for 124 units, the project includes seven very-low income units and 18 low income units which, under the state's Density Bonus Law, allows for the inclusion of up to 58 additional units.

One of the project parcels is 4.06 acres and would include 120 residential units in two buildings – a four-story building that would include 92 units and a three-story building that would include 28 units and 14,000 square feet of ground-floor retail. The second parcel is 1.76 acres and would accommodate a four-story building with 58 housing units, including the 25 affordable units. Access to the mixed-use residential and retail parcel would be provided via two driveways on Redwood Boulevard. There would also be two driveways on Olive Avenue providing access to the project, including an existing driveway that also serves the existing retail development at the corner of the Redwood Boulevard/Olive Avenue intersection. Access to the residential and retail parcel would also be available from the parcel north of the project that will be occupied by an approved hotel project. The proposed project site plan is shown in Figure 5.



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VILLAGE AT NOVATO

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SITE PLAN /
GROUND LEVEL PLAN

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Traffic Impact Study for the Village at Novato Project
Figure 5 – Site Plan

Trip Generation

The anticipated trip generation for the proposed project was estimated using standard rates published by the Institute of Transportation Engineers (ITE) in *Trip Generation Manual*, 10th Edition, 2017 for Multifamily Housing (Mid-Rise) (ITE Land Use #221) and for Shopping Center (ITE Land Use #820), as these descriptions most closely match the proposed project.

Traffic associated with a mixed-use development, such as the proposed project, has several different trip components. Some trips are made without leaving the site, such as residents patronizing or working at the on-site retail uses. These trips are called "internal capture" trips. The *Trip Generation Handbook* includes data and methodologies that can be applied to determine the proportion of internal trips that may occur within a development area that includes a variety of land uses. Because there are other retail uses nearby that are interconnected and in addition to the space included as part of the project, these opportunities were also considered in determining the potential for internal capture.

Based on application of these assumptions, the proposed project is expected to generate an average of 1,349 trips per day, including 77 a.m. peak hour trips and 103 trips during the p.m. peak hour. These results are summarized in Table 7.

Table 7 – Trip Generation Summary

Land Use	Units	Daily		AM Peak Hour				PM Peak Hour			
		Rate	Trips	Rate	Trips	In	Out	Rate	Trips	In	Out
Multifamily housing (mid-rise)	178 du	5.44	968	0.36	64	17	47	0.44	78	48	30
*Internal Capture**			-74		0	0	0		-14	-7	-7
Shopping Center	14.0 ksf	37.75	529	0.94	13	8	5	3.81	53	26	27
Internal Capture			*-74***	*-2%*	*0*	*0*	*0*	*-24%*	*-14*	*-7*	*-7*
Net New Trips			**1,349**		**77**	**25**	**52**		**103**	**60**	**43**

Note: du = dwelling unit; ksf = 1,000 square feet; * Internal capture for residential use is the opposite end of trips estimated for the retail use; ** Daily internal trips estimated using the average percentages of a.m. and p.m. peak hour internal trips

Trip Distribution

The pattern used to allocate new project trips to the street network was determined by reviewing existing traffic patterns in the study area and considering the likely travel patterns made by project residents and retail customers. The trip distribution assumptions are shown in Table 8.

Table 8 – Trip Distribution Assumptions	
Route	**Percent**
Atherton Ave – east of Redwood Blvd (including US 101)	35
Grant Ave (Downtown)	15
De Long Ave – east of Redwood Blvd	15
Olive Ave – east of Redwood Blvd	10
Redwood Blvd – south of Diablo Ave-De Long Ave	10
San Marin Dr – west of Redwood Blvd	10
Diablo Ave – west of Redwood Blvd	5
TOTAL	**100**

Intersection Operation

Existing plus Project Conditions

Upon the addition of project-related traffic to the Existing volumes, all study intersections are expected to operate at LOS D or better. Project traffic volumes are shown in Figure 6. These results are summarized in Table 9.

Table 9 – Existing and Existing plus Project Peak Hour Intersection Levels of Service

Study Intersection ***Approach***	**Existing Conditions**				**Existing plus Project**			
	AM Peak		**PM Peak**		**AM Peak**		**PM Peak**	
	Delay	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**
1. Redwood Blvd/San Marin Dr-Atherton Ave	33.0	C	36.4	D	33.1	C	36.8	D
2. Redwood Blvd/Golden Gate Pl-Ranch Dr	1.1	A	0.8	A	1.0	A	0.8	A
Eastbound (Ranch Dr) Approach	*11.8*	*B*	*12.7*	*B*	*12.0*	*B*	*13.0*	*B*
Westbound (Golden Gate Pl) Approach	*12.4*	*B*	*14.9*	*B*	*12.7*	*B*	*15.2*	*C*
3. Redwood Blvd/Olive Ave	21.1	C	24.2	C	22.1	C	26.2	C
4. Redwood Blvd/Vallejo Ave (West)	10.0	A	12.3	B	10.3	B	12.5	B
5. Redwood Blvd/Vallejo Ave (East)	9.0	A	12.7	B	9.1	A	13.0	B
6. Redwood Blvd/Grant Ave	20.3	C	21.0	C	20.4	C	21.1	C
7. Redwood Blvd/Diablo Ave-De Long Ave	36.2	D	37.5	D	36.4	D	37.8	D

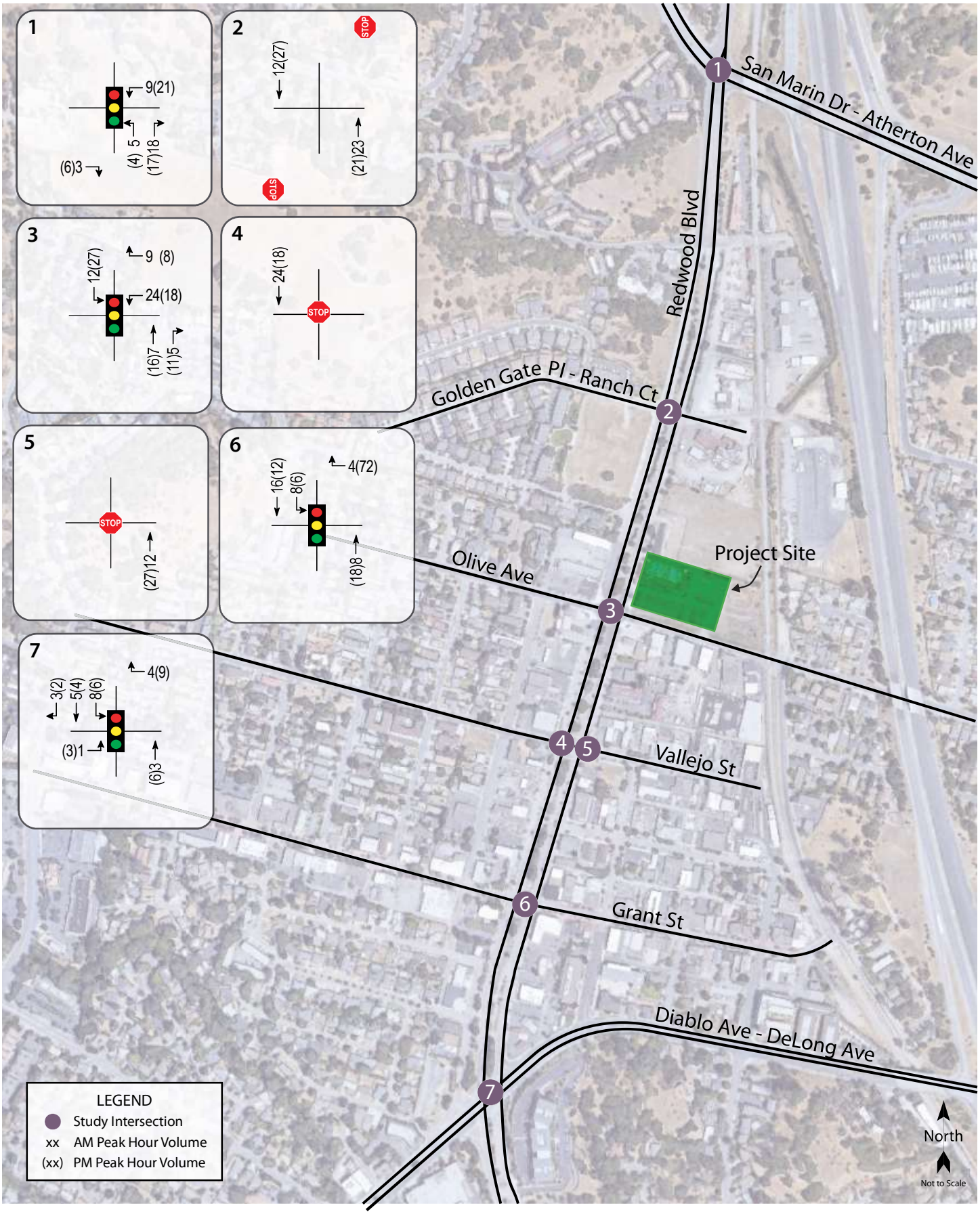
Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*

Finding – The study intersections are expected to continue operating acceptably upon the addition of project-generated traffic to existing volumes.

Baseline plus Project Conditions

With project-related traffic added to Baseline volumes, all study intersections are expected to operate acceptably at LOS D or better. These results are summarized in Table 10.

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nov138.ai 2/21

Traffic Impact Study for the Village at Novato Project

Figure 6 – Project Traffic Volumes

Table 10 – Baseline and Baseline plus Project Peak Hour Intersection Levels of Service								
Study Intersection *Approach*		**Baseline Conditions**				**Baseline plus Project**			
		AM Peak		**PM Peak**		**AM Peak**		**PM Peak**	
		Delay	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**
1.	Redwood Blvd/San Marin Dr-Atherton Ave	34.3	C	39.2	D	34.5	C	39.9	D
2.	Redwood Blvd/Golden Gate Pl-Ranch Dr	1.7	A	1.4	A	1.7	A	1.4	A
	Eastbound (Ranch Dr) Approach	*12.7*	*B*	*14.1*	*B*	*12.9*	*B*	*14.3*	*B*
	Westbound (Golden Gate Pl) Approach	*12.9*	*B*	*16.4*	*C*	*13.1*	*B*	*16.8*	*C*
3.	Redwood Blvd/Olive Ave	21.7	C	26.0	C	22.8	C	28.3	C
4.	Redwood Blvd/Vallejo Ave (West)	11.2	B	14.6	B	11.5	B	14.9	B
5.	Redwood Blvd/Vallejo Ave (East)	9.6	A	15.3	C	9.7	A	15.9	C
6.	Redwood Blvd/Grant Ave	20.6	C	21.3	C	20.7	C	21.4	C
7.	Redwood Blvd/Diablo Ave-De Long Ave	37.0	D	38.4	D	37.2	D	38.6	D

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*

Finding – All study intersections are expected to continue operating acceptably upon the addition of project-generated traffic.

Future plus Project Conditions

Upon the addition of project-generated traffic to the anticipated Future volumes, and with the planned improvements, the study intersections are expected to remain at the same Levels of Service. Redwood Boulevard/Golden Gate Place-Ranch Drive would be expected to operate acceptably at LOS B during peak hours with the addition of a traffic signal. The Future plus Project operating conditions are summarized in Table 11.

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Table 11 – Future and Future plus Project Peak Hour Intersection Levels of Service

Study Intersection *Approach*	Future Conditions				Future plus Project			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1. Redwood Blvd/San Marin Dr-Atherton Ave	37.7	D	**86.3**	**F**	37.8	D	**90.9**	**F**
With Improvements: Change lane configurations	29.4	C	44.9	D	29.5	C	45.6	D
2. Redwood Blvd/Golden Gate Pl-Ranch Dr	3.2	*A*	19.0	C	3.2	A	20.6	C
Eastbound (Ranch Dr) Approach	*14.6*	*B*	*20.9*	*C*	*14.8*	*B*	*21.6*	*C*
Westbound (Golden Gate Pl) Approach	*19.2*	*C*	***123.8***	***F***	*19.7*	*C*	***138.6***	***F***
With traffic signal	12.8	B	18.2	B	12.8	B	18.3	B
3. Redwood Blvd/Olive Ave	22.7	C	25.2	C	24.2	C	27.6	C
4. Redwood Blvd/Vallejo Ave (West)	11.3	B	17.4	C	11.5	B	18.0	*C*
5. Redwood Blvd/Vallejo Ave (East)	10.1	B	17.3	C	10.2	B	18.1	C
6. Redwood Blvd/Grant Ave	21.0	C	32.1	C	21.1	C	32.4	C
7. Redwood Blvd/Diablo Ave-De Long Ave	39.0	D	44.5	D	39.3	D	45.0	D

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics;* **Bold** text = deficient operation; Shaded cells = conditions with potential improvements

The westbound approach at the Redwood Boulevard/Golden Gate Place-Ranch Drive intersection would be expected to operate at LOS F without and with the proposed project. With the addition of a traffic signal, the westbound approach would operate at LOS B under both scenarios, which is considered acceptable. At the time this study was conducted, the City had not identified the need for a signal at this location.

Finding – Upon the addition of project-related traffic, the overall delay at the study intersections would be acceptable with the inclusion of the City's planned improvements, with LOS remaining at the same Levels of Service as without the project. The westbound approach to the Redwood Boulevard/Golden Gate Place-Ranch Drive intersection would operate at LOS F during the p.m. peak hour without and with the project. The addition of a traffic signal at this intersection would be expected to reduce delay to acceptable levels under Future and Future plus Project conditions. However, because the signal would only be needed as a result of anticipated development on Golden Gate Place and the project does not add any traffic to the westbound movement, the project's effect on traffic operation is considered acceptable.

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Alternative Modes

Pedestrian Facilities

Given the proximity of shopping areas, transit stops, and downtown Novato to the site, it is reasonable to assume that some project residents, patrons and employees will want to walk, bicycle, and/or use transit for trips from and to the proposed residential units and commercial use. The existing sidewalk network along the Redwood Boulevard frontage of the existing retail development at the Redwood Boulevard/Olive Avenue intersection provide connectivity to downtown Novato, including the commercial district along Grant Avenue and the Downtown Novato SMART rail station.

The project would provide sidewalks along the project frontage on Redwood Boulevard and the City is currently widening Olive Avenue, which will include the addition of a sidewalk along the project frontage. Sidewalks would also be constructed within the projects and marked crossings would be added to facilitate pedestrian crossings of the parking lot drive aisles and provide direct pedestrian access to the existing and proposed commercial developments.

With the completion of these improvements, the sidewalk network would connect the project to destinations throughout the area. North of the project on Redwood Boulevard, sidewalks would be provided as future development occurs.

Finding – Pedestrian facilities serving the project site would be adequate with completion of the planned improvements included as part of the project.

Recommendation – The applicant should work with the City to determine its proportional share of the cost for the Olive Avenue improvements.

Bicycle Facilities

The existing bike lanes on Redwood Boulevard would provide access to the site from the north and south. The widening of Olive Avenue will enable the addition of bike lanes as recommended in the City's *Bicycle/Pedestrian Plan*, further enhancing bicycle access to the project. Further, the future addition of the SMART path through the project area will provide bicycle access and network connectivity.

Finding – Existing bicycle facilities together with shared use of minor streets provide adequate access for bicyclists, which will be enhanced by the addition of planned facilities.

Transit

The Downtown Novato SMART station and bus stops near the project site provide access to a range of transit services that are adequate to accommodate local and regional project-generated transit trips. Existing stops are within an acceptable walking distance of the site and can be accessed using the existing sidewalk network.

Finding – Transit facilities serving the project site are adequate.

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Access and Circulation

Site Access

The project would be accessed via two driveways on Redwood Boulevard and two driveways on Olive Avenue. The western driveway on Olive Avenue would be shared with the existing retail development at the northeast corner of Redwood Boulevard and Olive Avenue. The Redwood Boulevard driveways and the eastern Olive Avenue driveway would be right turn in/right turn out only, as there is a median on Redwood Boulevard that prevents access by southbound traffic and a barrier in the center of Olive Avenue due to its proximity to the SMART railroad tracks. The site would also be accessed from the parking lot for the existing retail development, for which there are driveways on Redwood Boulevard and Olive Avenue. A connection would also be provided to the development north of the project, which has been approved for a hotel.

Sight Distance

Sight distances along Redwood Boulevard and Olive Avenue at the project driveways were evaluated based on sight distance criteria contained in the *Highway Design Manual* published by Caltrans. The recommended sight distance for driveway approaches is based on stopping sight distance and uses the approach travel speed as the basis for determining the recommended sight distance.

The stopping sight distance was field measured and applied to the driveway locations for evaluation purposes. Since vehicles traveling southbound on Redwood Boulevard cannot turn left into the project due to the presence of a median, sight distance was only evaluated for northbound traffic. The frontage on Redwood Boulevard would be modified as part of the project. The existing driveway on the north side of the Trader Joe's building would provide access to the project and would have a similar design, so this driveway was used to estimate sight distances. For Redwood Boulevard, the posted speed is 25 mph for northbound traffic until approximately 50 feet north of the existing driveway on the north side of the existing retail building, at which point the posted speed increases to 45 mph. The minimum stopping sight distance for a street with a design speed of 25 mph is 150 feet, while for a 45 mph speed the minimum is 360 feet. There is angled parking along Redwood Boulevard; however, the additional space provided by the bike lane would enable vehicles exiting the parking lot to move closer to the travel lanes before entering the roadway. Sight lines from the driveway are clear for more than 400 feet from the driveway, exceeding the minimum requirements for the higher speed section of roadway.

For Olive Avenue, with a design speed of 25 mph, the minimum stopping sight distance is 150 feet. Since the driveway has not yet been constructed, the sight distance was evaluated from the proposed location as identified in the site plan. The eastern project driveway would be located approximately 60 feet west of the SMART railroad tracks. Since there is a barrier between eastbound and westbound traffic in front of the driveway, the driveway accommodates only right turning traffic into and out of the driveway. Therefore sight distance was reviewed for westbound vehicles only. Sight lines are clear from the eastern project driveway for more than 500 feet, exceeding the minimum requirements.

Finding – Based on field observations and the site plan, sight distances from proposed project driveways on Redwood Boulevard and Olive Avenue would be adequate.

Access Analysis

Left-Turn Lane Warrants

The need for a left-turn lane on Olive Avenue at the western project driveway was evaluated based on criteria contained in the *Intersection Channelization Design Guide*, National Cooperative Highway Research Program

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(NCHRP) Report No. 279, Transportation Research Board, 1985, as well as an update of the methodology developed by the Washington State Department of Transportation and published in the *Method For Prioritizing Intersection Improvements*, January 1997. The NCHRP report references a methodology developed by M. D. Harmelink that includes equations that can be applied to expected or actual traffic volumes in order to determine the need for a left-turn pocket based on safety issues. While it is expected that most vehicles entering the project site would do so via Redwood Boulevard, a conservative approach was used for this analysis, as it was assumed that all inbound project trips coming from north and 40 percent of inbound project trips coming from south via Redwood Boulevard would use the western driveway on Olive Avenue; left-turning traffic cannot enter the eastern driveway due to the barrier between the eastbound and westbound travel lanes. Under Existing plus Project conditions, a left-turn lane would not be warranted on Olive Avenue at the western project driveway during either of the peak periods evaluated.

Finding – A left-turn lane is not warranted on Olive Avenue at the western project driveway.

Truck Access

Access to the site for delivery trucks was evaluated for the proposed ground-floor retail use on the project's northern parcel. Based on the site plan, a turning template was run for a 17-foot box truck entering at the proposed northern driveway entrance on Redwood Boulevard and existing at the driveway to the south of the building. The driveways were determined to be adequate for the design vehicle for both entrance and egress.

Finding – Access to the site for delivery trucks was determined to be adequate.

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Parking

The project was analyzed to determine whether the proposed parking supply would be sufficient for the anticipated parking demand. The parking analysis included the proposed project as well as the adjacent commercial development at the corner of Redwood Boulevard and Olive Avenue, as the existing and proposed projects will share access at the western Olive Avenue driveway and they have agreed to allow for vehicle access between the parking lots. The project site combined with the existing retail site would provide a total of 446 standard on-site parking spaces. The project would also provide 19 angled parking spaces on Redwood Boulevard along the frontage of the proposed retail use; these spaces were not included in the assessment of the on-site parking supply.

The proposed parking for the project was evaluated based on the City of Novato Municipal Code, Section 19.30.040 – Number of Parking Spaces Required. Consideration was also given to Section 19.16.040 – Downtown Specific Plan Overlay District, as the project falls within the District boundary. A summary of the parking analysis is indicated in Table 12.

Table 12 – Parking Analysis per City of Novato Code

Land Use	Units	Rate	Parking Spaces
Multi-family dwellings	101 du	1 space per studio or 1-bedroom unit	101
	77 du	1.5 spaces per 2-bedroom unit	116
General retail	14 ksf	1 space/300 sf	47
Shopping center*	20 ksf	1 space/300 sf	67
Required Parking Total			*331*
Total Proposed Parking Supply			**446**

Notes: du = dwelling unit; sf = square foot; * = existing use

The proposed parking supply exceeds City requirements for the proposed land uses. Further, the project is being proposed under the State Density Bonus law (Public Resources Code Section 21064.3), which provides lower parking ratios for multi-family dwellings within one-half mile of a major transit stop, requiring only 0.5 spaces per unit for studio, one-bedroom, and two-bedroom apartments. Based on the Density Bonus Law parking ratios, 128 on-site spaces would be required for the proposed 178 residential units; including the existing and proposed retail uses, 242 on-site parking spaces would be required.

Finding – The proposed parking supply for the residential and retail portions of the project would meet City and State requirements.

Bicycle Parking

The City of Novato's Municipal Code also stipulates the City's bicycle parking requirements for new developments. According to the Municipal Code Section 19.30.090, bicycle parking is required for multifamily residential projects at a rate of at least 10 percent of the number of required vehicle spaces, unless separate garage space is reserved for each unit. Retail developments are required to provide bicycle parking spaces equal at a rate of at least five percent of the number of required vehicle spaces to serve customers and employees.

For the residential portion of the project, bicycle storage will be provided in locked rooms, with a total of 192 spaces for bicycles, more than the 128 required by the Code. For the new retail space, two bicycle parking spaces

would be required; two racks will be provided with capacity for four bicycles. At the existing retail development adjacent to the project, there are currently two bicycle racks providing spaces for four bicycles, which meets City requirements. The summary of the required and proposed bicycle parking is provided in Table 13.

Table 13 – Bicycle Parking Requirements

Land Use	Required Vehicle Parking Spaces	Rate for Required Bicycle Parking	Required Bicycle Parking Spaces	Proposed Bicycle Parking Spaces
Multi-family dwellings	128*	Storage space for each unit	178	192
General retail	47	5% of required vehicle parking spaces	2	4
Shopping center*	67	5% of required vehicle parking spaces	3	4**
Other project site locations	N/A	N/A	N/A	16
Total			*183*	*216*

Notes: * = Density Bons Law requirement; ** = existing

Finding – The proposed bicycle parking would meet City requirements.

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CEQA Checklist

The California Environmental Quality Act (CEQA) provide a checklist that defines the four areas in which a project can potentially have a significant traffic impact. Following are discussion of those four area and the project's identified impact.

XVI. TRANSPORTATION/TRAFFIC

a. Would the project conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?

The *City of Novato General Plan 2035* includes the following mobility-related policies that apply to the project:

- *Policy MO 8: Enhance Multimodal Infrastructure*. When developing plans for new or retrofitted roadways, incorporate infrastructure as appropriate that enhances multimodal circulation in addition to auto circulation, such as sidewalks, pedestrian paths, bike lanes, pedestrian refuge islands, accessible curb ramps, transit shelters, and pedestrian-scale lighting.

- *Policy MO 11: Higher Density/Intensity Land Uses Adjacent to Public Transit*. Encourage higher density/intensity land uses such as offices, mixed use, multiple family residences, public services, and commercial retail centers near transit routes and facilities to reduce vehicle trips.

- *Policy MO 18: Comprehensive Bicycle Network*. Establish and maintain a bicycle network that is consistent with the adopted Bicycle/Pedestrian Plan.

- *Policy MO 19: Bicycle Parking.* Assure the provision of adequate bicycle parking to encourage bicycle use.

- *Policy MO 20: Safe and Convenient Pedestrian Facilities.* Promote, provide and maintain a safe and convenient pedestrian system, including consideration of lighting, sidewalk condition, road surface conditions, roadway crossings, access points, signage, shade landscaping, and street furniture.

Potentially Significant. The proposed project is consistent with adopted policies and plans regarding public transit, bicycle, and pedestrian facilities. As part of the Redwood Boulevard frontage improvements, the project includes restriping bike lanes in accordance with the *City of Novato Bicycle/Pedestrian Plan* as well as the provision of sidewalks. Sidewalks are not currently present along Olive Avenue to accommodate the pedestrian demand generate by the project. The project also supports City policies for increased density at location accessible to transit facilities and routes.

Mitigation. The applicant should work with the City to identify its appropriate share for the cost of installing sidewalks along Olive Avenue.

b. Would the project conflict or be inconsistent with CEQA Guidelines § 15064.3, subdivision (b)?

Consideration was given to the project's potential generation of Vehicle Miles Traveled (VMT). Because the City of Novato has not yet adopted a standard of significance for evaluating VMT, guidance provided by the California Governor's Office of Planning and Research (OPR) in the publication *Transportation Impacts (SB 743) CEQA Guidelines Update and Technical Advisory*, 2018, was used. This document indicates that with respect to assessing VMT for residential projects, a project generating vehicle travel that is 15 or more percent below the existing citywide residential VMT per capita may indicate a less-than-significant transportation impact. The OPR publication, as well as CEQA Guidelines Section 15064.3(b)(1) also indicate that "generally, projects within one-

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half mile of either an existing major transit stop or a stop along an existing high-quality transit corridor should be presumed to cause a less than significant transportation impact." For retail projects, the OPR guidance indicates that projects less than 50,000 square feet are considered local-serving retail, which tends to shorten trips and reduce VMT. Since the retail component of the project is 14,000 square feet, it be presumed to have a less-than-significant VMT impact.

The Village at Novato would be located approximately 0.3 miles from the Downtown Novato SMART commuter rail station and would be accessible to the station by both walking and bicycling. Additional transit service is accessible from the project, including the Novato San Marin SMART station (0.6 miles away) and Marin Transit Route 49, for which as bus stop is located approximately 400 feet from the project. Based on the OPR guidance, the project can reasonably be assumed to have a less-than-significant VMT impact due to its proximity to high quality transit.

OPR guidance was also considered in comparing the project VMT per capita to the citywide average, using data from the Transportation Authority of Marin Demand Model (TAMDM) maintained by TAM. The citywide per capita VMT rate is 17.0; 15 percent below this level is 14.5, which served as the significance threshold for this analysis. The project VMT rate was estimated from model outputs for smaller geographic areas. The model analyzes travel patterns based on traffic analysis zones (TAZs) covering geographic areas throughout Marin County, which are broken down further into 1,400 Micro Analysis Zones (MAZs). No per capita VMT estimate was available for the project MAZ as there is no existing residential development. However, TAZ 182, where the project is located, does include some residential development. The analysis was therefore conducted using the VMT per capita for the project TAZ, which was calculated to be 9.0 by the TAM model.

Some project characteristics have been demonstrated to correlate with reductions in project VMT compared with expected levels, including project density. The publication *Quantifying Greenhouse Gas Mitigation Measures*, California Air Pollution Control Officers Association (CAPCOA), 2010, includes a methodology to determine the VMT reductions associated with increases in residential density using conventional single-family home development as a baseline. For the proposed Village at Novato project, which would have a residential density of 30.6 units per acre, a 21.2 percent reduction in VMT is projected. Applying the VMT reductions associated with project density, the project VMT per capita would be reduced from 9.0 to 7.1. Since this is below the significance threshold of 14.5, the VMT impact of the project can be considered less than significant. The VMT findings are shown in Table 14.

Table 14 – Vehicle Miles Traveled Analysis Summary

VMT Metric	Citywide Baseline VMT Rate	Significance Threshold	Project VMT Rate	Resulting Significance
Residential VMT per Capita	17.0	14.5	7.1	Less than significant

Note: VMT Rate is measured in VMT/Capita, or the number of daily miles driven per resident

Finding – Both the residential and retail components of the project would be expected to have a less-than-significant transportation impact on vehicle miles traveled.

c. Would the project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

Less than significant. The project must be designed to meet applicable Federal, State and City codes and regulations, and as such, would not be expected to introduce any new hazards in terms of its design. Sight distances were evaluated at the proposed project driveways and were determined to be adequate based on the speeds of approaching vehicles. The eastern project driveway on Olive Avenue is approximately 60 feet west of the SMART railroad tracks; however, there is a barrier in the center of the roadway that prevents vehicles exiting the driveway from turning left toward the tracks.

d. Would the project result in inadequate emergency access?

Less than significant. The site would need to be designed to meet all applicable City and State standards, including the California Fire Code. This would pertain to the project access points as well as internal streets. Buildings would be a up to four stories tall, so access would need to accommodate a ladder fire truck. With conformance to these standards, the project would have a less-than-significant impact with respect to emergency access.

The site plan indicates that drive aisles through the site would be 26 feet wide. This width is typically adequate to provide adequate emergency access for ladder trucks and the required stabilizers to access the multi-story buildings on the site, assuming that the parking lot design conforms to current standards. The project site is therefore expected to have a less-than-significant impact related to emergency access.

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Conclusions and Recommendations

Conclusions

- The proposed project is expected to generate an average of 1,349 trips per day, including 77 a.m. peak hour trips and 103 p.m. peak hour trips.
- Under Existing conditions, the study intersections operate acceptably overall during both peak hours, without and with the project.
- Under the Baseline scenario, all study intersections would operate acceptably without the project and with the addition of project-related trips.
- Under Future conditions, six of the seven project intersections would operate acceptably without and with the project. The intersection of Redwood Boulevard/San Marin Drive-Atherton Avenue would be expected to operate at LOS F without the project and with the addition of project-related trips. With the implementation of improvements identified in the General Plan, this intersection would operate at LOS D without and with the project. While overall operation would remain acceptable, the westbound approach to the Redwood Boulevard/Golden Gate Place-Ranch Drive intersection would operate at LOS F without the project and with the addition of project-related trips. The addition of a traffic signal at this intersection would achieve acceptable operation for all movements.
- Sight distances at proposed project driveways would be adequate.
- The project would meet City requirements for vehicle parking for both the residential and retail uses included in the project. The proposed bicycle storage and parking facilities were determined to be adequate as well.
- The project is consistent with City policies regarding circulation, including bicycle, pedestrian, and transit facilities. The project includes restriping the bike lanes and adding sidewalks as part of the Redwood Boulevard frontage improvements. Sidewalks would be constructed along the project frontage on Olive Avenue as part of the roadway widening project being undertaken by the City. With those improvements, the project would be adequately served by facilities for pedestrians, bicyclists, and transit users. The impacts on City policies regarding circulation would therefore be less-than-significant.
- Due to its location less than one-half mile from the Downtown Novato SMART rail station, the density of the proposed residential development, and available travel demand model data, the per capita VMT for the residential portion of project would be more than 15 percent below the citywide average and can therefore be considered less-than-significant. As the retail portion of the project is less than 50,00 square feet, it is considered local-serving and therefore has a less-than-significant impact in terms of VMT.
- The project would have a less-than significant impact with respect to increased hazards as a result of a geometric design feature or incompatible land uses.
- The project would have a less-than-significant impact with respect to emergency access.

Recommendations

- The applicant should work with the City to determine the project's proportional share and contribute to the cost of sidewalks along the Olive Avenue frontage of the project.

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Study Participants and References

Study Participants

Principal in Charge	Dalene J. Whitlock, PE, PTOE
Transportation Planner	Barry Bergman, AICP
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Assistant Engineer	Allison Woodworth, EIT
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Quality Control	Dalene J. Whitlock, PE, PTOE

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Appendix A

Collision Rate Calculations

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Intersection Collision Rate Worksheet

7514 Redwood Boulevard Mixed-Use Project

Intersection # 1: Redwood Boulevard & San Marin Dr - Atherton Ave
Date of Count: Thursday, November 17, 2016

Number of Collisions: 15
Number of Injuries: 8
Number of Fatalities: 0
Average Daily Traffic (ADT): 29500
Start Date: August 12, 2015
End Date: July 30, 2020
Number of Years: 5

Intersection Type: Four-Legged
Control Type: Signals
Area: Urban

$$\text{Collision Rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x Days per Year x Number of Years}}$$

$$\text{Collision Rate} = \frac{15 \times 1{,}000{,}000}{29{,}500 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.28 c/mve**	**0.0%**	**53.3%**
Statewide Average*	**0.24 c/mve**	**0.5%**	**44.6%**

Notes
ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2016 Collision Data on California State Highways, Caltrans

Intersection # 2: Redwood Boulevard & Golden Gate Pl - Ranch Dr
Date of Count: Tuesday, March 27, 2018

Number of Collisions: 3
Number of Injuries: 2
Number of Fatalities: 0
Average Daily Traffic (ADT): 11600
Start Date: August 12, 2015
End Date: July 30, 2020
Number of Years: 5

Intersection Type: Four-Legged
Control Type: Stop & Yield Controls
Area: Urban

$$\text{Collision Rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x Days per Year x Number of Years}}$$

$$\text{Collision Rate} = \frac{3 \times 1{,}000{,}000}{11{,}600 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.14 c/mve**	**0.0%**	**66.7%**
Statewide Average*	**0.13 c/mve**	**1.1%**	**43.8%**

Notes
ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2016 Collision Data on California State Highways, Caltrans

Intersection Collision Rate Worksheet

7514 Redwood Boulevard Mixed-Use Project

Intersection # 3: Redwood Boulevard & Olive Avenue
Date of Count: Thursday, November 15, 2012

Number of Collisions: 16
Number of Injuries: 5
Number of Fatalities: 0
Average Daily Traffic (ADT): 19800
Start Date: August 12, 2015
End Date: July 30, 2020
Number of Years: 5

Intersection Type: Four-Legged
Control Type: Signals
Area: Urban

$$\text{Collision Rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x Days per Year x Number of Years}}$$

$$\text{Collision Rate} = \frac{16 \times 1{,}000{,}000}{19{,}800 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.44 c/mve**	**0.0%**	**31.3%**
Statewide Average*	**0.24 c/mve**	**0.5%**	**44.6%**

Notes
ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2016 Collision Data on California State Highways, Caltrans

Intersection # 4: Redwood Boulevard & Vallejo Avenue
Date of Count: Wednesday, November 4, 2020

Number of Collisions: 12
Number of Injuries: 5
Number of Fatalities: 0
Average Daily Traffic (ADT): 14700
Start Date: August 12, 2015
End Date: July 30, 2020
Number of Years: 5

Intersection Type: Four-Legged
Control Type: 4 Way Stop
Area: Urban

$$\text{Collision Rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x Days per Year x Number of Years}}$$

$$\text{Collision Rate} = \frac{12 \times 1{,}000{,}000}{14{,}700 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.45 c/mve**	**0.0%**	**41.7%**
Statewide Average*	**0.19 c/mve**	**0.4%**	**29.2%**

Notes
ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2016 Collision Data on California State Highways, Caltrans

Intersection Collision Rate Worksheet

7514 Redwood Boulevard Mixed-Use Project

Intersection # 5: Redwood Boulevard & Grant Avenue
Date of Count: Sunday, September 23, 2012

Number of Collisions: 18
Number of Injuries: 7
Number of Fatalities: 0
Average Daily Traffic (ADT): 19800
Start Date: August 12, 2015
End Date: July 30, 2020
Number of Years: 5

Intersection Type: Four-Legged
Control Type: Signals
Area: Urban

$$\text{Collision Rate} = \frac{\text{Number of Collisions} \times 1 \text{ Million}}{\text{ADT} \times \text{Days per Year} \times \text{Number of Years}}$$

$$\text{Collision Rate} = \frac{18 \times 1{,}000{,}000}{19{,}800 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.50 c/mve**	**0.0%**	**38.9%**
Statewide Average*	**0.24 c/mve**	**0.5%**	**44.6%**

Notes
ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2016 Collision Data on California State Highways, Caltrans

Intersection # 6: Redwood Boulevard & Diablo Ave - De Long Ave
Date of Count: Thursday, November 17, 2016

Number of Collisions: 31
Number of Injuries: 12
Number of Fatalities: 0
Average Daily Traffic (ADT): 31300
Start Date: August 12, 2015
End Date: July 30, 2020
Number of Years: 5

Intersection Type: Four-Legged
Control Type: Signals
Area: Urban

$$\text{Collision Rate} = \frac{\text{Number of Collisions} \times 1 \text{ Million}}{\text{ADT} \times \text{Days per Year} \times \text{Number of Years}}$$

$$\text{Collision Rate} = \frac{31 \times 1{,}000{,}000}{31{,}300 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.54 c/mve**	**0.0%**	**38.7%**
Statewide Average*	**0.24 c/mve**	**0.5%**	**44.6%**

Notes
ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2016 Collision Data on California State Highways, Caltrans

Intersection Collision Rate Worksheet

7514 Redwood Boulevard Mixed-Use Project

Intersection # 7: &

Date of Count: Saturday, January 0, 1900

Number of Collisions: 0
Number of Injuries: 0
Number of Fatalities: 0
Average Daily Traffic (ADT): 0
Start Date: January 0, 1900
End Date: January 0, 1900
Number of Years: 0

Intersection Type: 0
Control Type: 0
Area: 0

$$\text{Collision Rate} = \frac{\text{Number of Collisions} \times 1 \text{ Million}}{\text{ADT} \times \text{Days per Year} \times \text{Number of Years}}$$

$$\text{Collision Rate} = \frac{0 \times 1{,}000{,}000}{0 \times 365 \times 0}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.00 c/mve**	**0.0%**	**0.0%**
Statewide Average*	**0.22 c/mve**	**1.0%**	**34.6%**

Notes
ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2016 Collision Data on California State Highways, Caltrans

Intersection # 8: &

Date of Count: Saturday, January 0, 1900

Number of Collisions: 0
Number of Injuries: 0
Number of Fatalities: 0
Average Daily Traffic (ADT): 0
Start Date: January 0, 1900
End Date: January 0, 1900
Number of Years: 0

Intersection Type: 0
Control Type: 0
Area: 0

$$\text{Collision Rate} = \frac{\text{Number of Collisions} \times 1 \text{ Million}}{\text{ADT} \times \text{Days per Year} \times \text{Number of Years}}$$

$$\text{Collision Rate} = \frac{0 \times 1{,}000{,}000}{0 \times 365 \times 0}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.00 c/mve**	**0.0%**	**0.0%**
Statewide Average*	**0.22 c/mve**	**1.0%**	**34.6%**

Notes
ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2016 Collision Data on California State Highways, Caltrans

Intersection Collision Rate Worksheet

7514 Redwood Boulevard Mixed-Use Project

Intersection # 9: &

Date of Count: Saturday, January 0, 1900

Number of Collisions: 0
Number of Injuries: 0
Number of Fatalities: 0
Average Daily Traffic (ADT): 0
Start Date: January 0, 1900
End Date: January 0, 1900
Number of Years: 0

Intersection Type: 0
Control Type: 0
Area: 0

$$\text{Collision Rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x Days per Year x Number of Years}}$$

$$\text{Collision Rate} = \frac{0 \times 1{,}000{,}000}{0 \times 365 \times 0}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.00 c/mve**	**0.0%**	**0.0%**
Statewide Average*	**0.22 c/mve**	**1.0%**	**34.6%**

Notes
ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2016 Collision Data on California State Highways, Caltrans

Intersection # 10: &

Date of Count: Saturday, January 0, 1900

Number of Collisions: 0
Number of Injuries: 0
Number of Fatalities: 0
Average Daily Traffic (ADT): 0
Start Date: January 0, 1900
End Date: January 0, 1900
Number of Years: 0

Intersection Type: 0
Control Type: 0
Area: 0

$$\text{Collision Rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x Days per Year x Number of Years}}$$

$$\text{Collision Rate} = \frac{0 \times 1{,}000{,}000}{0 \times 365 \times 0}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.00 c/mve**	**0.0%**	**0.0%**
Statewide Average*	**0.22 c/mve**	**1.0%**	**34.6%**

Notes
ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2016 Collision Data on California State Highways, Caltrans

Intersection Collision Rate Worksheet

7514 Redwood Boulevard Mixed-Use Project

Intersection # 11: &

Date of Count: Saturday, January 0, 1900

Number of Collisions: 0
Number of Injuries: 0
Number of Fatalities: 0
Average Daily Traffic (ADT): 0
Start Date: January 0, 1900
End Date: January 0, 1900
Number of Years: 0

Intersection Type: 0
Control Type: 0
Area: 0

$$\text{Collision Rate} = \frac{\text{Number of Collisions} \times 1 \text{ Million}}{\text{ADT} \times \text{Days per Year} \times \text{Number of Years}}$$

$$\text{Collision Rate} = \frac{0 \times 1{,}000{,}000}{0 \times 365 \times 0}$$

	Collision Rate		Fatality Rate	Injury Rate
Study Intersection	**0.00**	**c/mve**	**0.0%**	**0.0%**
Statewide Average*	**0.22**	**c/mve**	**1.0%**	**34.6%**

Notes
ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2016 Collision Data on California State Highways, Caltrans

Intersection # 12: &

Date of Count: Saturday, January 0, 1900

Number of Collisions: 0
Number of Injuries: 0
Number of Fatalities: 0
Average Daily Traffic (ADT): 0
Start Date: January 0, 1900
End Date: January 0, 1900
Number of Years: 0

Intersection Type: 0
Control Type: 0
Area: 0

$$\text{Collision Rate} = \frac{\text{Number of Collisions} \times 1 \text{ Million}}{\text{ADT} \times \text{Days per Year} \times \text{Number of Years}}$$

$$\text{Collision Rate} = \frac{0 \times 1{,}000{,}000}{0 \times 365 \times 0}$$

	Collision Rate		Fatality Rate	Injury Rate
Study Intersection	**0.00**	**c/mve**	**0.0%**	**0.0%**
Statewide Average*	**0.22**	**c/mve**	**1.0%**	**34.6%**

Notes
ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2016 Collision Data on California State Highways, Caltrans

Intersection Collision Rate Worksheet

7514 Redwood Boulevard Mixed-Use Project

Intersection # 13: &

Date of Count: Saturday, January 0, 1900

Number of Collisions: 0
Number of Injuries: 0
Number of Fatalities: 0
Average Daily Traffic (ADT): 0
Start Date: January 0, 1900
End Date: January 0, 1900
Number of Years: 0

Intersection Type: 0
Control Type: 0
Area: 0

$$\text{Collision Rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x Days per Year x Number of Years}}$$

$$\text{Collision Rate} = \frac{0 \times 1{,}000{,}000}{0 \times 365 \times 0}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.00 c/mve**	**0.0%**	**0.0%**
Statewide Average*	**0.22 c/mve**	**1.0%**	**34.6%**

Notes
ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2016 Collision Data on California State Highways, Caltrans

Intersection # 14: &

Date of Count: Saturday, January 0, 1900

Number of Collisions: 0
Number of Injuries: 0
Number of Fatalities: 0
Average Daily Traffic (ADT): 0
Start Date: January 0, 1900
End Date: January 0, 1900
Number of Years: 0

Intersection Type: 0
Control Type: 0
Area: 0

$$\text{Collision Rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x Days per Year x Number of Years}}$$

$$\text{Collision Rate} = \frac{0 \times 1{,}000{,}000}{0 \times 365 \times 0}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.00 c/mve**	**0.0%**	**0.0%**
Statewide Average*	**0.22 c/mve**	**1.0%**	**34.6%**

Notes
ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2016 Collision Data on California State Highways, Caltrans

Intersection Collision Rate Worksheet

7514 Redwood Boulevard Mixed-Use Project

Intersection # 15: &

Date of Count: Saturday, January 0, 1900

Number of Collisions: 0
Number of Injuries: 0
Number of Fatalities: 0
Average Daily Traffic (ADT): 0
Start Date: January 0, 1900
End Date: January 0, 1900
Number of Years: 0

Intersection Type: 0
Control Type: 0
Area: 0

$$\text{Collision Rate} = \frac{\text{Number of Collisions} \times 1 \text{ Million}}{\text{ADT} \times \text{Days per Year} \times \text{Number of Years}}$$

$$\text{Collision Rate} = \frac{0 \times 1{,}000{,}000}{0 \times 365 \times 0}$$

	Collision Rate		Fatality Rate	Injury Rate
Study Intersection	**0.00**	**c/mve**	**0.0%**	**0.0%**
Statewide Average*	**0.22**	**c/mve**	**1.0%**	**34.6%**

Notes
ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2016 Collision Data on California State Highways, Caltrans

Intersection # 16: &

Date of Count: Saturday, January 0, 1900

Number of Collisions: 0
Number of Injuries: 0
Number of Fatalities: 0
Average Daily Traffic (ADT): 0
Start Date: January 0, 1900
End Date: January 0, 1900
Number of Years: 0

Intersection Type: 0
Control Type: 0
Area: 0

$$\text{Collision Rate} = \frac{\text{Number of Collisions} \times 1 \text{ Million}}{\text{ADT} \times \text{Days per Year} \times \text{Number of Years}}$$

$$\text{Collision Rate} = \frac{0 \times 1{,}000{,}000}{0 \times 365 \times 0}$$

	Collision Rate		Fatality Rate	Injury Rate
Study Intersection	**0.00**	**c/mve**	**0.0%**	**0.0%**
Statewide Average*	**0.22**	**c/mve**	**1.0%**	**34.6%**

Notes
ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2016 Collision Data on California State Highways, Caltrans

Intersection Collision Rate Worksheet

7514 Redwood Boulevard Mixed-Use Project

Intersection # 17: &

Date of Count: Saturday, January 0, 1900

Number of Collisions: 0
Number of Injuries: 0
Number of Fatalities: 0
Average Daily Traffic (ADT): 0
Start Date: January 0, 1900
End Date: January 0, 1900
Number of Years: 0

Intersection Type: 0
Control Type: 0
Area: 0

$$\text{Collision Rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x Days per Year x Number of Years}}$$

$$\text{Collision Rate} = \frac{0 \times 1{,}000{,}000}{0 \times 365 \times 0}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.00 c/mve**	**0.0%**	**0.0%**
Statewide Average*	**0.22 c/mve**	**1.0%**	**34.6%**

Notes
ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2016 Collision Data on California State Highways, Caltrans

Intersection # 18: &

Date of Count: Saturday, January 0, 1900

Number of Collisions: 0
Number of Injuries: 0
Number of Fatalities: 0
Average Daily Traffic (ADT): 0
Start Date: January 0, 1900
End Date: January 0, 1900
Number of Years: 0

Intersection Type: 0
Control Type: 0
Area: 0

$$\text{Collision Rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x Days per Year x Number of Years}}$$

$$\text{Collision Rate} = \frac{0 \times 1{,}000{,}000}{0 \times 365 \times 0}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.00 c/mve**	**0.0%**	**0.0%**
Statewide Average*	**0.22 c/mve**	**1.0%**	**34.6%**

Notes
ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2016 Collision Data on California State Highways, Caltrans

Intersection Collision Rate Worksheet

7514 Redwood Boulevard Mixed-Use Project

Intersection # 19: &

Date of Count: Saturday, January 0, 1900

Number of Collisions: 0
Number of Injuries: 0
Number of Fatalities: 0
Average Daily Traffic (ADT): 0
Start Date: January 0, 1900
End Date: January 0, 1900
Number of Years: 0

Intersection Type: 0
Control Type: 0
Area: 0

$$\text{Collision Rate} = \frac{\text{Number of Collisions} \times 1 \text{ Million}}{\text{ADT} \times \text{Days per Year} \times \text{Number of Years}}$$

$$\text{Collision Rate} = \frac{0 \times 1{,}000{,}000}{0 \times 365 \times 0}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.00 c/mve**	**0.0%**	**0.0%**
Statewide Average*	**0.22 c/mve**	**1.0%**	**34.6%**

Notes
ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2016 Collision Data on California State Highways, Caltrans

Intersection # 20: &

Date of Count: Saturday, January 0, 1900

Number of Collisions: 0
Number of Injuries: 0
Number of Fatalities: 0
Average Daily Traffic (ADT): 0
Start Date: January 0, 1900
End Date: January 0, 1900
Number of Years: 0

Intersection Type: 0
Control Type: 0
Area: 0

$$\text{Collision Rate} = \frac{\text{Number of Collisions} \times 1 \text{ Million}}{\text{ADT} \times \text{Days per Year} \times \text{Number of Years}}$$

$$\text{Collision Rate} = \frac{0 \times 1{,}000{,}000}{0 \times 365 \times 0}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.00 c/mve**	**0.0%**	**0.0%**
Statewide Average*	**0.22 c/mve**	**1.0%**	**34.6%**

Notes
ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2016 Collision Data on California State Highways, Caltrans

Appendix B

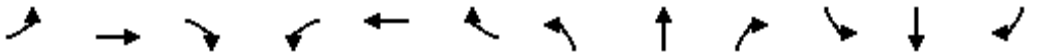
Intersection Level of Service Calculations

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HCM 6th Signalized Intersection Summary
1: Redwood Blvd & San Marin Dr

02/15/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	663	151	291	572	255	120	58	255	45	30	33
Future Volume (veh/h)	30	663	151	291	572	255	120	58	255	45	30	33
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1856	1885	1885	1885	1885	1856	1885	1885	1885
Adj Flow Rate, veh/h	32	698	159	306	602	268	126	61	0	47	32	35
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	3	1	1	1	1	3	1	1	1
Cap, veh/h	89	1175	264	803	2406	1046	238	129		162	73	80
Arrive On Green	0.05	0.28	0.28	0.45	0.68	0.68	0.07	0.07	0.00	0.09	0.09	0.09
Sat Flow, veh/h	1795	4198	944	1767	3513	1528	3483	1885	1572	1795	809	884
Grp Volume(v), veh/h	32	569	288	306	588	282	126	61	0	47	0	67
Grp Sat Flow(s),veh/h/ln	1795	1716	1710	1767	1716	1610	1742	1885	1572	1795	0	1693
Q Serve(g_s), s	2.5	20.9	21.3	16.7	9.5	9.8	5.1	4.5	0.0	3.6	0.0	5.5
Cycle Q Clear(g_c), s	2.5	20.9	21.3	16.7	9.5	9.8	5.1	4.5	0.0	3.6	0.0	5.5
Prop In Lane	1.00		0.55	1.00		0.95	1.00		1.00	1.00		0.52
Lane Grp Cap(c), veh/h	89	960	479	803	2350	1103	238	129		162	0	153
V/C Ratio(X)	0.36	0.59	0.60	0.38	0.25	0.26	0.53	0.47		0.29	0.00	0.44
Avail Cap(c_a), veh/h	123	1034	515	803	2350	1103	279	151		529	0	499
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	67.1	45.4	45.5	26.3	8.8	8.8	65.7	65.5	0.0	62.1	0.0	62.9
Incr Delay (d2), s/veh	0.9	1.0	2.2	0.6	0.3	0.6	0.7	1.0	0.0	0.4	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	9.0	9.3	7.3	3.6	3.6	2.3	2.2	0.0	1.6	0.0	2.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	68.0	46.4	47.7	26.9	9.0	9.4	66.4	66.5	0.0	62.4	0.0	63.7
LnGrp LOS	E	D	D	C	A	A	E	E		E	A	E
Approach Vol, veh/h		889			1176			187	A		114	
Approach Delay, s/veh		47.6			13.7			66.4			63.2	
Approach LOS		D			B			E			E	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.3	104.0		14.3	69.4	44.9		17.5				
Change Period (Y+Rc), s	3.0	4.0		4.3	3.0	* 4		4.3				
Max Green Setting (Gmax), s	10.0	49.7		11.7	16.1	* 44		43.0				
Max Q Clear Time (g_c+I1), s	4.5	11.8		7.1	18.7	23.3		7.5				
Green Ext Time (p_c), s	0.0	10.2		0.2	0.0	7.6		0.3				

Intersection Summary		
HCM 6th Ctrl Delay	33.0	
HCM 6th LOS	C	

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	24	0	23	14	0	8	11	384	15	5	406	14
Future Vol, veh/h	24	0	23	14	0	8	11	384	15	5	406	14
Conflicting Peds, #/hr	5	0	8	8	0	5	9	0	8	5	0	6
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	40	-	-	-	-	-	160	-	-	200	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	0	0	0	5	0	5	0	3	5	5	3	0
Mvmt Flow	25	0	24	14	0	8	11	396	15	5	419	14

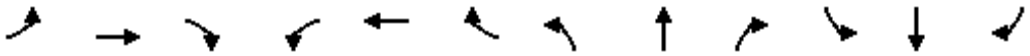
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	670	886	234	662	886	219	442	0	0	419	0	0
Stage 1	445	445	-	434	434	-	-	-	-	-	-	-
Stage 2	225	441	-	228	452	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.6	6.5	7	4.1	-	-	4.2	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.6	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.6	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.55	4	3.35	2.2	-	-	2.25	-	-
Pot Cap-1 Maneuver	347	286	774	341	286	776	1129	-	-	1115	-	-
Stage 1	567	578	-	563	585	-	-	-	-	-	-	-
Stage 2	763	580	-	745	574	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	335	277	762	322	277	766	1119	-	-	1107	-	-
Mov Cap-2 Maneuver	437	385	-	425	384	-	-	-	-	-	-	-
Stage 1	557	570	-	553	574	-	-	-	-	-	-	-
Stage 2	744	570	-	713	566	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.8	12.4	0.2	0.1
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1119	-	-	437	762	507	1107	-	-
HCM Lane V/C Ratio	0.01	-	-	0.057	0.031	0.045	0.005	-	-
HCM Control Delay (s)	8.2	-	-	13.7	9.9	12.4	8.3	-	-
HCM Lane LOS	A	-	-	B	A	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.1	0.1	0	-	-

HCM 6th Signalized Intersection Summary
3: Redwood Blvd & Olive Ave

02/15/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	87	97	27	88	129	83	15	325	97	143	326	66
Future Volume (veh/h)	87	97	27	88	129	83	15	325	97	143	326	66
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	95	105	29	96	140	90	16	353	105	155	354	72
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	249	197	54	116	169	109	70	525	234	291	801	161
Arrive On Green	0.14	0.14	0.14	0.22	0.22	0.22	0.04	0.15	0.15	0.16	0.27	0.27
Sat Flow, veh/h	1781	1411	390	517	755	485	1781	3554	1585	1781	2947	593
Grp Volume(v), veh/h	95	0	134	326	0	0	16	353	105	155	212	214
Grp Sat Flow(s),veh/h/ln	1781	0	1800	1757	0	0	1781	1777	1585	1781	1777	1764
Q Serve(g_s), s	2.7	0.0	3.8	9.8	0.0	0.0	0.5	5.2	3.4	4.4	5.5	5.6
Cycle Q Clear(g_c), s	2.7	0.0	3.8	9.8	0.0	0.0	0.5	5.2	3.4	4.4	5.5	5.6
Prop In Lane	1.00		0.22	0.29		0.28	1.00		1.00	1.00		0.34
Lane Grp Cap(c), veh/h	249	0	251	393	0	0	70	525	234	291	483	479
V/C Ratio(X)	0.38	0.00	0.53	0.83	0.00	0.00	0.23	0.67	0.45	0.53	0.44	0.45
Avail Cap(c_a), veh/h	833	0	842	818	0	0	320	1917	855	320	958	951
HCM 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
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.7	0.0	22.2	20.6	0.0	0.0	25.9	22.4	21.6	21.3	16.8	16.8
Incr Delay (d2), s/veh	0.4	0.0	0.7	1.7	0.0	0.0	0.6	0.6	0.5	0.6	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	0.0	1.6	3.9	0.0	0.0	0.2	2.1	1.2	1.7	2.0	2.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	22.1	0.0	22.9	22.3	0.0	0.0	26.5	23.0	22.1	21.9	17.0	17.0
LnGrp LOS	C	A	C	C	A	A	C	C	C	C	B	B
Approach Vol, veh/h		229			326			474			581	
Approach Delay, s/veh		22.6			22.3			22.9			18.3	
Approach LOS		C			C			C			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	13.1	12.1		12.9	6.2	19.0		17.6				
Change Period (Y+Rc), s	4.0	* 3.9		5.1	4.0	* 3.9		5.1				
Max Green Setting (Gmax), s	10.0	* 30		26.0	10.0	* 30		25.9				
Max Q Clear Time (g_c+I1), s	6.4	7.2		5.8	2.5	7.6		11.8				
Green Ext Time (p_c), s	0.0	1.0		0.3	0.0	0.8		0.7				

Intersection Summary		
HCM 6th Ctrl Delay		21.1
HCM 6th LOS		C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	10
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	82	73	3	36	0	0	0	0	37	321	59
Future Vol, veh/h	0	82	73	3	36	0	0	0	0	37	321	59
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	96	86	4	42	0	0	0	0	44	378	69
Number of Lanes	0	1	0	0	1	0	0	0	0	0	2	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	2	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	2	1
HCM Control Delay	9.4	8.7	10.4
HCM LOS	A	A	B

Lane	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	0%	8%	19%	0%
Vol Thru, %	53%	92%	81%	73%
Vol Right, %	47%	0%	0%	27%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	155	39	198	220
LT Vol	0	3	37	0
Through Vol	82	36	161	161
RT Vol	73	0	0	59
Lane Flow Rate	182	46	232	258
Geometry Grp	2	2	7	7
Degree of Util (X)	0.243	0.067	0.334	0.351
Departure Headway (Hd)	4.795	5.272	5.182	4.899
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	748	677	692	733
Service Time	2.828	3.321	2.926	2.642
HCM Lane V/C Ratio	0.243	0.068	0.335	0.352
HCM Control Delay	9.4	8.7	10.5	10.3
HCM Lane LOS	A	A	B	B
HCM 95th-tile Q	1	0.2	1.5	1.6

Intersection	
Intersection Delay, s/veh	9
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	33	86	0	0	28	70	11	246	12	0	0	0
Future Vol, veh/h	33	86	0	0	28	70	11	246	12	0	0	0
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	39	101	0	0	33	82	13	289	14	0	0	0
Number of Lanes	0	1	0	0	1	0	0	2	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	1
HCM Control Delay	9.1	8.2	9.3
HCM LOS	A	A	A

Lane	NBLn1	NBLn2	EBLn1	WBLn1
Vol Left, %	8%	0%	28%	0%
Vol Thru, %	92%	91%	72%	29%
Vol Right, %	0%	9%	0%	71%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	134	135	119	98
LT Vol	11	0	33	0
Through Vol	123	123	86	28
RT Vol	0	12	0	70
Lane Flow Rate	158	159	140	115
Geometry Grp	7	7	2	2
Degree of Util (X)	0.226	0.224	0.19	0.142
Departure Headway (Hd)	5.17	5.066	4.878	4.438
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	694	708	735	807
Service Time	2.909	2.805	2.912	2.473
HCM Lane V/C Ratio	0.228	0.225	0.19	0.143
HCM Control Delay	9.4	9.3	9.1	8.2
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.9	0.9	0.7	0.5

HCM 6th Signalized Intersection Summary
6: Redwood Blvd & Grant Ave

02/15/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	54	93	109	12	72	22	165	286	36	28	308	60
Future Volume (veh/h)	54	93	109	12	72	22	165	286	36	28	308	60
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.95	0.98		0.96	1.00		0.89	1.00		0.95
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1900	1885	1900	1900	1900	1900	1870	1900	1900	1870	1900
Adj Flow Rate, veh/h	59	102	120	13	79	24	181	314	40	31	338	66
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	0	1	0	0	0	0	2	0	0	2	0
Cap, veh/h	589	770	616	536	770	627	344	664	83	384	691	133
Arrive On Green	0.41	0.41	0.41	0.41	0.41	0.41	0.19	0.21	0.21	0.21	0.23	0.23
Sat Flow, veh/h	1264	1900	1521	1149	1900	1547	1810	3127	392	1810	2945	566
Grp Volume(v), veh/h	59	102	120	13	79	24	181	176	178	31	202	202
Grp Sat Flow(s),veh/h/ln	1264	1900	1521	1149	1900	1547	1810	1777	1742	1810	1777	1734
Q Serve(g_s), s	2.0	2.2	3.4	0.5	1.7	0.6	5.9	5.7	5.9	0.9	6.5	6.6
Cycle Q Clear(g_c), s	3.7	2.2	3.4	2.7	1.7	0.6	5.9	5.7	5.9	0.9	6.5	6.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.23	1.00		0.33
Lane Grp Cap(c), veh/h	589	770	616	536	770	627	344	377	370	384	417	407
V/C Ratio(X)	0.10	0.13	0.19	0.02	0.10	0.04	0.53	0.47	0.48	0.08	0.48	0.50
Avail Cap(c_a), veh/h	826	1126	901	751	1126	916	701	1012	992	384	656	640
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.3	12.3	12.6	13.2	12.2	11.8	24.0	22.7	22.7	20.8	21.8	21.8
Incr Delay (d2), s/veh	0.1	0.1	0.2	0.0	0.1	0.0	0.9	0.9	1.0	0.1	0.9	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.9	1.1	0.1	0.7	0.2	2.5	2.4	2.4	0.4	2.7	2.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.4	12.4	12.9	13.2	12.2	11.9	24.9	23.6	23.7	20.8	22.6	22.8
LnGrp LOS	B	B	B	B	B	B	C	C	C	C	C	C
Approach Vol, veh/h		281			116			535			435	
Approach Delay, s/veh		12.8			12.3			24.1			22.6	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	16.0	19.1		30.7	17.7	17.5		30.7
Change Period (Y+Rc), s	3.5	3.7		4.0	3.7	* 3.5		4.0
Max Green Setting (Gmax), s	25.5	24.3		39.0	12.5	* 38		39.0
Max Q Clear Time (g_c+I1), s	7.9	8.6		4.7	2.9	7.9		5.7
Green Ext Time (p_c), s	0.3	2.2		0.8	0.0	2.3		1.9

Intersection Summary	
HCM 6th Ctrl Delay	20.3
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
7: Redwood Blvd & Diablo Ave/De Long Ave

02/15/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	176	421	152	154	554	140	40	98	30	100	194	130
Future Volume (veh/h)	176	421	152	154	554	140	40	98	30	100	194	130
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1900	1900	1900	1870	1826	1900	1900	1826	1811	1900	1810
Adj Flow Rate, veh/h	191	458	0	167	602	0	43	107	33	109	211	141
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	0	0	0	2	5	0	0	5	6	0	1
Cap, veh/h	455	1785		236	1757		143	599	254	278	323	250
Arrive On Green	0.13	0.49	0.00	0.13	0.49	0.00	0.08	0.17	0.17	0.08	0.17	0.17
Sat Flow, veh/h	3483	3705	0	1810	3647	0	1810	3610	1528	3346	1900	1472
Grp Volume(v), veh/h	191	458	0	167	602	0	43	107	33	109	211	141
Grp Sat Flow(s),veh/h/ln	1742	1805	0	1810	1777	0	1810	1805	1528	1673	1900	1472
Q Serve(g_s), s	6.6	9.5	0.0	11.5	13.4	0.0	2.9	3.3	2.4	4.0	13.5	11.4
Cycle Q Clear(g_c), s	6.6	9.5	0.0	11.5	13.4	0.0	2.9	3.3	2.4	4.0	13.5	11.4
Prop In Lane	1.00		0.00	1.00		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	455	1785		236	1757		143	599	254	278	323	250
V/C Ratio(X)	0.42	0.26		0.71	0.34		0.30	0.18	0.13	0.39	0.65	0.56
Avail Cap(c_a), veh/h	455	1785		237	1757		225	972	411	358	497	385
HCM 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
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	0.94	0.94	0.94
Uniform Delay (d), s/veh	52.0	19.0	0.0	54.1	20.0	0.0	56.5	46.6	46.2	56.5	50.4	49.5
Incr Delay (d2), s/veh	0.5	0.3	0.0	8.0	0.5	0.0	0.4	0.1	0.1	0.3	0.8	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	4.1	0.0	5.7	5.6	0.0	1.3	1.5	0.9	1.7	6.5	4.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	52.4	19.4	0.0	62.1	20.5	0.0	56.9	46.7	46.3	56.8	51.2	50.2
LnGrp LOS	D	B		E	C		E	D	D	E	D	D
Approach Vol, veh/h		649	A		769	A		183			461	
Approach Delay, s/veh		29.1			29.6			49.0			52.2	
Approach LOS		C			C			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.3	26.4	21.0	68.4	13.7	26.9	21.0	68.4
Change Period (Y+Rc), s	3.5	4.8	4.0	4.1	3.5	* 4.8	4.0	* 4.1
Max Green Setting (Gmax), s	13.9	35.0	17.0	47.7	16.2	* 34	17.0	* 48
Max Q Clear Time (g_c+I1), s	10.6	5.3	8.6	15.4	4.9	15.5	13.5	11.5
Green Ext Time (p_c), s	0.1	0.4	0.3	2.8	0.0	1.0	0.1	2.2

Intersection Summary	
HCM 6th Ctrl Delay	36.2
HCM 6th LOS	D

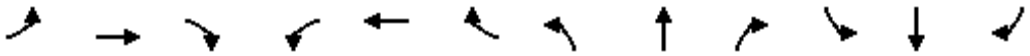
Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
1: Redwood Blvd & San Marin Dr

02/24/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	536	146	244	893	52	264	54	393	227	69	63
Future Volume (veh/h)	14	536	146	244	893	52	264	54	393	227	69	63
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1856	1885	1885	1885	1885	1856	1885	1885	1885
Adj Flow Rate, veh/h	15	570	155	260	950	55	281	57	0	241	73	67
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	1	1	1	3	1	1	1	1	3	1	1	1
Cap, veh/h	58	1175	312	588	2943	170	313	170		299	149	137
Arrive On Green	0.03	0.29	0.29	0.33	0.59	0.59	0.09	0.09	0.00	0.17	0.17	0.17
Sat Flow, veh/h	1795	4043	1075	1767	4977	288	3483	1885	1572	1795	894	821
Grp Volume(v), veh/h	15	482	243	260	654	351	281	57	0	241	0	140
Grp Sat Flow(s),veh/h/ln	1795	1716	1687	1767	1716	1833	1742	1885	1572	1795	0	1715
Q Serve(g_s), s	1.1	15.1	15.5	15.0	12.5	12.6	10.4	3.7	0.0	16.8	0.0	9.6
Cycle Q Clear(g_c), s	1.1	15.1	15.5	15.0	12.5	12.6	10.4	3.7	0.0	16.8	0.0	9.6
Prop In Lane	1.00		0.64	1.00		0.16	1.00		1.00	1.00		0.48
Lane Grp Cap(c), veh/h	58	997	490	588	2029	1084	313	170		299	0	285
V/C Ratio(X)	0.26	0.48	0.50	0.44	0.32	0.32	0.90	0.34		0.81	0.00	0.49
Avail Cap(c_a), veh/h	138	1161	571	588	2029	1084	313	170		594	0	567
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	61.4	38.1	38.2	33.9	13.4	13.4	58.6	55.5	0.0	52.2	0.0	49.2
Incr Delay (d2), s/veh	0.9	0.5	1.1	1.1	0.4	0.8	25.9	0.4	0.0	2.0	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	6.4	6.6	6.6	4.9	5.4	5.6	1.7	0.0	7.6	0.0	4.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	62.3	38.6	39.3	35.0	13.8	14.2	84.4	55.9	0.0	54.1	0.0	49.7
LnGrp LOS	E	D	D	D	B	B	F	E		D	A	D
Approach Vol, veh/h		740			1265			338	A		381	
Approach Delay, s/veh		39.3			18.3			79.6			52.5	
Approach LOS		D			B			E			D	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.2	80.9		16.0	46.3	41.8		25.9				
Change Period (Y+Rc), s	3.0	4.0		4.3	3.0	* 4		4.3				
Max Green Setting (Gmax), s	10.0	49.7		11.7	16.1	* 44		43.0				
Max Q Clear Time (g_c+I1), s	3.1	14.6		12.4	17.0	17.5		18.8				
Green Ext Time (p_c), s	0.0	11.7		0.0	0.0	7.0		0.8				

Intersection Summary	
HCM 6th Ctrl Delay	36.4
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	11	0	12	20	0	11	16	553	17	8	492	17
Future Vol, veh/h	11	0	12	20	0	11	16	553	17	8	492	17
Conflicting Peds, #/hr	5	0	8	8	0	5	9	0	8	5	0	6
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	40	-	-	-	-	-	160	-	-	200	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	0	0	5	0	5	0	3	5	5	3	0
Mvmt Flow	11	0	13	21	0	11	17	576	18	8	513	18

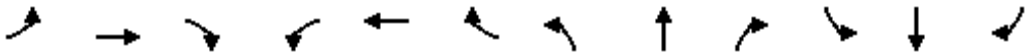
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	874	1183	283	908	1183	310	540	0	0	602	0	0
Stage 1	547	547	-	627	627	-	-	-	-	-	-	-
Stage 2	327	636	-	281	556	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.6	6.5	7	4.1	-	-	4.2	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.6	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.6	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.55	4	3.35	2.2	-	-	2.25	-	-
Pot Cap-1 Maneuver	247	191	720	226	191	677	1039	-	-	951	-	-
Stage 1	494	521	-	431	479	-	-	-	-	-	-	-
Stage 2	665	475	-	694	516	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	235	183	708	214	183	669	1030	-	-	944	-	-
Mov Cap-2 Maneuver	353	303	-	324	302	-	-	-	-	-	-	-
Stage 1	482	512	-	421	467	-	-	-	-	-	-	-
Stage 2	640	463	-	671	507	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12.7	14.9	0.2	0.1
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1030	-	-	353	708	397	944	-	-
HCM Lane V/C Ratio	0.016	-	-	0.032	0.018	0.081	0.009	-	-
HCM Control Delay (s)	8.6	-	-	15.5	10.2	14.9	8.8	-	-
HCM Lane LOS	A	-	-	C	B	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.1	0.3	0	-	-

HCM 6th Signalized Intersection Summary
3: Redwood Blvd & Olive Ave

02/24/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	122	71	29	128	105	86	71	698	149	92	321	110
Future Volume (veh/h)	122	71	29	128	105	86	71	698	149	92	321	110
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	130	76	31	136	112	91	76	743	159	98	341	117
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	211	150	61	159	131	106	202	917	409	224	705	238
Arrive On Green	0.12	0.12	0.12	0.23	0.23	0.23	0.11	0.26	0.26	0.13	0.27	0.27
Sat Flow, veh/h	1781	1263	515	702	578	470	1781	3554	1585	1781	2608	880
Grp Volume(v), veh/h	130	0	107	339	0	0	76	743	159	98	231	227
Grp Sat Flow(s),veh/h/ln	1781	0	1778	1751	0	0	1781	1777	1585	1781	1777	1712
Q Serve(g_s), s	4.6	0.0	3.8	12.4	0.0	0.0	2.6	13.1	5.5	3.4	7.2	7.4
Cycle Q Clear(g_c), s	4.6	0.0	3.8	12.4	0.0	0.0	2.6	13.1	5.5	3.4	7.2	7.4
Prop In Lane	1.00		0.29	0.40		0.27	1.00		1.00	1.00		0.51
Lane Grp Cap(c), veh/h	211	0	211	395	0	0	202	917	409	224	480	463
V/C Ratio(X)	0.62	0.00	0.51	0.86	0.00	0.00	0.38	0.81	0.39	0.44	0.48	0.49
Avail Cap(c_a), veh/h	695	0	694	681	0	0	267	1601	714	267	800	771
HCM 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
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.9	0.0	27.5	24.8	0.0	0.0	27.3	23.2	20.4	26.9	20.4	20.4
Incr Delay (d2), s/veh	1.1	0.0	0.7	2.1	0.0	0.0	0.4	0.7	0.2	0.5	0.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	0.0	1.6	5.1	0.0	0.0	1.1	5.3	2.0	1.4	2.8	2.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.0	0.0	28.2	26.9	0.0	0.0	27.8	23.8	20.6	27.4	20.6	20.7
LnGrp LOS	C	A	C	C	A	A	C	C	C	C	C	C
Approach Vol, veh/h		237			339			978			556	
Approach Delay, s/veh		28.6			26.9			23.6			21.9	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	12.4	21.1		13.0	11.5	21.9		20.1				
Change Period (Y+Rc), s	4.0	* 3.9		5.1	4.0	* 3.9		5.1				
Max Green Setting (Gmax), s	10.0	* 30		26.0	10.0	* 30		25.9				
Max Q Clear Time (g_c+I1), s	5.4	15.1		6.6	4.6	9.4		14.4				
Green Ext Time (p_c), s	0.0	2.1		0.2	0.0	0.9		0.7				

Intersection Summary		
HCM 6th Ctrl Delay		24.2
HCM 6th LOS		C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	12.3
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	152	101	24	165	0	0	0	0	40	388	58
Future Vol, veh/h	0	152	101	24	165	0	0	0	0	40	388	58
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	165	110	26	179	0	0	0	0	43	422	63
Number of Lanes	0	1	0	0	1	0	0	0	0	0	2	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	2	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	2	1
HCM Control Delay	12	11.5	12.8
HCM LOS	B	B	B

Lane	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	0%	13%	17%	0%
Vol Thru, %	60%	87%	83%	77%
Vol Right, %	40%	0%	0%	23%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	253	189	234	252
LT Vol	0	24	40	0
Through Vol	152	165	194	194
RT Vol	101	0	0	58
Lane Flow Rate	275	205	254	274
Geometry Grp	2	2	7	7
Degree of Util (X)	0.408	0.325	0.42	0.433
Departure Headway (Hd)	5.337	5.699	5.943	5.694
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	674	631	608	633
Service Time	3.368	3.731	3.669	3.419
HCM Lane V/C Ratio	0.408	0.325	0.418	0.433
HCM Control Delay	12	11.5	12.9	12.7
HCM Lane LOS	B	B	B	B
HCM 95th-tile Q	2	1.4	2.1	2.2

Intersection	
Intersection Delay, s/veh	12.7
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	118	74	0	0	110	96	79	424	21	0	0	0
Future Vol, veh/h	118	74	0	0	110	96	79	424	21	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	128	80	0	0	120	104	86	461	23	0	0	0
Number of Lanes	0	1	0	0	1	0	0	2	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	1
HCM Control Delay	11.8	11.1	13.6
HCM LOS	B	B	B

Lane	NBLn1	NBLn2	EBLn1	WBLn1
Vol Left, %	27%	0%	61%	0%
Vol Thru, %	73%	91%	39%	53%
Vol Right, %	0%	9%	0%	47%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	291	233	192	206
LT Vol	79	0	118	0
Through Vol	212	212	74	110
RT Vol	0	21	0	96
Lane Flow Rate	316	253	209	224
Geometry Grp	7	7	2	2
Degree of Util (X)	0.518	0.4	0.336	0.335
Departure Headway (Hd)	5.891	5.69	5.802	5.394
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	614	633	620	667
Service Time	3.611	3.41	3.831	3.423
HCM Lane V/C Ratio	0.515	0.4	0.337	0.336
HCM Control Delay	14.8	12.2	11.8	11.1
HCM Lane LOS	B	B	B	B
HCM 95th-tile Q	3	1.9	1.5	1.5

HCM 6th Signalized Intersection Summary
6: Redwood Blvd & Grant Ave

02/24/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	130	179	28	164	58	261	517	56	41	379	94
Future Volume (veh/h)	75	130	179	28	164	58	261	517	56	41	379	94
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.95	0.98		0.96	1.00		0.91	1.00		0.95
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1900	1885	1900	1900	1900	1900	1870	1900	1900	1870	1900
Adj Flow Rate, veh/h	79	137	188	29	173	61	275	544	59	43	399	99
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	0	1	0	0	0	0	2	0	0	2	0
Cap, veh/h	494	764	612	482	764	622	351	859	93	291	658	161
Arrive On Green	0.40	0.40	0.40	0.40	0.40	0.40	0.19	0.27	0.27	0.16	0.24	0.24
Sat Flow, veh/h	1127	1900	1521	1050	1900	1547	1810	3198	345	1810	2798	685
Grp Volume(v), veh/h	79	137	188	29	173	61	275	301	302	43	251	247
Grp Sat Flow(s),veh/h/ln	1127	1900	1521	1050	1900	1547	1810	1777	1767	1810	1777	1706
Q Serve(g_s), s	3.3	3.1	5.6	1.2	4.0	1.6	9.6	9.9	10.0	1.4	8.4	8.6
Cycle Q Clear(g_c), s	7.3	3.1	5.6	4.3	4.0	1.6	9.6	9.9	10.0	1.4	8.4	8.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.20	1.00		0.40
Lane Grp Cap(c), veh/h	494	764	612	482	764	622	351	477	475	291	418	401
V/C Ratio(X)	0.16	0.18	0.31	0.06	0.23	0.10	0.78	0.63	0.64	0.15	0.60	0.61
Avail Cap(c_a), veh/h	701	1114	891	675	1114	907	694	1001	996	340	649	623
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	15.5	12.8	13.6	14.2	13.1	12.4	25.5	21.4	21.5	24.0	22.7	22.7
Incr Delay (d2), s/veh	0.2	0.2	0.4	0.1	0.2	0.1	2.9	1.4	1.4	0.2	1.4	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	1.3	1.9	0.3	1.6	0.5	4.3	4.1	4.1	0.6	3.5	3.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.7	13.0	14.0	14.3	13.3	12.5	28.3	22.8	22.9	24.2	24.1	24.3
LnGrp LOS	B	B	B	B	B	B	C	C	C	C	C	C
Approach Vol, veh/h		404			263			878			541	
Approach Delay, s/veh		14.0			13.2			24.6			24.2	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	16.4	19.3		30.8	14.4	21.4		30.8
Change Period (Y+Rc), s	3.5	3.7		4.0	3.7	* 3.5		4.0
Max Green Setting (Gmax), s	25.5	24.3		39.0	12.5	* 38		39.0
Max Q Clear Time (g_c+I1), s	11.6	10.6		6.3	3.4	12.0		9.3
Green Ext Time (p_c), s	0.5	2.7		2.1	0.0	4.2		2.9

Intersection Summary	
HCM 6th Ctrl Delay	21.0
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
7: Redwood Blvd & Diablo Ave/De Long Ave

02/24/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	238	555	91	108	941	252	119	242	80	194	144	170
Future Volume (veh/h)	238	555	91	108	941	252	119	242	80	194	144	170
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1900	1900	1900	1870	1826	1900	1900	1826	1811	1900	1810
Adj Flow Rate, veh/h	243	566	0	110	960	0	121	247	82	198	147	173
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	0	0	0	2	5	0	0	5	6	0	1
Cap, veh/h	455	1709		232	1674		179	677	287	283	329	255
Arrive On Green	0.13	0.47	0.00	0.13	0.47	0.00	0.10	0.19	0.19	0.08	0.17	0.17
Sat Flow, veh/h	3483	3705	0	1810	3647	0	1810	3610	1530	3346	1900	1473
Grp Volume(v), veh/h	243	566	0	110	960	0	121	247	82	198	147	173
Grp Sat Flow(s),veh/h/ln	1742	1805	0	1810	1777	0	1810	1805	1530	1673	1900	1473
Q Serve(g_s), s	8.5	12.7	0.0	7.3	25.5	0.0	8.4	7.8	6.0	7.5	9.0	14.3
Cycle Q Clear(g_c), s	8.5	12.7	0.0	7.3	25.5	0.0	8.4	7.8	6.0	7.5	9.0	14.3
Prop In Lane	1.00		0.00	1.00		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	455	1709		232	1674		179	677	287	283	329	255
V/C Ratio(X)	0.53	0.33		0.47	0.57		0.68	0.36	0.29	0.70	0.45	0.68
Avail Cap(c_a), veh/h	455	1709		237	1674		225	972	412	358	497	385
HCM 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
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	0.88	0.88	0.88
Uniform Delay (d), s/veh	52.8	21.4	0.0	52.6	24.9	0.0	56.6	46.1	45.3	57.9	48.1	50.3
Incr Delay (d2), s/veh	1.0	0.5	0.0	0.6	1.4	0.0	3.1	0.1	0.2	2.3	0.3	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.8	5.5	0.0	3.4	10.9	0.0	3.9	3.4	2.3	3.3	4.4	5.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.8	21.9	0.0	53.1	26.4	0.0	59.6	46.2	45.5	60.2	48.5	51.4
LnGrp LOS	D	C		D	C		E	D	D	E	D	D
Approach Vol, veh/h		809	A		1070	A		450			518	
Approach Delay, s/veh		31.5			29.1			49.7			53.9	
Approach LOS		C			C			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.5	29.2	21.0	65.3	16.3	27.3	20.7	65.7
Change Period (Y+Rc), s	3.5	4.8	4.0	4.1	3.5	* 4.8	4.0	* 4.1
Max Green Setting (Gmax), s	13.9	35.0	17.0	47.7	16.2	* 34	17.0	* 48
Max Q Clear Time (g_c+I1), s	10.5	9.8	10.5	27.5	10.4	16.3	9.3	14.7
Green Ext Time (p_c), s	0.1	1.0	0.3	4.5	0.1	0.8	0.1	2.7

Intersection Summary	
HCM 6th Ctrl Delay	37.5
HCM 6th LOS	D

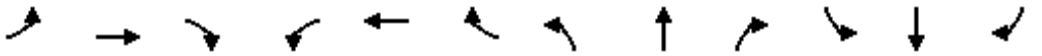
Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
1: Redwood Blvd & San Marin Dr

02/16/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	31	679	172	322	587	264	137	66	292	66	48	36
Future Volume (veh/h)	31	679	172	322	587	264	137	66	292	66	48	36
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1856	1885	1885	1885	1885	1856	1885	1885	1885
Adj Flow Rate, veh/h	33	715	181	339	618	278	144	69	0	69	51	38
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	3	1	1	1	1	3	1	1	1
Cap, veh/h	91	1151	288	801	2392	1053	239	129		163	90	67
Arrive On Green	0.05	0.28	0.28	0.45	0.68	0.68	0.07	0.07	0.00	0.09	0.09	0.09
Sat Flow, veh/h	1795	4101	1025	1767	3499	1540	3483	1885	1572	1795	989	737
Grp Volume(v), veh/h	33	597	299	339	606	290	144	69	0	69	0	89
Grp Sat Flow(s),veh/h/ln	1795	1716	1695	1767	1716	1608	1742	1885	1572	1795	0	1725
Q Serve(g_s), s	2.6	22.1	22.5	18.9	9.9	10.2	5.9	5.2	0.0	5.3	0.0	7.2
Cycle Q Clear(g_c), s	2.6	22.1	22.5	18.9	9.9	10.2	5.9	5.2	0.0	5.3	0.0	7.2
Prop In Lane	1.00		0.60	1.00		0.96	1.00		1.00	1.00		0.43
Lane Grp Cap(c), veh/h	91	963	476	801	2345	1099	239	129		163	0	156
V/C Ratio(X)	0.36	0.62	0.63	0.42	0.26	0.26	0.60	0.53		0.42	0.00	0.57
Avail Cap(c_a), veh/h	123	1034	511	801	2345	1099	279	151		529	0	508
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	67.0	45.7	45.9	27.0	8.9	8.9	66.1	65.8	0.0	62.8	0.0	63.7
Incr Delay (d2), s/veh	0.9	1.3	2.7	0.8	0.3	0.6	1.2	1.3	0.0	0.7	0.0	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	9.6	9.8	8.3	3.7	3.7	2.6	2.5	0.0	2.4	0.0	3.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	67.9	47.0	48.6	27.7	9.1	9.5	67.3	67.0	0.0	63.4	0.0	64.9
LnGrp LOS	E	D	D	C	A	A	E	E		E	A	E
Approach Vol, veh/h		929			1235			213	A		158	
Approach Delay, s/veh		48.2			14.3			67.2			64.2	
Approach LOS		D			B			E			E	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.4	103.8		14.3	69.2	45.0		17.5				
Change Period (Y+Rc), s	3.0	4.0		4.3	3.0	* 4		4.3				
Max Green Setting (Gmax), s	10.0	49.7		11.7	16.1	* 44		43.0				
Max Q Clear Time (g_c+I1), s	4.6	12.2		7.9	20.9	24.5		9.2				
Green Ext Time (p_c), s	0.0	10.6		0.2	0.0	7.8		0.4				

Intersection Summary		
HCM 6th Ctrl Delay	34.3	
HCM 6th LOS	C	

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	31	0	34	22	0	26	15	421	27	28	450	17
Future Vol, veh/h	31	0	34	22	0	26	15	421	27	28	450	17
Conflicting Peds, #/hr	5	0	8	8	0	5	9	0	8	5	0	6
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	40	-	-	-	-	-	160	-	-	200	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	0	0	0	5	0	5	0	3	5	5	3	0
Mvmt Flow	32	0	35	23	0	27	15	434	28	29	464	18

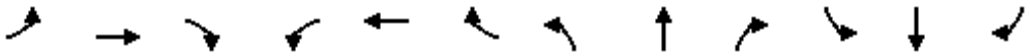
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	792	1040	258	784	1035	244	491	0	0	470	0	0
Stage 1	540	540	-	486	486	-	-	-	-	-	-	-
Stage 2	252	500	-	298	549	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.6	6.5	7	4.1	-	-	4.2	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.6	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.6	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.55	4	3.35	2.2	-	-	2.25	-	-
Pot Cap-1 Maneuver	283	232	747	278	234	747	1083	-	-	1067	-	-
Stage 1	499	524	-	524	554	-	-	-	-	-	-	-
Stage 2	736	546	-	678	520	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	261	219	735	253	221	738	1074	-	-	1059	-	-
Mov Cap-2 Maneuver	371	330	-	368	334	-	-	-	-	-	-	-
Stage 1	488	505	-	513	542	-	-	-	-	-	-	-
Stage 2	696	534	-	623	501	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12.7	12.9	0.3	0.5
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1074	-	-	371	735	505	1059	-	-
HCM Lane V/C Ratio	0.014	-	-	0.086	0.048	0.098	0.027	-	-
HCM Control Delay (s)	8.4	-	-	15.6	10.1	12.9	8.5	-	-
HCM Lane LOS	A	-	-	C	B	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.1	0.3	0.1	-	-

HCM 6th Signalized Intersection Summary
3: Redwood Blvd & Olive Ave

02/16/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	87	97	27	90	129	90	15	371	101	152	380	66
Future Volume (veh/h)	87	97	27	90	129	90	15	371	101	152	380	66
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	95	105	29	98	140	98	16	403	110	165	413	72
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	241	191	53	117	167	117	70	574	256	287	858	148
Arrive On Green	0.14	0.14	0.14	0.23	0.23	0.23	0.04	0.16	0.16	0.16	0.28	0.28
Sat Flow, veh/h	1781	1411	390	511	730	511	1781	3554	1585	1781	3029	524
Grp Volume(v), veh/h	95	0	134	336	0	0	16	403	110	165	241	244
Grp Sat Flow(s),veh/h/ln	1781	0	1800	1753	0	0	1781	1777	1585	1781	1777	1776
Q Serve(g_s), s	2.8	0.0	4.0	10.6	0.0	0.0	0.5	6.2	3.6	4.9	6.5	6.6
Cycle Q Clear(g_c), s	2.8	0.0	4.0	10.6	0.0	0.0	0.5	6.2	3.6	4.9	6.5	6.6
Prop In Lane	1.00		0.22	0.29		0.29	1.00		1.00	1.00		0.30
Lane Grp Cap(c), veh/h	241	0	243	401	0	0	70	574	256	287	503	503
V/C Ratio(X)	0.39	0.00	0.55	0.84	0.00	0.00	0.23	0.70	0.43	0.58	0.48	0.48
Avail Cap(c_a), veh/h	802	0	811	786	0	0	309	1847	824	309	923	923
HCM 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
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.8	0.0	23.3	21.2	0.0	0.0	26.9	22.9	21.8	22.4	17.2	17.2
Incr Delay (d2), s/veh	0.4	0.0	0.7	1.8	0.0	0.0	0.6	0.6	0.4	1.2	0.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.0	1.7	4.2	0.0	0.0	0.2	2.5	1.3	2.0	2.4	2.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.2	0.0	24.1	23.0	0.0	0.0	27.5	23.5	22.2	23.6	17.4	17.5
LnGrp LOS	C	A	C	C	A	A	C	C	C	C	B	B
Approach Vol, veh/h		229			336			529			650	
Approach Delay, s/veh		23.7			23.0			23.3			19.0	
Approach LOS		C			C			C			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	13.3	13.2		12.9	6.3	20.3		18.3				
Change Period (Y+Rc), s	4.0	* 3.9		5.1	4.0	* 3.9		5.1				
Max Green Setting (Gmax), s	10.0	* 30		26.0	10.0	* 30		25.9				
Max Q Clear Time (g_c+I1), s	6.9	8.2		6.0	2.5	8.6		12.6				
Green Ext Time (p_c), s	0.0	1.1		0.3	0.0	0.9		0.7				

Intersection Summary		
HCM 6th Ctrl Delay		21.7
HCM 6th LOS		C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	11.2
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	105	111	3	53	0	0	0	0	37	366	70
Future Vol, veh/h	0	105	111	3	53	0	0	0	0	37	366	70
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	124	131	4	62	0	0	0	0	44	431	82
Number of Lanes	0	1	0	0	1	0	0	0	0	0	2	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	2	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	2	1
HCM Control Delay	10.7	9.2	11.7
HCM LOS	B	A	B

Lane	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	0%	5%	17%	0%
Vol Thru, %	49%	95%	83%	72%
Vol Right, %	51%	0%	0%	28%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	216	56	220	253
LT Vol	0	3	37	0
Through Vol	105	53	183	183
RT Vol	111	0	0	70
Lane Flow Rate	254	66	259	298
Geometry Grp	2	2	7	7
Degree of Util (X)	0.349	0.101	0.389	0.424
Departure Headway (Hd)	4.944	5.521	5.407	5.128
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	724	644	660	696
Service Time	2.998	3.601	3.178	2.898
HCM Lane V/C Ratio	0.351	0.102	0.392	0.428
HCM Control Delay	10.7	9.2	11.6	11.7
HCM Lane LOS	B	A	B	B
HCM 95th-tile Q	1.6	0.3	1.8	2.1

Intersection	
Intersection Delay, s/veh	9.6
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	56	86	0	0	28	70	28	273	12	0	0	0
Future Vol, veh/h	56	86	0	0	28	70	28	273	12	0	0	0
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	66	101	0	0	33	82	33	321	14	0	0	0
Number of Lanes	0	1	0	0	1	0	0	2	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	1
HCM Control Delay	9.6	8.4	9.9
HCM LOS	A	A	A

Lane	NBLn1	NBLn2	EBLn1	WBLn1
Vol Left, %	17%	0%	39%	0%
Vol Thru, %	83%	92%	61%	29%
Vol Right, %	0%	8%	0%	71%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	165	149	142	98
LT Vol	28	0	56	0
Through Vol	137	137	86	28
RT Vol	0	12	0	70
Lane Flow Rate	194	175	167	115
Geometry Grp	7	7	2	2
Degree of Util (X)	0.285	0.25	0.233	0.147
Departure Headway (Hd)	5.294	5.152	5.029	4.602
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	677	695	713	776
Service Time	3.042	2.9	3.07	2.648
HCM Lane V/C Ratio	0.287	0.252	0.234	0.148
HCM Control Delay	10.2	9.6	9.6	8.4
HCM Lane LOS	B	A	A	A
HCM 95th-tile Q	1.2	1	0.9	0.5

HCM 6th Signalized Intersection Summary
6: Redwood Blvd & Grant Ave

02/16/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	54	93	109	12	72	38	165	314	36	57	362	60
Future Volume (veh/h)	54	93	109	12	72	38	165	314	36	57	362	60
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.95	0.98		0.96	1.00		0.89	1.00		0.95
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1900	1885	1900	1900	1900	1900	1870	1900	1900	1870	1900
Adj Flow Rate, veh/h	59	102	120	13	79	42	181	345	40	63	398	66
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	0	1	0	0	0	0	2	0	0	2	0
Cap, veh/h	581	770	616	536	770	627	344	695	80	372	711	117
Arrive On Green	0.41	0.41	0.41	0.41	0.41	0.41	0.19	0.22	0.22	0.21	0.23	0.23
Sat Flow, veh/h	1244	1900	1521	1149	1900	1547	1810	3168	363	1810	3030	497
Grp Volume(v), veh/h	59	102	120	13	79	42	181	192	193	63	232	232
Grp Sat Flow(s),veh/h/ln	1244	1900	1521	1149	1900	1547	1810	1777	1753	1810	1777	1751
Q Serve(g_s), s	2.0	2.2	3.4	0.5	1.7	1.1	5.9	6.2	6.4	1.9	7.6	7.7
Cycle Q Clear(g_c), s	3.7	2.2	3.4	2.7	1.7	1.1	5.9	6.2	6.4	1.9	7.6	7.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.21	1.00		0.28
Lane Grp Cap(c), veh/h	581	770	616	536	770	627	344	390	385	372	417	411
V/C Ratio(X)	0.10	0.13	0.19	0.02	0.10	0.07	0.53	0.49	0.50	0.17	0.56	0.57
Avail Cap(c_a), veh/h	814	1126	901	751	1126	916	701	1012	999	372	656	646
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.3	12.3	12.6	13.2	12.2	12.0	24.0	22.5	22.5	21.5	22.2	22.2
Incr Delay (d2), s/veh	0.1	0.1	0.2	0.0	0.1	0.1	0.9	1.0	1.0	0.2	1.2	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.9	1.1	0.1	0.7	0.4	2.5	2.6	2.6	0.8	3.2	3.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.4	12.4	12.9	13.2	12.2	12.0	24.9	23.4	23.6	21.7	23.3	23.5
LnGrp LOS	B	B	B	B	B	B	C	C	C	C	C	C
Approach Vol, veh/h		281			134			566			527	
Approach Delay, s/veh		12.8			12.3			24.0			23.2	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	16.0	19.1		30.7	17.2	17.9		30.7
Change Period (Y+Rc), s	3.5	3.7		4.0	3.7	* 3.5		4.0
Max Green Setting (Gmax), s	25.5	24.3		39.0	12.5	* 38		39.0
Max Q Clear Time (g_c+I1), s	17.9	9.7		4.7	3.9	8.4		5.7
Green Ext Time (p_c), s	0.3	2.5		0.9	0.0	2.5		1.9

Intersection Summary	
HCM 6th Ctrl Delay	20.6
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
7: Redwood Blvd & Diablo Ave/De Long Ave

02/16/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	182	421	152	154	554	152	40	108	30	127	211	140
Future Volume (veh/h)	182	421	152	154	554	152	40	108	30	127	211	140
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1900	1900	1900	1870	1826	1900	1900	1826	1811	1900	1810
Adj Flow Rate, veh/h	198	458	0	167	602	0	43	117	33	138	229	152
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	0	0	0	2	5	0	0	5	6	0	1
Cap, veh/h	455	1761		236	1733		143	619	262	281	336	260
Arrive On Green	0.13	0.49	0.00	0.13	0.49	0.00	0.08	0.17	0.17	0.08	0.18	0.18
Sat Flow, veh/h	3483	3705	0	1810	3647	0	1810	3610	1528	3346	1900	1474
Grp Volume(v), veh/h	198	458	0	167	602	0	43	117	33	138	229	152
Grp Sat Flow(s),veh/h/ln	1742	1805	0	1810	1777	0	1810	1805	1528	1673	1900	1474
Q Serve(g_s), s	6.8	9.7	0.0	11.5	13.6	0.0	2.9	3.6	2.4	5.1	14.7	12.3
Cycle Q Clear(g_c), s	6.8	9.7	0.0	11.5	13.6	0.0	2.9	3.6	2.4	5.1	14.7	12.3
Prop In Lane	1.00		0.00	1.00		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	455	1761		236	1733		143	619	262	281	336	260
V/C Ratio(X)	0.44	0.26		0.71	0.35		0.30	0.19	0.13	0.49	0.68	0.58
Avail Cap(c_a), veh/h	455	1761		237	1733		225	972	411	358	497	386
HCM 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
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	0.92	0.92	0.92
Uniform Delay (d), s/veh	52.1	19.5	0.0	54.1	20.5	0.0	56.5	46.1	45.6	56.9	50.1	49.1
Incr Delay (d2), s/veh	0.5	0.4	0.0	8.0	0.6	0.0	0.4	0.1	0.1	0.5	0.8	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	4.2	0.0	5.7	5.7	0.0	1.3	1.6	0.9	2.2	7.1	4.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	52.6	19.9	0.0	62.1	21.1	0.0	56.9	46.2	45.7	57.3	50.9	49.8
LnGrp LOS	D	B		E	C		E	D	D	E	D	D
Approach Vol, veh/h		656	A		769	A		193			519	
Approach Delay, s/veh		29.8			30.0			48.5			52.3	
Approach LOS		C			C			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.4	27.1	21.0	67.5	13.7	27.8	21.0	67.5
Change Period (Y+Rc), s	3.5	4.8	4.0	4.1	3.5	* 4.8	4.0	* 4.1
Max Green Setting (Gmax), s	13.9	35.0	17.0	47.7	16.2	* 34	17.0	* 48
Max Q Clear Time (g_c+I1), s	7.1	5.6	8.8	15.6	4.9	16.7	13.5	11.7
Green Ext Time (p_c), s	0.1	0.4	0.3	2.8	0.0	1.1	0.1	2.2

Intersection Summary	
HCM 6th Ctrl Delay	37.0
HCM 6th LOS	D

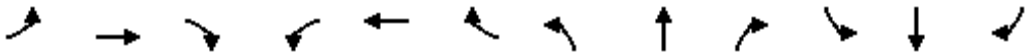
Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
1: Redwood Blvd & San Marin Dr

02/24/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	555	168	294	915	75	286	75	424	240	84	66
Future Volume (veh/h)	17	555	168	294	915	75	286	75	424	240	84	66
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1856	1885	1885	1885	1885	1856	1885	1885	1885
Adj Flow Rate, veh/h	18	590	179	313	973	80	304	80	0	255	89	70
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	1	1	1	3	1	1	1	1	3	1	1	1
Cap, veh/h	66	1161	344	567	2808	230	313	170		312	168	132
Arrive On Green	0.04	0.30	0.30	0.32	0.58	0.58	0.09	0.09	0.00	0.17	0.17	0.17
Sat Flow, veh/h	1795	3934	1167	1767	4847	398	3483	1885	1572	1795	967	761
Grp Volume(v), veh/h	18	513	256	313	688	365	304	80	0	255	0	159
Grp Sat Flow(s),veh/h/ln	1795	1716	1670	1767	1716	1814	1742	1885	1572	1795	0	1728
Q Serve(g_s), s	1.3	16.1	16.6	19.0	13.7	13.8	11.3	5.2	0.0	17.8	0.0	10.9
Cycle Q Clear(g_c), s	1.3	16.1	16.6	19.0	13.7	13.8	11.3	5.2	0.0	17.8	0.0	10.9
Prop In Lane	1.00		0.70	1.00		0.22	1.00		1.00	1.00		0.44
Lane Grp Cap(c), veh/h	66	1013	493	567	1988	1051	313	170		312	0	300
V/C Ratio(X)	0.27	0.51	0.52	0.55	0.35	0.35	0.97	0.47		0.82	0.00	0.53
Avail Cap(c_a), veh/h	138	1161	565	567	1988	1051	313	170		594	0	572
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	60.9	38.0	38.1	36.4	14.4	14.4	59.0	56.2	0.0	51.7	0.0	48.9
Incr Delay (d2), s/veh	0.8	0.6	1.2	2.0	0.5	0.9	42.3	0.8	0.0	2.0	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	6.8	6.9	8.5	5.4	5.9	6.7	2.5	0.0	8.1	0.0	4.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	61.7	38.5	39.3	38.4	14.9	15.3	101.3	57.0	0.0	53.7	0.0	49.4
LnGrp LOS	E	D	D	D	B	B	F	E		D	A	D
Approach Vol, veh/h		787			1366			384	A		414	
Approach Delay, s/veh		39.3			20.4			92.1			52.1	
Approach LOS		D			C			F			D	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.8	79.3		16.0	44.7	42.4		26.9				
Change Period (Y+Rc), s	3.0	4.0		4.3	3.0	* 4		4.3				
Max Green Setting (Gmax), s	10.0	49.7		11.7	16.1	* 44		43.0				
Max Q Clear Time (g_c+I1), s	3.3	15.8		13.3	21.0	18.6		19.8				
Green Ext Time (p_c), s	0.0	12.3		0.0	0.0	7.4		0.9				

Intersection Summary		
HCM 6th Ctrl Delay		39.2
HCM 6th LOS		D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	16	0	19	30	0	29	26	604	28	31	547	26
Future Vol, veh/h	16	0	19	30	0	29	26	604	28	31	547	26
Conflicting Peds, #/hr	5	0	8	8	0	5	9	0	8	5	0	6
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	40	-	-	-	-	-	160	-	-	200	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	0	0	5	0	5	0	3	5	5	3	0
Mvmt Flow	17	0	20	31	0	30	27	629	29	32	570	27

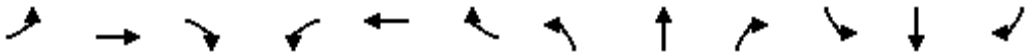
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1031	1377	316	1063	1376	342	606	0	0	666	0	0
Stage 1	657	657	-	706	706	-	-	-	-	-	-	-
Stage 2	374	720	-	357	670	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.6	6.5	7	4.1	-	-	4.2	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.6	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.6	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.55	4	3.35	2.2	-	-	2.25	-	-
Pot Cap-1 Maneuver	190	146	686	174	146	645	982	-	-	899	-	-
Stage 1	425	465	-	386	442	-	-	-	-	-	-	-
Stage 2	624	435	-	625	459	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	170	134	675	158	134	637	974	-	-	892	-	-
Mov Cap-2 Maneuver	288	249	-	271	252	-	-	-	-	-	-	-
Stage 1	410	444	-	372	426	-	-	-	-	-	-	-
Stage 2	575	419	-	580	438	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.1	16.4	0.3	0.5
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	974	-	-	288	675	378	892	-	-
HCM Lane V/C Ratio	0.028	-	-	0.058	0.029	0.163	0.036	-	-
HCM Control Delay (s)	8.8	-	-	18.3	10.5	16.4	9.2	-	-
HCM Lane LOS	A	-	-	C	B	C	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.2	0.1	0.6	0.1	-	-

HCM 6th Signalized Intersection Summary
3: Redwood Blvd & Olive Ave

02/24/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	122	71	29	133	105	97	71	759	152	100	385	110
Future Volume (veh/h)	122	71	29	133	105	97	71	759	152	100	385	110
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	130	76	31	141	112	103	76	807	162	106	410	117
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	200	142	58	162	129	118	195	972	434	221	787	222
Arrive On Green	0.11	0.11	0.11	0.23	0.23	0.23	0.11	0.27	0.27	0.12	0.29	0.29
Sat Flow, veh/h	1781	1263	515	691	549	505	1781	3554	1585	1781	2735	773
Grp Volume(v), veh/h	130	0	107	356	0	0	76	807	162	106	265	262
Grp Sat Flow(s),veh/h/ln	1781	0	1778	1745	0	0	1781	1777	1585	1781	1777	1731
Q Serve(g_s), s	4.9	0.0	4.0	13.9	0.0	0.0	2.8	15.1	5.8	3.9	8.8	9.0
Cycle Q Clear(g_c), s	4.9	0.0	4.0	13.9	0.0	0.0	2.8	15.1	5.8	3.9	8.8	9.0
Prop In Lane	1.00		0.29	0.40		0.29	1.00		1.00	1.00		0.45
Lane Grp Cap(c), veh/h	200	0	199	409	0	0	195	972	434	221	511	498
V/C Ratio(X)	0.65	0.00	0.54	0.87	0.00	0.00	0.39	0.83	0.37	0.48	0.52	0.53
Avail Cap(c_a), veh/h	656	0	654	640	0	0	252	1509	673	252	755	735
HCM 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
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.0	0.0	29.6	26.0	0.0	0.0	29.2	24.1	20.8	28.8	21.1	21.1
Incr Delay (d2), s/veh	1.3	0.0	0.8	5.0	0.0	0.0	0.5	1.3	0.2	0.6	0.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	0.0	1.7	6.1	0.0	0.0	1.2	6.2	2.1	1.6	3.4	3.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	31.4	0.0	30.5	31.1	0.0	0.0	29.7	25.4	21.0	29.4	21.4	21.4
LnGrp LOS	C	A	C	C	A	A	C	C	C	C	C	C
Approach Vol, veh/h		237			356			1045			633	
Approach Delay, s/veh		31.0			31.1			25.0			22.7	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	12.8	23.2		13.0	11.7	24.2		21.6				
Change Period (Y+Rc), s	4.0	* 3.9		5.1	4.0	* 3.9		5.1				
Max Green Setting (Gmax), s	10.0	* 30		26.0	10.0	* 30		25.9				
Max Q Clear Time (g_c+I1), s	5.9	17.1		6.9	4.8	11.0		15.9				
Green Ext Time (p_c), s	0.0	2.3		0.2	0.0	1.0		0.7				

Intersection Summary		
HCM 6th Ctrl Delay		26.0
HCM 6th LOS		C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	14.6
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	168	127	24	218	0	0	0	0	40	426	89
Future Vol, veh/h	0	168	127	24	218	0	0	0	0	40	426	89
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	183	138	26	237	0	0	0	0	43	463	97
Number of Lanes	0	1	0	0	1	0	0	0	0	0	2	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	2	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	2	1
HCM Control Delay	14.2	13.6	15.2
HCM LOS	B	B	C

Lane	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	0%	10%	16%	0%
Vol Thru, %	57%	90%	84%	71%
Vol Right, %	43%	0%	0%	29%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	295	242	253	302
LT Vol	0	24	40	0
Through Vol	168	218	213	213
RT Vol	127	0	0	89
Lane Flow Rate	321	263	275	328
Geometry Grp	2	2	7	7
Degree of Util (X)	0.501	0.437	0.479	0.545
Departure Headway (Hd)	5.627	5.984	6.265	5.975
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	638	600	575	604
Service Time	3.673	4.031	4.006	3.716
HCM Lane V/C Ratio	0.503	0.438	0.478	0.543
HCM Control Delay	14.2	13.6	14.7	15.7
HCM Lane LOS	B	B	B	C
HCM 95th-tile Q	2.8	2.2	2.6	3.3

Intersection	
Intersection Delay, s/veh	15.3
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	134	74	0	0	110	96	132	472	21	0	0	0
Future Vol, veh/h	134	74	0	0	110	96	132	472	21	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	146	80	0	0	120	104	143	513	23	0	0	0
Number of Lanes	0	1	0	0	1	0	0	2	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	1
HCM Control Delay	12.8	11.8	17.3
HCM LOS	B	B	C

Lane	NBLn1	NBLn2	EBLn1	WBLn1
Vol Left, %	36%	0%	64%	0%
Vol Thru, %	64%	92%	36%	53%
Vol Right, %	0%	8%	0%	47%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	368	257	208	206
LT Vol	132	0	134	0
Through Vol	236	236	74	110
RT Vol	0	21	0	96
Lane Flow Rate	400	279	226	224
Geometry Grp	7	7	2	2
Degree of Util (X)	0.67	0.45	0.38	0.352
Departure Headway (Hd)	6.033	5.794	6.049	5.666
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	600	623	595	636
Service Time	3.761	3.522	4.084	3.701
HCM Lane V/C Ratio	0.667	0.448	0.38	0.352
HCM Control Delay	20.2	13.2	12.8	11.8
HCM Lane LOS	C	B	B	B
HCM 95th-tile Q	5.1	2.3	1.8	1.6

HCM 6th Signalized Intersection Summary
6: Redwood Blvd & Grant Ave

02/24/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	130	179	28	164	93	261	583	56	63	421	94
Future Volume (veh/h)	75	130	179	28	164	93	261	583	56	63	421	94
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.95	0.98		0.96	1.00		0.91	1.00		0.95
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1900	1885	1900	1900	1900	1900	1870	1900	1900	1870	1900
Adj Flow Rate, veh/h	79	137	188	29	173	98	275	614	59	66	443	99
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	0	1	0	0	0	0	2	0	0	2	0
Cap, veh/h	477	758	607	477	758	617	347	918	88	274	694	154
Arrive On Green	0.40	0.40	0.40	0.40	0.40	0.40	0.19	0.28	0.28	0.15	0.24	0.24
Sat Flow, veh/h	1090	1900	1520	1049	1900	1546	1810	3245	311	1810	2862	633
Grp Volume(v), veh/h	79	137	188	29	173	98	275	336	337	66	273	269
Grp Sat Flow(s),veh/h/ln	1090	1900	1520	1049	1900	1546	1810	1777	1779	1810	1777	1719
Q Serve(g_s), s	3.5	3.1	5.7	1.2	4.1	2.7	9.8	11.2	11.3	2.2	9.3	9.4
Cycle Q Clear(g_c), s	7.5	3.1	5.7	4.4	4.1	2.7	9.8	11.2	11.3	2.2	9.3	9.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.17	1.00		0.37
Lane Grp Cap(c), veh/h	477	758	607	477	758	617	347	503	503	274	431	417
V/C Ratio(X)	0.17	0.18	0.31	0.06	0.23	0.16	0.79	0.67	0.67	0.24	0.63	0.64
Avail Cap(c_a), veh/h	673	1100	880	666	1100	896	685	990	991	336	641	620
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	15.9	13.1	13.9	14.5	13.4	13.0	25.9	21.3	21.4	25.2	22.8	22.9
Incr Delay (d2), s/veh	0.2	0.2	0.4	0.1	0.2	0.2	3.1	1.5	1.6	0.3	1.6	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	1.3	1.9	0.3	1.7	0.9	4.3	4.7	4.7	0.9	3.9	3.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	16.1	13.3	14.3	14.6	13.6	13.1	29.0	22.9	22.9	25.5	24.4	24.6
LnGrp LOS	B	B	B	B	B	B	C	C	C	C	C	C
Approach Vol, veh/h		404			300			948			608	
Approach Delay, s/veh		14.3			13.5			24.7			24.6	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	16.4	20.0		30.9	13.9	22.5		30.9
Change Period (Y+Rc), s	3.5	3.7		4.0	3.7	* 3.5		4.0
Max Green Setting (Gmax), s	25.5	24.3		39.0	12.5	* 38		39.0
Max Q Clear Time (g_c+I1), s	11.3	11.4		6.4	4.2	13.3		9.5
Green Ext Time (p_c), s	0.5	2.9		2.3	0.1	4.7		2.9

Intersection Summary	
HCM 6th Ctrl Delay	21.3
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
7: Redwood Blvd & Diablo Ave/De Long Ave

02/24/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	249	555	91	108	941	285	119	264	80	213	157	180
Future Volume (veh/h)	249	555	91	108	941	285	119	264	80	213	157	180
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1900	1900	1900	1870	1826	1900	1900	1826	1811	1900	1810
Adj Flow Rate, veh/h	254	566	0	110	960	0	121	269	82	217	160	184
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	0	0	0	2	5	0	0	5	6	0	1
Cap, veh/h	455	1691		232	1656		179	695	295	283	339	263
Arrive On Green	0.13	0.47	0.00	0.13	0.47	0.00	0.10	0.19	0.19	0.08	0.18	0.18
Sat Flow, veh/h	3483	3705	0	1810	3647	0	1810	3610	1531	3346	1900	1474
Grp Volume(v), veh/h	254	566	0	110	960	0	121	269	82	217	160	184
Grp Sat Flow(s),veh/h/ln	1742	1805	0	1810	1777	0	1810	1805	1531	1673	1900	1474
Q Serve(g_s), s	8.9	12.9	0.0	7.3	25.7	0.0	8.4	8.5	5.9	8.3	9.8	15.2
Cycle Q Clear(g_c), s	8.9	12.9	0.0	7.3	25.7	0.0	8.4	8.5	5.9	8.3	9.8	15.2
Prop In Lane	1.00		0.00	1.00		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	455	1691		232	1656		179	695	295	283	339	263
V/C Ratio(X)	0.56	0.33		0.47	0.58		0.68	0.39	0.28	0.77	0.47	0.70
Avail Cap(c_a), veh/h	455	1691		237	1656		225	972	412	358	497	386
HCM 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
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	0.86	0.86	0.86
Uniform Delay (d), s/veh	53.0	21.8	0.0	52.6	25.4	0.0	56.6	45.8	44.8	58.2	47.9	50.1
Incr Delay (d2), s/veh	1.3	0.5	0.0	0.6	1.5	0.0	3.1	0.1	0.2	4.7	0.3	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	5.6	0.0	3.4	11.0	0.0	3.9	3.7	2.3	3.7	4.7	5.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.2	22.3	0.0	53.1	26.9	0.0	59.6	45.9	45.0	63.0	48.2	51.2
LnGrp LOS	D	C		D	C		E	D	D	E	D	D
Approach Vol, veh/h		820	A		1070	A		472			561	
Approach Delay, s/veh		32.2			29.6			49.3			54.9	
Approach LOS		C			C			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.5	29.8	21.0	64.7	16.3	28.0	20.7	65.0
Change Period (Y+Rc), s	3.5	4.8	4.0	4.1	3.5	* 4.8	4.0	* 4.1
Max Green Setting (Gmax), s	13.9	35.0	17.0	47.7	16.2	* 34	17.0	* 48
Max Q Clear Time (g_c+I1), s	10.3	10.5	10.9	27.7	10.4	17.2	9.3	14.9
Green Ext Time (p_c), s	0.1	1.1	0.3	4.5	0.1	0.9	0.1	2.7

Intersection Summary	
HCM 6th Ctrl Delay	38.4
HCM 6th LOS	D

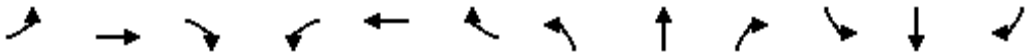
Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
1: Redwood Blvd & San Marin Dr

02/16/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	71	797	167	365	1086	737	177	143	304	180	60	48
Future Volume (veh/h)	71	797	167	365	1086	737	177	143	304	180	60	48
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1856	1885	1885	1885	1885	1856	1885	1885	1885
Adj Flow Rate, veh/h	71	797	135	365	1086	610	177	143	0	180	60	20
Peak Hour 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
Percent Heavy Veh, %	1	1	1	3	1	1	1	1	3	1	1	1
Cap, veh/h	116	1307	220	683	2117	986	279	151		236	177	59
Arrive On Green	0.06	0.29	0.29	0.39	0.62	0.62	0.08	0.08	0.00	0.13	0.13	0.13
Sat Flow, veh/h	1795	4433	745	1767	3431	1598	3483	1885	1572	1795	1343	448
Grp Volume(v), veh/h	71	616	316	365	1086	610	177	143	0	180	0	80
Grp Sat Flow(s),veh/h/ln	1795	1716	1747	1767	1716	1598	1742	1885	1572	1795	0	1791
Q Serve(g_s), s	5.6	22.5	22.8	23.3	25.9	34.5	7.2	11.0	0.0	14.1	0.0	5.9
Cycle Q Clear(g_c), s	5.6	22.5	22.8	23.3	25.9	34.5	7.2	11.0	0.0	14.1	0.0	5.9
Prop In Lane	1.00		0.43	1.00		1.00	1.00		1.00	1.00		0.25
Lane Grp Cap(c), veh/h	116	1011	515	683	2117	986	279	151		236	0	235
V/C Ratio(X)	0.61	0.61	0.61	0.53	0.51	0.62	0.63	0.95		0.76	0.00	0.34
Avail Cap(c_a), veh/h	123	1034	527	683	2117	986	279	151		529	0	528
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	66.5	44.2	44.3	34.6	15.7	17.3	65.1	66.8	0.0	61.2	0.0	57.6
Incr Delay (d2), s/veh	5.3	1.2	2.5	1.5	0.9	2.9	3.6	56.7	0.0	1.9	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	9.7	10.2	10.4	10.3	13.3	3.3	7.6	0.0	6.5	0.0	2.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	71.8	45.5	46.8	36.1	16.6	20.2	68.7	123.5	0.0	63.1	0.0	58.0
LnGrp LOS	E	D	D	D	B	C	E	F		E	A	E
Approach Vol, veh/h		1003			2061			320	A		260	
Approach Delay, s/veh		47.7			21.1			93.2			61.5	
Approach LOS		D			C			F			E	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	12.4	94.1		16.0	59.5	47.0		23.5				
Change Period (Y+Rc), s	3.0	4.0		4.3	3.0	* 4		4.3				
Max Green Setting (Gmax), s	10.0	49.7		11.7	16.1	* 44		43.0				
Max Q Clear Time (g_c+I1), s	7.6	36.5		13.0	25.3	24.8		16.1				
Green Ext Time (p_c), s	0.0	10.7		0.0	0.0	8.0		0.5				

Intersection Summary		
HCM 6th Ctrl Delay	37.7	
HCM 6th LOS	D	

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	31	1	33	65	1	61	43	517	71	70	468	20
Future Vol, veh/h	31	1	33	65	1	61	43	517	71	70	468	20
Conflicting Peds, #/hr	5	0	8	8	0	5	9	0	8	5	0	6
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	40	-	-	-	-	-	160	-	-	200	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	5	0	5	0	3	5	5	3	0
Mvmt Flow	31	1	33	65	1	61	43	517	71	70	468	20

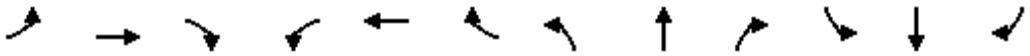
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	977	1309	261	1030	1284	307	497	0	0	596	0	0
Stage 1	627	627	-	647	647	-	-	-	-	-	-	-
Stage 2	350	682	-	383	637	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.6	6.5	7	4.1	-	-	4.2	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.6	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.6	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.55	4	3.35	2.2	-	-	2.25	-	-
Pot Cap-1 Maneuver	208	161	744	184	166	680	1077	-	-	956	-	-
Stage 1	443	479	-	419	470	-	-	-	-	-	-	-
Stage 2	645	453	-	603	475	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	170	141	732	158	145	672	1068	-	-	949	-	-
Mov Cap-2 Maneuver	284	244	-	271	257	-	-	-	-	-	-	-
Stage 1	422	440	-	399	447	-	-	-	-	-	-	-
Stage 2	559	431	-	528	436	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.6	19.2	0.6	1.1
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1068	-	-	284	691	380	949	-	-
HCM Lane V/C Ratio	0.04	-	-	0.109	0.049	0.334	0.074	-	-
HCM Control Delay (s)	8.5	-	-	19.2	10.5	19.2	9.1	-	-
HCM Lane LOS	A	-	-	C	B	C	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.4	0.2	1.4	0.2	-	-

HCM 6th Signalized Intersection Summary
3: Redwood Blvd & Olive Ave

02/16/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	111	98	33	133	130	111	18	441	132	134	409	87
Future Volume (veh/h)	111	98	33	133	130	111	18	441	132	134	409	87
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	111	98	33	133	130	111	18	441	132	134	409	87
Peak Hour 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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	232	174	59	155	152	130	77	609	272	264	807	170
Arrive On Green	0.13	0.13	0.13	0.25	0.25	0.25	0.04	0.17	0.17	0.15	0.28	0.28
Sat Flow, veh/h	1781	1339	451	621	607	518	1781	3554	1585	1781	2920	616
Grp Volume(v), veh/h	111	0	131	374	0	0	18	441	132	134	247	249
Grp Sat Flow(s),veh/h/ln	1781	0	1789	1746	0	0	1781	1777	1585	1781	1777	1760
Q Serve(g_s), s	3.5	0.0	4.1	12.3	0.0	0.0	0.6	7.1	4.5	4.2	7.1	7.2
Cycle Q Clear(g_c), s	3.5	0.0	4.1	12.3	0.0	0.0	0.6	7.1	4.5	4.2	7.1	7.2
Prop In Lane	1.00		0.25	0.36		0.30	1.00		1.00	1.00		0.35
Lane Grp Cap(c), veh/h	232	0	233	437	0	0	77	609	272	264	491	486
V/C Ratio(X)	0.48	0.00	0.56	0.86	0.00	0.00	0.23	0.72	0.49	0.51	0.50	0.51
Avail Cap(c_a), veh/h	768	0	771	750	0	0	295	1767	788	295	884	875
HCM 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
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.3	0.0	24.6	21.6	0.0	0.0	27.9	23.6	22.6	23.7	18.3	18.4
Incr Delay (d2), s/veh	0.6	0.0	0.8	1.9	0.0	0.0	0.6	0.6	0.5	0.6	0.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.0	1.7	4.9	0.0	0.0	0.3	2.9	1.7	1.7	2.6	2.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	24.9	0.0	25.4	23.5	0.0	0.0	28.5	24.3	23.1	24.2	18.6	18.7
LnGrp LOS	C	A	C	C	A	A	C	C	C	C	B	B
Approach Vol, veh/h		242			374			591			630	
Approach Delay, s/veh		25.2			23.5			24.1			19.9	
Approach LOS		C			C			C			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	12.9	14.2		13.0	6.6	20.6		20.2				
Change Period (Y+Rc), s	4.0	* 3.9		5.1	4.0	* 3.9		5.1				
Max Green Setting (Gmax), s	10.0	* 30		26.0	10.0	* 30		25.9				
Max Q Clear Time (g_c+I1), s	6.2	9.1		6.1	2.6	9.2		14.3				
Green Ext Time (p_c), s	0.0	1.3		0.3	0.0	0.9		0.8				

Intersection Summary			
HCM 6th Ctrl Delay		22.7	
HCM 6th LOS		C	

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	11.3
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	102	97	5	57	0	0	0	0	45	500	68
Future Vol, veh/h	0	102	97	5	57	0	0	0	0	45	500	68
Peak Hour 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
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	102	97	5	57	0	0	0	0	45	500	68
Number of Lanes	0	1	0	0	1	0	0	0	0	0	2	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	2	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	2	1
HCM Control Delay	10	9.2	11.9
HCM LOS	A	A	B

Lane	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	0%	8%	15%	0%
Vol Thru, %	51%	92%	85%	79%
Vol Right, %	49%	0%	0%	21%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	199	62	295	318
LT Vol	0	5	45	0
Through Vol	102	57	250	250
RT Vol	97	0	0	68
Lane Flow Rate	199	62	295	318
Geometry Grp	2	2	7	7
Degree of Util (X)	0.278	0.095	0.432	0.445
Departure Headway (Hd)	5.032	5.535	5.267	5.04
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	712	644	681	712
Service Time	3.081	3.602	3.025	2.798
HCM Lane V/C Ratio	0.279	0.096	0.433	0.447
HCM Control Delay	10	9.2	12	11.8
HCM Lane LOS	A	A	B	B
HCM 95th-tile Q	1.1	0.3	2.2	2.3

Intersection	
Intersection Delay, s/veh	10.1
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	49	98	0	0	33	80	29	420	18	0	0	0
Future Vol, veh/h	49	98	0	0	33	80	29	420	18	0	0	0
Peak Hour 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
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	49	98	0	0	33	80	29	420	18	0	0	0
Number of Lanes	0	1	0	0	1	0	0	2	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	1
HCM Control Delay	9.7	8.7	10.6
HCM LOS	A	A	B

Lane	NBLn1	NBLn2	EBLn1	WBLn1
Vol Left, %	12%	0%	33%	0%
Vol Thru, %	88%	92%	67%	29%
Vol Right, %	0%	8%	0%	71%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	239	228	147	113
LT Vol	29	0	49	0
Through Vol	210	210	98	33
RT Vol	0	18	0	80
Lane Flow Rate	239	228	147	113
Geometry Grp	7	7	2	2
Degree of Util (X)	0.347	0.324	0.213	0.15
Departure Headway (Hd)	5.232	5.116	5.206	4.774
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	684	700	688	748
Service Time	2.986	2.869	3.252	2.824
HCM Lane V/C Ratio	0.349	0.326	0.214	0.151
HCM Control Delay	10.8	10.3	9.7	8.7
HCM Lane LOS	B	B	A	A
HCM 95th-tile Q	1.6	1.4	0.8	0.5

HCM 6th Signalized Intersection Summary
6: Redwood Blvd & Grant Ave

02/16/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	100	99	199	23	76	39	224	377	48	32	428	87
Future Volume (veh/h)	100	99	199	23	76	39	224	377	48	32	428	87
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.95	0.98		0.96	1.00		0.90	1.00		0.95
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1900	1885	1900	1900	1900	1900	1870	1900	1900	1870	1900
Adj Flow Rate, veh/h	100	99	199	23	76	39	224	377	48	32	428	87
Peak Hour 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
Percent Heavy Veh, %	2	0	1	0	0	0	0	2	0	0	2	0
Cap, veh/h	580	764	611	505	764	622	348	712	90	366	694	140
Arrive On Green	0.40	0.40	0.40	0.40	0.40	0.40	0.19	0.23	0.23	0.20	0.24	0.24
Sat Flow, veh/h	1251	1900	1521	1074	1900	1547	1810	3128	394	1810	2919	587
Grp Volume(v), veh/h	100	99	199	23	76	39	224	212	213	32	259	256
Grp Sat Flow(s),veh/h/ln	1251	1900	1521	1074	1900	1547	1810	1777	1745	1810	1777	1730
Q Serve(g_s), s	3.6	2.2	6.0	0.9	1.7	1.0	7.6	7.0	7.1	1.0	8.7	8.8
Cycle Q Clear(g_c), s	5.3	2.2	6.0	3.1	1.7	1.0	7.6	7.0	7.1	1.0	8.7	8.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.23	1.00		0.34
Lane Grp Cap(c), veh/h	580	764	611	505	764	622	348	404	397	366	423	411
V/C Ratio(X)	0.17	0.13	0.33	0.05	0.10	0.06	0.64	0.52	0.54	0.09	0.61	0.62
Avail Cap(c_a), veh/h	809	1112	890	702	1112	905	693	1000	982	366	648	631
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.0	12.6	13.7	13.5	12.4	12.2	24.8	22.6	22.6	21.6	22.6	22.7
Incr Delay (d2), s/veh	0.2	0.1	0.4	0.1	0.1	0.1	1.5	1.1	1.1	0.1	1.4	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.9	2.0	0.2	0.7	0.3	3.3	2.9	2.9	0.4	3.6	3.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.2	12.7	14.1	13.6	12.5	12.3	26.3	23.6	23.8	21.7	24.1	24.3
LnGrp LOS	B	B	B	B	B	B	C	C	C	C	C	C
Approach Vol, veh/h		398			138			649			547	
Approach Delay, s/veh		13.8			12.6			24.6			24.0	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	16.3	19.5		30.8	17.2	18.7		30.8
Change Period (Y+Rc), s	3.5	3.7		4.0	3.7	* 3.5		4.0
Max Green Setting (Gmax), s	25.5	24.3		39.0	12.5	* 38		39.0
Max Q Clear Time (g_c+I1), s	10.6	10.8		5.1	3.0	9.1		8.0
Green Ext Time (p_c), s	0.4	2.8		1.0	0.0	2.8		2.7

Intersection Summary	
HCM 6th Ctrl Delay	21.0
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
7: Redwood Blvd & Diablo Ave/De Long Ave

02/16/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	232	489	168	156	574	207	54	139	31	201	274	170
Future Volume (veh/h)	232	489	168	156	574	207	54	139	31	201	274	170
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1900	1900	1900	1870	1826	1900	1900	1826	1811	1900	1810
Adj Flow Rate, veh/h	232	489	0	156	574	0	54	139	31	201	274	170
Peak Hour 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
Percent Heavy Veh, %	1	0	0	0	2	5	0	0	5	6	0	1
Cap, veh/h	455	1677		236	1649		155	702	298	283	367	285
Arrive On Green	0.13	0.46	0.00	0.13	0.46	0.00	0.09	0.19	0.19	0.08	0.19	0.19
Sat Flow, veh/h	3483	3705	0	1810	3647	0	1810	3610	1531	3346	1900	1478
Grp Volume(v), veh/h	232	489	0	156	574	0	54	139	31	201	274	170
Grp Sat Flow(s),veh/h/ln	1742	1805	0	1810	1777	0	1810	1805	1531	1673	1900	1478
Q Serve(g_s), s	8.1	10.9	0.0	10.7	13.4	0.0	3.7	4.2	2.2	7.6	17.7	13.6
Cycle Q Clear(g_c), s	8.1	10.9	0.0	10.7	13.4	0.0	3.7	4.2	2.2	7.6	17.7	13.6
Prop In Lane	1.00		0.00	1.00		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	455	1677		236	1649		155	702	298	283	367	285
V/C Ratio(X)	0.51	0.29		0.66	0.35		0.35	0.20	0.10	0.71	0.75	0.60
Avail Cap(c_a), veh/h	455	1677		237	1649		225	972	412	358	497	386
HCM 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
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	0.87	0.87	0.87
Uniform Delay (d), s/veh	52.6	21.6	0.0	53.8	22.3	0.0	56.0	43.9	43.1	58.0	49.4	47.8
Incr Delay (d2), s/veh	0.7	0.4	0.0	5.4	0.6	0.0	0.5	0.1	0.1	2.6	2.2	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.6	4.8	0.0	5.2	5.7	0.0	1.7	1.8	0.8	3.4	8.7	5.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.3	22.0	0.0	59.2	22.8	0.0	56.5	43.9	43.1	60.5	51.6	48.5
LnGrp LOS	D	C		E	C		E	D	D	E	D	D
Approach Vol, veh/h		721	A		730	A		224			645	
Approach Delay, s/veh		32.1			30.6			46.8			53.6	
Approach LOS		C			C			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.5	30.1	21.0	64.4	14.7	29.9	20.9	64.5
Change Period (Y+Rc), s	3.5	4.8	4.0	4.1	3.5	* 4.8	4.0	* 4.1
Max Green Setting (Gmax), s	13.9	35.0	17.0	47.7	16.2	* 34	17.0	* 48
Max Q Clear Time (g_c+I1), s	19.6	6.2	10.1	15.4	5.7	19.7	12.7	12.9
Green Ext Time (p_c), s	0.1	0.5	0.3	2.6	0.0	1.2	0.1	2.3

Intersection Summary	
HCM 6th Ctrl Delay	39.0
HCM 6th LOS	D

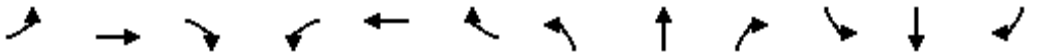
Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
1: Redwood Blvd & San Marin Dr

02/24/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	36	1167	218	379	1110	232	290	100	523	730	165	107
Future Volume (veh/h)	36	1167	218	379	1110	232	290	100	523	730	165	107
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1856	1885	1885	1885	1885	1856	1885	1885	1885
Adj Flow Rate, veh/h	36	1167	191	379	1110	199	290	100	0	730	165	84
Peak Hour 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
Percent Heavy Veh, %	1	1	1	3	1	1	1	1	3	1	1	1
Cap, veh/h	100	1411	231	252	1770	317	313	170		594	387	197
Arrive On Green	0.06	0.32	0.32	0.14	0.40	0.40	0.09	0.09	0.00	0.33	0.33	0.33
Sat Flow, veh/h	1795	4453	729	1767	4388	786	3483	1885	1572	1795	1170	596
Grp Volume(v), veh/h	36	899	459	379	868	441	290	100	0	730	0	249
Grp Sat Flow(s),veh/h/ln	1795	1716	1751	1767	1716	1744	1742	1885	1572	1795	0	1766
Q Serve(g_s), s	2.5	31.5	31.6	18.5	26.3	26.3	10.7	6.6	0.0	43.0	0.0	14.3
Cycle Q Clear(g_c), s	2.5	31.5	31.6	18.5	26.3	26.3	10.7	6.6	0.0	43.0	0.0	14.3
Prop In Lane	1.00		0.42	1.00		0.45	1.00		1.00	1.00		0.34
Lane Grp Cap(c), veh/h	100	1087	555	252	1384	703	313	170		594	0	584
V/C Ratio(X)	0.36	0.83	0.83	1.51	0.63	0.63	0.93	0.59		1.23	0.00	0.43
Avail Cap(c_a), veh/h	138	1161	593	252	1384	703	313	170		594	0	584
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	59.1	41.1	41.1	55.7	31.0	31.0	58.7	56.8	0.0	43.5	0.0	33.9
Incr Delay (d2), s/veh	0.8	5.1	9.5	247.4	2.2	4.2	31.6	3.7	0.0	117.4	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	13.9	14.9	25.5	11.2	11.8	6.0	3.3	0.0	37.8	0.0	6.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	59.9	46.2	50.6	303.1	33.1	35.2	90.3	60.5	0.0	160.9	0.0	34.1
LnGrp LOS	E	D	D	F	C	D	F	E		F	A	C
Approach Vol, veh/h		1394			1688			390	A		979	
Approach Delay, s/veh		48.0			94.3			82.6			128.7	
Approach LOS		D			F			F			F	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.3	56.4		16.0	21.5	45.2		47.3				
Change Period (Y+Rc), s	3.0	4.0		4.3	3.0	* 4		4.3				
Max Green Setting (Gmax), s	10.0	49.7		11.7	16.1	* 44		43.0				
Max Q Clear Time (g_c+I1), s	4.5	28.3		12.7	20.5	33.6		45.0				
Green Ext Time (p_c), s	0.0	12.5		0.0	0.0	7.4		0.0				

Intersection Summary			
HCM 6th Ctrl Delay		86.3	
HCM 6th LOS		F	

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	19

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	19	1	24	142	1	134	63	632	121	138	653	33
Future Vol, veh/h	19	1	24	142	1	134	63	632	121	138	653	33
Conflicting Peds, #/hr	5	0	8	8	0	5	9	0	8	5	0	6
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	40	-	-	-	-	-	160	-	-	200	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	5	0	5	0	3	5	5	3	0
Mvmt Flow	19	1	24	142	1	134	63	632	121	138	653	33

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1403	1842	360	1438	1798	390	695	0	0	761	0	0
Stage 1	955	955	-	827	827	-	-	-	-	-	-	-
Stage 2	448	887	-	611	971	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.6	6.5	7	4.1	-	-	4.2	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.6	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.6	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.55	4	3.35	2.2	-	-	2.25	-	-
Pot Cap-1 Maneuver	101	76	642	~ 91	81	600	910	-	-	827	-	-
Stage 1	282	339	-	326	389	-	-	-	-	-	-	-
Stage 2	565	365	-	440	334	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	63	58	632	~ 71	62	593	902	-	-	821	-	-
Mov Cap-2 Maneuver	149	132	-	166	148	-	-	-	-	-	-	-
Stage 1	260	280	-	301	359	-	-	-	-	-	-	-
Stage 2	404	337	-	348	276	-	-	-	-	-	-	-

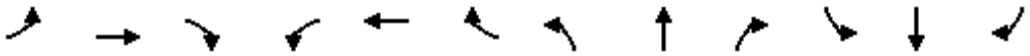
Approach	EB	WB	NB	SB
HCM Control Delay, s	20.9	123.8	0.7	1.7
HCM LOS	C	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	902	-	-	149	549	255	821	-	-
HCM Lane V/C Ratio	0.07	-	-	0.128	0.046	1.086	0.168	-	-
HCM Control Delay (s)	9.3	-	-	32.7	11.9	123.8	10.3	-	-
HCM Lane LOS	A	-	-	D	B	F	B	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.4	0.1	11.7	0.6	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

HCM 6th Signalized Intersection Summary
3: Redwood Blvd & Olive Ave

02/24/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	166	74	36	134	107	92	77	806	191	88	539	157
Future Volume (veh/h)	166	74	36	134	107	92	77	806	191	88	539	157
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	166	74	36	134	107	92	77	806	191	88	539	157
Peak Hour 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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	218	146	71	156	124	107	199	977	436	211	764	222
Arrive On Green	0.12	0.12	0.12	0.22	0.22	0.22	0.11	0.27	0.27	0.12	0.28	0.28
Sat Flow, veh/h	1781	1188	578	703	562	483	1781	3554	1585	1781	2717	788
Grp Volume(v), veh/h	166	0	110	333	0	0	77	806	191	88	352	344
Grp Sat Flow(s),veh/h/ln	1781	0	1766	1748	0	0	1781	1777	1585	1781	1777	1728
Q Serve(g_s), s	6.2	0.0	4.0	12.6	0.0	0.0	2.8	14.6	6.8	3.2	12.2	12.3
Cycle Q Clear(g_c), s	6.2	0.0	4.0	12.6	0.0	0.0	2.8	14.6	6.8	3.2	12.2	12.3
Prop In Lane	1.00		0.33	0.40		0.28	1.00		1.00	1.00		0.46
Lane Grp Cap(c), veh/h	218	0	216	387	0	0	199	977	436	211	500	486
V/C Ratio(X)	0.76	0.00	0.51	0.86	0.00	0.00	0.39	0.82	0.44	0.42	0.70	0.71
Avail Cap(c_a), veh/h	673	0	667	658	0	0	259	1548	691	259	774	753
HCM 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
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	29.2	0.0	28.3	25.8	0.0	0.0	28.4	23.4	20.6	28.2	22.2	22.2
Incr Delay (d2), s/veh	2.1	0.0	0.7	2.5	0.0	0.0	0.5	1.0	0.3	0.5	0.7	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	0.0	1.7	5.3	0.0	0.0	1.2	6.0	2.5	1.3	4.8	4.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	31.3	0.0	29.0	28.3	0.0	0.0	28.8	24.4	20.8	28.7	22.9	22.9
LnGrp LOS	C	A	C	C	A	A	C	C	C	C	C	C
Approach Vol, veh/h		276			333			1074			784	
Approach Delay, s/veh		30.4			28.3			24.1			23.5	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	12.1	22.8		13.5	11.7	23.3		20.4				
Change Period (Y+Rc), s	4.0	* 3.9		5.1	4.0	* 3.9		5.1				
Max Green Setting (Gmax), s	10.0	* 30		26.0	10.0	* 30		25.9				
Max Q Clear Time (g_c+I1), s	5.2	16.6		8.2	4.8	14.3		14.6				
Green Ext Time (p_c), s	0.0	2.3		0.3	0.0	1.4		0.7				

Intersection Summary		
HCM 6th Ctrl Delay		25.2
HCM 6th LOS		C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	17.4
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	171	130	30	208	0	0	0	0	49	652	75
Future Vol, veh/h	0	171	130	30	208	0	0	0	0	49	652	75
Peak Hour 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
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	171	130	30	208	0	0	0	0	49	652	75
Number of Lanes	0	1	0	0	1	0	0	0	0	0	2	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	2	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	2	1
HCM Control Delay	14.4	13.6	19.8
HCM LOS	B	B	C

Lane	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	0%	13%	13%	0%
Vol Thru, %	57%	87%	87%	81%
Vol Right, %	43%	0%	0%	19%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	301	238	375	401
LT Vol	0	30	49	0
Through Vol	171	208	326	326
RT Vol	130	0	0	75
Lane Flow Rate	301	238	375	401
Geometry Grp	2	2	7	7
Degree of Util (X)	0.49	0.412	0.645	0.668
Departure Headway (Hd)	5.855	6.238	6.195	5.996
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	614	576	585	601
Service Time	3.896	4.283	3.933	3.734
HCM Lane V/C Ratio	0.49	0.413	0.641	0.667
HCM Control Delay	14.4	13.6	19.6	20
HCM Lane LOS	B	B	C	C
HCM 95th-tile Q	2.7	2	4.6	5

Intersection	
Intersection Delay, s/veh	17.3
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	133	87	0	0	123	106	115	643	27	0	0	0
Future Vol, veh/h	133	87	0	0	123	106	115	643	27	0	0	0
Peak Hour 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
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	133	87	0	0	123	106	115	643	27	0	0	0
Number of Lanes	0	1	0	0	1	0	0	2	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	1
HCM Control Delay	13	12.2	20
HCM LOS	B	B	C

Lane	NBLn1	NBLn2	EBLn1	WBLn1
Vol Left, %	26%	0%	60%	0%
Vol Thru, %	74%	92%	40%	54%
Vol Right, %	0%	8%	0%	46%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	437	349	220	229
LT Vol	115	0	133	0
Through Vol	322	322	87	123
RT Vol	0	27	0	106
Lane Flow Rate	436	348	220	229
Geometry Grp	7	7	2	2
Degree of Util (X)	0.729	0.564	0.379	0.369
Departure Headway (Hd)	6.011	5.823	6.195	5.8
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	602	620	581	621
Service Time	3.74	3.552	4.23	3.836
HCM Lane V/C Ratio	0.724	0.561	0.379	0.369
HCM Control Delay	23.3	15.9	13	12.2
HCM Lane LOS	C	C	B	B
HCM 95th-tile Q	6.2	3.5	1.8	1.7

HCM 6th Signalized Intersection Summary
6: Redwood Blvd & Grant Ave

02/24/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	141	142	329	49	178	72	414	620	74	44	520	181
Future Volume (veh/h)	141	142	329	49	178	72	414	620	74	44	520	181
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.95	0.98		0.96	1.00		0.91	1.00		0.95
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1900	1885	1900	1900	1900	1900	1870	1900	1900	1870	1900
Adj Flow Rate, veh/h	141	142	329	49	178	72	414	620	74	44	520	181
Peak Hour 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
Percent Heavy Veh, %	2	0	1	0	0	0	0	2	0	0	2	0
Cap, veh/h	422	699	557	377	699	567	456	822	98	430	629	218
Arrive On Green	0.37	0.37	0.37	0.37	0.37	0.37	0.25	0.26	0.26	0.24	0.25	0.25
Sat Flow, veh/h	1110	1900	1515	920	1900	1542	1810	3158	376	1810	2553	883
Grp Volume(v), veh/h	141	142	329	49	178	72	414	348	346	44	361	340
Grp Sat Flow(s),veh/h/ln	1110	1900	1515	920	1900	1542	1810	1777	1757	1810	1777	1660
Q Serve(g_s), s	8.5	4.3	14.7	3.2	5.5	2.6	18.5	15.1	15.2	1.6	16.1	16.2
Cycle Q Clear(g_c), s	14.0	4.3	14.7	7.5	5.5	2.6	18.5	15.1	15.2	1.6	16.1	16.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.21	1.00		0.53
Lane Grp Cap(c), veh/h	422	699	557	377	699	567	456	463	457	430	438	409
V/C Ratio(X)	0.33	0.20	0.59	0.13	0.25	0.13	0.91	0.75	0.76	0.10	0.82	0.83
Avail Cap(c_a), veh/h	531	887	707	469	887	720	552	797	788	430	517	483
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.3	18.1	21.3	20.6	18.4	17.5	30.3	28.4	28.5	24.9	29.8	29.8
Incr Delay (d2), s/veh	0.7	0.2	1.4	0.2	0.3	0.1	16.3	2.5	2.6	0.1	9.1	10.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	1.9	5.3	0.7	2.4	0.9	10.0	6.6	6.6	0.7	7.8	7.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	24.0	18.3	22.8	20.8	18.7	17.7	46.6	30.9	31.0	24.9	38.9	40.1
LnGrp LOS	C	B	C	C	B	B	D	C	C	C	D	D
Approach Vol, veh/h		612			299			1108			745	
Approach Delay, s/veh		22.0			18.8			36.8			38.6	
Approach LOS		C			B			D			D	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	14.5	24.3		34.7	23.6	25.3		34.7
Change Period (Y+Rc), s	3.5	3.7		4.0	3.7	* 3.5		4.0
Max Green Setting (Gmax), s	25.5	24.3		39.0	12.5	* 38		39.0
Max Q Clear Time (g_c+I1), s	10.5	18.2		9.5	3.6	17.2		16.7
Green Ext Time (p_c), s	0.5	2.4		2.4	0.0	4.6		4.2

Intersection Summary	
HCM 6th Ctrl Delay	32.1
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	288	590	111	109	983	405	142	317	87	340	236	246
Future Volume (veh/h)	288	590	111	109	983	405	142	317	87	340	236	246
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1900	1900	1900	1870	1826	1900	1900	1826	1811	1900	1810
Adj Flow Rate, veh/h	288	590	0	109	983	0	142	317	87	340	236	246
Peak Hour 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
Percent Heavy Veh, %	1	0	0	0	2	5	0	0	5	6	0	1
Cap, veh/h	455	1583		232	1549		180	723	306	358	395	307
Arrive On Green	0.13	0.44	0.00	0.13	0.44	0.00	0.10	0.20	0.20	0.11	0.21	0.21
Sat Flow, veh/h	3483	3705	0	1810	3647	0	1810	3610	1531	3346	1900	1480
Grp Volume(v), veh/h	288	590	0	109	983	0	142	317	87	340	236	246
Grp Sat Flow(s),veh/h/ln	1742	1805	0	1810	1777	0	1810	1805	1531	1673	1900	1480
Q Serve(g_s), s	10.2	14.3	0.0	7.3	28.0	0.0	10.0	10.0	6.3	13.1	14.6	20.5
Cycle Q Clear(g_c), s	10.2	14.3	0.0	7.3	28.0	0.0	10.0	10.0	6.3	13.1	14.6	20.5
Prop In Lane	1.00		0.00	1.00		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	455	1583		232	1549		180	723	306	358	395	307
V/C Ratio(X)	0.63	0.37		0.47	0.63		0.79	0.44	0.28	0.95	0.60	0.80
Avail Cap(c_a), veh/h	455	1583		237	1549		225	972	412	358	497	387
HCM 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
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	0.72	0.72	0.72
Uniform Delay (d), s/veh	53.5	24.5	0.0	52.6	28.6	0.0	57.2	45.6	44.1	57.7	46.6	48.9
Incr Delay (d2), s/veh	2.6	0.7	0.0	0.6	2.0	0.0	10.7	0.2	0.2	28.0	0.4	5.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	6.3	0.0	3.3	12.2	0.0	5.0	4.4	2.4	7.0	7.0	8.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	56.1	25.2	0.0	53.1	30.6	0.0	68.0	45.7	44.3	85.7	47.0	54.2
LnGrp LOS	E	C		D	C		E	D	D	F	D	D
Approach Vol, veh/h		878	A		1092	A		546			822	
Approach Delay, s/veh		35.3			32.8			51.3			65.1	
Approach LOS		D			C			D			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	17.4	30.8	21.0	60.8	16.4	31.8	20.7	61.1
Change Period (Y+Rc), s	3.5	4.8	4.0	4.1	3.5	* 4.8	4.0	* 4.1
Max Green Setting (Gmax), s	13.9	35.0	17.0	47.7	16.2	* 34	17.0	* 48
Max Q Clear Time (g_c+I1), s	15.1	12.0	12.2	30.0	12.0	22.5	9.3	16.3
Green Ext Time (p_c), s	0.0	1.3	0.3	4.4	0.1	1.2	0.1	2.9

Intersection Summary	
HCM 6th Ctrl Delay	44.5
HCM 6th LOS	D

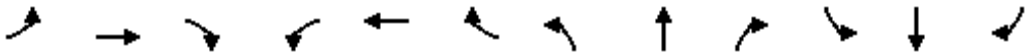
Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
1: Redwood Blvd & San Marin Dr

02/16/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	663	154	300	572	255	125	58	273	45	30	33
Future Volume (veh/h)	30	663	154	300	572	255	125	58	273	45	30	33
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1856	1885	1885	1885	1885	1856	1885	1885	1885
Adj Flow Rate, veh/h	32	698	162	316	602	268	132	61	0	47	32	35
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	3	1	1	1	1	3	1	1	1
Cap, veh/h	89	1170	268	803	2406	1046	238	129		162	73	80
Arrive On Green	0.05	0.28	0.28	0.45	0.68	0.68	0.07	0.07	0.00	0.09	0.09	0.09
Sat Flow, veh/h	1795	4181	958	1767	3513	1528	3483	1885	1572	1795	809	884
Grp Volume(v), veh/h	32	571	289	316	588	282	132	61	0	47	0	67
Grp Sat Flow(s),veh/h/ln	1795	1716	1708	1767	1716	1610	1742	1885	1572	1795	0	1693
Q Serve(g_s), s	2.5	21.0	21.4	17.3	9.5	9.8	5.4	4.5	0.0	3.6	0.0	5.5
Cycle Q Clear(g_c), s	2.5	21.0	21.4	17.3	9.5	9.8	5.4	4.5	0.0	3.6	0.0	5.5
Prop In Lane	1.00		0.56	1.00		0.95	1.00		1.00	1.00		0.52
Lane Grp Cap(c), veh/h	89	960	478	803	2350	1103	238	129		162	0	153
V/C Ratio(X)	0.36	0.59	0.60	0.39	0.25	0.26	0.55	0.47		0.29	0.00	0.44
Avail Cap(c_a), veh/h	123	1034	515	803	2350	1103	279	151		529	0	499
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	67.1	45.4	45.6	26.4	8.8	8.8	65.8	65.5	0.0	62.1	0.0	62.9
Incr Delay (d2), s/veh	0.9	1.0	2.2	0.7	0.3	0.6	0.7	1.0	0.0	0.4	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	9.1	9.4	7.5	3.6	3.6	2.4	2.2	0.0	1.6	0.0	2.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	68.0	46.5	47.8	27.1	9.0	9.4	66.6	66.5	0.0	62.4	0.0	63.7
LnGrp LOS	E	D	D	C	A	A	E	E		E	A	E
Approach Vol, veh/h		892			1186			193	A		114	
Approach Delay, s/veh		47.7			13.9			66.5			63.2	
Approach LOS		D			B			E			E	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.3	104.0		14.3	69.4	44.9		17.5				
Change Period (Y+Rc), s	3.0	4.0		4.3	3.0	* 4		4.3				
Max Green Setting (Gmax), s	10.0	49.7		11.7	16.1	* 44		43.0				
Max Q Clear Time (g_c+I1), s	4.5	11.8		7.4	19.3	23.4		7.5				
Green Ext Time (p_c), s	0.0	10.2		0.1	0.0	7.6		0.3				

Intersection Summary		
HCM 6th Ctrl Delay	33.1	
HCM 6th LOS	C	

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

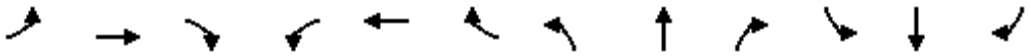
Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	24	0	23	14	0	8	11	407	15	5	418	14
Future Vol, veh/h	24	0	23	14	0	8	11	407	15	5	418	14
Conflicting Peds, #/hr	5	0	8	8	0	5	9	0	8	5	0	6
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	40	-	-	-	-	-	160	-	-	200	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	0	0	0	5	0	5	0	3	5	5	3	0
Mvmt Flow	25	0	24	14	0	8	11	420	15	5	431	14

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	694	922	240	692	922	231	454	0	0	443	0	0
Stage 1	457	457	-	458	458	-	-	-	-	-	-	-
Stage 2	237	465	-	234	464	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.6	6.5	7	4.1	-	-	4.2	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.6	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.6	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.55	4	3.35	2.2	-	-	2.25	-	-
Pot Cap-1 Maneuver	333	272	767	325	272	762	1117	-	-	1092	-	-
Stage 1	558	571	-	544	570	-	-	-	-	-	-	-
Stage 2	751	566	-	739	567	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	321	263	755	306	263	753	1107	-	-	1084	-	-
Mov Cap-2 Maneuver	426	374	-	411	373	-	-	-	-	-	-	-
Stage 1	548	563	-	535	560	-	-	-	-	-	-	-
Stage 2	732	556	-	707	559	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12	12.7	0.2	0.1
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1107	-	-	426	755	492	1084	-	-
HCM Lane V/C Ratio	0.01	-	-	0.058	0.031	0.046	0.005	-	-
HCM Control Delay (s)	8.3	-	-	14	9.9	12.7	8.3	-	-
HCM Lane LOS	A	-	-	B	A	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.1	0.1	0	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	87	97	27	112	129	92	15	332	102	155	326	66
Future Volume (veh/h)	87	97	27	112	129	92	15	332	102	155	326	66
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	95	105	29	122	140	100	16	361	111	168	354	72
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	240	190	52	144	165	118	70	527	235	287	796	160
Arrive On Green	0.13	0.13	0.13	0.24	0.24	0.24	0.04	0.15	0.15	0.16	0.27	0.27
Sat Flow, veh/h	1781	1411	390	591	678	484	1781	3554	1585	1781	2947	593
Grp Volume(v), veh/h	95	0	134	362	0	0	16	361	111	168	212	214
Grp Sat Flow(s),veh/h/ln	1781	0	1800	1754	0	0	1781	1777	1585	1781	1777	1764
Q Serve(g_s), s	2.8	0.0	4.0	11.4	0.0	0.0	0.5	5.6	3.7	5.1	5.7	5.8
Cycle Q Clear(g_c), s	2.8	0.0	4.0	11.4	0.0	0.0	0.5	5.6	3.7	5.1	5.7	5.8
Prop In Lane	1.00		0.22	0.34		0.28	1.00		1.00	1.00		0.34
Lane Grp Cap(c), veh/h	240	0	242	428	0	0	70	527	235	287	480	476
V/C Ratio(X)	0.40	0.00	0.55	0.85	0.00	0.00	0.23	0.69	0.47	0.59	0.44	0.45
Avail Cap(c_a), veh/h	799	0	808	784	0	0	307	1840	821	307	920	913
HCM 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
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.9	0.0	23.4	20.9	0.0	0.0	27.0	23.4	22.6	22.5	17.5	17.6
Incr Delay (d2), s/veh	0.4	0.0	0.7	1.8	0.0	0.0	0.6	0.6	0.5	1.5	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.0	1.7	4.6	0.0	0.0	0.2	2.3	1.4	2.0	2.1	2.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.3	0.0	24.2	22.7	0.0	0.0	27.6	24.0	23.2	24.0	17.8	17.8
LnGrp LOS	C	A	C	C	A	A	C	C	C	C	B	B
Approach Vol, veh/h		229			362			488			594	
Approach Delay, s/veh		23.8			22.7			23.9			19.5	
Approach LOS		C			C			C			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	13.3	12.5		12.9	6.3	19.6		19.2				
Change Period (Y+Rc), s	4.0	* 3.9		5.1	4.0	* 3.9		5.1				
Max Green Setting (Gmax), s	10.0	* 30		26.0	10.0	* 30		25.9				
Max Q Clear Time (g_c+I1), s	7.1	7.6		6.0	2.5	7.8		13.4				
Green Ext Time (p_c), s	0.0	1.0		0.3	0.0	0.8		0.8				

Intersection Summary		
HCM 6th Ctrl Delay		22.1
HCM 6th LOS		C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	10.3
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	82	73	3	36	0	0	0	0	37	345	59
Future Vol, veh/h	0	82	73	3	36	0	0	0	0	37	345	59
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	96	86	4	42	0	0	0	0	44	406	69
Number of Lanes	0	1	0	0	1	0	0	0	0	0	2	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	2	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	2	1
HCM Control Delay	9.5	8.8	10.7
HCM LOS	A	A	B

Lane	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	0%	8%	18%	0%
Vol Thru, %	53%	92%	82%	75%
Vol Right, %	47%	0%	0%	25%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	155	39	210	232
LT Vol	0	3	37	0
Through Vol	82	36	173	173
RT Vol	73	0	0	59
Lane Flow Rate	182	46	246	272
Geometry Grp	2	2	7	7
Degree of Util (X)	0.245	0.068	0.355	0.372
Departure Headway (Hd)	4.845	5.326	5.182	4.914
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	740	670	693	730
Service Time	2.883	3.379	2.926	2.658
HCM Lane V/C Ratio	0.246	0.069	0.355	0.373
HCM Control Delay	9.5	8.8	10.8	10.6
HCM Lane LOS	A	A	B	B
HCM 95th-tile Q	1	0.2	1.6	1.7

Intersection	
Intersection Delay, s/veh	9.1
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	33	86	0	0	28	70	11	258	12	0	0	0
Future Vol, veh/h	33	86	0	0	28	70	11	258	12	0	0	0
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	39	101	0	0	33	82	13	304	14	0	0	0
Number of Lanes	0	1	0	0	1	0	0	2	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	1
HCM Control Delay	9.1	8.3	9.4
HCM LOS	A	A	A

Lane	NBLn1	NBLn2	EBLn1	WBLn1
Vol Left, %	8%	0%	28%	0%
Vol Thru, %	92%	91%	72%	29%
Vol Right, %	0%	9%	0%	71%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	140	141	119	98
LT Vol	11	0	33	0
Through Vol	129	129	86	28
RT Vol	0	12	0	70
Lane Flow Rate	165	166	140	115
Geometry Grp	7	7	2	2
Degree of Util (X)	0.237	0.234	0.191	0.143
Departure Headway (Hd)	5.172	5.072	4.911	4.47
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	693	707	731	800
Service Time	2.91	2.811	2.945	2.506
HCM Lane V/C Ratio	0.238	0.235	0.192	0.144
HCM Control Delay	9.5	9.4	9.1	8.3
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.9	0.9	0.7	0.5

HCM 6th Signalized Intersection Summary
6: Redwood Blvd & Grant Ave

02/16/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	54	93	109	12	72	26	165	294	36	36	324	60
Future Volume (veh/h)	54	93	109	12	72	26	165	294	36	36	324	60
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.95	0.98		0.96	1.00		0.89	1.00		0.95
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1900	1885	1900	1900	1900	1900	1870	1900	1900	1870	1900
Adj Flow Rate, veh/h	59	102	120	13	79	29	181	323	40	40	356	66
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	0	1	0	0	0	0	2	0	0	2	0
Cap, veh/h	587	770	616	536	770	627	344	673	82	381	697	128
Arrive On Green	0.41	0.41	0.41	0.41	0.41	0.41	0.19	0.21	0.21	0.21	0.23	0.23
Sat Flow, veh/h	1259	1900	1521	1149	1900	1547	1810	3139	383	1810	2973	544
Grp Volume(v), veh/h	59	102	120	13	79	29	181	181	182	40	211	211
Grp Sat Flow(s),veh/h/ln	1259	1900	1521	1149	1900	1547	1810	1777	1745	1810	1777	1740
Q Serve(g_s), s	2.0	2.2	3.4	0.5	1.7	0.7	5.9	5.9	6.0	1.2	6.8	7.0
Cycle Q Clear(g_c), s	3.7	2.2	3.4	2.7	1.7	0.7	5.9	5.9	6.0	1.2	6.8	7.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.22	1.00		0.31
Lane Grp Cap(c), veh/h	587	770	616	536	770	627	344	381	374	381	417	408
V/C Ratio(X)	0.10	0.13	0.19	0.02	0.10	0.05	0.53	0.47	0.49	0.11	0.51	0.52
Avail Cap(c_a), veh/h	822	1126	901	751	1126	916	701	1012	994	381	656	642
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.3	12.3	12.6	13.2	12.2	11.9	24.0	22.6	22.7	21.0	21.9	22.0
Incr Delay (d2), s/veh	0.1	0.1	0.2	0.0	0.1	0.0	0.9	0.9	1.0	0.1	1.0	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.9	1.1	0.1	0.7	0.2	2.5	2.5	2.5	0.5	2.8	2.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.4	12.4	12.9	13.2	12.2	11.9	24.9	23.5	23.7	21.1	22.8	23.0
LnGrp LOS	B	B	B	B	B	B	C	C	C	C	C	C
Approach Vol, veh/h		281			121			544			462	
Approach Delay, s/veh		12.8			12.3			24.0			22.7	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	16.0	19.1		30.7	17.6	17.6		30.7
Change Period (Y+Rc), s	3.5	3.7		4.0	3.7	* 3.5		4.0
Max Green Setting (Gmax), s	25.5	24.3		39.0	12.5	* 38		39.0
Max Q Clear Time (g_c+I1), s	7.9	9.0		4.7	3.2	8.0		5.7
Green Ext Time (p_c), s	0.3	2.3		0.9	0.0	2.4		1.9

Intersection Summary	
HCM 6th Ctrl Delay	20.4
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
7: Redwood Blvd & Diablo Ave/De Long Ave

02/16/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	177	421	152	154	554	144	40	101	30	108	199	133
Future Volume (veh/h)	177	421	152	154	554	144	40	101	30	108	199	133
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1900	1900	1900	1870	1826	1900	1900	1826	1811	1900	1810
Adj Flow Rate, veh/h	192	458	0	167	602	0	43	110	33	117	216	145
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	0	0	0	2	5	0	0	5	6	0	1
Cap, veh/h	455	1778		236	1750		143	604	256	279	327	253
Arrive On Green	0.13	0.49	0.00	0.13	0.49	0.00	0.08	0.17	0.17	0.08	0.17	0.17
Sat Flow, veh/h	3483	3705	0	1810	3647	0	1810	3610	1528	3346	1900	1473
Grp Volume(v), veh/h	192	458	0	167	602	0	43	110	33	117	216	145
Grp Sat Flow(s),veh/h/ln	1742	1805	0	1810	1777	0	1810	1805	1528	1673	1900	1473
Q Serve(g_s), s	6.6	9.6	0.0	11.5	13.5	0.0	2.9	3.4	2.4	4.3	13.8	11.8
Cycle Q Clear(g_c), s	6.6	9.6	0.0	11.5	13.5	0.0	2.9	3.4	2.4	4.3	13.8	11.8
Prop In Lane	1.00		0.00	1.00		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	455	1778		236	1750		143	604	256	279	327	253
V/C Ratio(X)	0.42	0.26		0.71	0.34		0.30	0.18	0.13	0.42	0.66	0.57
Avail Cap(c_a), veh/h	455	1778		237	1750		225	972	411	358	497	385
HCM 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
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	0.93	0.93	0.93
Uniform Delay (d), s/veh	52.0	19.2	0.0	54.1	20.2	0.0	56.5	46.5	46.1	56.6	50.3	49.4
Incr Delay (d2), s/veh	0.5	0.4	0.0	8.0	0.5	0.0	0.4	0.1	0.1	0.3	0.8	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	4.1	0.0	5.7	5.6	0.0	1.3	1.5	0.9	1.9	6.7	4.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	52.5	19.5	0.0	62.1	20.7	0.0	56.9	46.5	46.1	56.9	51.1	50.1
LnGrp LOS	D	B		E	C		E	D	D	E	D	D
Approach Vol, veh/h		650	A		769	A		186			478	
Approach Delay, s/veh		29.2			29.7			48.9			52.2	
Approach LOS		C			C			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.3	26.6	21.0	68.1	13.7	27.1	21.0	68.1
Change Period (Y+Rc), s	3.5	4.8	4.0	4.1	3.5	* 4.8	4.0	* 4.1
Max Green Setting (Gmax), s	13.9	35.0	17.0	47.7	16.2	* 34	17.0	* 48
Max Q Clear Time (g_c+I1), s	10.3	5.4	8.6	15.5	4.9	15.8	13.5	11.6
Green Ext Time (p_c), s	0.1	0.4	0.3	2.8	0.0	1.0	0.1	2.2

Intersection Summary	
HCM 6th Ctrl Delay	36.4
HCM 6th LOS	D

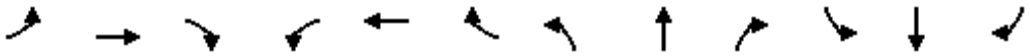
Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
1: Redwood Blvd & San Marin Dr

02/16/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	536	152	265	893	52	268	54	410	227	69	63
Future Volume (veh/h)	14	536	152	265	893	52	268	54	410	227	69	63
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1856	1885	1885	1885	1885	1856	1885	1885	1885
Adj Flow Rate, veh/h	15	570	162	282	950	55	285	57	0	241	73	67
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	1	1	1	3	1	1	1	1	3	1	1	1
Cap, veh/h	58	1163	323	588	2943	170	313	170		299	149	137
Arrive On Green	0.03	0.29	0.29	0.33	0.59	0.59	0.09	0.09	0.00	0.17	0.17	0.17
Sat Flow, veh/h	1795	4000	1111	1767	4977	288	3483	1885	1572	1795	894	821
Grp Volume(v), veh/h	15	487	245	282	654	351	285	57	0	241	0	140
Grp Sat Flow(s),veh/h/ln	1795	1716	1680	1767	1716	1833	1742	1885	1572	1795	0	1715
Q Serve(g_s), s	1.1	15.3	15.7	16.5	12.5	12.6	10.5	3.7	0.0	16.8	0.0	9.6
Cycle Q Clear(g_c), s	1.1	15.3	15.7	16.5	12.5	12.6	10.5	3.7	0.0	16.8	0.0	9.6
Prop In Lane	1.00		0.66	1.00		0.16	1.00		1.00	1.00		0.48
Lane Grp Cap(c), veh/h	58	997	488	588	2029	1084	313	170		299	0	285
V/C Ratio(X)	0.26	0.49	0.50	0.48	0.32	0.32	0.91	0.34		0.81	0.00	0.49
Avail Cap(c_a), veh/h	138	1161	569	588	2029	1084	313	170		594	0	567
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	61.4	38.1	38.3	34.4	13.4	13.4	58.6	55.5	0.0	52.2	0.0	49.2
Incr Delay (d2), s/veh	0.9	0.5	1.1	1.3	0.4	0.8	28.3	0.4	0.0	2.0	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	6.5	6.6	7.3	4.9	5.4	5.8	1.7	0.0	7.6	0.0	4.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	62.3	38.6	39.4	35.7	13.8	14.2	86.9	55.9	0.0	54.1	0.0	49.7
LnGrp LOS	E	D	D	D	B	B	F	E		D	A	D
Approach Vol, veh/h		747			1287			342	A		381	
Approach Delay, s/veh		39.4			18.7			81.7			52.5	
Approach LOS		D			B			F			D	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.2	80.9		16.0	46.3	41.8		25.9				
Change Period (Y+Rc), s	3.0	4.0		4.3	3.0	* 4		4.3				
Max Green Setting (Gmax), s	10.0	49.7		11.7	16.1	* 44		43.0				
Max Q Clear Time (g_c+I1), s	3.1	14.6		12.5	18.5	17.7		18.8				
Green Ext Time (p_c), s	0.0	11.7		0.0	0.0	7.1		0.8				

Intersection Summary		
HCM 6th Ctrl Delay	36.8	
HCM 6th LOS	D	

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

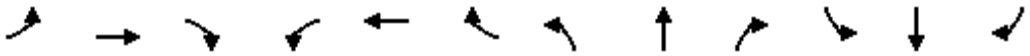
Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	11	0	12	20	0	11	16	574	17	8	519	17
Future Vol, veh/h	11	0	12	20	0	11	16	574	17	8	519	17
Conflicting Peds, #/hr	5	0	8	8	0	5	9	0	8	5	0	6
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	40	-	-	-	-	-	160	-	-	200	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	0	0	5	0	5	0	3	5	5	3	0
Mvmt Flow	11	0	13	21	0	11	17	598	18	8	541	18

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	913	1233	297	944	1233	321	568	0	0	624	0	0
Stage 1	575	575	-	649	649	-	-	-	-	-	-	-
Stage 2	338	658	-	295	584	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.6	6.5	7	4.1	-	-	4.2	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.6	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.6	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.55	4	3.35	2.2	-	-	2.25	-	-
Pot Cap-1 Maneuver	232	178	705	212	178	666	1014	-	-	933	-	-
Stage 1	475	506	-	418	469	-	-	-	-	-	-	-
Stage 2	656	464	-	681	501	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	221	171	694	201	171	658	1005	-	-	926	-	-
Mov Cap-2 Maneuver	340	292	-	312	291	-	-	-	-	-	-	-
Stage 1	463	497	-	408	457	-	-	-	-	-	-	-
Stage 2	631	452	-	658	492	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13	15.2	0.2	0.1
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1005	-	-	340	694	384	926	-	-
HCM Lane V/C Ratio	0.017	-	-	0.034	0.018	0.084	0.009	-	-
HCM Control Delay (s)	8.6	-	-	16	10.3	15.2	8.9	-	-
HCM Lane LOS	A	-	-	C	B	C	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	0.1	0.3	0	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	122	71	29	146	105	94	71	714	160	119	321	110
Future Volume (veh/h)	122	71	29	146	105	94	71	714	160	119	321	110
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	130	76	31	155	112	100	76	760	170	127	341	117
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	200	142	58	177	128	114	196	925	412	232	731	247
Arrive On Green	0.11	0.11	0.11	0.24	0.24	0.24	0.11	0.26	0.26	0.13	0.28	0.28
Sat Flow, veh/h	1781	1263	515	738	533	476	1781	3554	1585	1781	2608	880
Grp Volume(v), veh/h	130	0	107	367	0	0	76	760	170	127	231	227
Grp Sat Flow(s),veh/h/ln	1781	0	1778	1748	0	0	1781	1777	1585	1781	1777	1712
Q Serve(g_s), s	4.9	0.0	4.0	14.2	0.0	0.0	2.8	14.2	6.3	4.7	7.6	7.8
Cycle Q Clear(g_c), s	4.9	0.0	4.0	14.2	0.0	0.0	2.8	14.2	6.3	4.7	7.6	7.8
Prop In Lane	1.00		0.29	0.42		0.27	1.00		1.00	1.00		0.51
Lane Grp Cap(c), veh/h	200	0	200	420	0	0	196	925	412	232	498	480
V/C Ratio(X)	0.65	0.00	0.54	0.87	0.00	0.00	0.39	0.82	0.41	0.55	0.46	0.47
Avail Cap(c_a), veh/h	658	0	656	643	0	0	253	1514	675	253	757	729
HCM 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
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	29.9	0.0	29.5	25.7	0.0	0.0	29.1	24.5	21.6	28.7	21.0	21.0
Incr Delay (d2), s/veh	1.3	0.0	0.8	5.7	0.0	0.0	0.5	0.7	0.2	0.8	0.2	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	0.0	1.7	6.3	0.0	0.0	1.2	5.8	2.3	2.0	2.9	2.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	31.2	0.0	30.3	31.4	0.0	0.0	29.6	25.3	21.8	29.5	21.2	21.3
LnGrp LOS	C	A	C	C	A	A	C	C	C	C	C	C
Approach Vol, veh/h		237			367			1006			585	
Approach Delay, s/veh		30.8			31.4			25.0			23.0	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	13.2	22.2		13.0	11.7	23.6		22.0				
Change Period (Y+Rc), s	4.0	* 3.9		5.1	4.0	* 3.9		5.1				
Max Green Setting (Gmax), s	10.0	* 30		26.0	10.0	* 30		25.9				
Max Q Clear Time (g_c+I1), s	6.7	16.2		6.9	4.8	9.8		16.2				
Green Ext Time (p_c), s	0.0	2.1		0.2	0.0	0.9		0.7				

Intersection Summary		
HCM 6th Ctrl Delay		26.2
HCM 6th LOS		C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	12.5
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	152	101	24	165	0	0	0	0	40	406	58
Future Vol, veh/h	0	152	101	24	165	0	0	0	0	40	406	58
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	165	110	26	179	0	0	0	0	43	441	63
Number of Lanes	0	1	0	0	1	0	0	0	0	0	2	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	2	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	2	1
HCM Control Delay	12.1	11.6	13.1
HCM LOS	B	B	B

Lane	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	0%	13%	16%	0%
Vol Thru, %	60%	87%	84%	78%
Vol Right, %	40%	0%	0%	22%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	253	189	243	261
LT Vol	0	24	40	0
Through Vol	152	165	203	203
RT Vol	101	0	0	58
Lane Flow Rate	275	205	264	284
Geometry Grp	2	2	7	7
Degree of Util (X)	0.411	0.328	0.437	0.45
Departure Headway (Hd)	5.38	5.743	5.95	5.709
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	668	627	607	633
Service Time	3.412	3.776	3.676	3.435
HCM Lane V/C Ratio	0.412	0.327	0.435	0.449
HCM Control Delay	12.1	11.6	13.2	13
HCM Lane LOS	B	B	B	B
HCM 95th-tile Q	2	1.4	2.2	2.3

Intersection	
Intersection Delay, s/veh	13
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	118	74	0	0	110	96	79	451	21	0	0	0
Future Vol, veh/h	118	74	0	0	110	96	79	451	21	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	128	80	0	0	120	104	86	490	23	0	0	0
Number of Lanes	0	1	0	0	1	0	0	2	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	1
HCM Control Delay	11.9	11.3	14.1
HCM LOS	B	B	B

Lane	NBLn1	NBLn2	EBLn1	WBLn1
Vol Left, %	26%	0%	61%	0%
Vol Thru, %	74%	91%	39%	53%
Vol Right, %	0%	9%	0%	47%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	305	247	192	206
LT Vol	79	0	118	0
Through Vol	226	226	74	110
RT Vol	0	21	0	96
Lane Flow Rate	331	268	209	224
Geometry Grp	7	7	2	2
Degree of Util (X)	0.542	0.425	0.34	0.339
Departure Headway (Hd)	5.895	5.704	5.858	5.451
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	612	632	614	661
Service Time	3.619	3.428	3.89	3.482
HCM Lane V/C Ratio	0.541	0.424	0.34	0.339
HCM Control Delay	15.4	12.6	11.9	11.3
HCM Lane LOS	C	B	B	B
HCM 95th-tile Q	3.2	2.1	1.5	1.5

HCM 6th Signalized Intersection Summary
6: Redwood Blvd & Grant Ave

02/16/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	130	179	28	164	67	261	535	56	47	391	94
Future Volume (veh/h)	75	130	179	28	164	67	261	535	56	47	391	94
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.95	0.98		0.96	1.00		0.91	1.00		0.95
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1900	1885	1900	1900	1900	1900	1870	1900	1900	1870	1900
Adj Flow Rate, veh/h	79	137	188	29	173	71	275	563	59	49	412	99
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	0	1	0	0	0	0	2	0	0	2	0
Cap, veh/h	489	763	610	480	763	621	350	875	91	287	669	159
Arrive On Green	0.40	0.40	0.40	0.40	0.40	0.40	0.19	0.27	0.27	0.16	0.24	0.24
Sat Flow, veh/h	1117	1900	1520	1049	1900	1546	1810	3212	335	1810	2818	669
Grp Volume(v), veh/h	79	137	188	29	173	71	275	310	312	49	258	253
Grp Sat Flow(s),veh/h/ln	1117	1900	1520	1049	1900	1546	1810	1777	1770	1810	1777	1710
Q Serve(g_s), s	3.3	3.1	5.6	1.2	4.0	1.9	9.7	10.3	10.4	1.6	8.6	8.8
Cycle Q Clear(g_c), s	7.4	3.1	5.6	4.3	4.0	1.9	9.7	10.3	10.4	1.6	8.6	8.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.19	1.00		0.39
Lane Grp Cap(c), veh/h	489	763	610	480	763	621	350	484	482	287	422	406
V/C Ratio(X)	0.16	0.18	0.31	0.06	0.23	0.11	0.79	0.64	0.65	0.17	0.61	0.62
Avail Cap(c_a), veh/h	693	1110	888	672	1110	903	691	998	994	339	647	622
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	15.6	12.9	13.7	14.3	13.2	12.5	25.6	21.4	21.4	24.3	22.7	22.8
Incr Delay (d2), s/veh	0.2	0.2	0.4	0.1	0.2	0.1	2.9	1.4	1.5	0.2	1.4	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	1.3	1.9	0.3	1.7	0.6	4.3	4.3	4.3	0.7	3.6	3.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.8	13.1	14.1	14.4	13.4	12.7	28.5	22.8	22.9	24.5	24.2	24.4
LnGrp LOS	B	B	B	B	B	B	C	C	C	C	C	C
Approach Vol, veh/h		404			273			897			560	
Approach Delay, s/veh		14.1			13.3			24.6			24.3	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	16.4	19.6		30.8	14.3	21.7		30.8
Change Period (Y+Rc), s	3.5	3.7		4.0	3.7	* 3.5		4.0
Max Green Setting (Gmax), s	25.5	24.3		39.0	12.5	* 38		39.0
Max Q Clear Time (g_c+I1), s	11.7	10.8		6.3	3.6	12.4		9.4
Green Ext Time (p_c), s	0.5	2.7		2.2	0.0	4.3		2.9

Intersection Summary	
HCM 6th Ctrl Delay	21.1
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
7: Redwood Blvd & Diablo Ave/De Long Ave

02/16/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	241	555	91	108	941	261	119	248	80	200	148	172
Future Volume (veh/h)	241	555	91	108	941	261	119	248	80	200	148	172
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1900	1900	1900	1870	1826	1900	1900	1826	1811	1900	1810
Adj Flow Rate, veh/h	246	566	0	110	960	0	121	253	82	204	151	176
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	0	0	0	2	5	0	0	5	6	0	1
Cap, veh/h	455	1704		232	1669		179	682	289	283	332	257
Arrive On Green	0.13	0.47	0.00	0.13	0.47	0.00	0.10	0.19	0.19	0.08	0.17	0.17
Sat Flow, veh/h	3483	3705	0	1810	3647	0	1810	3610	1530	3346	1900	1474
Grp Volume(v), veh/h	246	566	0	110	960	0	121	253	82	204	151	176
Grp Sat Flow(s),veh/h/ln	1742	1805	0	1810	1777	0	1810	1805	1530	1673	1900	1474
Q Serve(g_s), s	8.6	12.8	0.0	7.3	25.5	0.0	8.4	7.9	6.0	7.7	9.3	14.6
Cycle Q Clear(g_c), s	8.6	12.8	0.0	7.3	25.5	0.0	8.4	7.9	6.0	7.7	9.3	14.6
Prop In Lane	1.00		0.00	1.00		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	455	1704		232	1669		179	682	289	283	332	257
V/C Ratio(X)	0.54	0.33		0.47	0.58		0.68	0.37	0.28	0.72	0.45	0.68
Avail Cap(c_a), veh/h	455	1704		237	1669		225	972	412	358	497	385
HCM 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
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	0.87	0.87	0.87
Uniform Delay (d), s/veh	52.8	21.5	0.0	52.6	25.1	0.0	56.6	46.0	45.2	58.0	48.1	50.3
Incr Delay (d2), s/veh	1.1	0.5	0.0	0.6	1.4	0.0	3.1	0.1	0.2	2.9	0.3	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.8	5.6	0.0	3.4	10.9	0.0	3.9	3.5	2.3	3.4	4.5	5.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.9	22.0	0.0	53.1	26.5	0.0	59.6	46.1	45.4	60.9	48.4	51.3
LnGrp LOS	D	C		D	C		E	D	D	E	D	D
Approach Vol, veh/h		812	A		1070	A		456			531	
Approach Delay, s/veh		31.7			29.2			49.6			54.2	
Approach LOS		C			C			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.5	29.4	21.0	65.2	16.3	27.5	20.7	65.5
Change Period (Y+Rc), s	3.5	4.8	4.0	4.1	3.5	* 4.8	4.0	* 4.1
Max Green Setting (Gmax), s	13.9	35.0	17.0	47.7	16.2	* 34	17.0	* 48
Max Q Clear Time (g_c+I1), s	10.7	9.9	10.6	27.5	10.4	16.6	9.3	14.8
Green Ext Time (p_c), s	0.1	1.0	0.3	4.5	0.1	0.8	0.1	2.7

Intersection Summary	
HCM 6th Ctrl Delay	37.8
HCM 6th LOS	D

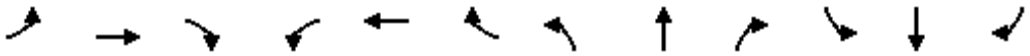
Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
1: Redwood Blvd & San Marin Dr

02/16/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	31	679	175	331	587	264	142	66	310	66	48	36
Future Volume (veh/h)	31	679	175	331	587	264	142	66	310	66	48	36
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1856	1885	1885	1885	1885	1856	1885	1885	1885
Adj Flow Rate, veh/h	33	715	184	348	618	278	149	69	0	69	51	38
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	3	1	1	1	1	3	1	1	1
Cap, veh/h	91	1147	291	801	2392	1053	239	129		163	90	67
Arrive On Green	0.05	0.28	0.28	0.45	0.68	0.68	0.07	0.07	0.00	0.09	0.09	0.09
Sat Flow, veh/h	1795	4086	1038	1767	3499	1540	3483	1885	1572	1795	989	737
Grp Volume(v), veh/h	33	599	300	348	606	290	149	69	0	69	0	89
Grp Sat Flow(s),veh/h/ln	1795	1716	1693	1767	1716	1608	1742	1885	1572	1795	0	1725
Q Serve(g_s), s	2.6	22.2	22.6	19.6	9.9	10.2	6.1	5.2	0.0	5.3	0.0	7.2
Cycle Q Clear(g_c), s	2.6	22.2	22.6	19.6	9.9	10.2	6.1	5.2	0.0	5.3	0.0	7.2
Prop In Lane	1.00		0.61	1.00		0.96	1.00		1.00	1.00		0.43
Lane Grp Cap(c), veh/h	91	963	475	801	2345	1099	239	129		163	0	156
V/C Ratio(X)	0.36	0.62	0.63	0.43	0.26	0.26	0.62	0.53		0.42	0.00	0.57
Avail Cap(c_a), veh/h	123	1034	510	801	2345	1099	279	151		529	0	508
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	67.0	45.8	45.9	27.2	8.9	8.9	66.2	65.8	0.0	62.8	0.0	63.7
Incr Delay (d2), s/veh	0.9	1.3	2.7	0.8	0.3	0.6	1.8	1.3	0.0	0.7	0.0	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	9.6	9.9	8.5	3.7	3.7	2.7	2.5	0.0	2.4	0.0	3.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	67.9	47.0	48.7	28.0	9.1	9.5	67.9	67.0	0.0	63.4	0.0	64.9
LnGrp LOS	E	D	D	C	A	A	E	E		E	A	E
Approach Vol, veh/h		932			1244			218	A		158	
Approach Delay, s/veh		48.3			14.5			67.7			64.2	
Approach LOS		D			B			E			E	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.4	103.8		14.3	69.2	45.0		17.5				
Change Period (Y+Rc), s	3.0	4.0		4.3	3.0	* 4		4.3				
Max Green Setting (Gmax), s	10.0	49.7		11.7	16.1	* 44		43.0				
Max Q Clear Time (g_c+I1), s	4.6	12.2		8.1	21.6	24.6		9.2				
Green Ext Time (p_c), s	0.0	10.6		0.2	0.0	7.8		0.4				

Intersection Summary		
HCM 6th Ctrl Delay		34.5
HCM 6th LOS		C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	31	0	34	22	0	26	15	444	27	28	462	17
Future Vol, veh/h	31	0	34	22	0	26	15	444	27	28	462	17
Conflicting Peds, #/hr	5	0	8	8	0	5	9	0	8	5	0	6
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	40	-	-	-	-	-	160	-	-	200	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	0	0	0	5	0	5	0	3	5	5	3	0
Mvmt Flow	32	0	35	23	0	27	15	458	28	29	476	18

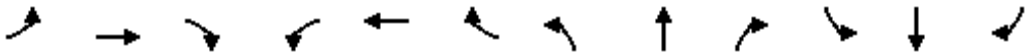
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	816	1076	264	814	1071	256	503	0	0	494	0	0
Stage 1	552	552	-	510	510	-	-	-	-	-	-	-
Stage 2	264	524	-	304	561	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.6	6.5	7	4.1	-	-	4.2	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.6	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.6	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.55	4	3.35	2.2	-	-	2.25	-	-
Pot Cap-1 Maneuver	272	221	741	265	223	734	1072	-	-	1045	-	-
Stage 1	491	518	-	507	541	-	-	-	-	-	-	-
Stage 2	724	533	-	672	513	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	250	208	729	241	210	725	1063	-	-	1037	-	-
Mov Cap-2 Maneuver	362	321	-	356	325	-	-	-	-	-	-	-
Stage 1	480	499	-	496	529	-	-	-	-	-	-	-
Stage 2	684	521	-	617	494	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12.9	13.1	0.3	0.5
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1063	-	-	362	729	492	1037	-	-
HCM Lane V/C Ratio	0.015	-	-	0.088	0.048	0.101	0.028	-	-
HCM Control Delay (s)	8.4	-	-	15.9	10.2	13.1	8.6	-	-
HCM Lane LOS	A	-	-	C	B	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.2	0.3	0.1	-	-

HCM 6th Signalized Intersection Summary
3: Redwood Blvd & Olive Ave

02/16/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	87	97	27	114	129	99	15	378	106	164	380	66
Future Volume (veh/h)	87	97	27	114	129	99	15	378	106	164	380	66
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	95	105	29	124	140	108	16	411	115	178	413	72
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	232	184	51	145	164	126	69	576	257	281	851	147
Arrive On Green	0.13	0.13	0.13	0.25	0.25	0.25	0.04	0.16	0.16	0.16	0.28	0.28
Sat Flow, veh/h	1781	1411	390	583	659	508	1781	3554	1585	1781	3029	524
Grp Volume(v), veh/h	95	0	134	372	0	0	16	411	115	178	241	244
Grp Sat Flow(s),veh/h/ln	1781	0	1800	1750	0	0	1781	1777	1585	1781	1777	1776
Q Serve(g_s), s	2.9	0.0	4.2	12.2	0.0	0.0	0.5	6.6	3.9	5.6	6.8	6.9
Cycle Q Clear(g_c), s	2.9	0.0	4.2	12.2	0.0	0.0	0.5	6.6	3.9	5.6	6.8	6.9
Prop In Lane	1.00		0.22	0.33		0.29	1.00		1.00	1.00		0.30
Lane Grp Cap(c), veh/h	232	0	234	435	0	0	69	576	257	281	499	499
V/C Ratio(X)	0.41	0.00	0.57	0.86	0.00	0.00	0.23	0.71	0.45	0.63	0.48	0.49
Avail Cap(c_a), veh/h	771	0	779	754	0	0	296	1774	791	296	887	887
HCM 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
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.0	0.0	24.6	21.5	0.0	0.0	28.0	23.9	22.7	23.7	18.0	18.0
Incr Delay (d2), s/veh	0.4	0.0	0.8	1.9	0.0	0.0	0.6	0.6	0.5	2.9	0.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.0	1.8	4.9	0.0	0.0	0.2	2.7	1.4	2.4	2.5	2.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	24.4	0.0	25.4	23.4	0.0	0.0	28.6	24.5	23.2	26.6	18.2	18.3
LnGrp LOS	C	A	C	C	A	A	C	C	C	C	B	B
Approach Vol, veh/h		229			372			542			663	
Approach Delay, s/veh		25.0			23.4			24.3			20.5	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	13.5	13.6		12.9	6.3	20.8		20.0				
Change Period (Y+Rc), s	4.0	* 3.9		5.1	4.0	* 3.9		5.1				
Max Green Setting (Gmax), s	10.0	* 30		26.0	10.0	* 30		25.9				
Max Q Clear Time (g_c+I1), s	7.6	8.6		6.2	2.5	8.9		14.2				
Green Ext Time (p_c), s	0.0	1.2		0.3	0.0	0.9		0.8				

Intersection Summary		
HCM 6th Ctrl Delay		22.8
HCM 6th LOS		C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	11.5
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	105	111	3	53	0	0	0	0	37	390	70
Future Vol, veh/h	0	105	111	3	53	0	0	0	0	37	390	70
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	124	131	4	62	0	0	0	0	44	459	82
Number of Lanes	0	1	0	0	1	0	0	0	0	0	2	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	2	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	2	1
HCM Control Delay	10.8	9.3	12
HCM LOS	B	A	B

Lane	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	0%	5%	16%	0%
Vol Thru, %	49%	95%	84%	74%
Vol Right, %	51%	0%	0%	26%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	216	56	232	265
LT Vol	0	3	37	0
Through Vol	105	53	195	195
RT Vol	111	0	0	70
Lane Flow Rate	254	66	273	312
Geometry Grp	2	2	7	7
Degree of Util (X)	0.352	0.102	0.41	0.445
Departure Headway (Hd)	4.993	5.574	5.408	5.142
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	717	638	661	695
Service Time	3.048	3.656	3.181	2.914
HCM Lane V/C Ratio	0.354	0.103	0.413	0.449
HCM Control Delay	10.8	9.3	11.9	12
HCM Lane LOS	B	A	B	B
HCM 95th-tile Q	1.6	0.3	2	2.3

Intersection	
Intersection Delay, s/veh	9.7
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	56	86	0	0	28	70	28	285	12	0	0	0
Future Vol, veh/h	56	86	0	0	28	70	28	285	12	0	0	0
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	66	101	0	0	33	82	33	335	14	0	0	0
Number of Lanes	0	1	0	0	1	0	0	2	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	1
HCM Control Delay	9.7	8.5	10
HCM LOS	A	A	A

Lane	NBLn1	NBLn2	EBLn1	WBLn1
Vol Left, %	16%	0%	39%	0%
Vol Thru, %	84%	92%	61%	29%
Vol Right, %	0%	8%	0%	71%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	171	155	142	98
LT Vol	28	0	56	0
Through Vol	143	143	86	28
RT Vol	0	12	0	70
Lane Flow Rate	201	182	167	115
Geometry Grp	7	7	2	2
Degree of Util (X)	0.295	0.26	0.235	0.148
Departure Headway (Hd)	5.293	5.156	5.057	4.632
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	676	694	708	771
Service Time	3.045	2.907	3.101	2.679
HCM Lane V/C Ratio	0.297	0.262	0.236	0.149
HCM Control Delay	10.3	9.7	9.7	8.5
HCM Lane LOS	B	A	A	A
HCM 95th-tile Q	1.2	1	0.9	0.5

HCM 6th Signalized Intersection Summary
6: Redwood Blvd & Grant Ave

02/16/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	54	93	109	12	72	42	165	322	36	65	378	60
Future Volume (veh/h)	54	93	109	12	72	42	165	322	36	65	378	60
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.95	0.98		0.96	1.00		0.89	1.00		0.95
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1900	1885	1900	1900	1900	1900	1870	1900	1900	1870	1900
Adj Flow Rate, veh/h	59	102	120	13	79	46	181	354	40	71	415	66
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	0	1	0	0	0	0	2	0	0	2	0
Cap, veh/h	580	770	616	536	770	627	344	703	79	368	716	113
Arrive On Green	0.41	0.41	0.41	0.41	0.41	0.41	0.19	0.22	0.22	0.20	0.23	0.23
Sat Flow, veh/h	1240	1900	1521	1149	1900	1547	1810	3178	355	1810	3051	481
Grp Volume(v), veh/h	59	102	120	13	79	46	181	196	198	71	240	241
Grp Sat Flow(s),veh/h/ln	1240	1900	1521	1149	1900	1547	1810	1777	1756	1810	1777	1755
Q Serve(g_s), s	2.0	2.2	3.4	0.5	1.7	1.2	5.9	6.4	6.5	2.1	7.9	8.0
Cycle Q Clear(g_c), s	3.7	2.2	3.4	2.7	1.7	1.2	5.9	6.4	6.5	2.1	7.9	8.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.20	1.00		0.27
Lane Grp Cap(c), veh/h	580	770	616	536	770	627	344	393	389	368	417	412
V/C Ratio(X)	0.10	0.13	0.19	0.02	0.10	0.07	0.53	0.50	0.51	0.19	0.58	0.59
Avail Cap(c_a), veh/h	812	1126	901	751	1126	916	701	1012	1000	368	656	648
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.3	12.3	12.6	13.2	12.2	12.0	24.0	22.4	22.5	21.7	22.3	22.4
Incr Delay (d2), s/veh	0.1	0.1	0.2	0.0	0.1	0.1	0.9	1.0	1.0	0.2	1.3	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.9	1.1	0.1	0.7	0.4	2.5	2.7	2.7	0.9	3.3	3.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.4	12.4	12.9	13.2	12.2	12.1	24.9	23.4	23.5	21.9	23.6	23.7
LnGrp LOS	B	B	B	B	B	B	C	C	C	C	C	C
Approach Vol, veh/h		281			138			575			552	
Approach Delay, s/veh		12.8			12.3			23.9			23.4	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	16.0	19.1		30.7	17.1	18.1		30.7
Change Period (Y+Rc), s	3.5	3.7		4.0	3.7	* 3.5		4.0
Max Green Setting (Gmax), s	25.5	24.3		39.0	12.5	* 38		39.0
Max Q Clear Time (g_c+I1), s	7.9	10.0		4.7	4.1	8.5		5.7
Green Ext Time (p_c), s	0.3	2.6		1.0	0.1	2.6		1.9

Intersection Summary	
HCM 6th Ctrl Delay	20.7
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
7: Redwood Blvd & Diablo Ave/De Long Ave

02/16/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	183	421	152	154	554	156	40	111	30	135	216	143
Future Volume (veh/h)	183	421	152	154	554	156	40	111	30	135	216	143
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1900	1900	1900	1870	1826	1900	1900	1826	1811	1900	1810
Adj Flow Rate, veh/h	199	458	0	167	602	0	43	121	33	147	235	155
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	0	0	0	2	5	0	0	5	6	0	1
Cap, veh/h	455	1753		236	1725		143	626	265	282	340	264
Arrive On Green	0.13	0.49	0.00	0.13	0.49	0.00	0.08	0.17	0.17	0.08	0.18	0.18
Sat Flow, veh/h	3483	3705	0	1810	3647	0	1810	3610	1529	3346	1900	1475
Grp Volume(v), veh/h	199	458	0	167	602	0	43	121	33	147	235	155
Grp Sat Flow(s),veh/h/ln	1742	1805	0	1810	1777	0	1810	1805	1529	1673	1900	1475
Q Serve(g_s), s	6.8	9.7	0.0	11.5	13.6	0.0	2.9	3.7	2.4	5.5	15.1	12.5
Cycle Q Clear(g_c), s	6.8	9.7	0.0	11.5	13.6	0.0	2.9	3.7	2.4	5.5	15.1	12.5
Prop In Lane	1.00		0.00	1.00		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	455	1753		236	1725		143	626	265	282	340	264
V/C Ratio(X)	0.44	0.26		0.71	0.35		0.30	0.19	0.12	0.52	0.69	0.59
Avail Cap(c_a), veh/h	455	1753		237	1725		225	972	412	358	497	386
HCM 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
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	0.91	0.91	0.91
Uniform Delay (d), s/veh	52.1	19.7	0.0	54.1	20.7	0.0	56.5	45.9	45.4	57.0	50.0	49.0
Incr Delay (d2), s/veh	0.5	0.4	0.0	8.0	0.6	0.0	0.4	0.1	0.1	0.5	0.9	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	4.2	0.0	5.7	5.7	0.0	1.3	1.7	0.9	2.4	7.3	4.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	52.6	20.1	0.0	62.1	21.3	0.0	56.9	46.0	45.5	57.5	50.9	49.7
LnGrp LOS	D	C		E	C		E	D	D	E	D	D
Approach Vol, veh/h		657	A		769	A		197			537	
Approach Delay, s/veh		29.9			30.1			48.3			52.3	
Approach LOS		C			C			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.4	27.4	21.0	67.2	13.7	28.1	21.0	67.2
Change Period (Y+Rc), s	3.5	4.8	4.0	4.1	3.5	* 4.8	4.0	* 4.1
Max Green Setting (Gmax), s	13.9	35.0	17.0	47.7	16.2	* 34	17.0	* 48
Max Q Clear Time (g_c+I1), s	17.5	5.7	8.8	15.6	4.9	17.1	13.5	11.7
Green Ext Time (p_c), s	0.1	0.5	0.3	2.8	0.0	1.1	0.1	2.2

Intersection Summary	
HCM 6th Ctrl Delay	37.2
HCM 6th LOS	D

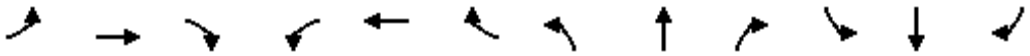
Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
1: Redwood Blvd & San Marin Dr

02/16/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	555	174	315	915	75	290	75	441	240	84	66
Future Volume (veh/h)	17	555	174	315	915	75	290	75	441	240	84	66
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1856	1885	1885	1885	1885	1856	1885	1885	1885
Adj Flow Rate, veh/h	18	590	185	335	973	80	309	80	0	255	89	70
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	1	1	1	3	1	1	1	1	3	1	1	1
Cap, veh/h	66	1151	353	567	2808	230	313	170		312	168	132
Arrive On Green	0.04	0.30	0.30	0.32	0.58	0.58	0.09	0.09	0.00	0.17	0.17	0.17
Sat Flow, veh/h	1795	3900	1195	1767	4847	398	3483	1885	1572	1795	967	761
Grp Volume(v), veh/h	18	517	258	335	688	365	309	80	0	255	0	159
Grp Sat Flow(s),veh/h/ln	1795	1716	1664	1767	1716	1814	1742	1885	1572	1795	0	1728
Q Serve(g_s), s	1.3	16.3	16.8	20.6	13.7	13.8	11.5	5.2	0.0	17.8	0.0	10.9
Cycle Q Clear(g_c), s	1.3	16.3	16.8	20.6	13.7	13.8	11.5	5.2	0.0	17.8	0.0	10.9
Prop In Lane	1.00		0.72	1.00		0.22	1.00		1.00	1.00		0.44
Lane Grp Cap(c), veh/h	66	1013	491	567	1988	1051	313	170		312	0	300
V/C Ratio(X)	0.27	0.51	0.52	0.59	0.35	0.35	0.99	0.47		0.82	0.00	0.53
Avail Cap(c_a), veh/h	138	1161	563	567	1988	1051	313	170		594	0	572
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	60.9	38.0	38.2	37.0	14.4	14.4	59.1	56.2	0.0	51.7	0.0	48.9
Incr Delay (d2), s/veh	0.8	0.6	1.2	2.5	0.5	0.9	46.7	0.8	0.0	2.0	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	6.9	7.0	9.3	5.4	5.9	7.0	2.5	0.0	8.1	0.0	4.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	61.7	38.6	39.4	39.5	14.9	15.3	105.8	57.0	0.0	53.7	0.0	49.4
LnGrp LOS	E	D	D	D	B	B	F	E		D	A	D
Approach Vol, veh/h		793			1388			389	A		414	
Approach Delay, s/veh		39.4			20.9			95.7			52.1	
Approach LOS		D			C			F			D	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.8	79.3		16.0	44.7	42.4		26.9				
Change Period (Y+Rc), s	3.0	4.0		4.3	3.0	* 4		4.3				
Max Green Setting (Gmax), s	10.0	49.7		11.7	16.1	* 44		43.0				
Max Q Clear Time (g_c+I1), s	3.3	15.8		13.5	22.6	18.8		19.8				
Green Ext Time (p_c), s	0.0	12.3		0.0	0.0	7.5		0.9				

Intersection Summary		
HCM 6th Ctrl Delay	39.9	
HCM 6th LOS	D	

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	16	0	19	30	0	29	26	625	28	31	574	26
Future Vol, veh/h	16	0	19	30	0	29	26	625	28	31	574	26
Conflicting Peds, #/hr	5	0	8	8	0	5	9	0	8	5	0	6
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	40	-	-	-	-	-	160	-	-	200	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	0	0	5	0	5	0	3	5	5	3	0
Mvmt Flow	17	0	20	31	0	30	27	651	29	32	598	27

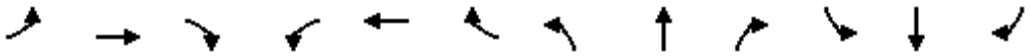
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1070	1427	330	1099	1426	353	634	0	0	688	0	0
Stage 1	685	685	-	728	728	-	-	-	-	-	-	-
Stage 2	385	742	-	371	698	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.6	6.5	7	4.1	-	-	4.2	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.6	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.6	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.55	4	3.35	2.2	-	-	2.25	-	-
Pot Cap-1 Maneuver	178	136	672	163	137	635	959	-	-	882	-	-
Stage 1	409	451	-	374	432	-	-	-	-	-	-	-
Stage 2	615	425	-	613	445	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	159	125	661	148	126	627	951	-	-	875	-	-
Mov Cap-2 Maneuver	277	240	-	261	243	-	-	-	-	-	-	-
Stage 1	394	430	-	361	416	-	-	-	-	-	-	-
Stage 2	566	410	-	569	425	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.3	16.8	0.3	0.5
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	951	-	-	277	661	366	875	-	-
HCM Lane V/C Ratio	0.028	-	-	0.06	0.03	0.168	0.037	-	-
HCM Control Delay (s)	8.9	-	-	18.8	10.6	16.8	9.3	-	-
HCM Lane LOS	A	-	-	C	B	C	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.2	0.1	0.6	0.1	-	-

HCM 6th Signalized Intersection Summary
3: Redwood Blvd & Olive Ave

02/16/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	122	71	29	151	105	105	71	775	163	127	385	110
Future Volume (veh/h)	122	71	29	151	105	105	71	775	163	127	385	110
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	130	76	31	161	112	112	76	824	173	135	410	117
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	190	135	55	181	126	126	189	979	437	224	808	228
Arrive On Green	0.11	0.11	0.11	0.25	0.25	0.25	0.11	0.28	0.28	0.13	0.30	0.30
Sat Flow, veh/h	1781	1263	515	729	507	507	1781	3554	1585	1781	2735	773
Grp Volume(v), veh/h	130	0	107	385	0	0	76	824	173	135	265	262
Grp Sat Flow(s),veh/h/ln	1781	0	1778	1743	0	0	1781	1777	1585	1781	1777	1731
Q Serve(g_s), s	5.2	0.0	4.3	15.9	0.0	0.0	3.0	16.3	6.6	5.3	9.2	9.4
Cycle Q Clear(g_c), s	5.2	0.0	4.3	15.9	0.0	0.0	3.0	16.3	6.6	5.3	9.2	9.4
Prop In Lane	1.00		0.29	0.42		0.29	1.00		1.00	1.00		0.45
Lane Grp Cap(c), veh/h	190	0	189	434	0	0	189	979	437	224	525	511
V/C Ratio(X)	0.68	0.00	0.56	0.89	0.00	0.00	0.40	0.84	0.40	0.60	0.50	0.51
Avail Cap(c_a), veh/h	622	0	620	606	0	0	239	1431	638	239	715	697
HCM 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
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.1	0.0	31.6	27.0	0.0	0.0	31.1	25.5	21.9	30.8	21.7	21.8
Incr Delay (d2), s/veh	1.6	0.0	1.0	9.1	0.0	0.0	0.5	2.1	0.2	2.4	0.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	0.0	1.9	7.5	0.0	0.0	1.3	6.9	2.4	2.3	3.6	3.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	33.7	0.0	32.6	36.1	0.0	0.0	31.6	27.5	22.2	33.2	22.0	22.1
LnGrp LOS	C	A	C	D	A	A	C	C	C	C	C	C
Approach Vol, veh/h		237			385			1073			662	
Approach Delay, s/veh		33.2			36.1			27.0			24.3	
Approach LOS		C			D			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	13.4	24.4		13.0	11.9	25.9		23.6				
Change Period (Y+Rc), s	4.0	* 3.9		5.1	4.0	* 3.9		5.1				
Max Green Setting (Gmax), s	10.0	* 30		26.0	10.0	* 30		25.9				
Max Q Clear Time (g_c+I1), s	7.3	18.3		7.2	5.0	11.4		17.9				
Green Ext Time (p_c), s	0.0	2.2		0.2	0.0	1.0		0.7				

Intersection Summary			
HCM 6th Ctrl Delay		28.3	
HCM 6th LOS		C	

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	14.9
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	168	127	24	218	0	0	0	0	40	444	89
Future Vol, veh/h	0	168	127	24	218	0	0	0	0	40	444	89
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	183	138	26	237	0	0	0	0	43	483	97
Number of Lanes	0	1	0	0	1	0	0	0	0	0	2	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	2	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	2	1
HCM Control Delay	14.4	13.8	15.7
HCM LOS	B	B	C

Lane	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	0%	10%	15%	0%
Vol Thru, %	57%	90%	85%	71%
Vol Right, %	43%	0%	0%	29%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	295	242	262	311
LT Vol	0	24	40	0
Through Vol	168	218	222	222
RT Vol	127	0	0	89
Lane Flow Rate	321	263	285	338
Geometry Grp	2	2	7	7
Degree of Util (X)	0.505	0.44	0.496	0.563
Departure Headway (Hd)	5.666	6.024	6.272	5.991
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	635	597	575	602
Service Time	3.712	4.073	4.015	3.734
HCM Lane V/C Ratio	0.506	0.441	0.496	0.561
HCM Control Delay	14.4	13.8	15.1	16.2
HCM Lane LOS	B	B	C	C
HCM 95th-tile Q	2.9	2.2	2.7	3.5

Intersection	
Intersection Delay, s/veh	15.9
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	134	74	0	0	110	96	132	499	21	0	0	0
Future Vol, veh/h	134	74	0	0	110	96	132	499	21	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	146	80	0	0	120	104	143	542	23	0	0	0
Number of Lanes	0	1	0	0	1	0	0	2	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	1
HCM Control Delay	12.9	11.9	18.2
HCM LOS	B	B	C

Lane	NBLn1	NBLn2	EBLn1	WBLn1
Vol Left, %	35%	0%	64%	0%
Vol Thru, %	65%	92%	36%	53%
Vol Right, %	0%	8%	0%	47%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	382	271	208	206
LT Vol	132	0	134	0
Through Vol	250	250	74	110
RT Vol	0	21	0	96
Lane Flow Rate	415	294	226	224
Geometry Grp	7	7	2	2
Degree of Util (X)	0.695	0.474	0.383	0.355
Departure Headway (Hd)	6.037	5.807	6.097	5.715
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	601	620	590	629
Service Time	3.765	3.535	4.132	3.75
HCM Lane V/C Ratio	0.691	0.474	0.383	0.356
HCM Control Delay	21.4	13.7	12.9	11.9
HCM Lane LOS	C	B	B	B
HCM 95th-tile Q	5.5	2.5	1.8	1.6

HCM 6th Signalized Intersection Summary
6: Redwood Blvd & Grant Ave

02/16/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	130	179	28	164	102	261	601	56	69	433	94
Future Volume (veh/h)	75	130	179	28	164	102	261	601	56	69	433	94
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.95	0.98		0.96	1.00		0.91	1.00		0.95
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1900	1885	1900	1900	1900	1900	1870	1900	1900	1870	1900
Adj Flow Rate, veh/h	79	137	188	29	173	107	275	633	59	73	456	99
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	0	1	0	0	0	0	2	0	0	2	0
Cap, veh/h	472	757	605	475	757	616	346	933	87	270	705	152
Arrive On Green	0.40	0.40	0.40	0.40	0.40	0.40	0.19	0.29	0.29	0.15	0.24	0.24
Sat Flow, veh/h	1082	1900	1520	1049	1900	1546	1810	3256	303	1810	2880	620
Grp Volume(v), veh/h	79	137	188	29	173	107	275	345	347	73	280	275
Grp Sat Flow(s),veh/h/ln	1082	1900	1520	1049	1900	1546	1810	1777	1782	1810	1777	1722
Q Serve(g_s), s	3.5	3.2	5.7	1.2	4.1	3.0	9.8	11.6	11.7	2.4	9.5	9.7
Cycle Q Clear(g_c), s	7.6	3.2	5.7	4.4	4.1	3.0	9.8	11.6	11.7	2.4	9.5	9.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.17	1.00		0.36
Lane Grp Cap(c), veh/h	472	757	605	475	757	616	346	509	511	270	435	421
V/C Ratio(X)	0.17	0.18	0.31	0.06	0.23	0.17	0.79	0.68	0.68	0.27	0.64	0.65
Avail Cap(c_a), veh/h	666	1097	877	663	1097	892	683	986	989	335	639	619
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.0	13.2	14.0	14.6	13.5	13.1	26.1	21.3	21.4	25.5	22.9	22.9
Incr Delay (d2), s/veh	0.2	0.2	0.4	0.1	0.2	0.2	3.1	1.6	1.6	0.4	1.6	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	1.3	1.9	0.3	1.7	1.0	4.4	4.8	4.8	1.0	4.0	4.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	16.2	13.3	14.4	14.7	13.7	13.3	29.2	22.9	22.9	25.9	24.5	24.7
LnGrp LOS	B	B	B	B	B	B	C	C	C	C	C	C
Approach Vol, veh/h		404			309			967			628	
Approach Delay, s/veh		14.4			13.7			24.7			24.7	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	16.4	20.2		30.9	13.8	22.9		30.9
Change Period (Y+Rc), s	3.5	3.7		4.0	3.7	* 3.5		4.0
Max Green Setting (Gmax), s	25.5	24.3		39.0	12.5	* 38		39.0
Max Q Clear Time (g_c+I1), s	11.8	11.7		6.4	4.4	13.7		9.6
Green Ext Time (p_c), s	0.5	2.9		2.4	0.1	4.8		2.9

Intersection Summary	
HCM 6th Ctrl Delay	21.4
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	252	555	91	108	941	294	119	270	80	219	161	182
Future Volume (veh/h)	252	555	91	108	941	294	119	270	80	219	161	182
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1900	1900	1900	1870	1826	1900	1900	1826	1811	1900	1810
Adj Flow Rate, veh/h	257	566	0	110	960	0	121	276	82	223	164	186
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	0	0	0	2	5	0	0	5	6	0	1
Cap, veh/h	455	1687		232	1652		179	699	296	283	341	265
Arrive On Green	0.13	0.47	0.00	0.13	0.46	0.00	0.10	0.19	0.19	0.08	0.18	0.18
Sat Flow, veh/h	3483	3705	0	1810	3647	0	1810	3610	1531	3346	1900	1475
Grp Volume(v), veh/h	257	566	0	110	960	0	121	276	82	223	164	186
Grp Sat Flow(s),veh/h/ln	1742	1805	0	1810	1777	0	1810	1805	1531	1673	1900	1475
Q Serve(g_s), s	9.0	12.9	0.0	7.3	25.7	0.0	8.4	8.7	5.9	8.5	10.1	15.4
Cycle Q Clear(g_c), s	9.0	12.9	0.0	7.3	25.7	0.0	8.4	8.7	5.9	8.5	10.1	15.4
Prop In Lane	1.00		0.00	1.00		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	455	1687		232	1652		179	699	296	283	341	265
V/C Ratio(X)	0.56	0.34		0.47	0.58		0.68	0.39	0.28	0.79	0.48	0.70
Avail Cap(c_a), veh/h	455	1687		237	1652		225	972	412	358	497	386
HCM 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
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	0.85	0.85	0.85
Uniform Delay (d), s/veh	53.0	21.9	0.0	52.6	25.5	0.0	56.6	45.8	44.7	58.4	47.9	50.1
Incr Delay (d2), s/veh	1.4	0.5	0.0	0.6	1.5	0.0	3.1	0.1	0.2	5.8	0.3	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	5.6	0.0	3.4	11.0	0.0	3.9	3.8	2.3	3.9	4.9	5.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.4	22.4	0.0	53.1	27.0	0.0	59.6	45.9	44.8	64.2	48.2	51.2
LnGrp LOS	D	C		D	C		E	D	D	E	D	D
Approach Vol, veh/h		823	A		1070	A		479			573	
Approach Delay, s/veh		32.4			29.7			49.2			55.4	
Approach LOS		C			C			D			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.5	30.0	21.0	64.5	16.3	28.1	20.7	64.9
Change Period (Y+Rc), s	3.5	4.8	4.0	4.1	3.5	* 4.8	4.0	* 4.1
Max Green Setting (Gmax), s	13.9	35.0	17.0	47.7	16.2	* 34	17.0	* 48
Max Q Clear Time (g_c+I1), s	10.5	10.7	11.0	27.7	10.4	17.4	9.3	14.9
Green Ext Time (p_c), s	0.1	1.1	0.3	4.5	0.1	0.9	0.1	2.7

Intersection Summary	
HCM 6th Ctrl Delay	38.6
HCM 6th LOS	D

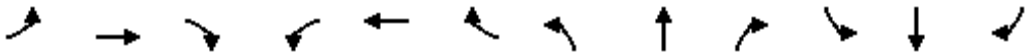
Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
1: Redwood Blvd & San Marin Dr

02/16/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	71	797	170	374	1086	737	182	143	322	180	60	48
Future Volume (veh/h)	71	797	170	374	1086	737	182	143	322	180	60	48
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1856	1885	1885	1885	1885	1856	1885	1885	1885
Adj Flow Rate, veh/h	71	797	138	374	1086	610	182	143	0	180	60	20
Peak Hour 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
Percent Heavy Veh, %	1	1	1	3	1	1	1	1	3	1	1	1
Cap, veh/h	116	1302	224	683	2117	986	279	151		236	177	59
Arrive On Green	0.06	0.29	0.29	0.39	0.62	0.62	0.08	0.08	0.00	0.13	0.13	0.13
Sat Flow, veh/h	1795	4417	759	1767	3431	1598	3483	1885	1572	1795	1343	448
Grp Volume(v), veh/h	71	618	317	374	1086	610	182	143	0	180	0	80
Grp Sat Flow(s),veh/h/ln	1795	1716	1745	1767	1716	1598	1742	1885	1572	1795	0	1791
Q Serve(g_s), s	5.6	22.6	22.9	24.0	25.9	34.5	7.4	11.0	0.0	14.1	0.0	5.9
Cycle Q Clear(g_c), s	5.6	22.6	22.9	24.0	25.9	34.5	7.4	11.0	0.0	14.1	0.0	5.9
Prop In Lane	1.00		0.44	1.00		1.00	1.00		1.00	1.00		0.25
Lane Grp Cap(c), veh/h	116	1011	514	683	2117	986	279	151		236	0	235
V/C Ratio(X)	0.61	0.61	0.62	0.55	0.51	0.62	0.65	0.95		0.76	0.00	0.34
Avail Cap(c_a), veh/h	123	1034	526	683	2117	986	279	151		529	0	528
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	66.5	44.3	44.4	34.8	15.7	17.3	65.2	66.8	0.0	61.2	0.0	57.6
Incr Delay (d2), s/veh	5.3	1.2	2.5	1.6	0.9	2.9	4.2	56.7	0.0	1.9	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	9.8	10.2	10.7	10.3	13.3	3.4	7.6	0.0	6.5	0.0	2.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	71.8	45.5	46.9	36.4	16.6	20.2	69.4	123.5	0.0	63.1	0.0	58.0
LnGrp LOS	E	D	D	D	B	C	E	F		E	A	E
Approach Vol, veh/h		1006			2070			325	A		260	
Approach Delay, s/veh		47.8			21.2			93.2			61.5	
Approach LOS		D			C			F			E	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	12.4	94.1		16.0	59.5	47.0		23.5				
Change Period (Y+Rc), s	3.0	4.0		4.3	3.0	* 4		4.3				
Max Green Setting (Gmax), s	10.0	49.7		11.7	16.1	* 44		43.0				
Max Q Clear Time (g_c+I1), s	7.6	36.5		13.0	26.0	24.9		16.1				
Green Ext Time (p_c), s	0.0	10.7		0.0	0.0	8.0		0.5				

Intersection Summary			
HCM 6th Ctrl Delay		37.8	
HCM 6th LOS		D	

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	31	1	33	65	1	61	43	540	71	70	480	20
Future Vol, veh/h	31	1	33	65	1	61	43	540	71	70	480	20
Conflicting Peds, #/hr	5	0	8	8	0	5	9	0	8	5	0	6
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	40	-	-	-	-	-	160	-	-	200	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	5	0	5	0	3	5	5	3	0
Mvmt Flow	31	1	33	65	1	61	43	540	71	70	480	20

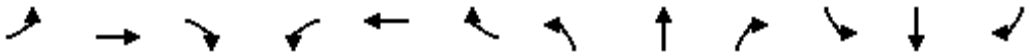
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1001	1344	267	1059	1319	319	509	0	0	619	0	0
Stage 1	639	639	-	670	670	-	-	-	-	-	-	-
Stage 2	362	705	-	389	649	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.6	6.5	7	4.1	-	-	4.2	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.6	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.6	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.55	4	3.35	2.2	-	-	2.25	-	-
Pot Cap-1 Maneuver	200	153	737	175	158	668	1066	-	-	937	-	-
Stage 1	436	474	-	406	459	-	-	-	-	-	-	-
Stage 2	635	442	-	598	469	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	163	133	725	150	138	660	1057	-	-	930	-	-
Mov Cap-2 Maneuver	277	237	-	263	250	-	-	-	-	-	-	-
Stage 1	415	435	-	387	437	-	-	-	-	-	-	-
Stage 2	549	420	-	523	430	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.8	19.7	0.6	1.1
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1057	-	-	277	684	370	930	-	-
HCM Lane V/C Ratio	0.041	-	-	0.112	0.05	0.343	0.075	-	-
HCM Control Delay (s)	8.6	-	-	19.6	10.5	19.7	9.2	-	-
HCM Lane LOS	A	-	-	C	B	C	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.4	0.2	1.5	0.2	-	-

HCM 6th Signalized Intersection Summary
3: Redwood Blvd & Olive Ave

02/16/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	111	98	33	157	130	120	18	448	137	146	409	87
Future Volume (veh/h)	111	98	33	157	130	120	18	448	137	146	409	87
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	111	98	33	157	130	120	18	448	137	146	409	87
Peak Hour 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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	224	168	57	180	149	138	76	610	272	262	805	170
Arrive On Green	0.13	0.13	0.13	0.27	0.27	0.27	0.04	0.17	0.17	0.15	0.28	0.28
Sat Flow, veh/h	1781	1339	451	673	557	514	1781	3554	1585	1781	2920	616
Grp Volume(v), veh/h	111	0	131	407	0	0	18	448	137	146	247	249
Grp Sat Flow(s),veh/h/ln	1781	0	1789	1744	0	0	1781	1777	1585	1781	1777	1760
Q Serve(g_s), s	3.6	0.0	4.3	14.0	0.0	0.0	0.6	7.5	4.9	4.8	7.4	7.5
Cycle Q Clear(g_c), s	3.6	0.0	4.3	14.0	0.0	0.0	0.6	7.5	4.9	4.8	7.4	7.5
Prop In Lane	1.00		0.25	0.39		0.29	1.00		1.00	1.00		0.35
Lane Grp Cap(c), veh/h	224	0	225	467	0	0	76	610	272	262	490	485
V/C Ratio(X)	0.50	0.00	0.58	0.87	0.00	0.00	0.24	0.73	0.50	0.56	0.51	0.51
Avail Cap(c_a), veh/h	738	0	741	720	0	0	284	1699	758	284	849	841
HCM 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
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.6	0.0	25.9	22.0	0.0	0.0	29.0	24.6	23.6	24.9	19.1	19.2
Incr Delay (d2), s/veh	0.6	0.0	0.9	4.9	0.0	0.0	0.6	0.6	0.5	0.9	0.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	0.0	1.8	6.0	0.0	0.0	0.3	3.1	1.8	1.9	2.8	2.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	26.2	0.0	26.8	26.8	0.0	0.0	29.6	25.3	24.1	25.8	19.4	19.5
LnGrp LOS	C	A	C	C	A	A	C	C	C	C	B	B
Approach Vol, veh/h		242			407			603			642	
Approach Delay, s/veh		26.5			26.8			25.1			20.9	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	13.2	14.7		13.0	6.7	21.2		21.9				
Change Period (Y+Rc), s	4.0	* 3.9		5.1	4.0	* 3.9		5.1				
Max Green Setting (Gmax), s	10.0	* 30		26.0	10.0	* 30		25.9				
Max Q Clear Time (g_c+I1), s	6.8	9.5		6.3	2.6	9.5		16.0				
Green Ext Time (p_c), s	0.0	1.3		0.3	0.0	0.9		0.8				

Intersection Summary			
HCM 6th Ctrl Delay		24.2	
HCM 6th LOS		C	

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	11.5
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	102	97	5	57	0	0	0	0	45	524	68
Future Vol, veh/h	0	102	97	5	57	0	0	0	0	45	524	68
Peak Hour 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
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	102	97	5	57	0	0	0	0	45	524	68
Number of Lanes	0	1	0	0	1	0	0	0	0	0	2	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	2	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	2	1
HCM Control Delay	10.1	9.2	12.2
HCM LOS	B	A	B

Lane	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	0%	8%	15%	0%
Vol Thru, %	51%	92%	85%	79%
Vol Right, %	49%	0%	0%	21%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	199	62	307	330
LT Vol	0	5	45	0
Through Vol	102	57	262	262
RT Vol	97	0	0	68
Lane Flow Rate	199	62	307	330
Geometry Grp	2	2	7	7
Degree of Util (X)	0.28	0.096	0.449	0.463
Departure Headway (Hd)	5.069	5.575	5.269	5.051
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	706	639	682	709
Service Time	3.12	3.645	3.027	2.809
HCM Lane V/C Ratio	0.282	0.097	0.45	0.465
HCM Control Delay	10.1	9.2	12.3	12.1
HCM Lane LOS	B	A	B	B
HCM 95th-tile Q	1.1	0.3	2.3	2.5

Intersection	
Intersection Delay, s/veh	10.2
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	49	98	0	0	33	80	29	432	18	0	0	0
Future Vol, veh/h	49	98	0	0	33	80	29	432	18	0	0	0
Peak Hour 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
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	49	98	0	0	33	80	29	432	18	0	0	0
Number of Lanes	0	1	0	0	1	0	0	2	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	1
HCM Control Delay	9.7	8.7	10.7
HCM LOS	A	A	B

Lane	NBLn1	NBLn2	EBLn1	WBLn1
Vol Left, %	12%	0%	33%	0%
Vol Thru, %	88%	92%	67%	29%
Vol Right, %	0%	8%	0%	71%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	245	234	147	113
LT Vol	29	0	49	0
Through Vol	216	216	98	33
RT Vol	0	18	0	80
Lane Flow Rate	245	234	147	113
Geometry Grp	7	7	2	2
Degree of Util (X)	0.356	0.333	0.213	0.151
Departure Headway (Hd)	5.233	5.119	5.228	4.797
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	684	700	685	745
Service Time	2.986	2.872	3.277	2.848
HCM Lane V/C Ratio	0.358	0.334	0.215	0.152
HCM Control Delay	10.9	10.4	9.7	8.7
HCM Lane LOS	B	B	A	A
HCM 95th-tile Q	1.6	1.5	0.8	0.5



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	100	99	199	23	76	43	224	385	48	40	444	87
Future Volume (veh/h)	100	99	199	23	76	43	224	385	48	40	444	87
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.95	0.98		0.96	1.00		0.90	1.00		0.95
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1900	1885	1900	1900	1900	1900	1870	1900	1900	1870	1900
Adj Flow Rate, veh/h	100	99	199	23	76	43	224	385	48	40	444	87
Peak Hour 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
Percent Heavy Veh, %	2	0	1	0	0	0	0	2	0	0	2	0
Cap, veh/h	576	762	609	503	762	620	346	718	89	367	707	137
Arrive On Green	0.40	0.40	0.40	0.40	0.40	0.40	0.19	0.23	0.23	0.20	0.24	0.24
Sat Flow, veh/h	1246	1900	1520	1074	1900	1546	1810	3138	387	1810	2940	571
Grp Volume(v), veh/h	100	99	199	23	76	43	224	216	217	40	267	264
Grp Sat Flow(s),veh/h/ln	1246	1900	1520	1074	1900	1546	1810	1777	1747	1810	1777	1734
Q Serve(g_s), s	3.6	2.2	6.0	0.9	1.7	1.1	7.6	7.1	7.3	1.2	9.0	9.1
Cycle Q Clear(g_c), s	5.3	2.2	6.0	3.1	1.7	1.1	7.6	7.1	7.3	1.2	9.0	9.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.22	1.00		0.33
Lane Grp Cap(c), veh/h	576	762	609	503	762	620	346	407	400	367	427	417
V/C Ratio(X)	0.17	0.13	0.33	0.05	0.10	0.07	0.65	0.53	0.54	0.11	0.62	0.63
Avail Cap(c_a), veh/h	803	1107	886	698	1107	901	690	996	979	367	645	630
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.2	12.7	13.8	13.7	12.5	12.4	25.0	22.6	22.7	21.7	22.7	22.8
Incr Delay (d2), s/veh	0.2	0.1	0.4	0.1	0.1	0.1	1.5	1.1	1.1	0.1	1.5	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.9	2.0	0.2	0.7	0.4	3.3	3.0	3.0	0.5	3.8	3.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.4	12.8	14.3	13.7	12.6	12.4	26.5	23.7	23.9	21.8	24.2	24.4
LnGrp LOS	B	B	B	B	B	B	C	C	C	C	C	C
Approach Vol, veh/h		398			142			657			571	
Approach Delay, s/veh		13.9			12.7			24.7			24.1	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	16.3	19.8		30.8	17.3	18.8		30.8
Change Period (Y+Rc), s	3.5	3.7		4.0	3.7	* 3.5		4.0
Max Green Setting (Gmax), s	25.5	24.3		39.0	12.5	* 38		39.0
Max Q Clear Time (g_c+I1), s	19.6	11.1		5.1	3.2	9.3		8.0
Green Ext Time (p_c), s	0.4	2.8		1.0	0.0	2.9		2.7

Intersection Summary		
HCM 6th Ctrl Delay	21.1	
HCM 6th LOS	C	

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
7: Redwood Blvd & Diablo Ave/De Long Ave

02/16/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	233	489	168	156	574	211	54	142	31	209	279	173
Future Volume (veh/h)	233	489	168	156	574	211	54	142	31	209	279	173
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1900	1900	1900	1870	1826	1900	1900	1826	1811	1900	1810
Adj Flow Rate, veh/h	233	489	0	156	574	0	54	142	31	209	279	173
Peak Hour 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
Percent Heavy Veh, %	1	0	0	0	2	5	0	0	5	6	0	1
Cap, veh/h	455	1670		236	1643		155	709	300	283	371	288
Arrive On Green	0.13	0.46	0.00	0.13	0.46	0.00	0.09	0.20	0.20	0.08	0.20	0.20
Sat Flow, veh/h	3483	3705	0	1810	3647	0	1810	3610	1531	3346	1900	1478
Grp Volume(v), veh/h	233	489	0	156	574	0	54	142	31	209	279	173
Grp Sat Flow(s),veh/h/ln	1742	1805	0	1810	1777	0	1810	1805	1531	1673	1900	1478
Q Serve(g_s), s	8.1	10.9	0.0	10.7	13.5	0.0	3.7	4.3	2.2	7.9	18.0	13.9
Cycle Q Clear(g_c), s	8.1	10.9	0.0	10.7	13.5	0.0	3.7	4.3	2.2	7.9	18.0	13.9
Prop In Lane	1.00		0.00	1.00		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	455	1670		236	1643		155	709	300	283	371	288
V/C Ratio(X)	0.51	0.29		0.66	0.35		0.35	0.20	0.10	0.74	0.75	0.60
Avail Cap(c_a), veh/h	455	1670		237	1643		225	972	412	358	497	387
HCM 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
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	0.86	0.86	0.86
Uniform Delay (d), s/veh	52.6	21.7	0.0	53.8	22.4	0.0	56.0	43.7	42.9	58.1	49.4	47.7
Incr Delay (d2), s/veh	0.7	0.4	0.0	5.4	0.6	0.0	0.5	0.1	0.1	3.5	2.4	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.6	4.8	0.0	5.2	5.7	0.0	1.7	1.9	0.8	3.5	8.9	5.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.4	22.1	0.0	59.2	23.0	0.0	56.5	43.8	42.9	61.6	51.8	48.3
LnGrp LOS	D	C		E	C		E	D	D	E	D	D
Approach Vol, veh/h		722	A		730	A		227			661	
Approach Delay, s/veh		32.2			30.7			46.7			54.0	
Approach LOS		C			C			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.5	30.3	21.0	64.2	14.7	30.2	20.9	64.3
Change Period (Y+Rc), s	3.5	4.8	4.0	4.1	3.5	* 4.8	4.0	* 4.1
Max Green Setting (Gmax), s	13.9	35.0	17.0	47.7	16.2	* 34	17.0	* 48
Max Q Clear Time (g_c+I1), s	19.9	6.3	10.1	15.5	5.7	20.0	12.7	12.9
Green Ext Time (p_c), s	0.1	0.5	0.3	2.6	0.0	1.3	0.1	2.3

Intersection Summary	
HCM 6th Ctrl Delay	39.3
HCM 6th LOS	D

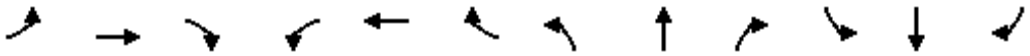
Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
1: Redwood Blvd & San Marin Dr

02/16/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	36	1167	224	400	1110	232	294	100	540	730	165	107
Future Volume (veh/h)	36	1167	224	400	1110	232	294	100	540	730	165	107
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1856	1885	1885	1885	1885	1856	1885	1885	1885
Adj Flow Rate, veh/h	36	1167	191	400	1110	192	294	100	0	730	165	80
Peak Hour 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
Percent Heavy Veh, %	1	1	1	3	1	1	1	1	3	1	1	1
Cap, veh/h	100	1411	231	252	1781	308	313	170		594	394	191
Arrive On Green	0.06	0.32	0.32	0.14	0.40	0.40	0.09	0.09	0.00	0.33	0.33	0.33
Sat Flow, veh/h	1795	4453	729	1767	4416	763	3483	1885	1572	1795	1192	578
Grp Volume(v), veh/h	36	899	459	400	862	440	294	100	0	730	0	245
Grp Sat Flow(s),veh/h/ln	1795	1716	1751	1767	1716	1748	1742	1885	1572	1795	0	1769
Q Serve(g_s), s	2.5	31.5	31.6	18.5	26.0	26.1	10.9	6.6	0.0	43.0	0.0	14.0
Cycle Q Clear(g_c), s	2.5	31.5	31.6	18.5	26.0	26.1	10.9	6.6	0.0	43.0	0.0	14.0
Prop In Lane	1.00		0.42	1.00		0.44	1.00		1.00	1.00		0.33
Lane Grp Cap(c), veh/h	100	1087	555	252	1384	705	313	170		594	0	585
V/C Ratio(X)	0.36	0.83	0.83	1.59	0.62	0.62	0.94	0.59		1.23	0.00	0.42
Avail Cap(c_a), veh/h	138	1161	593	252	1384	705	313	170		594	0	585
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	59.1	41.1	41.1	55.7	30.9	30.9	58.8	56.8	0.0	43.5	0.0	33.8
Incr Delay (d2), s/veh	0.8	5.1	9.5	283.4	2.1	4.1	34.4	3.7	0.0	117.4	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	13.9	14.9	28.0	11.2	11.8	6.2	3.3	0.0	37.8	0.0	5.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	59.9	46.2	50.6	339.2	33.0	35.1	93.2	60.5	0.0	160.9	0.0	34.0
LnGrp LOS	E	D	D	F	C	D	F	E		F	A	C
Approach Vol, veh/h		1394			1702			394	A		975	
Approach Delay, s/veh		48.0			105.5			84.9			129.0	
Approach LOS		D			F			F			F	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.3	56.4		16.0	21.5	45.2		47.3				
Change Period (Y+Rc), s	3.0	4.0		4.3	3.0	* 4		4.3				
Max Green Setting (Gmax), s	10.0	49.7		11.7	16.1	* 44		43.0				
Max Q Clear Time (g_c+I1), s	4.5	28.1		12.9	20.5	33.6		45.0				
Green Ext Time (p_c), s	0.0	12.5		0.0	0.0	7.4		0.0				

Intersection Summary			
HCM 6th Ctrl Delay		90.9	
HCM 6th LOS		F	

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	20.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	19	1	24	142	1	134	63	653	121	138	680	33
Future Vol, veh/h	19	1	24	142	1	134	63	653	121	138	680	33
Conflicting Peds, #/hr	5	0	8	8	0	5	9	0	8	5	0	6
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	40	-	-	-	-	-	160	-	-	200	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	5	0	5	0	3	5	5	3	0
Mvmt Flow	19	1	24	142	1	134	63	653	121	138	680	33

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1440	1890	374	1473	1846	400	722	0	0	782	0	0
Stage 1	982	982	-	848	848	-	-	-	-	-	-	-
Stage 2	458	908	-	625	998	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.6	6.5	7	4.1	-	-	4.2	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.6	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.6	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.55	4	3.35	2.2	-	-	2.25	-	-
Pot Cap-1 Maneuver	95	71	629	~ 86	76	591	889	-	-	812	-	-
Stage 1	271	330	-	316	380	-	-	-	-	-	-	-
Stage 2	557	357	-	432	324	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	59	54	619	~ 67	57	584	881	-	-	806	-	-
Mov Cap-2 Maneuver	143	126	-	160	141	-	-	-	-	-	-	-
Stage 1	250	271	-	291	350	-	-	-	-	-	-	-
Stage 2	395	329	-	340	266	-	-	-	-	-	-	-

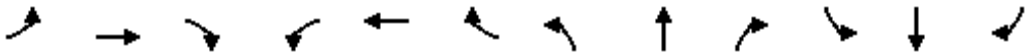
Approach	EB	WB	NB	SB
HCM Control Delay, s	21.6	138.6	0.7	1.7
HCM LOS	C	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	881	-	-	143	535	246	806	-	-
HCM Lane V/C Ratio	0.072	-	-	0.133	0.047	1.126	0.171	-	-
HCM Control Delay (s)	9.4	-	-	34	12.1	138.6	10.4	-	-
HCM Lane LOS	A	-	-	D	B	F	B	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.4	0.1	12.3	0.6	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

HCM 6th Signalized Intersection Summary
3: Redwood Blvd & Olive Ave

02/16/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	166	74	36	152	107	100	77	822	202	115	539	157
Future Volume (veh/h)	166	74	36	152	107	100	77	822	202	115	539	157
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	166	74	36	152	107	100	77	822	202	115	539	157
Peak Hour 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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	215	143	70	173	122	114	192	980	437	219	791	229
Arrive On Green	0.12	0.12	0.12	0.23	0.23	0.23	0.11	0.28	0.28	0.12	0.29	0.29
Sat Flow, veh/h	1781	1188	578	739	520	486	1781	3554	1585	1781	2717	788
Grp Volume(v), veh/h	166	0	110	359	0	0	77	822	202	115	352	344
Grp Sat Flow(s),veh/h/ln	1781	0	1766	1746	0	0	1781	1777	1585	1781	1777	1728
Q Serve(g_s), s	6.6	0.0	4.3	14.6	0.0	0.0	3.0	16.0	7.8	4.5	12.9	13.0
Cycle Q Clear(g_c), s	6.6	0.0	4.3	14.6	0.0	0.0	3.0	16.0	7.8	4.5	12.9	13.0
Prop In Lane	1.00		0.33	0.42		0.28	1.00		1.00	1.00		0.46
Lane Grp Cap(c), veh/h	215	0	213	409	0	0	192	980	437	219	517	503
V/C Ratio(X)	0.77	0.00	0.52	0.88	0.00	0.00	0.40	0.84	0.46	0.52	0.68	0.68
Avail Cap(c_a), veh/h	630	0	624	615	0	0	242	1449	646	242	725	705
HCM 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
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.4	0.0	30.3	27.1	0.0	0.0	30.6	25.1	22.1	30.2	23.0	23.1
Incr Delay (d2), s/veh	2.2	0.0	0.7	6.6	0.0	0.0	0.5	1.9	0.3	0.7	0.6	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	0.0	1.8	6.6	0.0	0.0	1.3	6.7	2.8	1.9	5.1	5.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	33.6	0.0	31.0	33.7	0.0	0.0	31.1	27.0	22.4	31.0	23.6	23.7
LnGrp LOS	C	A	C	C	A	A	C	C	C	C	C	C
Approach Vol, veh/h		276			359			1101			811	
Approach Delay, s/veh		32.6			33.7			26.4			24.7	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	13.0	24.2		14.0	11.9	25.3		22.3				
Change Period (Y+Rc), s	4.0	* 3.9		5.1	4.0	* 3.9		5.1				
Max Green Setting (Gmax), s	10.0	* 30		26.0	10.0	* 30		25.9				
Max Q Clear Time (g_c+I1), s	6.5	18.0		8.6	5.0	15.0		16.6				
Green Ext Time (p_c), s	0.0	2.3		0.3	0.0	1.3		0.7				

Intersection Summary		
HCM 6th Ctrl Delay		27.6
HCM 6th LOS		C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	18
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	171	130	30	208	0	0	0	0	49	670	75
Future Vol, veh/h	0	171	130	30	208	0	0	0	0	49	670	75
Peak Hour 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
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	171	130	30	208	0	0	0	0	49	670	75
Number of Lanes	0	1	0	0	1	0	0	0	0	0	2	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	2	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	2	1
HCM Control Delay	14.5	13.7	20.6
HCM LOS	B	B	C

Lane	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	0%	13%	13%	0%
Vol Thru, %	57%	87%	87%	82%
Vol Right, %	43%	0%	0%	18%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	301	238	384	410
LT Vol	0	30	49	0
Through Vol	171	208	335	335
RT Vol	130	0	0	75
Lane Flow Rate	301	238	384	410
Geometry Grp	2	2	7	7
Degree of Util (X)	0.492	0.414	0.661	0.684
Departure Headway (Hd)	5.88	6.264	6.198	6.004
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	611	574	584	603
Service Time	3.922	4.309	3.938	3.743
HCM Lane V/C Ratio	0.493	0.415	0.658	0.68
HCM Control Delay	14.5	13.7	20.3	20.8
HCM Lane LOS	B	B	C	C
HCM 95th-tile Q	2.7	2	4.9	5.3

Intersection	
Intersection Delay, s/veh	18.1
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	133	87	0	0	123	106	115	670	27	0	0	0
Future Vol, veh/h	133	87	0	0	123	106	115	670	27	0	0	0
Peak Hour 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
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	133	87	0	0	123	106	115	670	27	0	0	0
Number of Lanes	0	1	0	0	1	0	0	2	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	1
HCM Control Delay	13.1	12.3	21.1
HCM LOS	B	B	C

Lane	NBLn1	NBLn2	EBLn1	WBLn1
Vol Left, %	26%	0%	60%	0%
Vol Thru, %	74%	93%	40%	54%
Vol Right, %	0%	7%	0%	46%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	450	362	220	229
LT Vol	115	0	133	0
Through Vol	335	335	87	123
RT Vol	0	27	0	106
Lane Flow Rate	450	362	220	229
Geometry Grp	7	7	2	2
Degree of Util (X)	0.752	0.587	0.381	0.371
Departure Headway (Hd)	6.015	5.833	6.232	5.838
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	603	619	579	616
Service Time	3.743	3.561	4.266	3.872
HCM Lane V/C Ratio	0.746	0.585	0.38	0.372
HCM Control Delay	24.8	16.5	13.1	12.3
HCM Lane LOS	C	C	B	B
HCM 95th-tile Q	6.7	3.8	1.8	1.7

HCM 6th Signalized Intersection Summary
6: Redwood Blvd & Grant Ave

02/16/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	141	142	329	49	178	81	414	638	74	50	532	181
Future Volume (veh/h)	141	142	329	49	178	81	414	638	74	50	532	181
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.95	0.98		0.96	1.00		0.91	1.00		0.95
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1900	1885	1900	1900	1900	1900	1870	1900	1900	1870	1900
Adj Flow Rate, veh/h	141	142	329	49	178	81	414	638	74	50	532	181
Peak Hour 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
Percent Heavy Veh, %	2	0	1	0	0	0	0	2	0	0	2	0
Cap, veh/h	417	696	555	376	696	565	455	841	97	425	639	216
Arrive On Green	0.37	0.37	0.37	0.37	0.37	0.37	0.25	0.27	0.27	0.23	0.25	0.25
Sat Flow, veh/h	1101	1900	1515	920	1900	1542	1810	3170	367	1810	2570	870
Grp Volume(v), veh/h	141	142	329	49	178	81	414	357	355	50	367	346
Grp Sat Flow(s),veh/h/ln	1101	1900	1515	920	1900	1542	1810	1777	1760	1810	1777	1663
Q Serve(g_s), s	8.6	4.3	14.8	3.2	5.5	3.0	18.7	15.5	15.6	1.8	16.4	16.6
Cycle Q Clear(g_c), s	14.1	4.3	14.8	7.5	5.5	3.0	18.7	15.5	15.6	1.8	16.4	16.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.21	1.00		0.52
Lane Grp Cap(c), veh/h	417	696	555	376	696	565	455	472	467	425	442	413
V/C Ratio(X)	0.34	0.20	0.59	0.13	0.26	0.14	0.91	0.76	0.76	0.12	0.83	0.84
Avail Cap(c_a), veh/h	524	882	703	465	882	716	549	793	785	425	514	481
HCM 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
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.5	18.2	21.5	20.8	18.6	17.8	30.5	28.4	28.4	25.3	29.9	30.0
Incr Delay (d2), s/veh	0.7	0.2	1.4	0.2	0.3	0.2	16.5	2.5	2.6	0.1	9.8	10.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	1.9	5.3	0.7	2.4	1.1	10.0	6.8	6.8	0.8	8.1	7.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	24.2	18.4	23.0	21.0	18.9	18.0	47.0	30.9	31.0	25.4	39.7	40.9
LnGrp LOS	C	B	C	C	B	B	D	C	C	C	D	D
Approach Vol, veh/h		612			308			1126			763	
Approach Delay, s/veh		22.2			19.0			36.9			39.3	
Approach LOS		C			B			D			D	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	14.7	24.6		34.8	23.4	25.8		34.8
Change Period (Y+Rc), s	3.5	3.7		4.0	3.7	* 3.5		4.0
Max Green Setting (Gmax), s	25.5	24.3		39.0	12.5	* 38		39.0
Max Q Clear Time (g_c+I1), s	10.7	18.6		9.5	3.8	17.6		16.8
Green Ext Time (p_c), s	0.5	2.3		2.4	0.0	4.7		4.2

Intersection Summary		
HCM 6th Ctrl Delay	32.4	
HCM 6th LOS	C	

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
7: Redwood Blvd & Diablo Ave/De Long Ave

02/16/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	291	590	111	109	983	414	142	323	87	346	240	248
Future Volume (veh/h)	291	590	111	109	983	414	142	323	87	346	240	248
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1900	1900	1900	1870	1826	1900	1900	1826	1811	1900	1810
Adj Flow Rate, veh/h	291	590	0	109	983	0	142	323	87	346	240	248
Peak Hour 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
Percent Heavy Veh, %	1	0	0	0	2	5	0	0	5	6	0	1
Cap, veh/h	455	1580		232	1546		180	726	308	358	396	309
Arrive On Green	0.13	0.44	0.00	0.13	0.44	0.00	0.10	0.20	0.20	0.11	0.21	0.21
Sat Flow, veh/h	3483	3705	0	1810	3647	0	1810	3610	1531	3346	1900	1480
Grp Volume(v), veh/h	291	590	0	109	983	0	142	323	87	346	240	248
Grp Sat Flow(s),veh/h/ln	1742	1805	0	1810	1777	0	1810	1805	1531	1673	1900	1480
Q Serve(g_s), s	10.3	14.3	0.0	7.3	28.1	0.0	10.0	10.2	6.3	13.4	14.9	20.7
Cycle Q Clear(g_c), s	10.3	14.3	0.0	7.3	28.1	0.0	10.0	10.2	6.3	13.4	14.9	20.7
Prop In Lane	1.00		0.00	1.00		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	455	1580		232	1546		180	726	308	358	396	309
V/C Ratio(X)	0.64	0.37		0.47	0.64		0.79	0.44	0.28	0.97	0.61	0.80
Avail Cap(c_a), veh/h	455	1580		237	1546		225	972	412	358	497	387
HCM 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
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	0.72	0.72	0.72
Uniform Delay (d), s/veh	53.6	24.6	0.0	52.6	28.7	0.0	57.2	45.6	44.0	57.8	46.6	48.9
Incr Delay (d2), s/veh	2.7	0.7	0.0	0.6	2.0	0.0	10.7	0.2	0.2	31.8	0.4	5.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.7	6.3	0.0	3.3	12.2	0.0	5.0	4.5	2.4	7.3	7.2	8.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	56.3	25.3	0.0	53.1	30.7	0.0	68.0	45.7	44.2	89.6	47.0	54.4
LnGrp LOS	E	C		D	C		E	D	D	F	D	D
Approach Vol, veh/h		881	A		1092	A		552			834	
Approach Delay, s/veh		35.5			32.9			51.2			66.9	
Approach LOS		D			C			D			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	17.4	30.9	21.0	60.7	16.4	31.9	20.7	61.0
Change Period (Y+Rc), s	3.5	4.8	4.0	4.1	3.5	* 4.8	4.0	* 4.1
Max Green Setting (Gmax), s	13.9	35.0	17.0	47.7	16.2	* 34	17.0	* 48
Max Q Clear Time (g_c+I1), s	15.4	12.2	12.3	30.1	12.0	22.7	9.3	16.3
Green Ext Time (p_c), s	0.0	1.3	0.3	4.4	0.1	1.2	0.1	2.9

Intersection Summary	
HCM 6th Ctrl Delay	45.0
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Appendix C

CalEEMod Modeling Outputs

Village at Novato AQ - Bay Area AQMD Air District, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Village at Novato AQ

Bay Area AQMD Air District, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Apartments Mid Rise	178.00	Dwelling Unit	1.59	215,832.00	509
Strip Mall	14.00	1000sqft	0.00	14,000.00	0
Parking Lot	344.00	Space	0.00	137,600.00	0
Other Non-Asphalt Surfaces	42.75	1000sqft	0.98	42,750.00	0
Other Asphalt Surfaces	3.28	Acre	3.28	142,876.80	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	64
Climate Zone	5			**Operational Year**	2026
Utility Company	MCE				
CO2 Intensity (lb/MWhr)	289.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Project is in Novato, Marin County. Marin Clean Energy is the main utility provider

Land Use - 178 total residential units with 215,832 square feet, 14,000 sf of retail, 42,750 of open space, and assuming 3.28 acres of hardscape

Demolition - Demolition square footage based on provided plan set with demolition table, 64,547 square feet of existing asphalt/concrete

Grading - Import and export approximately 100 cubic yards of soil

Trips and VMT - 40 cubic yards of clear and grub added to demo; Demo haul rote trip length = 13 miles; Grading truck haul destination = 45 miles

Construction Phase - Construction based on number of calendar days per phase and adjusted to account for a five day per week schedule

Off-road Equipment - Applicant provided equipment list

Village at Novato AQ - Bay Area AQMD Air District, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Off-road Equipment - Applicant provided equipment list

Off-road Equipment - Applicant provided equipment list

Off-road Equipment - Applicant provided equipment list

Off-road Equipment - Applicant provided equipment list

Off-road Equipment - Default construction equipment

Architectural Coating - BAAQMD Regulation 6, Rule 3 Architectural Coating, flat coatings = 50 g/L and traffic markings = 100 g/L

Vehicle Trips - Trip Generation Rate from TIS

Woodstoves - There would be three natural gas fireplaces in the open space area

Area Coating - BAAQMD Regulation 6, Rule 3 Architectural Coating, non-flat coatings and traffic markings = 100 g/L

Construction Off-road Equipment Mitigation - New discretionary projects would need to implement BAAQMD Basic Construction Mitigation Measures

Area Mitigation -

Water Mitigation - CalGreen water reduction

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Exterior	150.00	50.00
tblArchitecturalCoating	EF_Nonresidential_Interior	100.00	50.00
tblArchitecturalCoating	EF_Parking	150.00	100.00
tblArchitecturalCoating	EF_Residential_Exterior	150.00	50.00
tblArchitecturalCoating	EF_Residential_Interior	100.00	50.00
tblAreaCoating	Area_EF_Nonresidential_Exterior	150	100
tblAreaCoating	Area_EF_Parking	150	100
tblAreaCoating	Area_EF_Residential_Exterior	150	100
tblAreaMitigation	UseLowVOCPaintNonresidentialExteriorValue	100	150
tblAreaMitigation	UseLowVOCPaintParkingValue	100	150
tblAreaMitigation	UseLowVOCPaintResidentialExteriorValue	100	150
tblConstructionPhase	NumDays	20.00	40.00
tblConstructionPhase	NumDays	230.00	497.00

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

tblConstructionPhase	NumDays	20.00	10.00
tblConstructionPhase	NumDays	10.00	20.00
tblConstructionPhase	PhaseEndDate	11/25/2024	1/1/2026
tblConstructionPhase	PhaseEndDate	9/30/2024	10/23/2025
tblConstructionPhase	PhaseEndDate	11/13/2023	11/28/2023
tblConstructionPhase	PhaseEndDate	10/28/2024	11/6/2025
tblConstructionPhase	PhaseEndDate	10/16/2023	10/30/2023
tblConstructionPhase	PhaseStartDate	10/29/2024	11/7/2025
tblConstructionPhase	PhaseStartDate	11/14/2023	11/29/2023
tblConstructionPhase	PhaseStartDate	10/17/2023	11/1/2023
tblConstructionPhase	PhaseStartDate	10/1/2024	10/24/2025
tblFireplaces	FireplaceWoodMass	228.80	0.00
tblFireplaces	NumberGas	26.70	3.00
tblFireplaces	NumberNoFireplace	7.12	3.00
tblFireplaces	NumberWood	30.26	0.00
tblGrading	MaterialExported	0.00	100.00
tblGrading	MaterialImported	0.00	100.00
tblLandUse	LandUseSquareFeet	178,000.00	215,832.00
tblLandUse	LotAcreage	4.68	1.59
tblLandUse	LotAcreage	0.32	0.00
tblLandUse	LotAcreage	3.10	0.00
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	LoadFactor	0.46	0.46
tblOffRoadEquipment	LoadFactor	0.50	0.50
tblOffRoadEquipment	LoadFactor	0.31	0.31
tblOffRoadEquipment	LoadFactor	0.40	0.40
tblOffRoadEquipment	OffRoadEquipmentType		Concrete/Industrial Saws
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Sweepers/Scrubbers

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

tblOffRoadEquipment	OffRoadEquipmentType		Plate Compactors
tblOffRoadEquipment	OffRoadEquipmentType		Trenchers
tblOffRoadEquipment	OffRoadEquipmentType		Aerial Lifts
tblOffRoadEquipment	OffRoadEquipmentType		Cement and Mortar Mixers
tblOffRoadEquipment	OffRoadEquipmentType		Air Compressors
tblOffRoadEquipment	OffRoadEquipmentType		Pressure Washers
tblOffRoadEquipment	OffRoadEquipmentType		Rough Terrain Forklifts
tblOffRoadEquipment	OffRoadEquipmentType		Concrete/Industrial Saws
tblOffRoadEquipment	OffRoadEquipmentType		Plate Compactors
tblOffRoadEquipment	OffRoadEquipmentType		Graders
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblTripsAndVMT	HaulingTripLength	20.00	13.00
tblTripsAndVMT	HaulingTripLength	20.00	45.00
tblTripsAndVMT	HaulingTripNumber	294.00	299.00
tblVehicleTrips	WD_TR	5.44	5.02
tblVehicleTrips	WD_TR	44.32	32.50

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

tblWoodstoves	NumberCatalytic	3.56	0.00
tblWoodstoves	NumberNoncatalytic	3.56	0.00
tblWoodstoves	WoodstoveDayYear	14.12	0.00
tblWoodstoves	WoodstoveWoodMass	582.40	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2023	0.0408	0.3512	0.4060	1.0300e-003	0.1310	0.0144	0.1454	0.0476	0.0135	0.0611	0.0000	93.5964	93.5964	0.0142	4.2400e-003	95.2157
2024	0.1994	1.5026	2.0369	6.4400e-003	0.3410	0.0426	0.3836	0.0922	0.0404	0.1326	0.0000	592.0755	592.0755	0.0573	0.0334	603.4661
2025	0.9037	1.2438	1.7376	5.3900e-003	0.2851	0.0350	0.3200	0.0770	0.0332	0.1102	0.0000	496.1124	496.1124	0.0493	0.0265	505.2492
2026	0.0190	6.1000e-004	1.4000e-003	0.0000	2.1000e-004	3.0000e-005	2.4000e-004	6.0000e-005	3.0000e-005	8.0000e-005	0.0000	0.2832	0.2832	1.0000e-005	0.0000	0.2846
Maximum	**0.9037**	**1.5026**	**2.0369**	**6.4400e-003**	**0.3410**	**0.0426**	**0.3836**	**0.0922**	**0.0404**	**0.1326**	**0.0000**	**592.0755**	**592.0755**	**0.0573**	**0.0334**	**603.4661**

Village at Novato AQ - Bay Area AQMD Air District, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

2.1 Overall Construction

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2023	0.0408	0.3512	0.4060	1.0300e-003	0.0775	0.0144	0.0919	0.0264	0.0135	0.0399	0.0000	93.5964	93.5964	0.0142	4.2400e-003	95.2157
2024	0.1994	1.5025	2.0369	6.4400e-003	0.3410	0.0426	0.3836	0.0922	0.0404	0.1326	0.0000	592.0752	592.0752	0.0573	0.0334	603.4659
2025	0.9037	1.2438	1.7376	5.3900e-003	0.2851	0.0350	0.3200	0.0770	0.0332	0.1102	0.0000	496.1122	496.1122	0.0493	0.0265	505.2490
2026	0.0190	6.1000e-004	1.4000e-003	0.0000	2.1000e-004	3.0000e-005	2.4000e-004	6.0000e-005	3.0000e-005	8.0000e-005	0.0000	0.2832	0.2832	1.0000e-005	0.0000	0.2846
Maximum	**0.9037**	**1.5025**	**2.0369**	**6.4400e-003**	**0.3410**	**0.0426**	**0.3836**	**0.0922**	**0.0404**	**0.1326**	**0.0000**	**592.0752**	**592.0752**	**0.0573**	**0.0334**	**603.4659**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**7.07**	**0.00**	**6.30**	**9.76**	**0.00**	**6.96**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**9-5-2023**	**12-4-2023**	0.2651	0.2651
2	**12-5-2023**	**3-4-2024**	0.4332	0.4332
3	**3-5-2024**	**6-4-2024**	0.4255	0.4255
4	**6-5-2024**	**9-4-2024**	0.4227	0.4227
5	**9-5-2024**	**12-4-2024**	0.4248	0.4248
6	**12-5-2024**	**3-4-2025**	0.4091	0.4091
7	**3-5-2025**	**6-4-2025**	0.4057	0.4057
8	**6-5-2025**	**9-4-2025**	0.4030	0.4030

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

9	**9-5-2025**	**12-4-2025**	0.6795	0.6795
10	**12-5-2025**	**3-4-2026**	0.3916	0.3916
		Highest	0.6795	0.6795

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	1.1046	0.0156	1.3243	7.0000e-005		7.3700e-003	7.3700e-003		7.3700e-003	7.3700e-003	0.0000	2.5407	2.5407	2.0900e-003	1.0000e-005	2.5950
Energy	8.4500e-003	0.0724	0.0321	4.6000e-004		5.8400e-003	5.8400e-003		5.8400e-003	5.8400e-003	0.0000	199.7869	199.7869	0.0148	3.1400e-003	201.0918
Mobile	0.4786	0.5081	4.3166	8.7500e-003	0.9936	6.5000e-003	1.0001	0.2655	6.0500e-003	0.2715	0.0000	833.3067	833.3067	0.0557	0.0406	846.7897
Waste						0.0000	0.0000		0.0000	0.0000	19.6049	0.0000	19.6049	1.1586	0.0000	48.5702
Water						0.0000	0.0000		0.0000	0.0000	4.0083	12.6507	16.6591	0.4131	9.9000e-003	29.9362
Total	**1.5916**	**0.5961**	**5.6730**	**9.2800e-003**	**0.9936**	**0.0197**	**1.0133**	**0.2655**	**0.0193**	**0.2847**	**23.6132**	**1,048.2850**	**1,071.8982**	**1.6443**	**0.0536**	**1,128.9831**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	1.1046	0.0156	1.3243	7.0000e-005		7.3700e-003	7.3700e-003		7.3700e-003	7.3700e-003	0.0000	2.5407	2.5407	2.0900e-003	1.0000e-005	2.5950
Energy	8.4500e-003	0.0724	0.0321	4.6000e-004		5.8400e-003	5.8400e-003		5.8400e-003	5.8400e-003	0.0000	199.7869	199.7869	0.0148	3.1400e-003	201.0918
Mobile	0.4786	0.5081	4.3166	8.7500e-003	0.9936	6.5000e-003	1.0001	0.2655	6.0500e-003	0.2715	0.0000	833.3067	833.3067	0.0557	0.0406	846.7897
Waste						0.0000	0.0000		0.0000	0.0000	19.6049	0.0000	19.6049	1.1586	0.0000	48.5702
Water						0.0000	0.0000		0.0000	0.0000	3.2067	10.8523	14.0590	0.3306	7.9300e-003	24.6858
Total	**1.5916**	**0.5961**	**5.6730**	**9.2800e-003**	**0.9936**	**0.0197**	**1.0133**	**0.2655**	**0.0193**	**0.2847**	**22.8115**	**1,046.4865**	**1,069.2981**	**1.5618**	**0.0517**	**1,123.7326**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**3.39**	**0.17**	**0.24**	**5.02**	**3.67**	**0.47**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	9/5/2023	10/2/2023	5	20	
2	Site Preparation	Site Preparation	10/3/2023	10/30/2023	5	20	
3	Grading	Grading	11/1/2023	11/28/2023	5	20	

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

4	Building Construction	Building Construction	11/29/2023	10/23/2025	5	497	
5	Paving	Paving	10/24/2025	11/6/2025	5	10	
6	Architectural Coating	Architectural Coating	11/7/2025	1/1/2026	5	40	

Acres of Grading (Site Preparation Phase): 10

Acres of Grading (Grading Phase): 0

Acres of Paving: 4.26

Residential Indoor: 437,060; Residential Outdoor: 145,687; Non-Residential Indoor: 21,000; Non-Residential Outdoor: 7,000; Striped Parking Area: 19,394 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Building Construction	Cranes	1	7.00	231	0.29
Demolition	Excavators	1	8.00	158	0.38
Grading	Excavators	1	8.00	158	0.38
Building Construction	Forklifts	0	8.00	89	0.20
Building Construction	Generator Sets	0	8.00	84	0.74
Grading	Graders	0	8.00	187	0.41
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	1	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Demolition	Rubber Tired Dozers	0	8.00	247	0.40
Grading	Rubber Tired Dozers	0	8.00	247	0.40
Site Preparation	Rubber Tired Dozers	1	8.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	0	7.00	97	0.37
Grading	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Site Preparation	Tractors/Loaders/Backhoes	0	8.00	97	0.37

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Building Construction	Welders	0	8.00	46	0.45
Site Preparation	Concrete/Industrial Saws	1	8.00	81	0.73
Site Preparation	Excavators	1	8.00	158	0.38
Site Preparation	Sweepers/Scrubbers	1	8.00	64	0.46
Grading	Plate Compactors	1	8.00	8	0.43
Grading	Trenchers	1	8.00	78	0.50
Building Construction	Aerial Lifts	2	8.00	63	0.31
Building Construction	Cement and Mortar Mixers	1	8.00	9	0.56
Building Construction	Air Compressors	1	8.00	78	0.48
Building Construction	Pressure Washers	1	8.00	13	0.30
Building Construction	Rough Terrain Forklifts	1	8.00	100	0.40
Paving	Concrete/Industrial Saws	1	8.00	81	0.73
Paving	Plate Compactors	2	8.00	8	0.43
Paving	Graders	1	8.00	187	0.41

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	1	3.00	0.00	299.00	10.80	7.30	13.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	4	10.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	3	8.00	0.00	25.00	10.80	7.30	45.00	LD_Mix	HDT_Mix	HHDT
Building Construction	7	268.00	74.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	8	20.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	54.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.2 Demolition - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0318	0.0000	0.0318	4.8100e-003	0.0000	4.8100e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.8900e-003	0.0155	0.0326	5.0000e-005		7.6000e-004	7.6000e-004		7.0000e-004	7.0000e-004	0.0000	4.5369	4.5369	1.4700e-003	0.0000	4.5736
Total	**1.8900e-003**	**0.0155**	**0.0326**	**5.0000e-005**	**0.0318**	**7.6000e-004**	**0.0325**	**4.8100e-003**	**7.0000e-004**	**5.5100e-003**	**0.0000**	**4.5369**	**4.5369**	**1.4700e-003**	**0.0000**	**4.5736**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.5000e-004	0.0141	3.8300e-003	6.0000e-005	1.6400e-003	1.1000e-004	1.7500e-003	4.5000e-004	1.0000e-004	5.5000e-004	0.0000	5.9255	5.9255	1.9000e-004	9.4000e-004	6.2101
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.0000e-005	5.0000e-005	6.7000e-004	0.0000	2.4000e-004	0.0000	2.4000e-004	6.0000e-005	0.0000	6.0000e-005	0.0000	0.1858	0.1858	1.0000e-005	1.0000e-005	0.1874
Total	**3.3000e-004**	**0.0142**	**4.5000e-003**	**6.0000e-005**	**1.8800e-003**	**1.1000e-004**	**1.9900e-003**	**5.1000e-004**	**1.0000e-004**	**6.1000e-004**	**0.0000**	**6.1113**	**6.1113**	**2.0000e-004**	**9.5000e-004**	**6.3976**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.2 Demolition - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0143	0.0000	0.0143	2.1600e-003	0.0000	2.1600e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.8900e-003	0.0155	0.0326	5.0000e-005		7.6000e-004	7.6000e-004		7.0000e-004	7.0000e-004	0.0000	4.5369	4.5369	1.4700e-003	0.0000	4.5736
Total	**1.8900e-003**	**0.0155**	**0.0326**	**5.0000e-005**	**0.0143**	**7.6000e-004**	**0.0151**	**2.1600e-003**	**7.0000e-004**	**2.8600e-003**	**0.0000**	**4.5369**	**4.5369**	**1.4700e-003**	**0.0000**	**4.5736**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.5000e-004	0.0141	3.8300e-003	6.0000e-005	1.6400e-003	1.1000e-004	1.7500e-003	4.5000e-004	1.0000e-004	5.5000e-004	0.0000	5.9255	5.9255	1.9000e-004	9.4000e-004	6.2101
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.0000e-005	5.0000e-005	6.7000e-004	0.0000	2.4000e-004	0.0000	2.4000e-004	6.0000e-005	0.0000	6.0000e-005	0.0000	0.1858	0.1858	1.0000e-005	1.0000e-005	0.1874
Total	**3.3000e-004**	**0.0142**	**4.5000e-003**	**6.0000e-005**	**1.8800e-003**	**1.1000e-004**	**1.9900e-003**	**5.1000e-004**	**1.0000e-004**	**6.1000e-004**	**0.0000**	**6.1113**	**6.1113**	**2.0000e-004**	**9.5000e-004**	**6.3976**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.3 Site Preparation - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0655	0.0000	0.0655	0.0337	0.0000	0.0337	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0139	0.1296	0.1194	2.3000e-004		6.3300e-003	6.3300e-003		5.9300e-003	5.9300e-003	0.0000	19.6505	19.6505	4.8800e-003	0.0000	19.7725
Total	**0.0139**	**0.1296**	**0.1194**	**2.3000e-004**	**0.0655**	**6.3300e-003**	**0.0719**	**0.0337**	**5.9300e-003**	**0.0396**	**0.0000**	**19.6505**	**19.6505**	**4.8800e-003**	**0.0000**	**19.7725**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.6000e-004	1.8000e-004	2.2200e-003	1.0000e-005	7.9000e-004	0.0000	7.9000e-004	2.1000e-004	0.0000	2.1000e-004	0.0000	0.6193	0.6193	2.0000e-005	2.0000e-005	0.6248
Total	**2.6000e-004**	**1.8000e-004**	**2.2200e-003**	**1.0000e-005**	**7.9000e-004**	**0.0000**	**7.9000e-004**	**2.1000e-004**	**0.0000**	**2.1000e-004**	**0.0000**	**0.6193**	**0.6193**	**2.0000e-005**	**2.0000e-005**	**0.6248**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.3 Site Preparation - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0295	0.0000	0.0295	0.0152	0.0000	0.0152	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0139	0.1296	0.1194	2.3000e-004		6.3300e-003	6.3300e-003		5.9300e-003	5.9300e-003	0.0000	19.6505	19.6505	4.8800e-003	0.0000	19.7725
Total	**0.0139**	**0.1296**	**0.1194**	**2.3000e-004**	**0.0295**	**6.3300e-003**	**0.0358**	**0.0152**	**5.9300e-003**	**0.0211**	**0.0000**	**19.6505**	**19.6505**	**4.8800e-003**	**0.0000**	**19.7725**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.6000e-004	1.8000e-004	2.2200e-003	1.0000e-005	7.9000e-004	0.0000	7.9000e-004	2.1000e-004	0.0000	2.1000e-004	0.0000	0.6193	0.6193	2.0000e-005	2.0000e-005	0.6248
Total	**2.6000e-004**	**1.8000e-004**	**2.2200e-003**	**1.0000e-005**	**7.9000e-004**	**0.0000**	**7.9000e-004**	**2.1000e-004**	**0.0000**	**2.1000e-004**	**0.0000**	**0.6193**	**0.6193**	**2.0000e-005**	**2.0000e-005**	**0.6248**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.4 Grading - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.0000e-005	0.0000	1.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	5.7700e-003	0.0505	0.0607	9.0000e-005		3.1100e-003	3.1100e-003		2.8700e-003	2.8700e-003	0.0000	7.8328	7.8328	2.4600e-003	0.0000	7.8944
Total	**5.7700e-003**	**0.0505**	**0.0607**	**9.0000e-005**	**1.0000e-005**	**3.1100e-003**	**3.1200e-003**	**0.0000**	**2.8700e-003**	**2.8700e-003**	**0.0000**	**7.8328**	**7.8328**	**2.4600e-003**	**0.0000**	**7.8944**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	4.0000e-005	3.5400e-003	6.8000e-004	2.0000e-005	4.8000e-004	3.0000e-005	5.1000e-004	1.3000e-004	3.0000e-005	1.6000e-004	0.0000	1.6408	1.6408	5.0000e-005	2.6000e-004	1.7197
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.0000e-004	1.4000e-004	1.7700e-003	1.0000e-005	6.3000e-004	0.0000	6.4000e-004	1.7000e-004	0.0000	1.7000e-004	0.0000	0.4954	0.4954	1.0000e-005	1.0000e-005	0.4999
Total	**2.4000e-004**	**3.6800e-003**	**2.4500e-003**	**3.0000e-005**	**1.1100e-003**	**3.0000e-005**	**1.1500e-003**	**3.0000e-004**	**3.0000e-005**	**3.3000e-004**	**0.0000**	**2.1363**	**2.1363**	**6.0000e-005**	**2.7000e-004**	**2.2195**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.4 Grading - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.0000e-005	0.0000	1.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	5.7700e-003	0.0505	0.0607	9.0000e-005		3.1100e-003	3.1100e-003		2.8700e-003	2.8700e-003	0.0000	7.8328	7.8328	2.4600e-003	0.0000	7.8944
Total	**5.7700e-003**	**0.0505**	**0.0607**	**9.0000e-005**	**1.0000e-005**	**3.1100e-003**	**3.1200e-003**	**0.0000**	**2.8700e-003**	**2.8700e-003**	**0.0000**	**7.8328**	**7.8328**	**2.4600e-003**	**0.0000**	**7.8944**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	4.0000e-005	3.5400e-003	6.8000e-004	2.0000e-005	4.8000e-004	3.0000e-005	5.1000e-004	1.3000e-004	3.0000e-005	1.6000e-004	0.0000	1.6408	1.6408	5.0000e-005	2.6000e-004	1.7197
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.0000e-004	1.4000e-004	1.7700e-003	1.0000e-005	6.3000e-004	0.0000	6.4000e-004	1.7000e-004	0.0000	1.7000e-004	0.0000	0.4954	0.4954	1.0000e-005	1.0000e-005	0.4999
Total	**2.4000e-004**	**3.6800e-003**	**2.4500e-003**	**3.0000e-005**	**1.1100e-003**	**3.0000e-005**	**1.1500e-003**	**3.0000e-004**	**3.0000e-005**	**3.3000e-004**	**0.0000**	**2.1363**	**2.1363**	**6.0000e-005**	**2.7000e-004**	**2.2195**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.5 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	9.6500e-003	0.0944	0.1040	2.0000e-004		3.7300e-003	3.7300e-003		3.5400e-003	3.5400e-003	0.0000	16.8243	16.8243	4.2000e-003	0.0000	16.9293
Total	**9.6500e-003**	**0.0944**	**0.1040**	**2.0000e-004**		**3.7300e-003**	**3.7300e-003**		**3.5400e-003**	**3.5400e-003**	**0.0000**	**16.8243**	**16.8243**	**4.2000e-003**	**0.0000**	**16.9293**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	9.1000e-004	0.0378	0.0118	1.7000e-004	5.5800e-003	2.2000e-004	5.8000e-003	1.6200e-003	2.1000e-004	1.8300e-003	0.0000	16.7984	16.7984	3.4000e-004	2.4800e-003	17.5475
Worker	7.8900e-003	5.4000e-003	0.0684	2.1000e-004	0.0244	1.3000e-004	0.0245	6.4800e-003	1.2000e-004	6.5900e-003	0.0000	19.0868	19.0868	5.5000e-004	5.2000e-004	19.2566
Total	**8.8000e-003**	**0.0432**	**0.0802**	**3.8000e-004**	**0.0299**	**3.5000e-004**	**0.0303**	**8.1000e-003**	**3.3000e-004**	**8.4200e-003**	**0.0000**	**35.8851**	**35.8851**	**8.9000e-004**	**3.0000e-003**	**36.8040**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.5 Building Construction - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	9.6500e-003	0.0944	0.1040	2.0000e-004		3.7300e-003	3.7300e-003		3.5400e-003	3.5400e-003	0.0000	16.8243	16.8243	4.2000e-003	0.0000	16.9293
Total	**9.6500e-003**	**0.0944**	**0.1040**	**2.0000e-004**		**3.7300e-003**	**3.7300e-003**		**3.5400e-003**	**3.5400e-003**	**0.0000**	**16.8243**	**16.8243**	**4.2000e-003**	**0.0000**	**16.9293**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	9.1000e-004	0.0378	0.0118	1.7000e-004	5.5800e-003	2.2000e-004	5.8000e-003	1.6200e-003	2.1000e-004	1.8300e-003	0.0000	16.7984	16.7984	3.4000e-004	2.4800e-003	17.5475
Worker	7.8900e-003	5.4000e-003	0.0684	2.1000e-004	0.0244	1.3000e-004	0.0245	6.4800e-003	1.2000e-004	6.5900e-003	0.0000	19.0868	19.0868	5.5000e-004	5.2000e-004	19.2566
Total	**8.8000e-003**	**0.0432**	**0.0802**	**3.8000e-004**	**0.0299**	**3.5000e-004**	**0.0303**	**8.1000e-003**	**3.3000e-004**	**8.4200e-003**	**0.0000**	**35.8851**	**35.8851**	**8.9000e-004**	**3.0000e-003**	**36.8040**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.5 Building Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1053	1.0164	1.1775	2.2400e-003		0.0387	0.0387		0.0367	0.0367	0.0000	191.6413	191.6413	0.0477	0.0000	192.8337
Total	**0.1053**	**1.0164**	**1.1775**	**2.2400e-003**		**0.0387**	**0.0387**		**0.0367**	**0.0367**	**0.0000**	**191.6413**	**191.6413**	**0.0477**	**0.0000**	**192.8337**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0100	0.4312	0.1320	1.9300e-003	0.0636	2.5400e-003	0.0662	0.0184	2.4300e-003	0.0208	0.0000	188.3734	188.3734	3.8800e-003	0.0279	196.7731
Worker	0.0841	0.0549	0.7274	2.2700e-003	0.2774	1.3600e-003	0.2788	0.0738	1.2500e-003	0.0751	0.0000	212.0608	212.0608	5.6700e-003	5.5600e-003	213.8592
Total	**0.0941**	**0.4861**	**0.8594**	**4.2000e-003**	**0.3410**	**3.9000e-003**	**0.3449**	**0.0922**	**3.6800e-003**	**0.0959**	**0.0000**	**400.4342**	**400.4342**	**9.5500e-003**	**0.0334**	**410.6324**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.5 Building Construction - 2024

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1053	1.0164	1.1775	2.2400e-003		0.0387	0.0387		0.0367	0.0367	0.0000	191.6411	191.6411	0.0477	0.0000	192.8335
Total	**0.1053**	**1.0164**	**1.1775**	**2.2400e-003**		**0.0387**	**0.0387**		**0.0367**	**0.0367**	**0.0000**	**191.6411**	**191.6411**	**0.0477**	**0.0000**	**192.8335**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0100	0.4312	0.1320	1.9300e-003	0.0636	2.5400e-003	0.0662	0.0184	2.4300e-003	0.0208	0.0000	188.3734	188.3734	3.8800e-003	0.0279	196.7731
Worker	0.0841	0.0549	0.7274	2.2700e-003	0.2774	1.3600e-003	0.2788	0.0738	1.2500e-003	0.0751	0.0000	212.0608	212.0608	5.6700e-003	5.5600e-003	213.8592
Total	**0.0941**	**0.4861**	**0.8594**	**4.2000e-003**	**0.3410**	**3.9000e-003**	**0.3449**	**0.0922**	**3.6800e-003**	**0.0959**	**0.0000**	**400.4342**	**400.4342**	**9.5500e-003**	**0.0334**	**410.6324**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.5 Building Construction - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0813	0.7724	0.9483	1.8100e-003		0.0283	0.0283		0.0269	0.0269	0.0000	155.0683	155.0683	0.0385	0.0000	156.0314
Total	**0.0813**	**0.7724**	**0.9483**	**1.8100e-003**		**0.0283**	**0.0283**		**0.0269**	**0.0269**	**0.0000**	**155.0683**	**155.0683**	**0.0385**	**0.0000**	**156.0314**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	7.9200e-003	0.3476	0.1049	1.5400e-003	0.0515	2.0600e-003	0.0535	0.0149	1.9700e-003	0.0169	0.0000	149.7134	149.7134	3.1200e-003	0.0221	156.3873
Worker	0.0640	0.0400	0.5526	1.7700e-003	0.2245	1.0500e-003	0.2255	0.0597	9.7000e-004	0.0607	0.0000	167.4915	167.4915	4.1700e-003	4.2200e-003	168.8522
Total	**0.0719**	**0.3876**	**0.6576**	**3.3100e-003**	**0.2759**	**3.1100e-003**	**0.2791**	**0.0746**	**2.9400e-003**	**0.0775**	**0.0000**	**317.2049**	**317.2049**	**7.2900e-003**	**0.0264**	**325.2395**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.5 Building Construction - 2025

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0813	0.7724	0.9483	1.8100e-003		0.0283	0.0283		0.0269	0.0269	0.0000	155.0681	155.0681	0.0385	0.0000	156.0312
Total	**0.0813**	**0.7724**	**0.9483**	**1.8100e-003**		**0.0283**	**0.0283**		**0.0269**	**0.0269**	**0.0000**	**155.0681**	**155.0681**	**0.0385**	**0.0000**	**156.0312**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	7.9200e-003	0.3476	0.1049	1.5400e-003	0.0515	2.0600e-003	0.0535	0.0149	1.9700e-003	0.0169	0.0000	149.7134	149.7134	3.1200e-003	0.0221	156.3873
Worker	0.0640	0.0400	0.5526	1.7700e-003	0.2245	1.0500e-003	0.2255	0.0597	9.7000e-004	0.0607	0.0000	167.4915	167.4915	4.1700e-003	4.2200e-003	168.8522
Total	**0.0719**	**0.3876**	**0.6576**	**3.3100e-003**	**0.2759**	**3.1100e-003**	**0.2791**	**0.0746**	**2.9400e-003**	**0.0775**	**0.0000**	**317.2049**	**317.2049**	**7.2900e-003**	**0.0264**	**325.2395**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.6 Paving - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	6.4000e-003	0.0598	0.0740	1.4000e-004		2.5300e-003	2.5300e-003		2.3700e-003	2.3700e-003	0.0000	12.0624	12.0624	3.0800e-003	0.0000	12.1394
Paving	4.3000e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0107**	**0.0598**	**0.0740**	**1.4000e-004**		**2.5300e-003**	**2.5300e-003**		**2.3700e-003**	**2.3700e-003**	**0.0000**	**12.0624**	**12.0624**	**3.0800e-003**	**0.0000**	**12.1394**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.3000e-004	1.4000e-004	1.9500e-003	1.0000e-005	7.9000e-004	0.0000	7.9000e-004	2.1000e-004	0.0000	2.1000e-004	0.0000	0.5896	0.5896	1.0000e-005	1.0000e-005	0.5944
Total	**2.3000e-004**	**1.4000e-004**	**1.9500e-003**	**1.0000e-005**	**7.9000e-004**	**0.0000**	**7.9000e-004**	**2.1000e-004**	**0.0000**	**2.1000e-004**	**0.0000**	**0.5896**	**0.5896**	**1.0000e-005**	**1.0000e-005**	**0.5944**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.6 Paving - 2025

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	6.4000e-003	0.0598	0.0740	1.4000e-004		2.5300e-003	2.5300e-003		2.3700e-003	2.3700e-003	0.0000	12.0624	12.0624	3.0800e-003	0.0000	12.1394
Paving	4.3000e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0107**	**0.0598**	**0.0740**	**1.4000e-004**		**2.5300e-003**	**2.5300e-003**		**2.3700e-003**	**2.3700e-003**	**0.0000**	**12.0624**	**12.0624**	**3.0800e-003**	**0.0000**	**12.1394**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.3000e-004	1.4000e-004	1.9500e-003	1.0000e-005	7.9000e-004	0.0000	7.9000e-004	2.1000e-004	0.0000	2.1000e-004	0.0000	0.5896	0.5896	1.0000e-005	1.0000e-005	0.5944
Total	**2.3000e-004**	**1.4000e-004**	**1.9500e-003**	**1.0000e-005**	**7.9000e-004**	**0.0000**	**7.9000e-004**	**2.1000e-004**	**0.0000**	**2.1000e-004**	**0.0000**	**0.5896**	**0.5896**	**1.0000e-005**	**1.0000e-005**	**0.5944**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.7 Architectural Coating - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.7338					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	3.3300e-003	0.0223	0.0353	6.0000e-005		1.0000e-003	1.0000e-003		1.0000e-003	1.0000e-003	0.0000	4.9788	4.9788	2.7000e-004	0.0000	4.9856
Total	**0.7372**	**0.0223**	**0.0353**	**6.0000e-005**		**1.0000e-003**	**1.0000e-003**		**1.0000e-003**	**1.0000e-003**	**0.0000**	**4.9788**	**4.9788**	**2.7000e-004**	**0.0000**	**4.9856**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.3700e-003	1.4800e-003	0.0205	7.0000e-005	8.3200e-003	4.0000e-005	8.3600e-003	2.2100e-003	4.0000e-005	2.2500e-003	0.0000	6.2084	6.2084	1.5000e-004	1.6000e-004	6.2589
Total	**2.3700e-003**	**1.4800e-003**	**0.0205**	**7.0000e-005**	**8.3200e-003**	**4.0000e-005**	**8.3600e-003**	**2.2100e-003**	**4.0000e-005**	**2.2500e-003**	**0.0000**	**6.2084**	**6.2084**	**1.5000e-004**	**1.6000e-004**	**6.2589**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.7 Architectural Coating - 2025

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.7338					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	3.3300e-003	0.0223	0.0353	6.0000e-005		1.0000e-003	1.0000e-003		1.0000e-003	1.0000e-003	0.0000	4.9788	4.9788	2.7000e-004	0.0000	4.9856
Total	**0.7372**	**0.0223**	**0.0353**	**6.0000e-005**		**1.0000e-003**	**1.0000e-003**		**1.0000e-003**	**1.0000e-003**	**0.0000**	**4.9788**	**4.9788**	**2.7000e-004**	**0.0000**	**4.9856**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.3700e-003	1.4800e-003	0.0205	7.0000e-005	8.3200e-003	4.0000e-005	8.3600e-003	2.2100e-003	4.0000e-005	2.2500e-003	0.0000	6.2084	6.2084	1.5000e-004	1.6000e-004	6.2589
Total	**2.3700e-003**	**1.4800e-003**	**0.0205**	**7.0000e-005**	**8.3200e-003**	**4.0000e-005**	**8.3600e-003**	**2.2100e-003**	**4.0000e-005**	**2.2500e-003**	**0.0000**	**6.2084**	**6.2084**	**1.5000e-004**	**1.6000e-004**	**6.2589**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.7 Architectural Coating - 2026

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0188					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	9.0000e-005	5.7000e-004	9.0000e-004	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005	0.0000	0.1277	0.1277	1.0000e-005	0.0000	0.1278
Total	**0.0189**	**5.7000e-004**	**9.0000e-004**	**0.0000**		**3.0000e-005**	**3.0000e-005**		**3.0000e-005**	**3.0000e-005**	**0.0000**	**0.1277**	**0.1277**	**1.0000e-005**	**0.0000**	**0.1278**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.0000e-005	3.0000e-005	5.0000e-004	0.0000	2.1000e-004	0.0000	2.1000e-004	6.0000e-005	0.0000	6.0000e-005	0.0000	0.1556	0.1556	0.0000	0.0000	0.1568
Total	**6.0000e-005**	**3.0000e-005**	**5.0000e-004**	**0.0000**	**2.1000e-004**	**0.0000**	**2.1000e-004**	**6.0000e-005**	**0.0000**	**6.0000e-005**	**0.0000**	**0.1556**	**0.1556**	**0.0000**	**0.0000**	**0.1568**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.7 Architectural Coating - 2026

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0188					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	9.0000e-005	5.7000e-004	9.0000e-004	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005	0.0000	0.1277	0.1277	1.0000e-005	0.0000	0.1278
Total	**0.0189**	**5.7000e-004**	**9.0000e-004**	**0.0000**		**3.0000e-005**	**3.0000e-005**		**3.0000e-005**	**3.0000e-005**	**0.0000**	**0.1277**	**0.1277**	**1.0000e-005**	**0.0000**	**0.1278**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.0000e-005	3.0000e-005	5.0000e-004	0.0000	2.1000e-004	0.0000	2.1000e-004	6.0000e-005	0.0000	6.0000e-005	0.0000	0.1556	0.1556	0.0000	0.0000	0.1568
Total	**6.0000e-005**	**3.0000e-005**	**5.0000e-004**	**0.0000**	**2.1000e-004**	**0.0000**	**2.1000e-004**	**6.0000e-005**	**0.0000**	**6.0000e-005**	**0.0000**	**0.1556**	**0.1556**	**0.0000**	**0.0000**	**0.1568**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.4786	0.5081	4.3166	8.7500e-003	0.9936	6.5000e-003	1.0001	0.2655	6.0500e-003	0.2715	0.0000	833.3067	833.3067	0.0557	0.0406	846.7897
Unmitigated	0.4786	0.5081	4.3166	8.7500e-003	0.9936	6.5000e-003	1.0001	0.2655	6.0500e-003	0.2715	0.0000	833.3067	833.3067	0.0557	0.0406	846.7897

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Mid Rise	893.56	873.98	728.02	2,002,693	2,002,693
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Parking Lot	0.00	0.00	0.00		
Strip Mall	455.00	588.56	286.02	692,922	692,922
Other Asphalt Surfaces	0.00	0.00	0.00		
Total	1,348.56	1,462.54	1,014.04	2,695,616	2,695,616

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Apartments Mid Rise	10.80	4.80	5.70	31.00	15.00	54.00	86	11	3
Other Non-Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Strip Mall	9.50	7.30	7.30	16.60	64.40	19.00	45	40	15
Other Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Apartments Mid Rise	0.554285	0.058871	0.188253	0.120585	0.022598	0.005697	0.010798	0.007525	0.000977	0.000545	0.026246	0.000848	0.002771
Other Non-Asphalt Surfaces	0.554285	0.058871	0.188253	0.120585	0.022598	0.005697	0.010798	0.007525	0.000977	0.000545	0.026246	0.000848	0.002771
Parking Lot	0.554285	0.058871	0.188253	0.120585	0.022598	0.005697	0.010798	0.007525	0.000977	0.000545	0.026246	0.000848	0.002771
Strip Mall	0.554285	0.058871	0.188253	0.120585	0.022598	0.005697	0.010798	0.007525	0.000977	0.000545	0.026246	0.000848	0.002771
Other Asphalt Surfaces	0.554285	0.058871	0.188253	0.120585	0.022598	0.005697	0.010798	0.007525	0.000977	0.000545	0.026246	0.000848	0.002771

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Village at Novato AQ - Bay Area AQMD Air District, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	116.1820	116.1820	0.0132	1.6000e-003	116.9902
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	116.1820	116.1820	0.0132	1.6000e-003	116.9902
NaturalGas Mitigated	8.4500e-003	0.0724	0.0321	4.6000e-004		5.8400e-003	5.8400e-003		5.8400e-003	5.8400e-003	0.0000	83.6049	83.6049	1.6000e-003	1.5300e-003	84.1017
NaturalGas Unmitigated	8.4500e-003	0.0724	0.0321	4.6000e-004		5.8400e-003	5.8400e-003		5.8400e-003	5.8400e-003	0.0000	83.6049	83.6049	1.6000e-003	1.5300e-003	84.1017

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Apartments Mid Rise	1.50286e+006	8.1000e-003	0.0693	0.0295	4.4000e-004		5.6000e-003	5.6000e-003		5.6000e-003	5.6000e-003	0.0000	80.1981	80.1981	1.5400e-003	1.4700e-003	80.6747
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Strip Mall	63840	3.4000e-004	3.1300e-003	2.6300e-003	2.0000e-005		2.4000e-004	2.4000e-004		2.4000e-004	2.4000e-004	0.0000	3.4068	3.4068	7.0000e-005	6.0000e-005	3.4270
Total		**8.4400e-003**	**0.0724**	**0.0321**	**4.6000e-004**		**5.8400e-003**	**5.8400e-003**		**5.8400e-003**	**5.8400e-003**	**0.0000**	**83.6049**	**83.6049**	**1.6100e-003**	**1.5300e-003**	**84.1017**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Apartments Mid Rise	1.50286e+006	8.1000e-003	0.0693	0.0295	4.4000e-004		5.6000e-003	5.6000e-003		5.6000e-003	5.6000e-003	0.0000	80.1981	80.1981	1.5400e-003	1.4700e-003	80.6747
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Strip Mall	63840	3.4000e-004	3.1300e-003	2.6300e-003	2.0000e-005		2.4000e-004	2.4000e-004		2.4000e-004	2.4000e-004	0.0000	3.4068	3.4068	7.0000e-005	6.0000e-005	3.4270
Total		**8.4400e-003**	**0.0724**	**0.0321**	**4.6000e-004**		**5.8400e-003**	**5.8400e-003**		**5.8400e-003**	**5.8400e-003**	**0.0000**	**83.6049**	**83.6049**	**1.6100e-003**	**1.5300e-003**	**84.1017**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Mid Rise	691774	90.9909	0.0104	1.2600e-003	91.6238
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Parking Lot	48160	6.3346	7.2000e-004	9.0000e-005	6.3787
Strip Mall	143360	18.8565	2.1500e-003	2.6000e-004	18.9877
Total		**116.1820**	**0.0132**	**1.6100e-003**	**116.9902**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Mid Rise	691774	90.9909	0.0104	1.2600e-003	91.6238
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Parking Lot	48160	6.3346	7.2000e-004	9.0000e-005	6.3787
Strip Mall	143360	18.8565	2.1500e-003	2.6000e-004	18.9877
Total		**116.1820**	**0.0132**	**1.6100e-003**	**116.9902**

6.0 Area Detail

6.1 Mitigation Measures Area

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	1.1046	0.0156	1.3243	7.0000e-005		7.3700e-003	7.3700e-003		7.3700e-003	7.3700e-003	0.0000	2.5407	2.5407	2.0900e-003	1.0000e-005	2.5950
Unmitigated	1.1046	0.0156	1.3243	7.0000e-005		7.3700e-003	7.3700e-003		7.3700e-003	7.3700e-003	0.0000	2.5407	2.5407	2.0900e-003	1.0000e-005	2.5950

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.1460					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.9185					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	4.0000e-005	3.2000e-004	1.4000e-004	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005	0.0000	0.3745	0.3745	1.0000e-005	1.0000e-005	0.3767
Landscaping	0.0400	0.0152	1.3241	7.0000e-005		7.3400e-003	7.3400e-003		7.3400e-003	7.3400e-003	0.0000	2.1661	2.1661	2.0900e-003	0.0000	2.2183
Total	**1.1046**	**0.0156**	**1.3243**	**7.0000e-005**		**7.3700e-003**	**7.3700e-003**		**7.3700e-003**	**7.3700e-003**	**0.0000**	**2.5407**	**2.5407**	**2.1000e-003**	**1.0000e-005**	**2.5950**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.1460					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.9185					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	4.0000e-005	3.2000e-004	1.4000e-004	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005	0.0000	0.3745	0.3745	1.0000e-005	1.0000e-005	0.3767
Landscaping	0.0400	0.0152	1.3241	7.0000e-005		7.3400e-003	7.3400e-003		7.3400e-003	7.3400e-003	0.0000	2.1661	2.1661	2.0900e-003	0.0000	2.2183
Total	**1.1046**	**0.0156**	**1.3243**	**7.0000e-005**		**7.3700e-003**	**7.3700e-003**		**7.3700e-003**	**7.3700e-003**	**0.0000**	**2.5407**	**2.5407**	**2.1000e-003**	**1.0000e-005**	**2.5950**

7.0 Water Detail

7.1 Mitigation Measures Water

Apply Water Conservation Strategy

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	14.0590	0.3306	7.9300e-003	24.6858
Unmitigated	16.6591	0.4131	9.9000e-003	29.9362

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments Mid Rise	11.5974 / 7.31141	15.2994	0.3792	9.0800e-003	27.4869
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Strip Mall	1.03702 / 0.63559	1.3597	0.0339	8.1000e-004	2.4494
Total		**16.6591**	**0.4131**	**9.8900e-003**	**29.9362**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments Mid Rise	9.27793 / 7.31141	12.9127	0.3035	7.2800e-003	22.6674
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Strip Mall	0.829612 / 0.63559	1.1463	0.0271	6.5000e-004	2.0184
Total		**14.0590**	**0.3306**	**7.9300e-003**	**24.6858**

8.0 Waste Detail

8.1 Mitigation Measures Waste

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	19.6049	1.1586	0.0000	48.5702
Unmitigated	19.6049	1.1586	0.0000	48.5702

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments Mid Rise	81.88	16.6209	0.9823	0.0000	41.1776
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Strip Mall	14.7	2.9840	0.1764	0.0000	7.3927
Total		**19.6049**	**1.1586**	**0.0000**	**48.5702**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments Mid Rise	81.88	16.6209	0.9823	0.0000	41.1776
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Strip Mall	14.7	2.9840	0.1764	0.0000	7.3927
Total		**19.6049**	**1.1586**	**0.0000**	**48.5702**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Village at Novato AQ - Bay Area AQMD Air District, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Village at Novato AQ

Bay Area AQMD Air District, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Apartments Mid Rise	178.00	Dwelling Unit	1.59	215,832.00	509
Strip Mall	14.00	1000sqft	0.00	14,000.00	0
Parking Lot	344.00	Space	0.00	137,600.00	0
Other Non-Asphalt Surfaces	42.75	1000sqft	0.98	42,750.00	0
Other Asphalt Surfaces	3.28	Acre	3.28	142,876.80	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	64
Climate Zone	5			**Operational Year**	2026
Utility Company	MCE				
CO2 Intensity (lb/MWhr)	289.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Project is in Novato, Marin County. Marin Clean Energy is the main utility provider

Land Use - 178 total residential units with 215,832 square feet, 14,000 sf of retail, 42,750 of open space, and assuming 3.28 acres of hardscape

Demolition - Demolition square footage based on provided plan set with demolition table, 64,547 square feet of existing asphalt/concrete

Grading - Import and export approximately 100 cubic yards of soil

Trips and VMT - 40 cubic yards of clear and grub added to demo; Demo haul rote trip length = 13 miles; Grading truck haul destination = 45 miles

Construction Phase - Construction based on number of calendar days per phase and adjusted to account for a five day per week schedule

Off-road Equipment - Applicant provided equipment list

Village at Novato AQ - Bay Area AQMD Air District, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Off-road Equipment - Applicant provided equipment list

Off-road Equipment - Applicant provided equipment list

Off-road Equipment - Applicant provided equipment list

Off-road Equipment - Applicant provided equipment list

Off-road Equipment - Default construction equipment

Architectural Coating - BAAQMD Regulation 6, Rule 3 Architectural Coating, flat coatings = 50 g/L and traffic markings = 100 g/L

Vehicle Trips - Trip Generation Rate from TIS

Woodstoves - There would be three natural gas fireplaces in the open space area

Area Coating - BAAQMD Regulation 6, Rule 3 Architectural Coating, non-flat coatings and traffic markings = 100 g/L

Construction Off-road Equipment Mitigation - New discretionary projects would need to implement BAAQMD Basic Construction Mitigation Measures

Area Mitigation -

Water Mitigation - CalGreen water reduction

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Exterior	150.00	50.00
tblArchitecturalCoating	EF_Nonresidential_Interior	100.00	50.00
tblArchitecturalCoating	EF_Parking	150.00	100.00
tblArchitecturalCoating	EF_Residential_Exterior	150.00	50.00
tblArchitecturalCoating	EF_Residential_Interior	100.00	50.00
tblAreaCoating	Area_EF_Nonresidential_Exterior	150	100
tblAreaCoating	Area_EF_Parking	150	100
tblAreaCoating	Area_EF_Residential_Exterior	150	100
tblAreaMitigation	UseLowVOCPaintNonresidentialExteriorValue	100	150
tblAreaMitigation	UseLowVOCPaintParkingValue	100	150
tblAreaMitigation	UseLowVOCPaintResidentialExteriorValue	100	150
tblConstructionPhase	NumDays	20.00	40.00
tblConstructionPhase	NumDays	230.00	497.00

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

tblConstructionPhase	NumDays	20.00	10.00
tblConstructionPhase	NumDays	10.00	20.00
tblConstructionPhase	PhaseEndDate	11/25/2024	1/1/2026
tblConstructionPhase	PhaseEndDate	9/30/2024	10/23/2025
tblConstructionPhase	PhaseEndDate	11/13/2023	11/28/2023
tblConstructionPhase	PhaseEndDate	10/28/2024	11/6/2025
tblConstructionPhase	PhaseEndDate	10/16/2023	10/30/2023
tblConstructionPhase	PhaseStartDate	10/29/2024	11/7/2025
tblConstructionPhase	PhaseStartDate	11/14/2023	11/29/2023
tblConstructionPhase	PhaseStartDate	10/17/2023	11/1/2023
tblConstructionPhase	PhaseStartDate	10/1/2024	10/24/2025
tblFireplaces	FireplaceWoodMass	228.80	0.00
tblFireplaces	NumberGas	26.70	3.00
tblFireplaces	NumberNoFireplace	7.12	3.00
tblFireplaces	NumberWood	30.26	0.00
tblGrading	MaterialExported	0.00	100.00
tblGrading	MaterialImported	0.00	100.00
tblLandUse	LandUseSquareFeet	178,000.00	215,832.00
tblLandUse	LotAcreage	4.68	1.59
tblLandUse	LotAcreage	0.32	0.00
tblLandUse	LotAcreage	3.10	0.00
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	LoadFactor	0.46	0.46
tblOffRoadEquipment	LoadFactor	0.50	0.50
tblOffRoadEquipment	LoadFactor	0.31	0.31
tblOffRoadEquipment	LoadFactor	0.40	0.40
tblOffRoadEquipment	OffRoadEquipmentType		Concrete/Industrial Saws
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Sweepers/Scrubbers

Village at Novato AQ - Bay Area AQMD Air District, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

tblOffRoadEquipment	OffRoadEquipmentType		Plate Compactors
tblOffRoadEquipment	OffRoadEquipmentType		Trenchers
tblOffRoadEquipment	OffRoadEquipmentType		Aerial Lifts
tblOffRoadEquipment	OffRoadEquipmentType		Cement and Mortar Mixers
tblOffRoadEquipment	OffRoadEquipmentType		Air Compressors
tblOffRoadEquipment	OffRoadEquipmentType		Pressure Washers
tblOffRoadEquipment	OffRoadEquipmentType		Rough Terrain Forklifts
tblOffRoadEquipment	OffRoadEquipmentType		Concrete/Industrial Saws
tblOffRoadEquipment	OffRoadEquipmentType		Plate Compactors
tblOffRoadEquipment	OffRoadEquipmentType		Graders
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblTripsAndVMT	HaulingTripLength	20.00	13.00
tblTripsAndVMT	HaulingTripLength	20.00	45.00
tblTripsAndVMT	HaulingTripNumber	294.00	299.00
tblVehicleTrips	WD_TR	5.44	5.02
tblVehicleTrips	WD_TR	44.32	32.50

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

tblWoodstoves	NumberCatalytic	3.56	0.00
tblWoodstoves	NumberNoncatalytic	3.56	0.00
tblWoodstoves	WoodstoveDayYear	14.12	0.00
tblWoodstoves	WoodstoveWoodMass	582.40	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2023	1.6449	12.9729	16.4598	0.0512	6.6345	0.6336	7.2680	3.3893	0.5931	3.9824	0.0000	5,175.1769	5,175.1769	0.5399	0.2842	5,272.0005
2024	1.5593	11.3063	15.9519	0.0503	2.7028	0.3248	3.0276	0.7283	0.3082	1.0364	0.0000	5,101.5363	5,101.5363	0.4786	0.2774	5,196.1530
2025	37.9315	11.9874	15.5169	0.0494	2.7028	0.5062	2.9991	0.7283	0.4747	1.0092	0.0000	5,027.5871	5,027.5871	0.6823	0.2704	5,120.0034
2026	37.9243	1.2070	2.8740	6.4500e-003	0.4436	0.0534	0.4970	0.1177	0.0533	0.1709	0.0000	647.4922	647.4922	0.0228	7.7100e-003	650.3604
Maximum	**37.9315**	**12.9729**	**16.4598**	**0.0512**	**6.6345**	**0.6336**	**7.2680**	**3.3893**	**0.5931**	**3.9824**	**0.0000**	**5,175.1769**	**5,175.1769**	**0.6823**	**0.2842**	**5,272.0005**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

2.1 Overall Construction (Maximum Daily Emission)

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2023	1.6449	12.9729	16.4598	0.0512	3.0307	0.6336	3.6643	1.5372	0.5931	2.1303	0.0000	5,175.1769	5,175.1769	0.5399	0.2842	5,272.0005
2024	1.5593	11.3063	15.9519	0.0503	2.7028	0.3248	3.0276	0.7283	0.3082	1.0364	0.0000	5,101.5363	5,101.5363	0.4786	0.2774	5,196.1530
2025	37.9315	11.9874	15.5169	0.0494	2.7028	0.5062	2.9991	0.7283	0.4747	1.0092	0.0000	5,027.5871	5,027.5871	0.6823	0.2704	5,120.0034
2026	37.9243	1.2070	2.8740	6.4500e-003	0.4436	0.0534	0.4970	0.1177	0.0533	0.1709	0.0000	647.4922	647.4922	0.0228	7.7100e-003	650.3604
Maximum	**37.9315**	**12.9729**	**16.4598**	**0.0512**	**3.0307**	**0.6336**	**3.6643**	**1.5372**	**0.5931**	**2.1303**	**0.0000**	**5,175.1769**	**5,175.1769**	**0.6823**	**0.2842**	**5,272.0005**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**28.87**	**0.00**	**26.13**	**37.32**	**0.00**	**29.88**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	6.2842	0.2274	14.7372	1.1500e-003		0.0863	0.0863		0.0863	0.0863	0.0000	100.6484	100.6484	0.0270	1.3600e-003	101.7276
Energy	0.0463	0.3966	0.1759	2.5200e-003		0.0320	0.0320		0.0320	0.0320		504.9785	504.9785	9.6800e-003	9.2600e-003	507.9793
Mobile	3.3013	2.8487	25.8951	0.0558	6.2520	0.0395	6.2915	1.6652	0.0368	1.7020		5,862.2866	5,862.2866	0.3490	0.2585	5,948.0514
Total	**9.6318**	**3.4727**	**40.8082**	**0.0595**	**6.2520**	**0.1577**	**6.4097**	**1.6652**	**0.1550**	**1.8202**	**0.0000**	**6,467.9134**	**6,467.9134**	**0.3857**	**0.2691**	**6,557.7584**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	6.2842	0.2274	14.7372	1.1500e-003		0.0863	0.0863		0.0863	0.0863	0.0000	100.6484	100.6484	0.0270	1.3600e-003	101.7276
Energy	0.0463	0.3966	0.1759	2.5200e-003		0.0320	0.0320		0.0320	0.0320		504.9785	504.9785	9.6800e-003	9.2600e-003	507.9793
Mobile	3.3013	2.8487	25.8951	0.0558	6.2520	0.0395	6.2915	1.6652	0.0368	1.7020		5,862.2866	5,862.2866	0.3490	0.2585	5,948.0514
Total	**9.6318**	**3.4727**	**40.8082**	**0.0595**	**6.2520**	**0.1577**	**6.4097**	**1.6652**	**0.1550**	**1.8202**	**0.0000**	**6,467.9134**	**6,467.9134**	**0.3857**	**0.2691**	**6,557.7584**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	9/5/2023	10/2/2023	5	20	
2	Site Preparation	Site Preparation	10/3/2023	10/30/2023	5	20	
3	Grading	Grading	11/1/2023	11/28/2023	5	20	
4	Building Construction	Building Construction	11/29/2023	10/23/2025	5	497	
5	Paving	Paving	10/24/2025	11/6/2025	5	10	
6	Architectural Coating	Architectural Coating	11/7/2025	1/1/2026	5	40	

Acres of Grading (Site Preparation Phase): 10

Acres of Grading (Grading Phase): 0

Acres of Paving: 4.26

Residential Indoor: 437,060; Residential Outdoor: 145,687; Non-Residential Indoor: 21,000; Non-Residential Outdoor: 7,000; Striped Parking Area: 19,394 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Building Construction	Cranes	1	7.00	231	0.29
Demolition	Excavators	1	8.00	158	0.38
Grading	Excavators	1	8.00	158	0.38

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Building Construction	Forklifts	0	8.00	89	0.20
Building Construction	Generator Sets	0	8.00	84	0.74
Grading	Graders	0	8.00	187	0.41
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	1	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Demolition	Rubber Tired Dozers	0	8.00	247	0.40
Grading	Rubber Tired Dozers	0	8.00	247	0.40
Site Preparation	Rubber Tired Dozers	1	8.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	0	7.00	97	0.37
Grading	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Site Preparation	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Building Construction	Welders	0	8.00	46	0.45
Site Preparation	Concrete/Industrial Saws	1	8.00	81	0.73
Site Preparation	Excavators	1	8.00	158	0.38
Site Preparation	Sweepers/Scrubbers	1	8.00	64	0.46
Grading	Plate Compactors	1	8.00	8	0.43
Grading	Trenchers	1	8.00	78	0.50
Building Construction	Aerial Lifts	2	8.00	63	0.31
Building Construction	Cement and Mortar Mixers	1	8.00	9	0.56
Building Construction	Air Compressors	1	8.00	78	0.48
Building Construction	Pressure Washers	1	8.00	13	0.30
Building Construction	Rough Terrain Forklifts	1	8.00	100	0.40
Paving	Concrete/Industrial Saws	1	8.00	81	0.73
Paving	Plate Compactors	2	8.00	8	0.43
Paving	Graders	1	8.00	187	0.41

Trips and VMT

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	1	3.00	0.00	299.00	10.80	7.30	13.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	4	10.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	3	8.00	0.00	25.00	10.80	7.30	45.00	LD_Mix	HDT_Mix	HHDT
Building Construction	7	268.00	74.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	8	20.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	54.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Demolition - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.1769	0.0000	3.1769	0.4810	0.0000	0.4810			0.0000			0.0000
Off-Road	0.1887	1.5486	3.2578	5.1700e-003		0.0758	0.0758		0.0697	0.0697		500.1056	500.1056	0.1617		504.1492
Total	**0.1887**	**1.5486**	**3.2578**	**5.1700e-003**	**3.1769**	**0.0758**	**3.2527**	**0.4810**	**0.0697**	**0.5507**		**500.1056**	**500.1056**	**0.1617**		**504.1492**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.2 Demolition - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0261	1.3597	0.3809	5.9900e-003	0.1701	0.0107	0.1808	0.0466	0.0102	0.0569		652.7834	652.7834	0.0214	0.1034	684.1417
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.1100e-003	4.6600e-003	0.0717	2.1000e-004	0.0246	1.2000e-004	0.0248	6.5400e-003	1.1000e-004	6.6500e-003		21.8654	21.8654	5.5000e-004	5.2000e-004	22.0337
Total	**0.0342**	**1.3643**	**0.4526**	**6.2000e-003**	**0.1947**	**0.0108**	**0.2056**	**0.0532**	**0.0104**	**0.0635**		**674.6488**	**674.6488**	**0.0220**	**0.1040**	**706.1754**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.4296	0.0000	1.4296	0.2165	0.0000	0.2165			0.0000			0.0000
Off-Road	0.1887	1.5486	3.2578	5.1700e-003		0.0758	0.0758		0.0697	0.0697	0.0000	500.1056	500.1056	0.1617		504.1492
Total	**0.1887**	**1.5486**	**3.2578**	**5.1700e-003**	**1.4296**	**0.0758**	**1.5054**	**0.2165**	**0.0697**	**0.2862**	**0.0000**	**500.1056**	**500.1056**	**0.1617**		**504.1492**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.2 Demolition - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0261	1.3597	0.3809	5.9900e-003	0.1701	0.0107	0.1808	0.0466	0.0102	0.0569		652.7834	652.7834	0.0214	0.1034	684.1417
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.1100e-003	4.6600e-003	0.0717	2.1000e-004	0.0246	1.2000e-004	0.0248	6.5400e-003	1.1000e-004	6.6500e-003		21.8654	21.8654	5.5000e-004	5.2000e-004	22.0337
Total	**0.0342**	**1.3643**	**0.4526**	**6.2000e-003**	**0.1947**	**0.0108**	**0.2056**	**0.0532**	**0.0104**	**0.0635**		**674.6488**	**674.6488**	**0.0220**	**0.1040**	**706.1754**

3.3 Site Preparation - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.5523	0.0000	6.5523	3.3675	0.0000	3.3675			0.0000			0.0000
Off-Road	1.3883	12.9573	11.9380	0.0225		0.6331	0.6331		0.5928	0.5928		2,166.0942	2,166.0942	0.5381		2,179.5462
Total	**1.3883**	**12.9573**	**11.9380**	**0.0225**	**6.5523**	**0.6331**	**7.1855**	**3.3675**	**0.5928**	**3.9602**		**2,166.0942**	**2,166.0942**	**0.5381**		**2,179.5462**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.3 Site Preparation - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0271	0.0155	0.2391	7.1000e-004	0.0822	4.1000e-004	0.0826	0.0218	3.8000e-004	0.0222		72.8845	72.8845	1.8400e-003	1.7300e-003	73.4457
Total	**0.0271**	**0.0155**	**0.2391**	**7.1000e-004**	**0.0822**	**4.1000e-004**	**0.0826**	**0.0218**	**3.8000e-004**	**0.0222**		**72.8845**	**72.8845**	**1.8400e-003**	**1.7300e-003**	**73.4457**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.9486	0.0000	2.9486	1.5154	0.0000	1.5154			0.0000			0.0000
Off-Road	1.3883	12.9573	11.9380	0.0225		0.6331	0.6331		0.5928	0.5928	0.0000	2,166.0942	2,166.0942	0.5381		2,179.5462
Total	**1.3883**	**12.9573**	**11.9380**	**0.0225**	**2.9486**	**0.6331**	**3.5817**	**1.5154**	**0.5928**	**2.1081**	**0.0000**	**2,166.0942**	**2,166.0942**	**0.5381**		**2,179.5462**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.3 Site Preparation - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0271	0.0155	0.2391	7.1000e-004	0.0822	4.1000e-004	0.0826	0.0218	3.8000e-004	0.0222		72.8845	72.8845	1.8400e-003	1.7300e-003	73.4457
Total	**0.0271**	**0.0155**	**0.2391**	**7.1000e-004**	**0.0822**	**4.1000e-004**	**0.0826**	**0.0218**	**3.8000e-004**	**0.0222**		**72.8845**	**72.8845**	**1.8400e-003**	**1.7300e-003**	**73.4457**

3.4 Grading - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.1300e-003	0.0000	1.1300e-003	1.7000e-004	0.0000	1.7000e-004			0.0000			0.0000
Off-Road	0.5772	5.0493	6.0733	9.0400e-003		0.3110	0.3110		0.2869	0.2869		863.4209	863.4209	0.2717		870.2128
Total	**0.5772**	**5.0493**	**6.0733**	**9.0400e-003**	**1.1300e-003**	**0.3110**	**0.3121**	**1.7000e-004**	**0.2869**	**0.2871**		**863.4209**	**863.4209**	**0.2717**		**870.2128**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.4 Grading - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	4.4500e-003	0.3407	0.0676	1.6600e-003	0.0492	3.0700e-003	0.0522	0.0135	2.9300e-003	0.0164		180.8363	180.8363	5.9900e-003	0.0287	189.5259
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0216	0.0124	0.1912	5.7000e-004	0.0657	3.3000e-004	0.0660	0.0174	3.0000e-004	0.0177		58.3076	58.3076	1.4700e-003	1.3800e-003	58.7566
Total	**0.0261**	**0.3531**	**0.2589**	**2.2300e-003**	**0.1149**	**3.4000e-003**	**0.1183**	**0.0309**	**3.2300e-003**	**0.0341**		**239.1439**	**239.1439**	**7.4600e-003**	**0.0300**	**248.2825**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					5.1000e-004	0.0000	5.1000e-004	8.0000e-005	0.0000	8.0000e-005			0.0000			0.0000
Off-Road	0.5772	5.0493	6.0733	9.0400e-003		0.3110	0.3110		0.2869	0.2869	0.0000	863.4209	863.4209	0.2717		870.2128
Total	**0.5772**	**5.0493**	**6.0733**	**9.0400e-003**	**5.1000e-004**	**0.3110**	**0.3115**	**8.0000e-005**	**0.2869**	**0.2870**	**0.0000**	**863.4209**	**863.4209**	**0.2717**		**870.2128**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.4 Grading - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	4.4500e-003	0.3407	0.0676	1.6600e-003	0.0492	3.0700e-003	0.0522	0.0135	2.9300e-003	0.0164		180.8363	180.8363	5.9900e-003	0.0287	189.5259
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0216	0.0124	0.1912	5.7000e-004	0.0657	3.3000e-004	0.0660	0.0174	3.0000e-004	0.0177		58.3076	58.3076	1.4700e-003	1.3800e-003	58.7566
Total	**0.0261**	**0.3531**	**0.2589**	**2.2300e-003**	**0.1149**	**3.4000e-003**	**0.1183**	**0.0309**	**3.2300e-003**	**0.0341**		**239.1439**	**239.1439**	**7.4600e-003**	**0.0300**	**248.2825**

3.5 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.8394	8.2096	9.0397	0.0171		0.3244	0.3244		0.3082	0.3082		1,612.6609	1,612.6609	0.4027		1,622.7283
Total	**0.8394**	**8.2096**	**9.0397**	**0.0171**		**0.3244**	**0.3244**		**0.3082**	**0.3082**		**1,612.6609**	**1,612.6609**	**0.4027**		**1,622.7283**

Village at Novato AQ - Bay Area AQMD Air District, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.5 Building Construction - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0805	3.1739	1.0136	0.0150	0.5012	0.0192	0.5204	0.1443	0.0184	0.1627		1,609.2116	1,609.2116	0.0329	0.2379	1,680.9268
Worker	0.7249	0.4164	6.4066	0.0191	2.2016	0.0109	2.2125	0.5840	0.0101	0.5940		1,953.3044	1,953.3044	0.0493	0.0463	1,968.3454
Total	**0.8054**	**3.5903**	**7.4202**	**0.0341**	**2.7027**	**0.0301**	**2.7329**	**0.7282**	**0.0284**	**0.7567**		**3,562.5160**	**3,562.5160**	**0.0822**	**0.2842**	**3,649.2721**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.8394	8.2096	9.0397	0.0171		0.3244	0.3244		0.3082	0.3082	0.0000	1,612.6609	1,612.6609	0.4027		1,622.7283
Total	**0.8394**	**8.2096**	**9.0397**	**0.0171**		**0.3244**	**0.3244**		**0.3082**	**0.3082**	**0.0000**	**1,612.6609**	**1,612.6609**	**0.4027**		**1,622.7283**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.5 Building Construction - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0805	3.1739	1.0136	0.0150	0.5012	0.0192	0.5204	0.1443	0.0184	0.1627		1,609.2116	1,609.2116	0.0329	0.2379	1,680.9268
Worker	0.7249	0.4164	6.4066	0.0191	2.2016	0.0109	2.2125	0.5840	0.0101	0.5940		1,953.3044	1,953.3044	0.0493	0.0463	1,968.3454
Total	**0.8054**	**3.5903**	**7.4202**	**0.0341**	**2.7027**	**0.0301**	**2.7329**	**0.7282**	**0.0284**	**0.7567**		**3,562.5160**	**3,562.5160**	**0.0822**	**0.2842**	**3,649.2721**

3.5 Building Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.8039	7.7591	8.9888	0.0171		0.2950	0.2950		0.2801	0.2801		1,612.5829	1,612.5829	0.4014		1,622.6167
Total	**0.8039**	**7.7591**	**8.9888**	**0.0171**		**0.2950**	**0.2950**		**0.2801**	**0.2801**		**1,612.5829**	**1,612.5829**	**0.4014**		**1,622.6167**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.5 Building Construction - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0782	3.1754	0.9920	0.0148	0.5012	0.0194	0.5206	0.1443	0.0185	0.1628		1,584.1136	1,584.1136	0.0327	0.2342	1,654.7100
Worker	0.6772	0.3718	5.9711	0.0185	2.2016	0.0104	2.2120	0.5840	9.5700e-003	0.5935		1,904.8399	1,904.8399	0.0446	0.0432	1,918.8263
Total	**0.7554**	**3.5472**	**6.9631**	**0.0332**	**2.7028**	**0.0298**	**2.7325**	**0.7283**	**0.0281**	**0.7564**		**3,488.9534**	**3,488.9534**	**0.0773**	**0.2774**	**3,573.5363**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.8039	7.7591	8.9888	0.0171		0.2950	0.2950		0.2801	0.2801	0.0000	1,612.5829	1,612.5829	0.4014		1,622.6167
Total	**0.8039**	**7.7591**	**8.9888**	**0.0171**		**0.2950**	**0.2950**		**0.2801**	**0.2801**	**0.0000**	**1,612.5829**	**1,612.5829**	**0.4014**		**1,622.6167**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.5 Building Construction - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0782	3.1754	0.9920	0.0148	0.5012	0.0194	0.5206	0.1443	0.0185	0.1628		1,584.1136	1,584.1136	0.0327	0.2342	1,654.7100
Worker	0.6772	0.3718	5.9711	0.0185	2.2016	0.0104	2.2120	0.5840	9.5700e-003	0.5935		1,904.8399	1,904.8399	0.0446	0.0432	1,918.8263
Total	**0.7554**	**3.5472**	**6.9631**	**0.0332**	**2.7028**	**0.0298**	**2.7325**	**0.7283**	**0.0281**	**0.7564**		**3,488.9534**	**3,488.9534**	**0.0773**	**0.2774**	**3,573.5363**

3.5 Building Construction - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.7671	7.2866	8.9464	0.0171		0.2670	0.2670		0.2533	0.2533		1,612.5807	1,612.5807	0.4006		1,622.5962
Total	**0.7671**	**7.2866**	**8.9464**	**0.0171**		**0.2670**	**0.2670**		**0.2533**	**0.2533**		**1,612.5807**	**1,612.5807**	**0.4006**		**1,622.5962**

Village at Novato AQ - Bay Area AQMD Air District, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.5 Building Construction - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0763	3.1635	0.9744	0.0145	0.5012	0.0194	0.5206	0.1443	0.0185	0.1628		1,555.9215	1,555.9215	0.0326	0.2299	1,625.2435
Worker	0.6361	0.3350	5.5961	0.0178	2.2016	9.9500e-003	2.2115	0.5840	9.1600e-003	0.5931		1,859.0849	1,859.0849	0.0404	0.0405	1,872.1638
Total	**0.7124**	**3.4985**	**6.5705**	**0.0323**	**2.7028**	**0.0293**	**2.7321**	**0.7283**	**0.0277**	**0.7559**		**3,415.0064**	**3,415.0064**	**0.0730**	**0.2704**	**3,497.4072**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.7671	7.2866	8.9464	0.0171		0.2670	0.2670		0.2533	0.2533	0.0000	1,612.5807	1,612.5807	0.4006		1,622.5962
Total	**0.7671**	**7.2866**	**8.9464**	**0.0171**		**0.2670**	**0.2670**		**0.2533**	**0.2533**	**0.0000**	**1,612.5807**	**1,612.5807**	**0.4006**		**1,622.5962**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.5 Building Construction - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0763	3.1635	0.9744	0.0145	0.5012	0.0194	0.5206	0.1443	0.0185	0.1628		1,555.9215	1,555.9215	0.0326	0.2299	1,625.2435
Worker	0.6361	0.3350	5.5961	0.0178	2.2016	9.9500e-003	2.2115	0.5840	9.1600e-003	0.5931		1,859.0849	1,859.0849	0.0404	0.0405	1,872.1638
Total	**0.7124**	**3.4985**	**6.5705**	**0.0323**	**2.7028**	**0.0293**	**2.7321**	**0.7283**	**0.0277**	**0.7559**		**3,415.0064**	**3,415.0064**	**0.0730**	**0.2704**	**3,497.4072**

3.6 Paving - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.2810	11.9624	14.7956	0.0279		0.5054	0.5054		0.4740	0.4740		2,659.2986	2,659.2986	0.6793		2,676.2816
Paving	0.8594					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**2.1403**	**11.9624**	**14.7956**	**0.0279**		**0.5054**	**0.5054**		**0.4740**	**0.4740**		**2,659.2986**	**2,659.2986**	**0.6793**		**2,676.2816**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.6 Paving - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0475	0.0250	0.4176	1.3300e-003	0.1643	7.4000e-004	0.1650	0.0436	6.8000e-004	0.0443		138.7377	138.7377	3.0100e-003	3.0200e-003	139.7137
Total	**0.0475**	**0.0250**	**0.4176**	**1.3300e-003**	**0.1643**	**7.4000e-004**	**0.1650**	**0.0436**	**6.8000e-004**	**0.0443**		**138.7377**	**138.7377**	**3.0100e-003**	**3.0200e-003**	**139.7137**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.2810	11.9624	14.7956	0.0279		0.5054	0.5054		0.4740	0.4740	0.0000	2,659.2986	2,659.2986	0.6793		2,676.2816
Paving	0.8594					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**2.1403**	**11.9624**	**14.7956**	**0.0279**		**0.5054**	**0.5054**		**0.4740**	**0.4740**	**0.0000**	**2,659.2986**	**2,659.2986**	**0.6793**		**2,676.2816**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.6 Paving - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0475	0.0250	0.4176	1.3300e-003	0.1643	7.4000e-004	0.1650	0.0436	6.8000e-004	0.0443		138.7377	138.7377	3.0100e-003	3.0200e-003	139.7137
Total	**0.0475**	**0.0250**	**0.4176**	**1.3300e-003**	**0.1643**	**7.4000e-004**	**0.1650**	**0.0436**	**6.8000e-004**	**0.0443**		**138.7377**	**138.7377**	**3.0100e-003**	**3.0200e-003**	**139.7137**

3.7 Architectural Coating - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	37.6324					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1709	1.1455	1.8091	2.9700e-003		0.0515	0.0515		0.0515	0.0515		281.4481	281.4481	0.0154		281.8319
Total	**37.8033**	**1.1455**	**1.8091**	**2.9700e-003**		**0.0515**	**0.0515**		**0.0515**	**0.0515**		**281.4481**	**281.4481**	**0.0154**		**281.8319**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.7 Architectural Coating - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.1282	0.0675	1.1276	3.6000e-003	0.4436	2.0000e-003	0.4456	0.1177	1.8500e-003	0.1195		374.5917	374.5917	8.1400e-003	8.1600e-003	377.2270
Total	**0.1282**	**0.0675**	**1.1276**	**3.6000e-003**	**0.4436**	**2.0000e-003**	**0.4456**	**0.1177**	**1.8500e-003**	**0.1195**		**374.5917**	**374.5917**	**8.1400e-003**	**8.1600e-003**	**377.2270**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	37.6324					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1709	1.1455	1.8091	2.9700e-003		0.0515	0.0515		0.0515	0.0515	0.0000	281.4481	281.4481	0.0154		281.8319
Total	**37.8033**	**1.1455**	**1.8091**	**2.9700e-003**		**0.0515**	**0.0515**		**0.0515**	**0.0515**	**0.0000**	**281.4481**	**281.4481**	**0.0154**		**281.8319**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.7 Architectural Coating - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.1282	0.0675	1.1276	3.6000e-003	0.4436	2.0000e-003	0.4456	0.1177	1.8500e-003	0.1195		374.5917	374.5917	8.1400e-003	8.1600e-003	377.2270
Total	**0.1282**	**0.0675**	**1.1276**	**3.6000e-003**	**0.4436**	**2.0000e-003**	**0.4456**	**0.1177**	**1.8500e-003**	**0.1195**		**374.5917**	**374.5917**	**8.1400e-003**	**8.1600e-003**	**377.2270**

3.7 Architectural Coating - 2026

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	37.6324					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1709	1.1455	1.8091	2.9700e-003		0.0515	0.0515		0.0515	0.0515		281.4481	281.4481	0.0154		281.8319
Total	**37.8033**	**1.1455**	**1.8091**	**2.9700e-003**		**0.0515**	**0.0515**		**0.0515**	**0.0515**		**281.4481**	**281.4481**	**0.0154**		**281.8319**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.7 Architectural Coating - 2026

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.1210	0.0615	1.0649	3.4800e-003	0.4436	1.9100e-003	0.4455	0.1177	1.7600e-003	0.1194		366.0442	366.0442	7.4200e-003	7.7100e-003	368.5286
Total	**0.1210**	**0.0615**	**1.0649**	**3.4800e-003**	**0.4436**	**1.9100e-003**	**0.4455**	**0.1177**	**1.7600e-003**	**0.1194**		**366.0442**	**366.0442**	**7.4200e-003**	**7.7100e-003**	**368.5286**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	37.6324					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1709	1.1455	1.8091	2.9700e-003		0.0515	0.0515		0.0515	0.0515	0.0000	281.4481	281.4481	0.0154		281.8319
Total	**37.8033**	**1.1455**	**1.8091**	**2.9700e-003**		**0.0515**	**0.0515**		**0.0515**	**0.0515**	**0.0000**	**281.4481**	**281.4481**	**0.0154**		**281.8319**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.7 Architectural Coating - 2026

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.1210	0.0615	1.0649	3.4800e-003	0.4436	1.9100e-003	0.4455	0.1177	1.7600e-003	0.1194		366.0442	366.0442	7.4200e-003	7.7100e-003	368.5286
Total	**0.1210**	**0.0615**	**1.0649**	**3.4800e-003**	**0.4436**	**1.9100e-003**	**0.4455**	**0.1177**	**1.7600e-003**	**0.1194**		**366.0442**	**366.0442**	**7.4200e-003**	**7.7100e-003**	**368.5286**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	3.3013	2.8487	25.8951	0.0558	6.2520	0.0395	6.2915	1.6652	0.0368	1.7020		5,862.2866	5,862.2866	0.3490	0.2585	5,948.0514
Unmitigated	3.3013	2.8487	25.8951	0.0558	6.2520	0.0395	6.2915	1.6652	0.0368	1.7020		5,862.2866	5,862.2866	0.3490	0.2585	5,948.0514

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Mid Rise	893.56	873.98	728.02	2,002,693	2,002,693
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Parking Lot	0.00	0.00	0.00		
Strip Mall	455.00	588.56	286.02	692,922	692,922
Other Asphalt Surfaces	0.00	0.00	0.00		
Total	1,348.56	1,462.54	1,014.04	2,695,616	2,695,616

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Apartments Mid Rise	10.80	4.80	5.70	31.00	15.00	54.00	86	11	3
Other Non-Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Strip Mall	9.50	7.30	7.30	16.60	64.40	19.00	45	40	15
Other Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Apartments Mid Rise	0.554285	0.058871	0.188253	0.120585	0.022598	0.005697	0.010798	0.007525	0.000977	0.000545	0.026246	0.000848	0.002771
Other Non-Asphalt Surfaces	0.554285	0.058871	0.188253	0.120585	0.022598	0.005697	0.010798	0.007525	0.000977	0.000545	0.026246	0.000848	0.002771
Parking Lot	0.554285	0.058871	0.188253	0.120585	0.022598	0.005697	0.010798	0.007525	0.000977	0.000545	0.026246	0.000848	0.002771
Strip Mall	0.554285	0.058871	0.188253	0.120585	0.022598	0.005697	0.010798	0.007525	0.000977	0.000545	0.026246	0.000848	0.002771
Other Asphalt Surfaces	0.554285	0.058871	0.188253	0.120585	0.022598	0.005697	0.010798	0.007525	0.000977	0.000545	0.026246	0.000848	0.002771

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0463	0.3966	0.1759	2.5200e-003		0.0320	0.0320		0.0320	0.0320		504.9785	504.9785	9.6800e-003	9.2600e-003	507.9793
NaturalGas Unmitigated	0.0463	0.3966	0.1759	2.5200e-003		0.0320	0.0320		0.0320	0.0320		504.9785	504.9785	9.6800e-003	9.2600e-003	507.9793

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Apartments Mid Rise	4117.41	0.0444	0.3795	0.1615	2.4200e-003		0.0307	0.0307		0.0307	0.0307		484.4015	484.4015	9.2800e-003	8.8800e-003	487.2801
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Strip Mall	174.904	1.8900e-003	0.0172	0.0144	1.0000e-004		1.3000e-003	1.3000e-003		1.3000e-003	1.3000e-003		20.5770	20.5770	3.9000e-004	3.8000e-004	20.6992
Total		**0.0463**	**0.3966**	**0.1759**	**2.5200e-003**		**0.0320**	**0.0320**		**0.0320**	**0.0320**		**504.9785**	**504.9785**	**9.6700e-003**	**9.2600e-003**	**507.9793**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Apartments Mid Rise	4.11741	0.0444	0.3795	0.1615	2.4200e-003		0.0307	0.0307		0.0307	0.0307		484.4015	484.4015	9.2800e-003	8.8800e-003	487.2801
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Strip Mall	0.174904	1.8900e-003	0.0172	0.0144	1.0000e-004		1.3000e-003	1.3000e-003		1.3000e-003	1.3000e-003		20.5770	20.5770	3.9000e-004	3.8000e-004	20.6992
Total		**0.0463**	**0.3966**	**0.1759**	**2.5200e-003**		**0.0320**	**0.0320**		**0.0320**	**0.0320**		**504.9785**	**504.9785**	**9.6700e-003**	**9.2600e-003**	**507.9793**

6.0 Area Detail

6.1 Mitigation Measures Area

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	6.2842	0.2274	14.7372	1.1500e-003		0.0863	0.0863		0.0863	0.0863	0.0000	100.6484	100.6484	0.0270	1.3600e-003	101.7276
Unmitigated	6.2842	0.2274	14.7372	1.1500e-003		0.0863	0.0863		0.0863	0.0863	0.0000	100.6484	100.6484	0.0270	1.3600e-003	101.7276

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.8002					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	5.0329					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	6.7900e-003	0.0581	0.0247	3.7000e-004		4.6900e-003	4.6900e-003		4.6900e-003	4.6900e-003	0.0000	74.1177	74.1177	1.4200e-003	1.3600e-003	74.5581
Landscaping	0.4443	0.1694	14.7125	7.8000e-004		0.0816	0.0816		0.0816	0.0816		26.5307	26.5307	0.0256		27.1695
Total	**6.2842**	**0.2274**	**14.7372**	**1.1500e-003**		**0.0862**	**0.0862**		**0.0862**	**0.0862**	**0.0000**	**100.6484**	**100.6484**	**0.0270**	**1.3600e-003**	**101.7276**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.8002					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	5.0329					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	6.7900e-003	0.0581	0.0247	3.7000e-004		4.6900e-003	4.6900e-003		4.6900e-003	4.6900e-003	0.0000	74.1177	74.1177	1.4200e-003	1.3600e-003	74.5581
Landscaping	0.4443	0.1694	14.7125	7.8000e-004		0.0816	0.0816		0.0816	0.0816		26.5307	26.5307	0.0256		27.1695
Total	**6.2842**	**0.2274**	**14.7372**	**1.1500e-003**		**0.0862**	**0.0862**		**0.0862**	**0.0862**	**0.0000**	**100.6484**	**100.6484**	**0.0270**	**1.3600e-003**	**101.7276**

7.0 Water Detail

7.1 Mitigation Measures Water

Apply Water Conservation Strategy

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Village at Novato AQ - Bay Area AQMD Air District, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Village at Novato AQ

Bay Area AQMD Air District, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Apartments Mid Rise	178.00	Dwelling Unit	1.59	215,832.00	509
Strip Mall	14.00	1000sqft	0.00	14,000.00	0
Parking Lot	344.00	Space	0.00	137,600.00	0
Other Non-Asphalt Surfaces	42.75	1000sqft	0.98	42,750.00	0
Other Asphalt Surfaces	3.28	Acre	3.28	142,876.80	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	64
Climate Zone	5			**Operational Year**	2026
Utility Company	MCE				
CO2 Intensity (lb/MWhr)	289.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Project is in Novato, Marin County. Marin Clean Energy is the main utility provider

Land Use - 178 total residential units with 215,832 square feet, 14,000 sf of retail, 42,750 of open space, and assuming 3.28 acres of hardscape

Demolition - Demolition square footage based on provided plan set with demolition table, 64,547 square feet of existing asphalt/concrete

Grading - Import and export approximately 100 cubic yards of soil

Trips and VMT - 40 cubic yards of clear and grub added to demo; Demo haul rote trip length = 13 miles; Grading truck haul destination = 45 miles

Construction Phase - Construction based on number of calendar days per phase and adjusted to account for a five day per week schedule

Off-road Equipment - Applicant provided equipment list

Village at Novato AQ - Bay Area AQMD Air District, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Off-road Equipment - Applicant provided equipment list

Off-road Equipment - Applicant provided equipment list

Off-road Equipment - Applicant provided equipment list

Off-road Equipment - Applicant provided equipment list

Off-road Equipment - Default construction equipment

Architectural Coating - BAAQMD Regulation 6, Rule 3 Architectural Coating, flat coatings = 50 g/L and traffic markings = 100 g/L

Vehicle Trips - Trip Generation Rate from TIS

Woodstoves - There would be three natural gas fireplaces in the open space area

Area Coating - BAAQMD Regulation 6, Rule 3 Architectural Coating, non-flat coatings and traffic markings = 100 g/L

Construction Off-road Equipment Mitigation - New discretionary projects would need to implement BAAQMD Basic Construction Mitigation Measures

Area Mitigation -

Water Mitigation - CalGreen water reduction

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Exterior	150.00	50.00
tblArchitecturalCoating	EF_Nonresidential_Interior	100.00	50.00
tblArchitecturalCoating	EF_Parking	150.00	100.00
tblArchitecturalCoating	EF_Residential_Exterior	150.00	50.00
tblArchitecturalCoating	EF_Residential_Interior	100.00	50.00
tblAreaCoating	Area_EF_Nonresidential_Exterior	150	100
tblAreaCoating	Area_EF_Parking	150	100
tblAreaCoating	Area_EF_Residential_Exterior	150	100
tblAreaMitigation	UseLowVOCPaintNonresidentialExteriorValue	100	150
tblAreaMitigation	UseLowVOCPaintParkingValue	100	150
tblAreaMitigation	UseLowVOCPaintResidentialExteriorValue	100	150
tblConstructionPhase	NumDays	20.00	40.00
tblConstructionPhase	NumDays	230.00	497.00

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

tblConstructionPhase	NumDays	20.00	10.00
tblConstructionPhase	NumDays	10.00	20.00
tblConstructionPhase	PhaseEndDate	11/25/2024	1/1/2026
tblConstructionPhase	PhaseEndDate	9/30/2024	10/23/2025
tblConstructionPhase	PhaseEndDate	11/13/2023	11/28/2023
tblConstructionPhase	PhaseEndDate	10/28/2024	11/6/2025
tblConstructionPhase	PhaseEndDate	10/16/2023	10/30/2023
tblConstructionPhase	PhaseStartDate	10/29/2024	11/7/2025
tblConstructionPhase	PhaseStartDate	11/14/2023	11/29/2023
tblConstructionPhase	PhaseStartDate	10/17/2023	11/1/2023
tblConstructionPhase	PhaseStartDate	10/1/2024	10/24/2025
tblFireplaces	FireplaceWoodMass	228.80	0.00
tblFireplaces	NumberGas	26.70	3.00
tblFireplaces	NumberNoFireplace	7.12	3.00
tblFireplaces	NumberWood	30.26	0.00
tblGrading	MaterialExported	0.00	100.00
tblGrading	MaterialImported	0.00	100.00
tblLandUse	LandUseSquareFeet	178,000.00	215,832.00
tblLandUse	LotAcreage	4.68	1.59
tblLandUse	LotAcreage	0.32	0.00
tblLandUse	LotAcreage	3.10	0.00
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	LoadFactor	0.46	0.46
tblOffRoadEquipment	LoadFactor	0.50	0.50
tblOffRoadEquipment	LoadFactor	0.31	0.31
tblOffRoadEquipment	LoadFactor	0.40	0.40
tblOffRoadEquipment	OffRoadEquipmentType		Concrete/Industrial Saws
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Sweepers/Scrubbers

Village at Novato AQ - Bay Area AQMD Air District, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

tblOffRoadEquipment	OffRoadEquipmentType		Plate Compactors
tblOffRoadEquipment	OffRoadEquipmentType		Trenchers
tblOffRoadEquipment	OffRoadEquipmentType		Aerial Lifts
tblOffRoadEquipment	OffRoadEquipmentType		Cement and Mortar Mixers
tblOffRoadEquipment	OffRoadEquipmentType		Air Compressors
tblOffRoadEquipment	OffRoadEquipmentType		Pressure Washers
tblOffRoadEquipment	OffRoadEquipmentType		Rough Terrain Forklifts
tblOffRoadEquipment	OffRoadEquipmentType		Concrete/Industrial Saws
tblOffRoadEquipment	OffRoadEquipmentType		Plate Compactors
tblOffRoadEquipment	OffRoadEquipmentType		Graders
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblTripsAndVMT	HaulingTripLength	20.00	13.00
tblTripsAndVMT	HaulingTripLength	20.00	45.00
tblTripsAndVMT	HaulingTripNumber	294.00	299.00
tblVehicleTrips	WD_TR	5.44	5.02
tblVehicleTrips	WD_TR	44.32	32.50

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

tblWoodstoves	NumberCatalytic	3.56	0.00
tblWoodstoves	NumberNoncatalytic	3.56	0.00
tblWoodstoves	WoodstoveDayYear	14.12	0.00
tblWoodstoves	WoodstoveWoodMass	582.40	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2023	1.6607	12.9765	16.2238	0.0498	6.6345	0.6336	7.2680	3.3893	0.5931	3.9824	0.0000	5,039.0248	5,039.0248	0.5402	0.2918	5,138.2782
2024	1.5766	11.5778	15.7542	0.0490	2.7028	0.3249	3.0276	0.7283	0.3083	1.0365	0.0000	4,969.1213	4,969.1213	0.4847	0.2844	5,066.0013
2025	37.9357	11.9932	15.3485	0.0482	2.7028	0.5062	2.9992	0.7283	0.4747	1.0093	0.0000	4,898.6532	4,898.6532	0.6828	0.2770	4,993.1899
2026	37.9288	1.2213	2.8376	6.2100e-003	0.4436	0.0534	0.4970	0.1177	0.0533	0.1709	0.0000	621.6829	621.6829	0.0239	8.8700e-003	624.9224
Maximum	**37.9357**	**12.9765**	**16.2238**	**0.0498**	**6.6345**	**0.6336**	**7.2680**	**3.3893**	**0.5931**	**3.9824**	**0.0000**	**5,039.0248**	**5,039.0248**	**0.6828**	**0.2918**	**5,138.2782**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

2.1 Overall Construction (Maximum Daily Emission)

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2023	1.6607	12.9765	16.2238	0.0498	3.0307	0.6336	3.6643	1.5372	0.5931	2.1303	0.0000	5,039.0248	5,039.0248	0.5402	0.2918	5,138.2782
2024	1.5766	11.5778	15.7542	0.0490	2.7028	0.3249	3.0276	0.7283	0.3083	1.0365	0.0000	4,969.1213	4,969.1213	0.4847	0.2844	5,066.0013
2025	37.9357	11.9932	15.3485	0.0482	2.7028	0.5062	2.9992	0.7283	0.4747	1.0093	0.0000	4,898.6532	4,898.6532	0.6828	0.2770	4,993.1899
2026	37.9288	1.2213	2.8376	6.2100e-003	0.4436	0.0534	0.4970	0.1177	0.0533	0.1709	0.0000	621.6829	621.6829	0.0239	8.8700e-003	624.9224
Maximum	**37.9357**	**12.9765**	**16.2238**	**0.0498**	**3.0307**	**0.6336**	**3.6643**	**1.5372**	**0.5931**	**2.1303**	**0.0000**	**5,039.0248**	**5,039.0248**	**0.6828**	**0.2918**	**5,138.2782**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**28.87**	**0.00**	**26.13**	**37.32**	**0.00**	**29.88**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	6.2842	0.2274	14.7372	1.1500e-003		0.0863	0.0863		0.0863	0.0863	0.0000	100.6484	100.6484	0.0270	1.3600e-003	101.7276
Energy	0.0463	0.3966	0.1759	2.5200e-003		0.0320	0.0320		0.0320	0.0320		504.9785	504.9785	9.6800e-003	9.2600e-003	507.9793
Mobile	2.9255	3.2715	28.1876	0.0528	6.2520	0.0395	6.2915	1.6652	0.0368	1.7020		5,539.9978	5,539.9978	0.3980	0.2833	5,634.3609
Total	**9.2559**	**3.8955**	**43.1006**	**0.0564**	**6.2520**	**0.1577**	**6.4098**	**1.6652**	**0.1550**	**1.8203**	**0.0000**	**6,145.6247**	**6,145.6247**	**0.4347**	**0.2939**	**6,244.0678**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	6.2842	0.2274	14.7372	1.1500e-003		0.0863	0.0863		0.0863	0.0863	0.0000	100.6484	100.6484	0.0270	1.3600e-003	101.7276
Energy	0.0463	0.3966	0.1759	2.5200e-003		0.0320	0.0320		0.0320	0.0320		504.9785	504.9785	9.6800e-003	9.2600e-003	507.9793
Mobile	2.9255	3.2715	28.1876	0.0528	6.2520	0.0395	6.2915	1.6652	0.0368	1.7020		5,539.9978	5,539.9978	0.3980	0.2833	5,634.3609
Total	**9.2559**	**3.8955**	**43.1006**	**0.0564**	**6.2520**	**0.1577**	**6.4098**	**1.6652**	**0.1550**	**1.8203**	**0.0000**	**6,145.6247**	**6,145.6247**	**0.4347**	**0.2939**	**6,244.0678**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	9/5/2023	10/2/2023	5	20	
2	Site Preparation	Site Preparation	10/3/2023	10/30/2023	5	20	
3	Grading	Grading	11/1/2023	11/28/2023	5	20	
4	Building Construction	Building Construction	11/29/2023	10/23/2025	5	497	
5	Paving	Paving	10/24/2025	11/6/2025	5	10	
6	Architectural Coating	Architectural Coating	11/7/2025	1/1/2026	5	40	

Acres of Grading (Site Preparation Phase): 10

Acres of Grading (Grading Phase): 0

Acres of Paving: 4.26

Residential Indoor: 437,060; Residential Outdoor: 145,687; Non-Residential Indoor: 21,000; Non-Residential Outdoor: 7,000; Striped Parking Area: 19,394 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Building Construction	Cranes	1	7.00	231	0.29
Demolition	Excavators	1	8.00	158	0.38
Grading	Excavators	1	8.00	158	0.38

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Building Construction	Forklifts	0	8.00	89	0.20
Building Construction	Generator Sets	0	8.00	84	0.74
Grading	Graders	0	8.00	187	0.41
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	1	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Demolition	Rubber Tired Dozers	0	8.00	247	0.40
Grading	Rubber Tired Dozers	0	8.00	247	0.40
Site Preparation	Rubber Tired Dozers	1	8.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	0	7.00	97	0.37
Grading	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Site Preparation	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Building Construction	Welders	0	8.00	46	0.45
Site Preparation	Concrete/Industrial Saws	1	8.00	81	0.73
Site Preparation	Excavators	1	8.00	158	0.38
Site Preparation	Sweepers/Scrubbers	1	8.00	64	0.46
Grading	Plate Compactors	1	8.00	8	0.43
Grading	Trenchers	1	8.00	78	0.50
Building Construction	Aerial Lifts	2	8.00	63	0.31
Building Construction	Cement and Mortar Mixers	1	8.00	9	0.56
Building Construction	Air Compressors	1	8.00	78	0.48
Building Construction	Pressure Washers	1	8.00	13	0.30
Building Construction	Rough Terrain Forklifts	1	8.00	100	0.40
Paving	Concrete/Industrial Saws	1	8.00	81	0.73
Paving	Plate Compactors	2	8.00	8	0.43
Paving	Graders	1	8.00	187	0.41

Trips and VMT

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	1	3.00	0.00	299.00	10.80	7.30	13.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	4	10.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	3	8.00	0.00	25.00	10.80	7.30	45.00	LD_Mix	HDT_Mix	HHDT
Building Construction	7	268.00	74.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	8	20.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	54.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Demolition - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.1769	0.0000	3.1769	0.4810	0.0000	0.4810			0.0000			0.0000
Off-Road	0.1887	1.5486	3.2578	5.1700e-003		0.0758	0.0758		0.0697	0.0697		500.1056	500.1056	0.1617		504.1492
Total	**0.1887**	**1.5486**	**3.2578**	**5.1700e-003**	**3.1769**	**0.0758**	**3.2527**	**0.4810**	**0.0697**	**0.5507**		**500.1056**	**500.1056**	**0.1617**		**504.1492**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.2 Demolition - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0241	1.4396	0.3874	6.0000e-003	0.1701	0.0107	0.1808	0.0466	0.0103	0.0569		653.7099	653.7099	0.0213	0.1036	685.1107
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.3200e-003	5.7500e-003	0.0687	2.0000e-004	0.0246	1.2000e-004	0.0248	6.5400e-003	1.1000e-004	6.6500e-003		20.3155	20.3155	6.3000e-004	6.0000e-004	20.5091
Total	**0.0324**	**1.4453**	**0.4561**	**6.2000e-003**	**0.1947**	**0.0109**	**0.2056**	**0.0532**	**0.0104**	**0.0636**		**674.0254**	**674.0254**	**0.0219**	**0.1042**	**705.6198**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.4296	0.0000	1.4296	0.2165	0.0000	0.2165			0.0000			0.0000
Off-Road	0.1887	1.5486	3.2578	5.1700e-003		0.0758	0.0758		0.0697	0.0697	0.0000	500.1056	500.1056	0.1617		504.1492
Total	**0.1887**	**1.5486**	**3.2578**	**5.1700e-003**	**1.4296**	**0.0758**	**1.5054**	**0.2165**	**0.0697**	**0.2862**	**0.0000**	**500.1056**	**500.1056**	**0.1617**		**504.1492**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.2 Demolition - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0241	1.4396	0.3874	6.0000e-003	0.1701	0.0107	0.1808	0.0466	0.0103	0.0569		653.7099	653.7099	0.0213	0.1036	685.1107
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.3200e-003	5.7500e-003	0.0687	2.0000e-004	0.0246	1.2000e-004	0.0248	6.5400e-003	1.1000e-004	6.6500e-003		20.3155	20.3155	6.3000e-004	6.0000e-004	20.5091
Total	**0.0324**	**1.4453**	**0.4561**	**6.2000e-003**	**0.1947**	**0.0109**	**0.2056**	**0.0532**	**0.0104**	**0.0636**		**674.0254**	**674.0254**	**0.0219**	**0.1042**	**705.6198**

3.3 Site Preparation - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.5523	0.0000	6.5523	3.3675	0.0000	3.3675			0.0000			0.0000
Off-Road	1.3883	12.9573	11.9380	0.0225		0.6331	0.6331		0.5928	0.5928		2,166.0942	2,166.0942	0.5381		2,179.5462
Total	**1.3883**	**12.9573**	**11.9380**	**0.0225**	**6.5523**	**0.6331**	**7.1855**	**3.3675**	**0.5928**	**3.9602**		**2,166.0942**	**2,166.0942**	**0.5381**		**2,179.5462**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.3 Site Preparation - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0277	0.0192	0.2290	6.6000e-004	0.0822	4.1000e-004	0.0826	0.0218	3.8000e-004	0.0222		67.7183	67.7183	2.0900e-003	1.9900e-003	68.3637
Total	**0.0277**	**0.0192**	**0.2290**	**6.6000e-004**	**0.0822**	**4.1000e-004**	**0.0826**	**0.0218**	**3.8000e-004**	**0.0222**		**67.7183**	**67.7183**	**2.0900e-003**	**1.9900e-003**	**68.3637**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.9486	0.0000	2.9486	1.5154	0.0000	1.5154			0.0000			0.0000
Off-Road	1.3883	12.9573	11.9380	0.0225		0.6331	0.6331		0.5928	0.5928	0.0000	2,166.0942	2,166.0942	0.5381		2,179.5462
Total	**1.3883**	**12.9573**	**11.9380**	**0.0225**	**2.9486**	**0.6331**	**3.5817**	**1.5154**	**0.5928**	**2.1081**	**0.0000**	**2,166.0942**	**2,166.0942**	**0.5381**		**2,179.5462**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.3 Site Preparation - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0277	0.0192	0.2290	6.6000e-004	0.0822	4.1000e-004	0.0826	0.0218	3.8000e-004	0.0222		67.7183	67.7183	2.0900e-003	1.9900e-003	68.3637
Total	**0.0277**	**0.0192**	**0.2290**	**6.6000e-004**	**0.0822**	**4.1000e-004**	**0.0826**	**0.0218**	**3.8000e-004**	**0.0222**		**67.7183**	**67.7183**	**2.0900e-003**	**1.9900e-003**	**68.3637**

3.4 Grading - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.1300e-003	0.0000	1.1300e-003	1.7000e-004	0.0000	1.7000e-004			0.0000			0.0000
Off-Road	0.5772	5.0493	6.0733	9.0400e-003		0.3110	0.3110		0.2869	0.2869		863.4209	863.4209	0.2717		870.2128
Total	**0.5772**	**5.0493**	**6.0733**	**9.0400e-003**	**1.1300e-003**	**0.3110**	**0.3121**	**1.7000e-004**	**0.2869**	**0.2871**		**863.4209**	**863.4209**	**0.2717**		**870.2128**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.4 Grading - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	4.2900e-003	0.3599	0.0680	1.6600e-003	0.0492	3.0700e-003	0.0522	0.0135	2.9400e-003	0.0164		180.9135	180.9135	5.9800e-003	0.0287	189.6070
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0222	0.0153	0.1832	5.3000e-004	0.0657	3.3000e-004	0.0660	0.0174	3.0000e-004	0.0177		54.1746	54.1746	1.6700e-003	1.5900e-003	54.6909
Total	**0.0265**	**0.3753**	**0.2512**	**2.1900e-003**	**0.1149**	**3.4000e-003**	**0.1183**	**0.0309**	**3.2400e-003**	**0.0341**		**235.0881**	**235.0881**	**7.6500e-003**	**0.0303**	**244.2980**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					5.1000e-004	0.0000	5.1000e-004	8.0000e-005	0.0000	8.0000e-005			0.0000			0.0000
Off-Road	0.5772	5.0493	6.0733	9.0400e-003		0.3110	0.3110		0.2869	0.2869	0.0000	863.4209	863.4209	0.2717		870.2128
Total	**0.5772**	**5.0493**	**6.0733**	**9.0400e-003**	**5.1000e-004**	**0.3110**	**0.3115**	**8.0000e-005**	**0.2869**	**0.2870**	**0.0000**	**863.4209**	**863.4209**	**0.2717**		**870.2128**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.4 Grading - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	4.2900e-003	0.3599	0.0680	1.6600e-003	0.0492	3.0700e-003	0.0522	0.0135	2.9400e-003	0.0164		180.9135	180.9135	5.9800e-003	0.0287	189.6070
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0222	0.0153	0.1832	5.3000e-004	0.0657	3.3000e-004	0.0660	0.0174	3.0000e-004	0.0177		54.1746	54.1746	1.6700e-003	1.5900e-003	54.6909
Total	**0.0265**	**0.3753**	**0.2512**	**2.1900e-003**	**0.1149**	**3.4000e-003**	**0.1183**	**0.0309**	**3.2400e-003**	**0.0341**		**235.0881**	**235.0881**	**7.6500e-003**	**0.0303**	**244.2980**

3.5 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.8394	8.2096	9.0397	0.0171		0.3244	0.3244		0.3082	0.3082		1,612.6609	1,612.6609	0.4027		1,622.7283
Total	**0.8394**	**8.2096**	**9.0397**	**0.0171**		**0.3244**	**0.3244**		**0.3082**	**0.3082**		**1,612.6609**	**1,612.6609**	**0.4027**		**1,622.7283**

Village at Novato AQ - Bay Area AQMD Air District, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.5 Building Construction - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0778	3.3586	1.0482	0.0150	0.5012	0.0193	0.5205	0.1443	0.0185	0.1627		1,611.5134	1,611.5134	0.0327	0.2385	1,683.4038
Worker	0.7435	0.5138	6.1360	0.0177	2.2016	0.0109	2.2125	0.5840	0.0101	0.5940		1,814.8505	1,814.8505	0.0560	0.0533	1,832.1461
Total	**0.8213**	**3.8724**	**7.1842**	**0.0328**	**2.7027**	**0.0302**	**2.7329**	**0.7282**	**0.0285**	**0.7568**		**3,426.3639**	**3,426.3639**	**0.0887**	**0.2918**	**3,515.5499**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.8394	8.2096	9.0397	0.0171		0.3244	0.3244		0.3082	0.3082	0.0000	1,612.6609	1,612.6609	0.4027		1,622.7283
Total	**0.8394**	**8.2096**	**9.0397**	**0.0171**		**0.3244**	**0.3244**		**0.3082**	**0.3082**	**0.0000**	**1,612.6609**	**1,612.6609**	**0.4027**		**1,622.7283**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.5 Building Construction - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0778	3.3586	1.0482	0.0150	0.5012	0.0193	0.5205	0.1443	0.0185	0.1627		1,611.5134	1,611.5134	0.0327	0.2385	1,683.4038
Worker	0.7435	0.5138	6.1360	0.0177	2.2016	0.0109	2.2125	0.5840	0.0101	0.5940		1,814.8505	1,814.8505	0.0560	0.0533	1,832.1461
Total	**0.8213**	**3.8724**	**7.1842**	**0.0328**	**2.7027**	**0.0302**	**2.7329**	**0.7282**	**0.0285**	**0.7568**		**3,426.3639**	**3,426.3639**	**0.0887**	**0.2918**	**3,515.5499**

3.5 Building Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.8039	7.7591	8.9888	0.0171		0.2950	0.2950		0.2801	0.2801		1,612.5829	1,612.5829	0.4014		1,622.6167
Total	**0.8039**	**7.7591**	**8.9888**	**0.0171**		**0.2950**	**0.2950**		**0.2801**	**0.2801**		**1,612.5829**	**1,612.5829**	**0.4014**		**1,622.6167**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.5 Building Construction - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0754	3.3601	1.0263	0.0148	0.5012	0.0195	0.5207	0.1443	0.0186	0.1629		1,586.4325	1,586.4325	0.0325	0.2347	1,657.1979
Worker	0.6973	0.4586	5.7391	0.0172	2.2016	0.0104	2.2120	0.5840	9.5700e-003	0.5935		1,770.1059	1,770.1059	0.0508	0.0497	1,786.1867
Total	**0.7727**	**3.8187**	**6.7654**	**0.0319**	**2.7028**	**0.0299**	**2.7326**	**0.7283**	**0.0282**	**0.7564**		**3,356.5384**	**3,356.5384**	**0.0833**	**0.2844**	**3,443.3846**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.8039	7.7591	8.9888	0.0171		0.2950	0.2950		0.2801	0.2801	0.0000	1,612.5829	1,612.5829	0.4014		1,622.6167
Total	**0.8039**	**7.7591**	**8.9888**	**0.0171**		**0.2950**	**0.2950**		**0.2801**	**0.2801**	**0.0000**	**1,612.5829**	**1,612.5829**	**0.4014**		**1,622.6167**

Village at Novato AQ - Bay Area AQMD Air District, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.5 Building Construction - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0754	3.3601	1.0263	0.0148	0.5012	0.0195	0.5207	0.1443	0.0186	0.1629		1,586.4325	1,586.4325	0.0325	0.2347	1,657.1979
Worker	0.6973	0.4586	5.7391	0.0172	2.2016	0.0104	2.2120	0.5840	9.5700e-003	0.5935		1,770.1059	1,770.1059	0.0508	0.0497	1,786.1867
Total	**0.7727**	**3.8187**	**6.7654**	**0.0319**	**2.7028**	**0.0299**	**2.7326**	**0.7283**	**0.0282**	**0.7564**		**3,356.5384**	**3,356.5384**	**0.0833**	**0.2844**	**3,443.3846**

3.5 Building Construction - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.7671	7.2866	8.9464	0.0171		0.2670	0.2670		0.2533	0.2533		1,612.5807	1,612.5807	0.4006		1,622.5962
Total	**0.7671**	**7.2866**	**8.9464**	**0.0171**		**0.2670**	**0.2670**		**0.2533**	**0.2533**		**1,612.5807**	**1,612.5807**	**0.4006**		**1,622.5962**

Village at Novato AQ - Bay Area AQMD Air District, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.5 Building Construction - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0734	3.3475	1.0085	0.0145	0.5012	0.0194	0.5207	0.1443	0.0186	0.1629		1,558.2439	1,558.2439	0.0324	0.2305	1,627.7296
Worker	0.6572	0.4131	5.3936	0.0166	2.2016	9.9500e-003	2.2115	0.5840	9.1600e-003	0.5931		1,727.8287	1,727.8287	0.0462	0.0466	1,742.8641
Total	**0.7306**	**3.7607**	**6.4021**	**0.0311**	**2.7028**	**0.0294**	**2.7322**	**0.7283**	**0.0278**	**0.7560**		**3,286.0725**	**3,286.0725**	**0.0786**	**0.2770**	**3,370.5937**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.7671	7.2866	8.9464	0.0171		0.2670	0.2670		0.2533	0.2533	0.0000	1,612.5807	1,612.5807	0.4006		1,622.5962
Total	**0.7671**	**7.2866**	**8.9464**	**0.0171**		**0.2670**	**0.2670**		**0.2533**	**0.2533**	**0.0000**	**1,612.5807**	**1,612.5807**	**0.4006**		**1,622.5962**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.5 Building Construction - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0734	3.3475	1.0085	0.0145	0.5012	0.0194	0.5207	0.1443	0.0186	0.1629		1,558.2439	1,558.2439	0.0324	0.2305	1,627.7296
Worker	0.6572	0.4131	5.3936	0.0166	2.2016	9.9500e-003	2.2115	0.5840	9.1600e-003	0.5931		1,727.8287	1,727.8287	0.0462	0.0466	1,742.8641
Total	**0.7306**	**3.7607**	**6.4021**	**0.0311**	**2.7028**	**0.0294**	**2.7322**	**0.7283**	**0.0278**	**0.7560**		**3,286.0725**	**3,286.0725**	**0.0786**	**0.2770**	**3,370.5937**

3.6 Paving - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.2810	11.9624	14.7956	0.0279		0.5054	0.5054		0.4740	0.4740		2,659.2986	2,659.2986	0.6793		2,676.2816
Paving	0.8594					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**2.1403**	**11.9624**	**14.7956**	**0.0279**		**0.5054**	**0.5054**		**0.4740**	**0.4740**		**2,659.2986**	**2,659.2986**	**0.6793**		**2,676.2816**

Village at Novato AQ - Bay Area AQMD Air District, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.6 Paving - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0490	0.0308	0.4025	1.2400e-003	0.1643	7.4000e-004	0.1650	0.0436	6.8000e-004	0.0443		128.9424	128.9424	3.4500e-003	3.4800e-003	130.0645
Total	**0.0490**	**0.0308**	**0.4025**	**1.2400e-003**	**0.1643**	**7.4000e-004**	**0.1650**	**0.0436**	**6.8000e-004**	**0.0443**		**128.9424**	**128.9424**	**3.4500e-003**	**3.4800e-003**	**130.0645**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.2810	11.9624	14.7956	0.0279		0.5054	0.5054		0.4740	0.4740	0.0000	2,659.2986	2,659.2986	0.6793		2,676.2816
Paving	0.8594					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**2.1403**	**11.9624**	**14.7956**	**0.0279**		**0.5054**	**0.5054**		**0.4740**	**0.4740**	**0.0000**	**2,659.2986**	**2,659.2986**	**0.6793**		**2,676.2816**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.6 Paving - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0490	0.0308	0.4025	1.2400e-003	0.1643	7.4000e-004	0.1650	0.0436	6.8000e-004	0.0443		128.9424	128.9424	3.4500e-003	3.4800e-003	130.0645
Total	**0.0490**	**0.0308**	**0.4025**	**1.2400e-003**	**0.1643**	**7.4000e-004**	**0.1650**	**0.0436**	**6.8000e-004**	**0.0443**		**128.9424**	**128.9424**	**3.4500e-003**	**3.4800e-003**	**130.0645**

3.7 Architectural Coating - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	37.6324					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1709	1.1455	1.8091	2.9700e-003		0.0515	0.0515		0.0515	0.0515		281.4481	281.4481	0.0154		281.8319
Total	**37.8033**	**1.1455**	**1.8091**	**2.9700e-003**		**0.0515**	**0.0515**		**0.0515**	**0.0515**		**281.4481**	**281.4481**	**0.0154**		**281.8319**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.7 Architectural Coating - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.1324	0.0832	1.0868	3.3400e-003	0.4436	2.0000e-003	0.4456	0.1177	1.8500e-003	0.1195		348.1446	348.1446	9.3100e-003	9.3900e-003	351.1741
Total	**0.1324**	**0.0832**	**1.0868**	**3.3400e-003**	**0.4436**	**2.0000e-003**	**0.4456**	**0.1177**	**1.8500e-003**	**0.1195**		**348.1446**	**348.1446**	**9.3100e-003**	**9.3900e-003**	**351.1741**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	37.6324					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1709	1.1455	1.8091	2.9700e-003		0.0515	0.0515		0.0515	0.0515	0.0000	281.4481	281.4481	0.0154		281.8319
Total	**37.8033**	**1.1455**	**1.8091**	**2.9700e-003**		**0.0515**	**0.0515**		**0.0515**	**0.0515**	**0.0000**	**281.4481**	**281.4481**	**0.0154**		**281.8319**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.7 Architectural Coating - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.1324	0.0832	1.0868	3.3400e-003	0.4436	2.0000e-003	0.4456	0.1177	1.8500e-003	0.1195		348.1446	348.1446	9.3100e-003	9.3900e-003	351.1741
Total	**0.1324**	**0.0832**	**1.0868**	**3.3400e-003**	**0.4436**	**2.0000e-003**	**0.4456**	**0.1177**	**1.8500e-003**	**0.1195**		**348.1446**	**348.1446**	**9.3100e-003**	**9.3900e-003**	**351.1741**

3.7 Architectural Coating - 2026

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	37.6324					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1709	1.1455	1.8091	2.9700e-003		0.0515	0.0515		0.0515	0.0515		281.4481	281.4481	0.0154		281.8319
Total	**37.8033**	**1.1455**	**1.8091**	**2.9700e-003**		**0.0515**	**0.0515**		**0.0515**	**0.0515**		**281.4481**	**281.4481**	**0.0154**		**281.8319**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.7 Architectural Coating - 2026

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.1255	0.0758	1.0285	3.2400e-003	0.4436	1.9100e-003	0.4455	0.1177	1.7600e-003	0.1194		340.2348	340.2348	8.5100e-003	8.8700e-003	343.0906
Total	**0.1255**	**0.0758**	**1.0285**	**3.2400e-003**	**0.4436**	**1.9100e-003**	**0.4455**	**0.1177**	**1.7600e-003**	**0.1194**		**340.2348**	**340.2348**	**8.5100e-003**	**8.8700e-003**	**343.0906**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	37.6324					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1709	1.1455	1.8091	2.9700e-003		0.0515	0.0515		0.0515	0.0515	0.0000	281.4481	281.4481	0.0154		281.8319
Total	**37.8033**	**1.1455**	**1.8091**	**2.9700e-003**		**0.0515**	**0.0515**		**0.0515**	**0.0515**	**0.0000**	**281.4481**	**281.4481**	**0.0154**		**281.8319**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.7 Architectural Coating - 2026

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.1255	0.0758	1.0285	3.2400e-003	0.4436	1.9100e-003	0.4455	0.1177	1.7600e-003	0.1194		340.2348	340.2348	8.5100e-003	8.8700e-003	343.0906
Total	**0.1255**	**0.0758**	**1.0285**	**3.2400e-003**	**0.4436**	**1.9100e-003**	**0.4455**	**0.1177**	**1.7600e-003**	**0.1194**		**340.2348**	**340.2348**	**8.5100e-003**	**8.8700e-003**	**343.0906**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	2.9255	3.2715	28.1876	0.0528	6.2520	0.0395	6.2915	1.6652	0.0368	1.7020		5,539.9978	5,539.9978	0.3980	0.2833	5,634.3609
Unmitigated	2.9255	3.2715	28.1876	0.0528	6.2520	0.0395	6.2915	1.6652	0.0368	1.7020		5,539.9978	5,539.9978	0.3980	0.2833	5,634.3609

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Mid Rise	893.56	873.98	728.02	2,002,693	2,002,693
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Parking Lot	0.00	0.00	0.00		
Strip Mall	455.00	588.56	286.02	692,922	692,922
Other Asphalt Surfaces	0.00	0.00	0.00		
Total	1,348.56	1,462.54	1,014.04	2,695,616	2,695,616

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Apartments Mid Rise	10.80	4.80	5.70	31.00	15.00	54.00	86	11	3
Other Non-Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Strip Mall	9.50	7.30	7.30	16.60	64.40	19.00	45	40	15
Other Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Apartments Mid Rise	0.554285	0.058871	0.188253	0.120585	0.022598	0.005697	0.010798	0.007525	0.000977	0.000545	0.026246	0.000848	0.002771
Other Non-Asphalt Surfaces	0.554285	0.058871	0.188253	0.120585	0.022598	0.005697	0.010798	0.007525	0.000977	0.000545	0.026246	0.000848	0.002771
Parking Lot	0.554285	0.058871	0.188253	0.120585	0.022598	0.005697	0.010798	0.007525	0.000977	0.000545	0.026246	0.000848	0.002771
Strip Mall	0.554285	0.058871	0.188253	0.120585	0.022598	0.005697	0.010798	0.007525	0.000977	0.000545	0.026246	0.000848	0.002771
Other Asphalt Surfaces	0.554285	0.058871	0.188253	0.120585	0.022598	0.005697	0.010798	0.007525	0.000977	0.000545	0.026246	0.000848	0.002771

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0463	0.3966	0.1759	2.5200e-003		0.0320	0.0320		0.0320	0.0320		504.9785	504.9785	9.6800e-003	9.2600e-003	507.9793
NaturalGas Unmitigated	0.0463	0.3966	0.1759	2.5200e-003		0.0320	0.0320		0.0320	0.0320		504.9785	504.9785	9.6800e-003	9.2600e-003	507.9793

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Apartments Mid Rise	4117.41	0.0444	0.3795	0.1615	2.4200e-003		0.0307	0.0307		0.0307	0.0307		484.4015	484.4015	9.2800e-003	8.8800e-003	487.2801
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Strip Mall	174.904	1.8900e-003	0.0172	0.0144	1.0000e-004		1.3000e-003	1.3000e-003		1.3000e-003	1.3000e-003		20.5770	20.5770	3.9000e-004	3.8000e-004	20.6992
Total		**0.0463**	**0.3966**	**0.1759**	**2.5200e-003**		**0.0320**	**0.0320**		**0.0320**	**0.0320**		**504.9785**	**504.9785**	**9.6700e-003**	**9.2600e-003**	**507.9793**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Apartments Mid Rise	4.11741	0.0444	0.3795	0.1615	2.4200e-003		0.0307	0.0307		0.0307	0.0307		484.4015	484.4015	9.2800e-003	8.8800e-003	487.2801
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Strip Mall	0.174904	1.8900e-003	0.0172	0.0144	1.0000e-004		1.3000e-003	1.3000e-003		1.3000e-003	1.3000e-003		20.5770	20.5770	3.9000e-004	3.8000e-004	20.6992
Total		**0.0463**	**0.3966**	**0.1759**	**2.5200e-003**		**0.0320**	**0.0320**		**0.0320**	**0.0320**		**504.9785**	**504.9785**	**9.6700e-003**	**9.2600e-003**	**507.9793**

6.0 Area Detail

6.1 Mitigation Measures Area

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	6.2842	0.2274	14.7372	1.1500e-003		0.0863	0.0863		0.0863	0.0863	0.0000	100.6484	100.6484	0.0270	1.3600e-003	101.7276
Unmitigated	6.2842	0.2274	14.7372	1.1500e-003		0.0863	0.0863		0.0863	0.0863	0.0000	100.6484	100.6484	0.0270	1.3600e-003	101.7276

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.8002					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	5.0329					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	6.7900e-003	0.0581	0.0247	3.7000e-004		4.6900e-003	4.6900e-003		4.6900e-003	4.6900e-003	0.0000	74.1177	74.1177	1.4200e-003	1.3600e-003	74.5581
Landscaping	0.4443	0.1694	14.7125	7.8000e-004		0.0816	0.0816		0.0816	0.0816		26.5307	26.5307	0.0256		27.1695
Total	**6.2842**	**0.2274**	**14.7372**	**1.1500e-003**		**0.0862**	**0.0862**		**0.0862**	**0.0862**	**0.0000**	**100.6484**	**100.6484**	**0.0270**	**1.3600e-003**	**101.7276**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.8002					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	5.0329					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	6.7900e-003	0.0581	0.0247	3.7000e-004		4.6900e-003	4.6900e-003		4.6900e-003	4.6900e-003	0.0000	74.1177	74.1177	1.4200e-003	1.3600e-003	74.5581
Landscaping	0.4443	0.1694	14.7125	7.8000e-004		0.0816	0.0816		0.0816	0.0816		26.5307	26.5307	0.0256		27.1695
Total	**6.2842**	**0.2274**	**14.7372**	**1.1500e-003**		**0.0862**	**0.0862**		**0.0862**	**0.0862**	**0.0000**	**100.6484**	**100.6484**	**0.0270**	**1.3600e-003**	**101.7276**

7.0 Water Detail

7.1 Mitigation Measures Water

Apply Water Conservation Strategy

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Appendix D

Confidential Cultural Resources Assessment

This appendix item is not public because it contains confidential information regarding the location of cultural resources. To discuss this report, please contact:

City of Novato
Community Development Department
922 Machin Avenue
Novato, California 94945
(415) 899-8939

Appendix E

Fuel Energy Calculations

Village at Novato

Last Updated: 11/4/2021

Compression-Ignition Engine Brake-Specific Fuel Consumption (BSFC) Factors **[1]**:

HP: 0 to 100	0.0588	HP: Greater than 100	0.0529

Values above are expressed in gallons per horsepower-hour/BSFC.

CONSTRUCTION EQUIPMENT

Construction Equipment	#	Hours per Day	Horsepower	Load Factor	Construction Phase	Fuel Used (gallons)
Excavators	1	8	158	0.38	Demolition	508
Concrete/Industrial Saws	1	8	81	0.73	Site Preparation Phase	556
Excavators	1	8	158	0.38	Site Preparation Phase	508
Rubber Tired Loaders	1	8	203	0.36	Site Preparation Phase	618
Tractors/Loaders/Backhoes	1	8	97	0.37	Site Preparation Phase	337
Excavators	1	8	158	0.38	Grading Phase	508
Graders	1	8	187	0.41	Grading Phase	648
Plate Compactors	1	8	8	0.43	Grading Phase	32
Rubber Tired Dozers	1	8	247	0.4	Grading Phase	836
Tractors/Loaders/Backhoes	1	8	97	0.37	Grading Phase	337
Trenchers	1	8	78	0.5	Grading Phase	367
Aerial Lifts	2	8	63	0.31	Building Construction Phase	9,126
Air Compressors	1	8	78	0.48	Building Construction Phase	8,748
Cement and Mortar Mixers	1	8	9	0.56	Building Construction Phase	1,178
Cranes	1	7	231	0.29	Building Construction Phase	12,319
Pressure Washers	1	8	13	0.3	Building Construction Phase	911
Rough Terrain Forklifts	1	8	100	0.4	Building Construction Phase	9,346
Concrete/Industrial Saws	1	8	81	0.73	Paving	278
Graders	1	8	187	0.41	Paving	324
Pavers	1	8	130	0.42	Paving	231
Paving Equipment	1	8	132	0.36	Paving	201
Plate Compactors	2	8	8	0.43	Paving	32
Rollers	2	8	80	0.38	Paving	286
Air Compressors	1	6	78	0.48	Architectural Coating Phase	528
					Total Fuel Used	**48,763**
						(Gallons)

Construction Phase	Days of Operation
Demolition	20
Site Preparation Phase	20
Grading Phase	20
Building Construction Phase	497
Paving	10
Architectural Coating Phase	40
Total Days	607

WORKER TRIPS

Constuction Phase	MPG [2]	Trips	Trip Length (miles)	Fuel Used (gallons)
Demolition	24.1	3	10.8	27
Site Preparation Phase	24.1	10	10.8	90
Grading Phase	24.1	8	10.8	72
Building Construction Phase	24.1	268	10.8	59,689
Paving	24.1	20	10.8	90
Architectural Coating Phase	24.1	54	10.8	968
		Total		**60,935**

HAULING AND VENDOR TRIPS

Trip Class	MPG [2]	Trips	Trip Length (miles)	Fuel Used (gallons)
HAULING TRIPS				
Demolition	7.5	299	20.0	797
Site Preparation Phase	7.5	0	20.0	0
Grading Phase	7.5	25	20.0	67
Building Construction Phase	7.5	0	20.0	0
Paving	7.5	0	20.0	0
Architectural Coating Phase	7.5	0	20.0	0
			Total	**864**
VENDOR TRIPS				
Demolition	7.5	0	7.3	0
Site Preparation Phase	7.5	0	7.3	0
Grading Phase	7.5	0	7.3	0
Building Construction Phase	7.5	74	7.3	35,797
Paving	7.5	0	7.3	0
Architectural Coating Phase	7.5	0	7.3	0
			Total	**35,797**

Total Gasoline Consumption (gallons)	**60,935**
Total Diesel Consumption (gallons)	**85,425**

Sources:

[1] United States Environmental Protection Agency. 2021. *Exhaust and Crankcase Emission Factors for Nonroad Compression-Ignition Engines in MOVES3.0.2* . September. Available at: https://www.epa.gov/system/files/documents/2021-08/420r21021.pdf.

[2] United States Department of Transportation, Bureau of Transportation Statistics. 2021. *National Transportation Statistics* . Available at: https://www.bts.gov/topics/national-transportation-statistics.

Village at Novato

Last Updated: 11/4/2021

Populate one of the following tables (Leave the other blank):

Annual VMT		OR	Daily Vehicle Trips	
Annual VMT:	2,695,616		Daily Vehicle Trips:	
			Average Trip Distance:	

Fleet Class	Fleet Mix
Light Duty Auto (LDA)	0.554285
Light Duty Truck 1 (LDT1)	0.058871
Light Duty Truck 2 (LDT2)	0.188253
Medium Duty Vehicle (MDV)	0.120585
Light Heavy Duty 1 (LHD1)	0.022598
Light Heavy Duty 2 (LHD2)	0.005697
Medium Heavy Duty (MHD)	0.010798
Heavy Heavy Duty (HHD)	0.007525
Other Bus (OBUS)	0.000977
Urban Bus (UBUS)	0.000545
Motorcycle (MCY)	0.026246
School Bus (SBUS)	0.000848
Motorhome (MH)	0.002771

Fuel Economy (MPG) [1]	
Passenger Vehicles	24.1
Light-Med Duty Trucks	17.9
Heavy Trucks/Other	7.5
Motorcycles	44

Fleet Mix

Vehicle Type	Percent	Fuel Type	Annual VMT: VMT	Vehicle Trips: VMT	Fuel Consumption (Gallons)
Passenger Vehicles	*55.43%*	*Gasoline*	1,494,140	0	61,997
Light-Medium Duty Trucks	*36.77%*	*Gasoline*	991,202	0	55,374
Heavy Trucks/Other	*5.18%*	*Diesel*	139,522	0	18,603
Motorcycle	*2.62%*	*Gasoline*	70749	0	1,608

Total Gasoline Consumption (gallons)	**118,980**
Total Diesel Consumption (gallons)	**18,603**

Sources:

[1] United States Department of Transportation, Bureau of Transportation Statistics. 2021. National Transportation Statistics. Available at: https://www.bts.gov/topics/national-transportation-statistics.

Appendix F

Geotechnical Investigation Report

GEOTECHNICAL INVESTIGATION
NEW MIXED-USE DEVELOPMENT
7514 REDWOOD BOULEVARD
NOVATO, CALIFORNIA

December 11, 2020

Project No. 3061.001

Prepared For:
ROIC, LLC
11250 El Camino Real
San Diego, California 92130

Attn: Mr. Richard Schoebel

CERTIFICATION

This document is an instrument of service, prepared by or under the direction of the undersigned professionals, in accordance with the current ordinary standard of care. The service specifically excludes the investigation of radon, asbestos, toxic mold and other biological pollutants, and other hazardous materials. The document is for the sole use of the client and consultants on this project. Use by third parties or others is expressly prohibited without written permission. If the project changes, or more than two years have passed since issuance of this report, the findings and recommendations must be reviewed by the undersigned.

MILLER PACIFIC ENGINEERING GROUP
(a California corporation)



Benjamin S. Pappas
Geotechnical Engineer No. 2786
(Expires 9/30/22)

REVIEWED BY



Scott Stephens
Geotechnical Engineer No. 2398
(Expires 6/30/21)

MILLER PACIFIC ENGINEERING GROUP

GEOTECHNICAL INVESTIGATION
NEW MIXED-USE DEVELOPMENT
7514 REDWOOD BOULEVARD
NOVATO, CALIFORNIA

Table of Contents

1.0 INTRODUCTION 1
2.0 PROJECT DESCRIPTION 1
3.1 Regional Geology 2
3.2 Seismicity 3
3.2.1 Active Faults in the Region 3
3.2.2 Historic Fault Activity 3
3.2.3 Probability of Future Earthquakes 3
3.5 Previous Investigations 4
3.6 Subsurface Conditions and Groundwater 5
4.0 GEOLOGIC HAZARDS EVALUATION 5
4.1 Fault Surface Rupture 5
4.2 Seismic Shaking 6
4.2.1 Deterministic Seismic Hazard Analysis 6
4.2.2 Probabilistic Seismic Hazard Analysis 7
4.3 Liquefaction Potential and Related Impacts 7
4.3.1 Liquefaction Evaluation 8
4.3.2 Post Liquefaction Settlement 8
4.4 Seismically Induced Ground Settlement 9
4.5 Lurching and Ground Cracking 9
4.6 Erosion 10
4.7 Seiche and Tsunami 10
4.8 Flooding 10
4.9 Expansive Soil 11
4.10 Settlement/Subsidence 11
4.11 Slope Instability/Landsliding 12
4.12 Soil Corrosion 12
4.13 Radon-222 Gas 12
5.0 CONCLUSIONS AND RECOMMENDATIONS 13
5.1 Site Preparation and Grading 13
5.1.1 Surface Preparation 13
5.1.2 Materials 13
5.1.3 Compacted Fill 13
5.2 Seismic Design 14
5.3 Settlement 15
5.4 Foundation Design 15
5.5 Site Drainage Considerations 18
5.6 Underground Utilities 18
5.7 Asphalt Concrete Pavements 18
6.0 SUPPLEMENTAL GEOTECHNICAL SERVICES 19
7.0 LIMITATIONS 20
8.0 LIST OF REFERENCES 21

MILLER PACIFIC ENGINEERING GROUP

FIGURES

Site Location Map ..... Figure 1
Site Plan 2
Regional Geologic Map 3
Active Fault Map 4
Historic Earthquake Map 5
Liquefaction Potential Map 6
SPT Liquefaction Results 7
CPT-1 Liquefaction Analysis Results 8
CPT- 2 Liquefaction Analysis Results 9
CPT- 3 Liquefaction Analysis Results 10
CPT-4 Liquefaction Analysis Results 11
CPT- 5 Liquefaction Analysis Results 12
CPT- 6 Liquefaction Analysis Results 13
FEMA Flood Map 14
Schematic Gravel Mat Detail 15

APPENDIX A – SUBSURFACE EXPLORATION AND LABORATORY TESTING

Soil Classification Charts A-1
Boring Logs ..... A-2 through A-13
Plasticity Index Test Results A-14
Sieve Analysis Test Results A-15-A-17
Corrosion Test Results A-18

APPENDIX B – SUBSURFACE EXPLORATION AND LABORATORY TESTING

CPT Device Interpretation Chart B-1
CPT-01 Data B-2
CPT-02 Data B-3
CPT-03 Data B-4
CPT-04 Data B-5
CPT-05 Data B-6
CPT-06 Data B-7

APPENDIX C – PREVIOUS EXPLORATION BY OTHERS

APPENDIX D – MCE_R GROUND MOTION HAZARD ANALYSIS

1.0 INTRODUCTION

This report summarizes our Geotechnical Investigation for the planned new mixed-use residential/commercial development at 7514 Redwood Boulevard in north-central Novato, California. A Site Location Map is shown on Figure 1. Our services have been provided in accordance with our Agreement dated September 4, 2020. The purpose of our services is to investigate site geologic conditions, evaluate significant geologic hazards which may affect the project, and provide geotechnical recommendations and criteria for use in project planning and design. The scope of our services is described in our proposal letter dated August 31, 2020 and includes the following:

- Review of readily available published geologic and geotechnical reference data;
- Supplemental subsurface exploration with four soil borings performed over a two-day period;
- Laboratory testing of select soil samples;
- Evaluation of geologic hazards relevant to site development and appropriate mitigation measures;
- Development of geotechnical recommendations and design criteria for the project; and
- Preparation of this report.

This report concludes the Geotechnical Investigation phase of our services. Future phases of work are anticipated to include a Geotechnical Consultation/Plan Review and Construction Observation and Testing.

2.0 PROJECT DESCRIPTION

Based on our review preliminary drawings indicate the project will consist of constructing 3 three- to four-story, residential apartments and 1 two-story, retail and residential structure. An approximate 200-space parking lot and drive aisles will be constructed between the structures. Ancillary improvements are expected to include extensive exterior hardscape and vehicle pavements, new utilities, site drainage, landscaping, and other items typical to similar developments. A site plan indicating the approximate extents of the planned improvements is shown on Figure 2.

3.0 SITE CONDITIONS

We performed a site reconnaissance on August 5, 2017 and October 1, 2020 to observe existing conditions at the site. The site generally consists of 2 adjacent assessor's parcels which together form a rough "L" shape on the north and east sides of the existing Trader Joe's commercial development. The site is effectively bounded to the south by Trader Joe's and Olive Avenue, to the west by Trader Joe's and Redwood Boulevard, to the north by existing commercial and light industrial development, and to the east by the SMART/Northwestern Pacific Railroad tracks.

The project site is generally level, with surface elevations ranging from about +9-feet MSL in the northeast corner to a maximum of about +13-feet in the southern and western parts of the property. The site is currently undeveloped and contains no structures; however, the site is crossed by aerial telecommunications and electrical wires, and there appear to be several existing subsurface utility installations. A large soil stockpile (on the order of several hundred cubic yards) occupies the central part of the southern parcel (east of Trader Joe's). Shallow, man-made drainage channels generally line along the southern and eastern edges of the site, and a similar channel trends approximately east-west across the common boundary between the 2 parcels.

Surface soils at the site are somewhat variable; typically consisting of stiff sandy and gravelly clay but locally composed predominantly of sand and gravel with lesser silt and clay. Abundant rock, brick, rubble, and other debris was also noted. No bedrock outcrops were observed at the site. The site is covered in low grasses, shrubs, some mature trees. Some debris from homeless encampments were also observed.

3.1 Regional Geology

The project site lies within the Coast Ranges geomorphic province of California. Regional topography within the Coast Ranges province is characterized by northwest-southeast trending mountain ridges and intervening valleys that parallel the major geologic structures, including the San Andreas Fault System. The province is also generally characterized by abundant landsliding and erosion, owing in part to its typically high levels of precipitation and seismic activity.

The oldest rocks in the region are the sedimentary, igneous, and metamorphic rocks of the Jurassic-Cretaceous age (190- to 65-million years old) Franciscan Assemblage. Within Marin County, a variety of sedimentary and volcanic rocks of Tertiary (1.8- to 65-million years old) and Quaternary (less than 1.8-million years old) age locally overlie the basement rocks of the Franciscan Assemblage. Tectonic deformation and erosion during late Tertiary and Quaternary time (the last several million years) formed the prominent coastal ridges and intervening valleys typical of the Coast Ranges province. The youngest geologic units in the region are Quaternary-age (last 1.8 million years) sedimentary deposits, including alluvial deposits which partially fill most of the valleys and colluvial deposits which typically blanket the lower portions of surrounding slopes.

Geologic mapping (Rice, 1974), indicates the site is underlain by Quaternary alluvium. Alluvium is typically composed of unconsolidated, variably sorted clay, silt, sand, and gravel deposited in stream channels, on terraces, or as fans at the base of adjacent uplands. A Regional Geologic Map is presented on Figure 3.

3.2 Seismicity

The project site is located within a seismically active region that includes the Central and Northern Coast Mountain Ranges. An “active” fault is defined as one that shows displacement within the last 11,000 years and, therefore, is considered more likely to generate a future earthquake than a fault that shows no evidence of recent rupture.

3.2.1 Active Faults in the Region

The California Department of Conservation, Division of Mines and Geology has mapped various active and inactive faults in the region (CDMG, 1972 and 2000). These faults are shown in relation to the project site on the Active Fault Map, Figure 4. The Rodgers Creek Fault is the nearest known active fault and is located approximately 12.0 kilometers (7.5-miles) northeast of the site (Google Earth, 2020).

3.2.2 Historic Fault Activity

Numerous earthquakes have occurred in the region within historic times. A map showing the epicentral locations of significant earthquakes in the Bay Area since 1985 is shown on Figure 5.

3.2.3 Probability of Future Earthquakes

The site will likely experience moderate to strong ground shaking from future earthquakes originating on any of several active faults in the San Francisco Bay region. The historical records do not directly indicate either the maximum credible earthquake or the probability of such a future event. To evaluate earthquake probabilities in California, the USGS has assembled a group of researchers into the “Working Group on California Earthquake Probabilities” (USGS 2003, 2008; Field et al 2015) to estimate the probabilities of earthquakes on active faults. These studies have been published cooperatively by the USGS, CGS, and Southern California Earthquake Center (SCEC) as the Uniform California Earthquake Rupture Forecast, Versions 1, 2, and 3 (aka UCERF, UCERF2, and UCERF3, respectively). In these studies, potential seismic sources were analyzed considering fault geometry, geologic slip rates, geodetic strain rates, historic activity, micro-seismicity, and other factors to arrive at estimates of earthquakes of various magnitudes on a variety of faults in California.

Conclusions from the most recent UCERF3 and USGS (Aagaard, et. al., 2016) indicate the highest probability of a M>6.7 earthquake on any of the active faults in the San Francisco Bay region by 2043 is assigned to the Hayward/Rodgers Creek Fault system, located approximately 12.0-kilometers northeast of the site, at 33%. Additional studies by the USGS regarding the probability of large earthquakes in the Bay Area are ongoing. These current evaluations include data from additional active faults and updated geological data.

3.3 Field Exploration and Laboratory Testing

We explored subsurface conditions in the general vicinity of the planned improvements on October 1st and 2nd, 2020 with four soil borings utilizing truck-mounted drilling equipment to maximum explored depth of 51.5-feet below the ground surface. The approximate boring locations are shown on Figure 2. Our Geologist logged the borings in the field and collected soil samples at select intervals for laboratory testing. Our subsurface exploration program is discussed in more detail in Appendix A. A Soil Classification Chart and the boring logs are presented on Figures A-1 through A-13.

Laboratory testing of select soil samples included determination of moisture content, dry density, unconfined compressive strength, sieve analysis, percent passing the #200 sieve, plasticity index and corrosion potential. The results of the moisture content, dry density, unconfined compressive strength, sieve analyses and percent passing the #200 sieve are presented on the boring logs. The results of the plasticity index, sieve analyses and corrosion resistance testing are provided on Figures A-14 through A-18. The laboratory testing program is discussed in further detail in Appendix A.

3.5 Previous Investigations

We previously performed a subsurface exploration at the project site that included 6 Cone Penetration Tests (CPTs) at the approximate locations shown on Figure 2. The CPTs were performed on August 5, 2017 by use of a 20-ton truck-mounted apparatus and were extended to maximum depths ranging from about 50- to 72-feet below the ground surface. The CPT is a special exploration technique that provides a continuous profile of data throughout the depth of exploration. It is particularly useful in defining stratigraphy, relative soil strength and in assessing liquefaction potential.

The recorded data is imported into computer software for reduction and analysis. The analysis of cone bearing and sleeve friction (i.e., friction ratio) indicates the soil type, the cone bearing alone indicates soil density or strength, and the pore pressure indicates the presence of clay. Variations in the data profile indicate changes in stratigraphy. This test method has been standardized and is described in detail by the ASTM Standard Test Method D3441 "Deep, Quasi-Static Cone and Friction Cone Penetration Tests of Soil." The results of our previous CPT subsurface exploration are presented in Appendix B.

Additionally, we have acquired and reviewed a previous Geotechnical Investigation performed at the site by Herzog Associates of Mill Valley (2005). Herzog's report includes description and analysis of 10 test borings performed at the site in 2002 and 2005. Herzog's borings were performed at the approximate locations shown on Figure 2 and extended to maximum explored depths between about 6.5- and 51.5-feet below the ground surface. The report also includes data from 10 CPTs performed by Edd Clark Associates in 2001, which extended to maximum depths ranging from 60- to 71-feet below the ground surface. The results of Herzog Associates and Edd Clark Associates subsurface explorations are presented in Appendix C.

Herzog's report appears to have been performed for the purpose of renovating the structure currently occupied by Trader Joe's and constructing the existing surrounding asphalt-paved parking areas. The report includes summary of field explorations by Herzog and others (as described above), laboratory testing, subsurface conditions, and liquefaction analysis, and provides design-level recommendations for seismic design, site grading, new foundations, retaining walls, pavements, site drainage, utility trenches, and other typical geotechnical items.

The report indicates extensive mitigation will be required for existing undocumented, locally expansive fill soils at the site and recommends removal and replacement of these fills with non-expansive materials up to a depth of 5-feet beneath new improvements. The report also indicates that alluvial soils underlying the site may be susceptible to liquefaction and generate differential settlements "on the order of a few inches at the ground surface". The report also indicates the "soil cap overlying the liquefiable sand layers should be adequate to prevent sand boils and abrupt differential settlement at the ground surface".

3.6 Subsurface Conditions and Groundwater

The results of our exploration and exploration performed previously by others confirms the regionally mapped geologic conditions at the site. In general, the site is underlain by about 1- to 5-feet of fill soils, generally composed of medium dense granular soils with locally abundant gravel. Beneath the fill, alluvial deposits are dominated by loose to dense clayey sands with interbedded soft medium stiff to stiff clays. Soft to medium stiff clay deposits was observed 40 to 50-feet below the ground surface in Borings 1, 2, and 3. Based on the CPT's that were pushed beyond 50-feet (CPT's 1 and 4) firm soils/weathered bedrock was encountered approximately 55 to 60-feet below the ground surface and refusal was encountered approximate 69- to 72-feet below the ground surface. CPTs performed previously by Edd Clark Associates encountered refusal at depths up to 60- to 72-feet, which is interpreted as the top of bedrock underlying the alluvial deposits.

Pore-pressure dissipation tests performed during our CPTs indicate groundwater at depths between about 7.8- and 9.3-feet below the ground surface. Previous exploration by others indicates groundwater at depths between about 4- and 10-feet below the surface. Based on our experience with other projects in the vicinity of the site, and given the site's low elevation, we anticipate that groundwater will generally exist within 5-feet of the ground surface throughout the year, and may rise to within a couple feet of the surface during the winter months or following periods of heavy rain.

4.0 GEOLOGIC HAZARDS EVALUATION

The principal geologic hazards which could potentially affect the project site include strong seismic shaking, liquefaction, flooding, and settlement. Other hazards, such as fault surface rupture, erosion, and slope instability, are not considered highly significant at the site. More detailed discussion of each geologic hazard considered, their anticipated impacts, and recommended mitigation measures are discussed below.

4.1 Fault Surface Rupture

Under the Alquist-Priolo Earthquake Fault Zoning Act, the California Geological Survey (CDMG)/California Geologic Survey (CGS) (1972, 2000) produced 1:24,000 scale maps showing all known active faults and defining zones within which special fault studies are required. The project site is not located with an Alquist-Priolo Earthquake Fault Zone, and the nearest known active fault to the site, the Rodgers Creek Fault, lies more than 7-miles to the northeast. Therefore, we judge the risk of fault surface rupture at the site is low.

Evaluation: *No significant impact.*
Recommendations: *No mitigation measures are anticipated.*

4.2 Seismic Shaking

The site will likely experience seismic ground shaking from future earthquakes in the San Francisco Bay Area. Earthquakes along several active faults in the region, as shown on Figure 4, could cause moderate to strong ground shaking at the site.

4.2.1 Deterministic Seismic Hazard Analysis

Deterministic Seismic Hazard Analysis (DSHA) predicts the intensity of earthquake ground motions by analyzing the characteristics of nearby faults, distance to the faults and rupture zones, earthquake magnitudes, earthquake durations, and site-specific geologic conditions. Empirical relations (Abrahamson, Silva & Kamai, Boore, Stewart, Seyhan & Atkinson, Campbell & Borzognia, and Chiou & Youngs, (2014)) for the stiff soil subsurface conditions were utilized to provide approximate estimates of median peak site accelerations. A summary of the principal active faults affecting the site, their closest distance, moment magnitude of characteristic earthquake, probable median accelerations and plus one standard deviation (+1σ), peak ground accelerations (PGA) for earthquakes on faults near the site are shown in Table A.

TABLE A
DETERMINISTIC PEAK GROUND ACCELERATION
Novato Mixed Use Development
Novato, California

Fault	Fault Distance[1]	Moment Magnitude[1]	Median PGA[1,2,3,4]	+1σ PGA[4]
Rodgers Creek	12.0 km	7.3	0.30 g	0.52 g
San Andreas	20.6 km	8.0	0.28 g	0.47 g
Hayward	17.6 km	7.3	0.24 g	0.42 g
San Gregorio	25.6 km	7.4	0.20 g	0.34 g
West Napa	27.4 km	6.7	0.14 g	0.24 g

Reference:
1. Google Earth (2020)
2. Abrahamson, Silva and Kamai (2014)
3. Boore, Stewart, Seyhan and Atkinson (2014)
4. Campbell and Borzognia (2014)
5. Chiou and Youngs (2014)
6. Values determined using Vs_{30} = 270 m/s for Site Class “D”

4.2.2 Probabilistic Seismic Hazard Analysis

Probabilistic Seismic Hazard Analysis (PSHA) analyzes all possible earthquake scenarios while incorporating the probability of each individual event to occur. The probability is determined in the form of the recurrence interval, which is the average time for a specific earthquake acceleration to be exceeded. The design earthquake is not solely dependent on the fault with the closest distance to the site and/or the largest magnitude, but rather the probability of given seismic events occurring on both known and unknown faults.

We calculated the PGA for two separate probabilistic conditions, the 2% chance of exceedance in 50 years (2,475-year statistical return period) and the 10% chance of exceedance in 50 years (475-year statistical return period), utilizing the online USGS Unified Hazard Tool (USGS, 2019). The results of the probabilistic analyses are presented below in Table B.

TABLE B
PROBABILISTIC SEISMIC HAZARD ANALYSES
Novato Mixed Use Development
Novato, California

	Statistical Return Period	Magnitude	PGA
2% in 50 years	2,475 years	7.3	0.78 g
10% in 50 years	475 years	7.2	0.47 g

Reference: USGS Unified Hazard Tool, accessed 2020

The potential for strong seismic shaking at the project site is high. Due to its close proximity, the Hayward Fault (approximately 12.0-kilometers northeast) presents the highest potential for strong ground shaking. The most significant adverse impact associated with strong seismic shaking is potential damage to structures and improvements.

Evaluation: *Less than significant with mitigation.*
Recommendations: *Minimum mitigation measures should include designing the structures and foundations in accordance with the most recent version of the California Building Code. Recommended seismic coefficients are provided in Section 5.2 of this report.*

4.3 Liquefaction Potential and Related Impacts

Liquefaction refers to the sudden, temporary loss of soil shear strength during strong ground shaking. Liquefaction-related phenomena include liquefaction-induced settlement, flow failure, and lateral spreading. These phenomena can occur where there are saturated, loose, granular deposits. Recent advances in liquefaction studies indicate that liquefaction can occur in granular materials with a high, 35 to 50%, fines content (soil particles that pass the #200 sieve), provided the fines exhibit a plasticity less than 7. Regional mapping indicates the site lies within a zone of "high liquefaction susceptibility" as shown on Figure 6. Additionally, saturated granular layers were observed during our subsurface exploration below the ground surface.

4.3.1 Liquefaction Evaluation

To evaluate soil liquefaction, the seismic energy from an earthquake is compared with the ability of the soil to resist pore pressure generation, known as the Cyclic Resistance Ratio (CRR). The earthquake energy is termed the cyclic stress ratio (CSR) and is a function of the maximum considered earthquake peak ground acceleration (PGA) and depth. Soil resistance to liquefaction is based on its relative density, and the amount and plasticity of the fines (silts and clays). The relative density of cohesionless soil is correlated with the Standard Penetration Test (SPT) blow count data measured in the field and corrected for hammer efficiency, overburden, and percent fines to determine the $(N_1)_{60,CS}$ value. Cone Penetration Test data, corrected for overburden, can also be utilized to determine the relative density of a soils and subsequently its resistance to liquefaction.

We analyzed the potential for liquefaction utilizing the data from our borings and the procedures outlined by Idriss and Boulanger (2008 & 2010), considering a magnitude 7.3 earthquake producing a PGA of 0.68-g, which corresponds to the PGA_M value as defined in ASCE 7-16 Section 11.8.3. Additionally, the liquefaction analysis software Cliq, developed by Geologismiki (2006), was utilized to evaluate liquefaction potential from the CPT data. The results of our liquefaction analyses, are presented on Figures 7 through 13 and indicate several localized soil layers, ranging from a few inches to over 15-feet thick, may liquefy under a strong seismic event.

4.3.2 Post Liquefaction Settlement

We predicted the amount of post liquefaction settlement utilizing the procedures outlined by Idriss and Boulanger (2008 & 2010), which indicate post liquefaction settlement can occur in soils that exhibit a factor of safety against liquefaction of 2.0 or less. Based on our analyses, we between predict 1.3 and 17.0-inches of total settlement and 8.0-inches of differential settlement, over 30-feet, may occur during the design seismic event.

The majority of the settlement was calculated in in Boring 2, where approximately 45-feet of loose granular soils below the groundwater level and 17-inches of settlement was predicted. Boring 2 was performed in the general vicinity of CPT 6 that predicted approximately 1.5-inches of post liquefaction settlement. Typically, CPTs are more accurate when analyzing liquefaction because continuous data is obtained rather than sampling every 5 to 10-feet. Therefore, we weight the results from the CPTs more than the results of the borings and anticipate up to 6-inches of total and 3-inches of differential settlement, over 30-feet, may occur during a strong seismic event.

Additionally, we utilized the procedures outlined by Ozocak and Sert (2010) to calculate the Liquefaction Potential Index (LPI), which is a gauge to determine if liquefiable layers will impact the ground surface. LPI is a function of the thickness, depth, and factor of safety against liquefaction in the individual layers within a soil column. The resulting LPI value corresponds to a relative potential for surface deformation impacting the ground surface. Typically, an LPI value of zero indicates the liquefiable layer will not impact the ground surface; while a value less than 5 has a low probability, values between 5 and 15 have a moderate probability and an LPI value greater than 15 have a high probability of surface impact. The results of our liquefaction analyses indicate LPI values up to 17, suggesting a high probability of liquefaction effects at the ground surface in the form of sand boils and ground cracking.

Based on our calculations, as described above, it is our opinion the loose granular alluvial deposits may liquefy during a strong seismic event. Therefore, liquefaction and related settlement presents a high risk of damage to the planned improvements.

Evaluation: *Less than significant with mitigation.*
Recommendations: *Deep foundations, gaining support from the stiff soils observed approximately 60-feet below the ground surface may be utilized to support the structures. Ground improvement may also be utilized to reduce the liquefaction impact on the project site and improve the shallow bearing capacity. Ground improvement methods may include drilled displacement columns (DDP), deep soil mixing (DSM) or vibratory stone columns (VSC).*

Alternatively, a reinforced gravel mat may be constructed to reduce the total post-liquefaction settlement to less than 2.0-inches and differential settlement to less than 1.0-inches. This system will also increase the shallow bearing capacity; therefore, allowing the structures to be supported on an interconnected shallow foundation system designed to withstand 2.0-inches of total and 1.0-inch of differential settlement over 30-feet. Additional discussion of the aforementioned foundations and ground modifications are presented in Section 5.3 of this report.

4.4 Seismically Induced Ground Settlement

Seismic ground shaking can induce settlement of unsaturated, loose, granular soils. Settlement occurs as the loose soil particles rearrange into a denser configuration when subjected to seismic ground shaking. Varying degrees of settlement can occur throughout a deposit, resulting in differential settlement of structures founded on such deposits. Groundwater at the site is relatively shallow, and loose granular soils were not observed in the near-surface; therefore, we judge the risk of seismically-induced settlement at the site is low.

Evaluation: *Less than significant.*
Recommendations: *No mitigation measures are anticipated.*

4.5 Lurching and Ground Cracking

Lurching and associated ground cracking can occur during strong ground shaking. The ground cracking generally occurs along the tops of slopes where stiff soils are underlain by soft deposits or along steep slopes or channel banks. The site is relatively flat, with no significant slopes or channels. Therefore, the risk of damage due to lurching and ground cracking is low.

Evaluation: *Less than significant.*
Recommendations: *No mitigation measures are anticipated.*

4.6 Erosion

Sandy soils on moderate slopes or clayey soils on steep slopes are susceptible to erosion when exposed to concentrated water runoff. The project site is relatively flat, and project plans indicate little exposed soil will remain post-construction. Therefore, the risk of damage due to erosion is generally low.

Evaluation: *Less than significant with mitigation.*
Recommendations: *The project Civil Engineer should design a site drainage system which collects and conveys surface runoff and discharges at an appropriate location unlikely to cause significant erosion, ideally into an existing storm drain system. Erosion control measures during and after construction should conform to the most recent version of the California Stormwater Quality Association's Best Management Practice Handbook (2003) or similar guidelines. Additional discussion and recommendations for geotechnical site drainage are presented in Section 5 of this report.*

4.7 Seiche and Tsunami

Seiche and tsunami are short duration earthquake-generated water waves in large enclosed bodies of water and the open ocean, respectively. The extent and severity of a seiche or tsunami would be dependent upon ground motions and fault offset from nearby active faults. The project site is located several miles inland of San Pablo Bay and is not mapped as lying within a tsunami inundation zone (CGS, 2009). Therefore, the risk of inundation by seiche or tsunami is low.

Evaluation: *Less than significant.*
Recommendations: *No mitigation measures are anticipated.*

4.8 Flooding

The project site lies at relatively low elevation and is mapped as lying within a FEMA 500-year flood zone as shown on Figure 14. Additionally, localized flooding can occur during a strong rainfall event due to adverse site grades and/or an inadequate storm drainage system. Therefore, we judge there is a moderate risk of damage due to large-scale flooding at the site.

Evaluation: *Less than significant with mitigation.*
Mitigation: *New structures should be designed with finish-floor elevations at or above City flood minimums. Careful attention should be paid to site grading and drainage design to minimize the effects of potential inundation. Designers should consider the potential for localized ponding of water and small-scale flooding during the maximum credible rainfall event to design site grades and drainage systems. Additional recommendations for site grading and drainage are presented in Section 5.1 of this report.*

4.9 Expansive Soil

Expansive soils will shrink and swell with fluctuations in moisture content and are capable of exerting significant expansion pressures on building foundations, interior floor slabs and exterior flatwork. Distress from expansive soil movement can include cracking of brittle wall coverings (stucco, plaster, drywall, etc.), racked door and/or window frames, and uneven floors and cracked slabs. Flatwork, pavements and concrete slabs-on-grade are particularly vulnerable to distress due to their low bearing pressures. Based on our subsurface exploration, granular soils were observed near the ground surface. However, previous subsurface explorations performed by Herzog indicate some high plasticity, expansive soils are present below a thin fill layer near the existing Trader Joe's. Therefore, we judge the risk of damage due to expansive soils is low to moderate.

Evaluation: *Less than significant with mitigation.*

Recommendations: *Any expansive soils encountered within the upper 36 inches under structures should be removed and replaced with non-expansive soil. In other areas, minimum treatment of moderate to highly plastic clays should be moisture-conditioned to above-optimum to reduce expansion potential and maintained in a moist condition until covered with baserock or other "impermeable" surface. Alternatively, in-situ lime/cement treatment of surficial soils could be considered to reduce the expansive potential as well as protect the site during the winter months. Additional discussion and recommendations are presented in the site preparation/grading section of this report.*

4.10 Settlement/Subsidence

Significant settlement can occur when new loads are placed at sites due to consolidation of soft compressible clays or compression of loose granular soils. Differential settlement may occur where structures span cut/fill transitions or other variable support conditions. In general, the site is underlain by medium-stiff to stiff clays and loose to dense granular soils, although some zones of soft clays, roughly 50-feet below the ground surface were observed. These materials, depending on their stress history, may be prone to consolidation under new, widespread, applied loads such as large fills. If fills are kept to a minimum, foundation loads from the proposed structures should have a negligible effect on the soft compressible soils observed roughly 50-feet below the ground surface. Therefore, pending on the proposed grading plan, we judge the risk of damage due to settlement is low to moderate.

Evaluation: *Less than significant with mitigation.*

Recommendations: *Consolidation settlement potential should be evaluated based on the final grading plans and analysis. There are several alternative methods by which post-construction settlements may be mitigated if significant fills are proposed. including deep foundation systems, "zero net loading" by over-excavation and replacement with lightweight fill, crawl spaces/basements, Geofoam, pre-loading and specialized ground-improvement techniques. Detailed discussion of approaches to settlement mitigation and recommended foundation types are presented in Section 5.3 of this report.*

4.11 Slope Instability/Landsliding

Slope instability generally occurs on relatively steep slopes and/or on slopes underlain by weak materials. The project site is essentially level, with no significant slopes in close proximity. Therefore, the risk of damage due to slope instability is low.

Evaluation: *Less than significant.*
Recommendations: *No mitigation measures are anticipated.*

4.12 Soil Corrosion

Corrosive soil can damage buried metallic structures, cause concrete spalling, and deteriorate rebar reinforcement. Per Caltrans Corrosion Guidelines (Caltrans, 2012), corrosive soils are determined based on their inherent resistivity, pH, and soluble salt (chlorides and sulfates) content. The resistivity of soil is an indicator of the possible presence of soluble salts, with higher resistivity values indicating a lower rate/potential for corrosion. Per Caltrans guidelines, resistivity values lower than 1,000 ohm-cm may be corrosive. The chloride and sulfate content of the soil should be determined in soils with resistivity values less than 1,000 ohm-cm to determine corrosive potential.

Per Caltrans Corrosion Guidelines (2012) a soil is considered corrosive if one or more of the following conditions exist within the soil; the pH level is less than 5.5, the chloride concentration is greater than 500 ppm, or the sulfate concentration is 2,000 ppm or greater. Laboratory testing was performed on representative samples of the near-surface site soils to evaluate pH, electrical resistivity, chloride and sulfate contents. These laboratory test results are presented on Figure A-20.

The results of our corrosivity testing indicate the upper soil layers have a pH of 6.4 a chloride concentration of 525 parts per million (ppm), and sulfate concentrations of 96 ppm and resistivity of 1,641 ohm-cm. Therefore, based on the results of the corrosion testing, corrosive soil is considered a low geologic hazard at the project site.

Evaluation: *Less than significant with mitigation.*
Recommendations: *Site utilities should be constructed of materials that can withstand a slightly acidic environment. Additionally, foundations should be constructed with corrosion-resistant concrete and provided with concrete adequate cover to protect rebar in accordance with ACI guidelines.*

4.13 Radon-222 Gas

Radon-222 is a product of the radioactive decay of uranium-238 and raduim-226, which occur naturally in a variety of rock types, mainly phosphatic shales, but also in other igneous, metamorphic, and sedimentary rocks. While low levels of radon gas are common, very high levels, which are typically caused by a combination of poor ventilation and high concentrations of uranium and radium in the underlying geologic materials, can be hazardous to human health.

The project site is located in Marin County, California, which is mapped in radon gas Zone 3 by the United States Environmental Protection Agency (USEPA, 2017). Zone 3 is classified by the EPA as exhibiting a “low” potential for Radon-222 gas with average predicted indoor screening levels less than 2 pCi/L. Therefore, the potential for hazardous levels of radon at the project site is low.

Evaluation: *Less than significant.*
Recommendations: *No mitigation measures are anticipated.*

5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on our review of reference material and the results of our subsurface exploration and laboratory testing, we conclude that the proposed development is feasible from a geotechnical perspective. The primary geotechnical issues to address in design of the project are providing adequate seismic design, potential expansive soils mitigation, long term settlements, uniform foundation support for the new structures, and designing foundations to resist the effects of liquefaction-induced settlements. Specific recommendations and criteria to address these and other geotechnical project facets are presented in the following sections.

5.1 Site Preparation and Grading

Site grading plans have yet to be developed; however, we anticipate minor to moderate site grading may be required to develop the site. The grading recommendations presented below are appropriate for construction in the late spring through fall months. From winter through the early spring months, on-site soils may be saturated due to rainfall and may be difficult to compact without drying by aeration or the addition of lime and/or cement (or a similar product) to dry the soils. Site preparation and grading should conform to the recommendations and criteria outlined below. General recommendations for wintertime construction are provided later in this report.

5.1.1 Surface Preparation

Clear all trees, brush, roots, over-sized debris, and organic material from areas to be graded. Trees that will be removed (in structural areas) must also include removal of stumps and roots larger than two inches in diameter. Excavated areas (i.e., excavations for stump removal) should be restored with properly moisture conditioned and compacted fill as described in the following sections. Any loose soil or rock at subgrade will need to be excavated to expose firm natural soils or bedrock. Debris, rocks larger than six inches and vegetation are not suitable for structural fill and should be removed from the site. Alternatively, vegetation strippings may be used in landscape areas. Surface preparation should extend at least 5-feet beyond proposed structures and 3-feet beyond pavement areas.

5.1.2 Materials

Based on our laboratory testing, onsite granular soils exhibit low to medium plasticity and are likely suitable for use as fill, provided they meet the following criteria for onsite and imported fill material. Any highly plastic soils encountered during site grading should be separated and used in landscape areas or removed from the site and legally disposed. Onsite and import soils shall consist of soil and rock mixtures that: (1) are free of organic material, (2) have a Liquid Limit less than 40 and a Plasticity Index of less than 20, (3) have a maximum particle size of 6 inches, and (4) have more than 50% retained on the No. 200 sieve. Any imported fill material shall be tested and inspected by the project geotechnical engineer to determine its suitability for use as fill material.

5.1.3 Compacted Fill

On-site fill, backfill, and scarified subgrades (8-inches deep) should be conditioned to within 3% of the optimum moisture content. Properly moisture conditioned and cured on-site materials should subsequently be placed in loose horizontal lifts of 8 inches thick or less, and uniformly compacted to a minimum of 90% R.C. Relative compaction, maximum dry density, and optimum moisture content of fill materials should be determined in

accordance with ASTM Test Method D 1557, "Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using a 10-lb. Rammer and 18-in. Drop". Where highly plastic soils are encountered, the moisture conditioning should be increased to at least 3% above the optimum moisture content and compacted to between 88% and 92% relative compaction resulting in a firm and unyielding surface. Relative compaction should increase to 95% in the upper foot where vehicular pavement is planned.

5.2 Seismic Design

The project site is located in a seismically active area. Therefore, structures should be designed in conformance to the seismic provisions of the most recent (2019) California Building Code (CBC). However, since the goal of the building code is protection of life safety, some structural damage may still occur during strong ground shaking.

Due to the presence of sandy soil layers beneath the building site that are prone to liquefaction, we judge the site should be classified as “Site Class F” per the 2019 California Building Code. However, per section 20.3.1 of the ASCE 7-16, a site-specific seismic response analysis (i.e., SHAKE, DeepSoil, etc.) is not required if the proposed structure has a fundamental period less than 0.5 seconds. We anticipate the proposed structure will have a fundamental period less than 0.5-seconds; therefore, based on the harmonic mean of the blow counts, we recommend classifying the site as a “Site Class D”. We should be contacted and retained to perform a site-specific ground response analysis if the fundamental periods of the proposed buildings are greater.

Per ASCE 7-16 Section 11.4.8, a Site-Specific Ground Motion Hazard Analysis shall be performed in accordance with ASCE 7-16 Section 21.2 on sites classified as a “Site Class D” if the S_1 value is greater than or equal to 0.2 g. The S_1 value for the site conditions and location is 0.60 g; therefore, we performed a Site-Specific Ground Motion Hazard Analysis as presented in Appendix D and the results are presented below on Table C.

TABLE C
ASCE 7-16 SEISMIC PARAMETERS
Novato Mixed Use Development
Novato, California

Factor Name	Coefficient	ASCE 7-16 Site Specific Value
Site Class[1]	$S_{A,B,C,D,E, or F}$	S_D
Spectral Response (short)	SM_S	1.35 g
Spectral Response (1-sec)	SM_1	1.31 g
Design Spectral Response (short)	SD_S	0.90 g
Design Spectral Response (1-sec)	SD_1	0.87 g
MCE_G[2] PGA adjusted for Site Class	PGA_M	0.68 g

Notes:
1. Site Class D Description: Stiff soil profile with shear wave velocities between 600 and 1,200 ft/sec, standard blow counts between 15 and 50 blows per foot, and undrained shear strength between 1,000 and 2,000 psf.
2. Maximum Considered Earthquake Geometric Mean.

5.3 Settlement

Placement of new fill or building loads at the site will cause consolidation of the approximately 10-foot thick soft and compressible clay soil layer observed approximately 40 to 50-feet below the ground surface. The consolidation of this layer will result in surface settlements. Due to the depth of this soft clay layer, we do not anticipate foundation loads will cause significant consolidation. However, new fills over a large area greater than 1-foot thick will cause this layer to consolidate. We anticipate 1-inch of settlement will occur for every foot of fill placed. Consolidation of the soft clay will also occur laterally from the load application, potentially causing settlements to nearby existing improvements. The time at which settlement occurs is also dependent on the thickness of the soft soil layer. Settlements occur quicker in relatively thin deposits while relatively thick deposits may take centuries to fully consolidate.

Consolidation of the clay layer, and resulting surface settlements, may be mitigated by "load-balancing" the project site. Load balancing includes removing existing soil from the site and replacing with lightweight fill resulting in a loss weight/stress. This loss of weight/stress should equal the new anticipated structural and/or new fill loads. Lava rock is a commonly used lightweight fill at about 60 pounds per cubic foot (pcf), or half of a typical soil (120 pcf). Styrofoam blocks (Geofoam) or lightweight "cellular" concrete is also utilized as lightweight fill with weights ranging from 3 pcf to about 30 pcf. However, careful consideration is necessary when utilizing geofoam to assure enough surface loading is provided to prevent buoyant conditions due to high groundwater levels. We should be consulted when the civil plans are nearing completion and the structural loads are known to estimate the amount of settlement and provide project specific mitigation measures, including the use of lightweight fill.

5.4 Foundation Design

Due to the presence of variable loose granular soils and potentially liquefiable soils underlying the site, we recommend the planned mixed-use development structures be supported on a foundation system that can prevent or withstand future potential post liquefaction settlement. We recommend a deep foundation system that extends though the loose alluvial soils and embeds into the underlying stiff residual soil/weathered bedrock to support the structures. Deep foundations may consist of torque down piles, augercast piles, drilled piers or drilled displacement piles. These foundation options are discussed in more detail below.

Torque-Down Piles – Torque down piles are full displacement, steel pipe piles that consist of a large-diameter steel shaft with a closed-ended, conical tip and helix. The pile is "screwed" into the ground to depth and the steel shaft displaces the surrounding soil as it advances. The piles are typically filled with grout after installation. Torque-down piles achieve vertical capacity through friction between the soil and the steel pipe and end bearing of the closed-ended tip. Torque down pile installation produces very little spoils with minimal noise and vibrations.

Augercast Piles – Augercast piles are installed by rotating a continuous flight, hollow shaft auger or a displacement drill to displace the soil to a specified depth. High strength cement grout is pumped under pressure through the hollow shaft as the auger is slowly withdrawn. Reinforcing is typically installed while the cement grout is still fluid or through the hollow shaft of the auger prior to the withdrawal and grouting process. Augercast pile installation produces little to moderate spoils with minimal to moderate vibrations.

Drilled Piers – Drilled piers are a larger-diameter system (typically 18 to 36 inches in diameter) which consist of excavating a hole to a desired depth, installing a steel reinforcing cage, and filling the hole with concrete. While drilled piers can be constructed in a variety of soil conditions, we anticipate the drilled holes would likely need to be supported with drilling fluid or casing due to presence of loose, granular, liquefiable soils were observed during our subsurface exploration. Drilled pier installation produces significant spoils with low noise and vibrations.

Drill Displacement Columns – Drilled displacement columns (DDC) are a ground improvement method which uses a displacement drill to compact soil in the ground. The soils are displaced and grout is injected under pressure as the drill is retracted to further densify the soil. The soil displacement and grout injection help to create a stronger "composite" grouted column/soil matrix which can increase the allowable bearing capacity to 5,000 psf, decreases compressibility, and increases soil resistance to liquefaction. Drill displacement column installation produces very little spoils with minimal to no vibrations.

Deep foundations should be spaced more than three pier/pile diameters apart from each other to reduce "group-effects". Additionally, center piles located within groups should be installed prior to the outside piles. With the exception of drilled piers, the capacity of the deep foundation system is dependent on many project and installation parameters. In general displacement deep foundations will result in skin frictions approximately 20% higher than drilled piers. Additionally, deep foundations that rely on end bearing (i.e. drilled displacement columns, driven piles, torque-down piles, etc.) should extend through the liquefiable and soft clay soils, approximately 50-60-feet below the ground surface. Therefore, we should be consulted to aid in the design of alternates deep foundation system based on the system utilized. Drilled piers may be designed utilizing the parameters outlined on Table D.

TABLE D
DRILLED PIER FOUNDATION DESIGN CRITERIA
Novato Mixed Use Development
Novato, California

Minimum diameter[1]:		18-inches
Minimum bedrock embedment:		5-feet
Skin friction[2]:		
	Static design	Seismic design
Soil:	300 psf	100 psf
Bedrock:	2,000 psf	2,800 psf
Lateral passive resistance[3,4,5]:		
	Static design	Seismic design
Soil:	300 pcf	100 pcf
Bedrock:	800 pcf	1,000 pcf

Notes:

1.) A corrosion rate of 0.0015 in/year should be utilized when determining steel pile diameter and/or sacrificial steel thickness.
2.) Uplift capacity is equal to 80% of the downward skin resistance.
3.) Ignore uppermost 6-inches unless concrete or asphalt surfacing exists adjacent to foundation.
4.) Apply passive resistance over two pier diameters.
5.) Lateral pile reduction factors, "P-multipliers" should be included in design when foundations are within groups. P-multipliers are dependent on pier/pile spacing (s) and diameter (d). The following equations should be utilized to calculate the p-multiplier:
   a. First (Lead) Row Piles: $P_m = 0.26*\ln(s/d) + 0.50 \leq 1.0$
   b. Second Row Piles: $P_m = 0.52*\ln(s/d) \leq 1.0$
   c. Third Row or Higher Piles: $P_m = 0.60*\ln(s/d) - 0.25 \leq 1.0$

A shallow foundation system may be considered to support the proposed structures, provided they are constructed on a reinforced gravel mat. A reinforced gravel mat will reduce the amount of predicted total and differential post liquefaction settlement to less than 2-inches and 1-inch (over a 40-foot span), respectively. The reinforced mat should be constructed by over-excavating below the building pad subgrade on the order of 5-feet +/-. The over-excavation is then backfilled with Caltrans Class 2 Aggregate Basrerock with the introduction of rigid geogrids (i.e., Tensar TX5, Mirafi BXG110, or approved equivalent) layered every foot within structural fill. The foundation dimensions and the depth of the structural fill mat will determine the allowable bearing capacity. Bearing capacities on the order of 3000 – 5000 psf are commonly achieved. If this option is pursued, we should consult with the design team to determine the thickness of the mat required to achieve the design bearing capacity. A schematic detail outlining the gravel mat concept is provided on Figure 15.

5.5 Site Drainage Considerations

Future differential settlements may result in uneven grades and generally poor site surface drainage. Careful consideration should be given to design of new finished grades at the site to ensure positive drainage. We recommend that the building areas be raised slightly and that the adjoining landscaped areas be sloped downward at 5 percent for a distance of at least 5-feet from the perimeter of building foundations. Where hard surfaces, such as concrete or asphalt adjoin foundations, slope these surfaces at least 0.10-feet in the first 5-feet (2 percent). Roof gutter downspouts may discharge onto the pavements, but should not discharge onto any landscaped areas. Provide area drains for landscape planters adjacent to buildings and parking areas and collect downspout discharges into a tight pipe collection system. The tight pipe system should discharge at an appropriate location unlikely to result in adverse erosion, preferably into an established municipal storm drain system.

5.6 Underground Utilities

Excavations deeper than about 3-feet may encounter groundwater throughout the year. Excavations deeper than about 5-feet will generally encounter saturated, soft- to medium-stiff clays and medium-dense sandy soils. Based on our exploration, onsite soils are “Type C” per Cal/OSHA guidelines and will be prone to caving and raveling in open excavations. The Contractor should anticipate caving conditions and provide adequate shoring as needed. Dewatering could be required, particularly for excavations in excess of 3-feet and during the winter months.

The project site may experience some future static or seismic settlement and underground utilities may be prone to breakage, particularly during a seismic event. In order to reduce the likelihood of damage, flexible utility conduits and connections should be utilized and fitted with both automatic and manual emergency shutoff valves at key connection points and at service tie-ins. Bedding materials for utility pipes should be non-corrosive sand with 90 to 100 percent of particles passing the No. 4 sieve and no more than 15 percent finer than the No. 200 sieve. Provide the minimum bedding beneath the pipe in accordance with the manufacturer’s recommendation, typically 3 to 6-inches. Utility excavations should be backfilled with select fill per criteria developed as part of a design level Investigation and compacted to a minimum of 90 percent relative compaction. In pavement areas, relative compaction should be increased to a minimum of 95 percent in the upper 12-inches.

5.7 Asphalt Concrete Pavements

We have calculated preliminary pavement sections in accordance with Caltrans procedures for flexible pavement design using an assumed R-value of 10. We have provided a range of Traffic Indices (TI) from 4 to 6 depending on the expected traffic loads for a twenty-year design life. In general, areas expected to experience loading from heavy vehicles (such as fire lanes, loading dock access roads, trash enclosures, etc.) should be designed using the higher Traffic Index, while parking areas and other lightly-loaded areas can utilize a thinner pavement section based on the lower Traffic Index. Preliminary recommended pavement sections are shown in Table E; these should be verified on the basis of supplemental laboratory testing when project plans are better-developed

TABLE E
PAVEMENT DESIGN CRITERIA
7514 Redwood Boulevard
Novato, California

	T.I.	Asphalt Concrete	Aggregate Baserock
Light passenger vehicles & parking stalls	4.0	2.5-inches	8.0-inches
Moderate truck traffic & drive aisles	5.0	3.0-inches	9.5-inches
Heavy truck traffic & fire lanes	6.0	3.5-inches	11.0-inches

Subgrade preparation for asphalt-paved areas should be performed in accordance with the grading recommendations of this report. The base rock should consist of compacted Class 2 Aggregate Base (Caltrans, 2018), be conditioned to near optimum moisture content, placed in lifts no more than six inches thick, and compacted to achieve at least 95 percent relative compaction and a non-yielding surface when proof-rolled with heavy construction equipment. The subgrade should also be maintained at near-optimum moisture content prior to placement of aggregate base rock. Areas of soft or saturated soils encountered during construction should be excavated and replaced with properly moisture conditioned fill or aggregate base.

6.0 SUPPLEMENTAL GEOTECHNICAL SERVICES

We must review the plans and specifications for the project when they are nearing completion to confirm that the intent of our geotechnical recommendations has been incorporated and provide supplemental recommendations, if needed. During construction, we must observe and test site grading, foundation excavations for the structures and associated improvements to confirm that the soils encountered during construction are consistent with the design criteria.

7.0 LIMITATIONS

We believe this report has been prepared in accordance with generally accepted geotechnical engineering practices in Marin County at the time the report was prepared. This report has been prepared for the exclusive use of ROIC, LLC and/or its assignees specifically for this project. No other warranty, expressed or implied, is made. Our evaluations and recommendations are based on the data obtained during our subsurface exploration program and our experience with soils in this geographic area.

Our approved scope of work did not include an environmental assessment of the site. Consequently, this report does not contain information regarding the presence or absence of toxic or hazardous wastes.

The evaluations and recommendations do not reflect variations in subsurface conditions that may exist between boring locations or in unexplored portions of the site. Should such variations become apparent during construction, the general recommendations contained within this report will not be considered valid unless MPEG is given the opportunity to review such variations and revise or modify our recommendations accordingly. No changes may be made to the general recommendations contained herein without the written consent of MPEG.

We recommend that this report, in its entirety, be made available to project team members, contractors, and subcontractors for informational purposes and discussion. We intend that the information presented within this report be interpreted only within the context of the report as a whole. No portion of this report should be separated from the rest of the information presented herein. No single portion of this report shall be considered valid unless it is presented with and as an integral part of the entire report.

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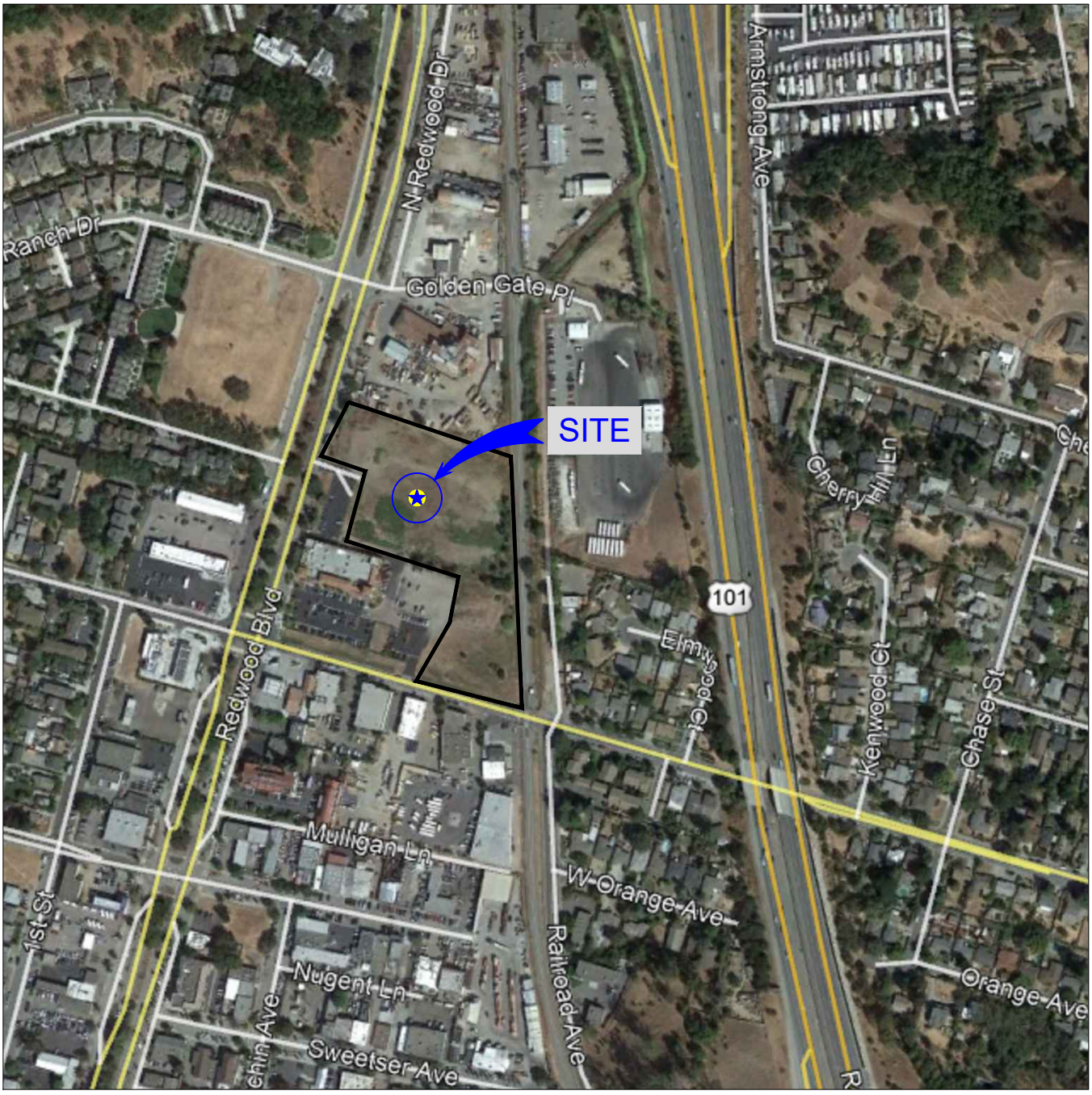
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SITE COORDINATES
LAT. 38.112°
LON. -122.567°

SITE LOCATION

N.T.S.

NORTH

REFERENCE: Google Earth, 2020

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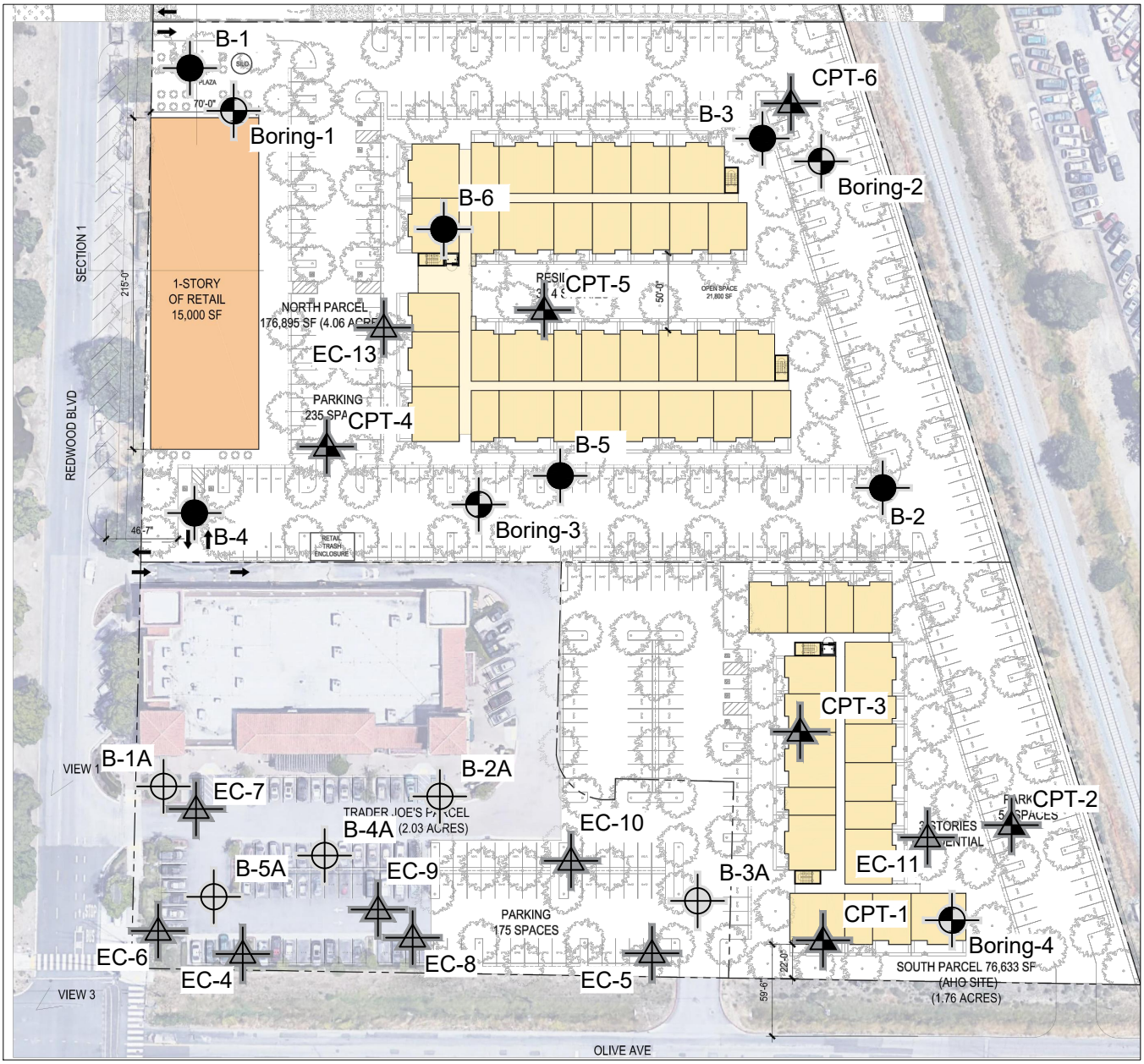
SITE LOCATION MAP

Novato Mixed Use Development
Olive Ave & Redwood Blvd
Novato, California

Project No. 3061.001 Date: 11/11/2020

Drawn RGB
Checked

1
FIGURE



REFERENCE: Trachtenberg Architects, "Novato Mixed Use", February 2, 2020

SITE PLAN

(Not to Scale)

NORTH

LEGEND

- Approx. Boring Location - Herzog, 2004
- Approx. Boring Location - Herzog, 2005
- Approx. Boring Location - MPEG, 2020
- Approx. CPT Location - Edd Clark & Assoc., 2001
- Approx. CPT Location - MPEG, 2017

MPEG MILLER PACIFIC ENGINEERING GROUP
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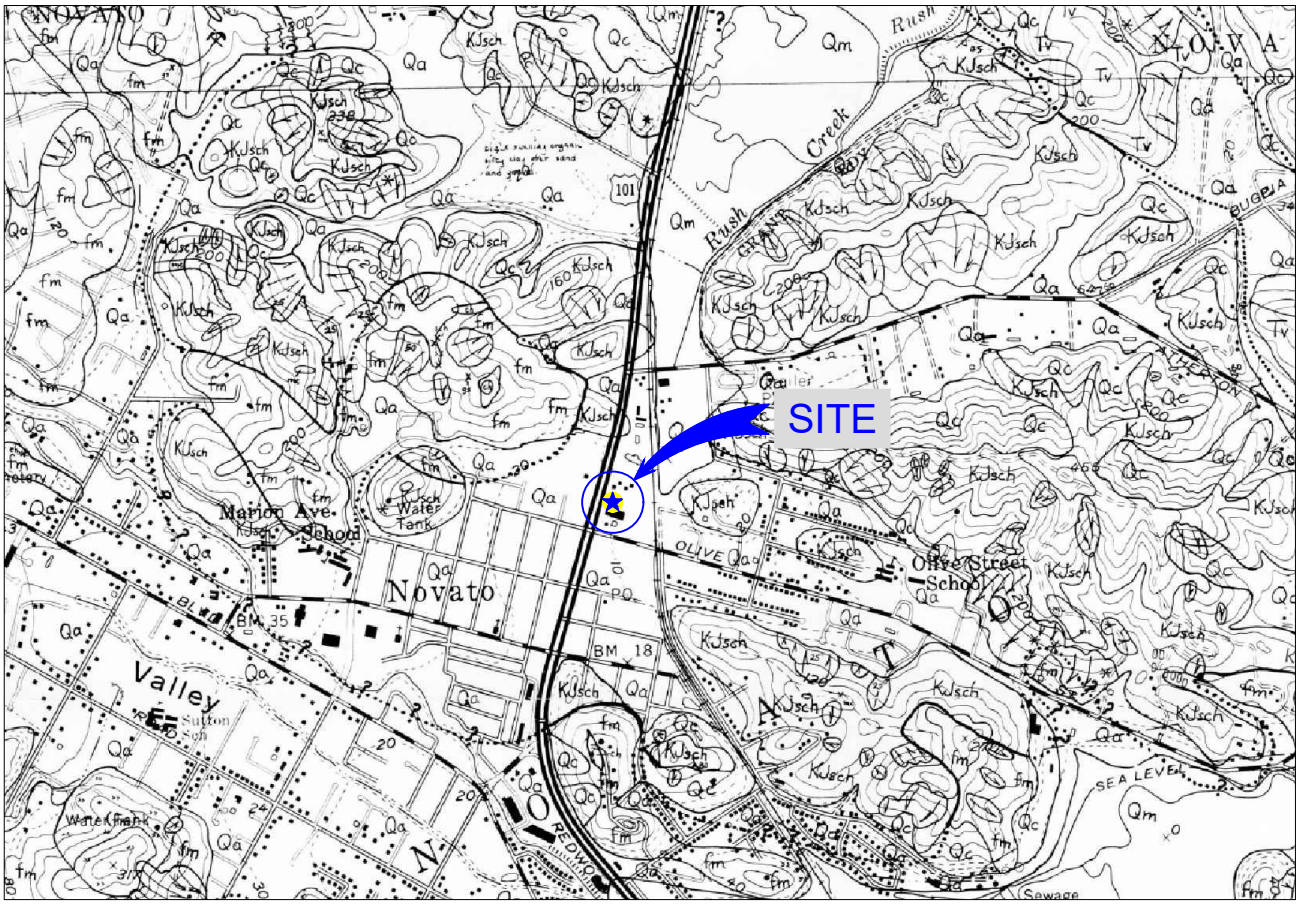
SITE PLAN

Novato Mixed Use Development
Olive Ave & Redwwod Blvd
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Project No. 3061.001 Date: 11/11/2020

Drawn RGB
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2
FIGURE



REGIONAL GEOLOGIC MAP

(NOT TO SCALE)

NORTH

LEGEND

Qm — **Bay Mud -** Marshlands, former marshlands, and mudflats. Mostly at or below mean sea level; these are thick deposits of unconsolidated, low-density, semi-fluid, highly compressible, highly impermeable silty clay.

Qa — **Alluvium -** Unconsolidated deposits of clay, silt, sand, and gravel underlying the bottom lands of the main stream valleys, consisting of materials transported and deposited by streams.

KJsch — **Semi-Schist, Phyllite, and Schist -** Predominantly slightly to well foliated or lineated metamorphosed sedimentary and volcanic rocks.

fm — **Franciscan Melange -** A tectonic mixture consisting of small to large masses of resistant rock types embedded in a matrix of pervasively sheared or pulverized rock material.

Debris Flow Landslides - Predominantly deposits of unconsolidated and unsorted soil and rock debris (colluvium) that have moved downslope en masse or in increments by flow or creep processes.

Reference: Rice, Salem J., (1974), "Geology of the Western Part of the Novato Area, Marin County, California" California Geological Survey, Scale 1:12,000.

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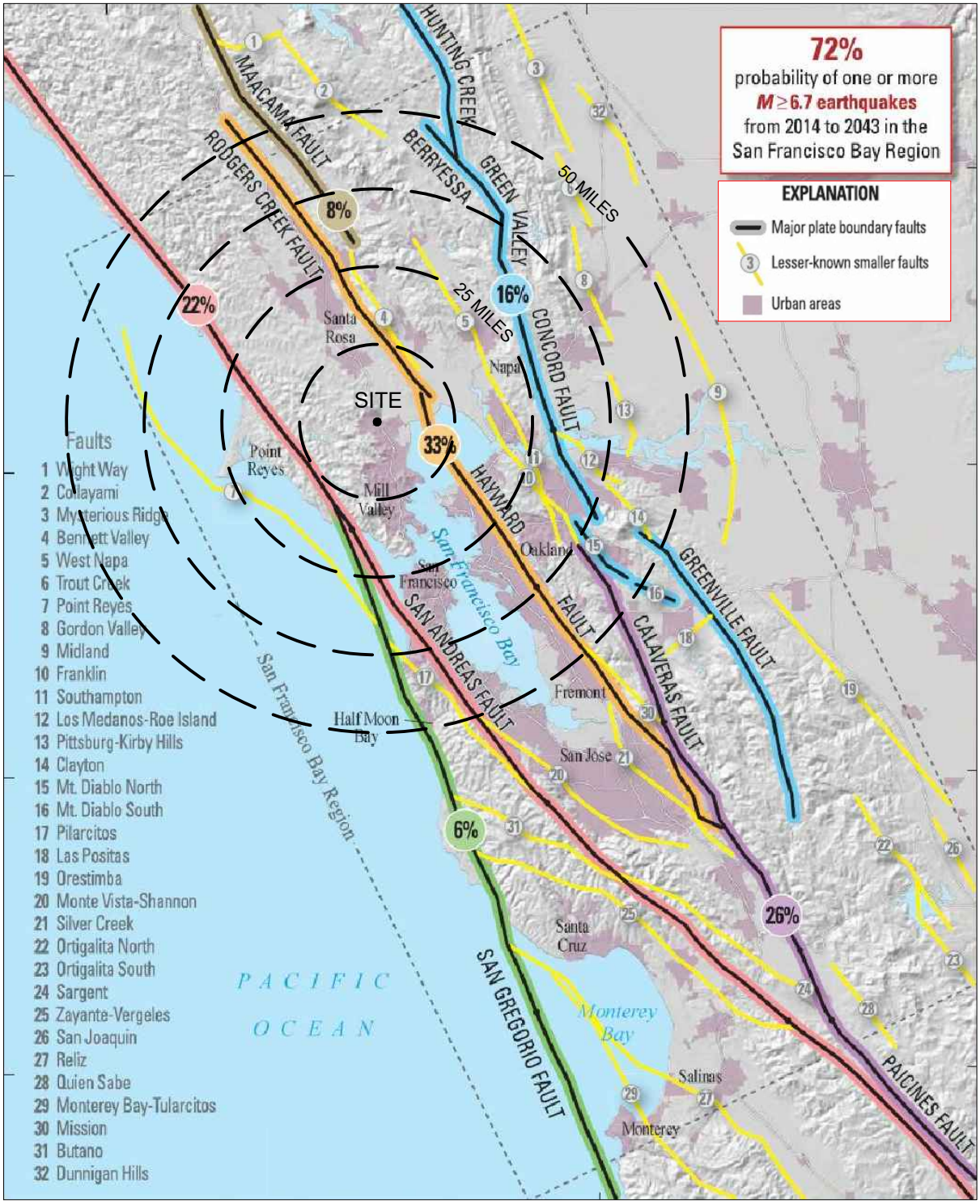
REGIONAL GEOLOGIC MAP

Novato Mixed Use Development
Olive Ave and Redwood Blvd
Novato, California

Project No. 3061.001 Date: 11/11/2020

Drawn RGB
Checked

3
FIGURE



SITE COORDINATES
LAT. 38.1123°
LON. -122.5670°

SCALE
0 12.5 25 50 MILES

NORTH

DATA SOURCE:
1) U.S. Geological Survey, U.S. Department of the Interior, "Earthquake Outlook for the San Francisco Bay Region 2014-2043", Map of Known Active Faults in the San Francisco Bay Region, Fact Sheet 2016-3020, Revised August 2016 (ver. 1.1).

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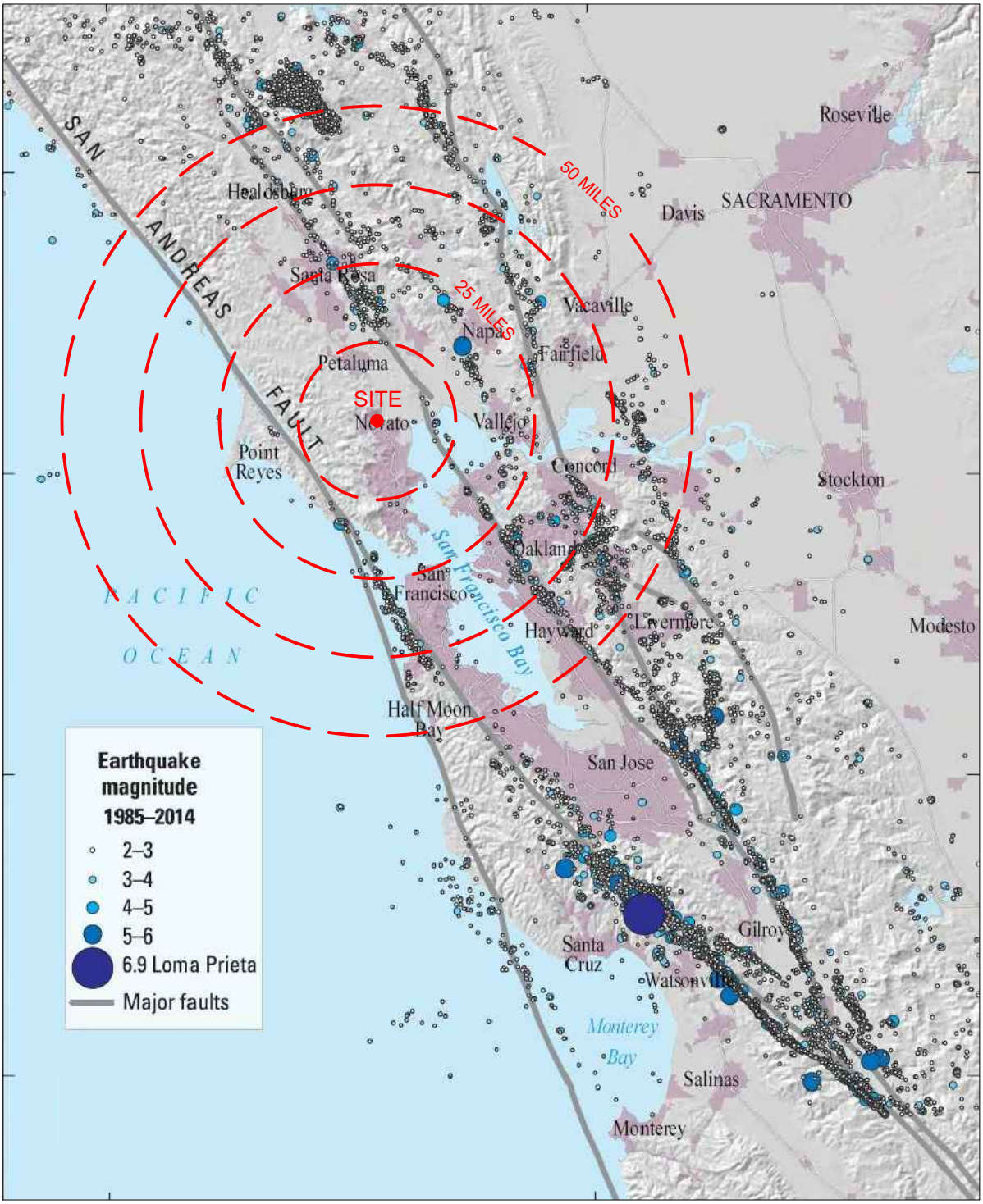
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ACTIVE FAULTS MAP

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4
FIGURE



SITE COORDINATES
LAT. 38.1123°
LON. -122.5670°

SCALE
0 12.5 25 50 MILES

NORTH

DATA SOURCE:
1) U.S. Geological Survey, U.S. Department of the Interior, "Earthquake Outlook for the San Francisco Bay Region 2014-2043", Map of Earthquakes Greater Than Magnitude 2.0 in the San Francisco Bay Region from 1985-2014, Fact Sheet 2016-3020, Revised August 2016 (ver. 1.1).

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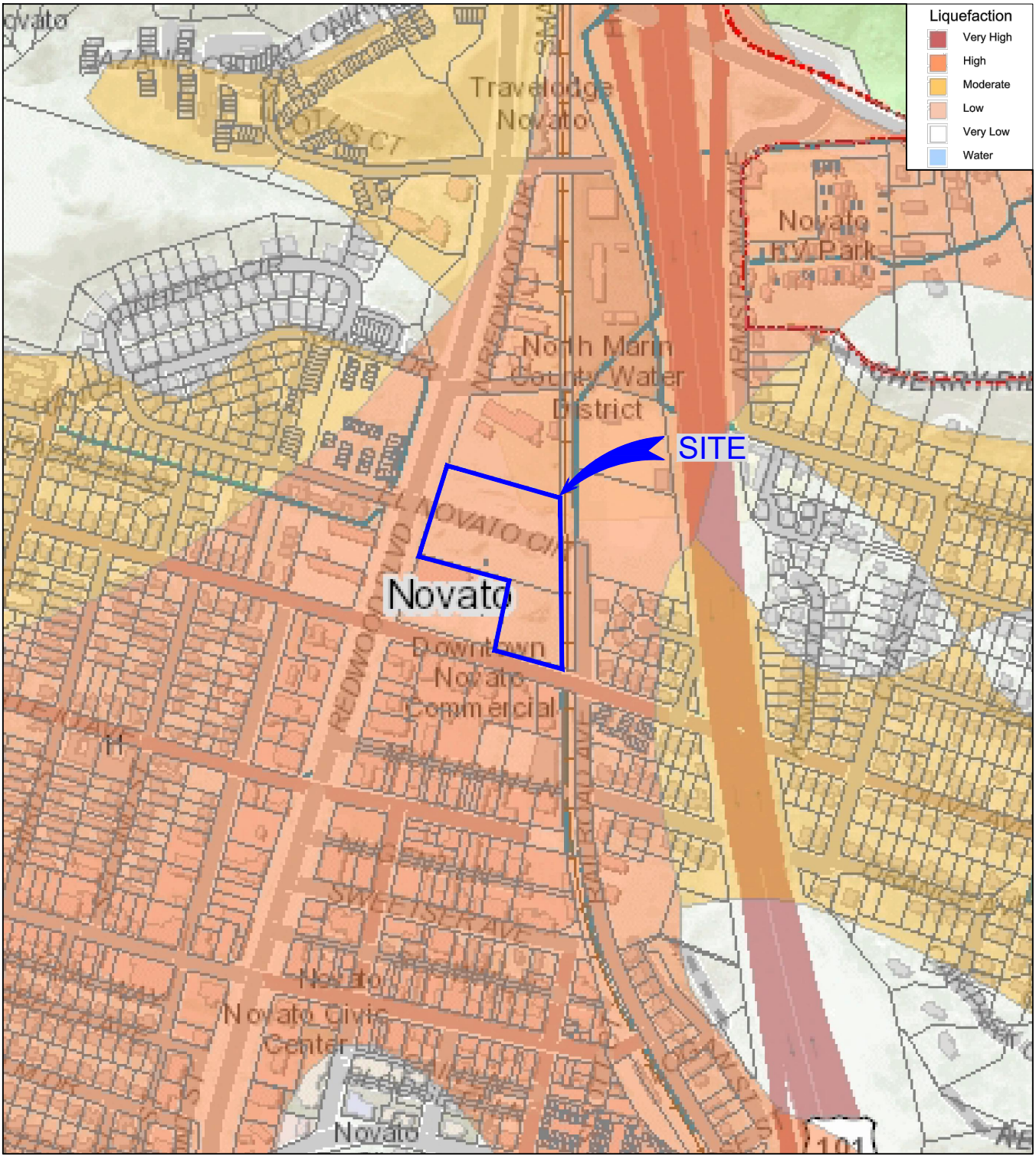
HISTORIC EARTHQUAKES MAP

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Olive Ave and Redwood Blvd
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5
FIGURE



REFERENCE: MarinMap.org, accessed 2020

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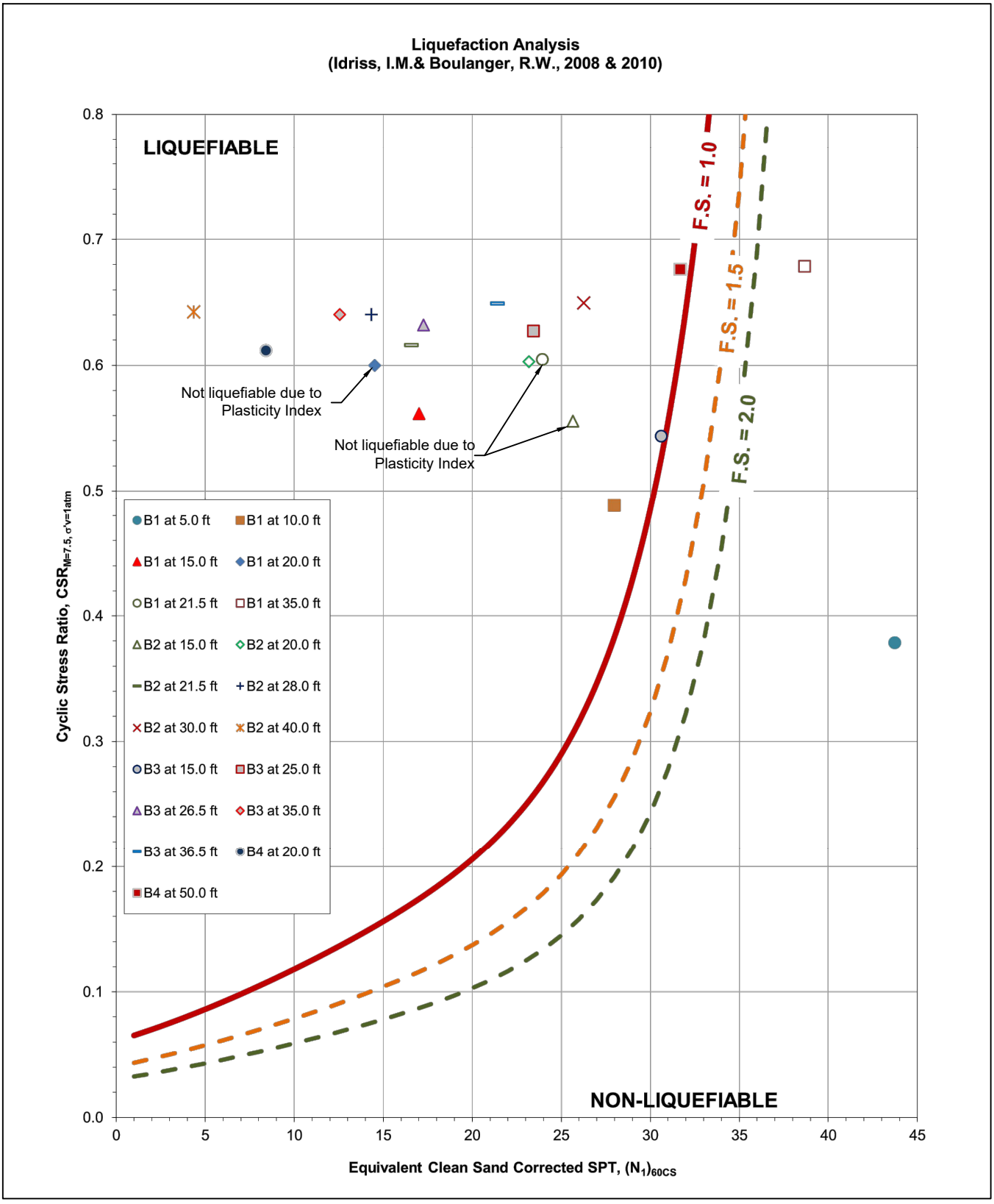
LIQUEFACTION POTENTIAL MAP

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6
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SPT LIQUEFACTION RESULTS

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7
FIGURE

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CPT-1 LIQUEFACTION ANALYSIS RESULTS

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8
FIGURE

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CPT-2 LIQUEFACTION ANALYSIS RESULTS

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9
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CPT-3 LIQUEFACTION ANALYSIS RESULTS

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10
FIGURE

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CPT-4 LIQUEFACTION ANALYSIS RESULTS

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11
FIGURE

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CPT-5 LIQUEFACTION ANALYSIS RESULTS

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12
FIGURE

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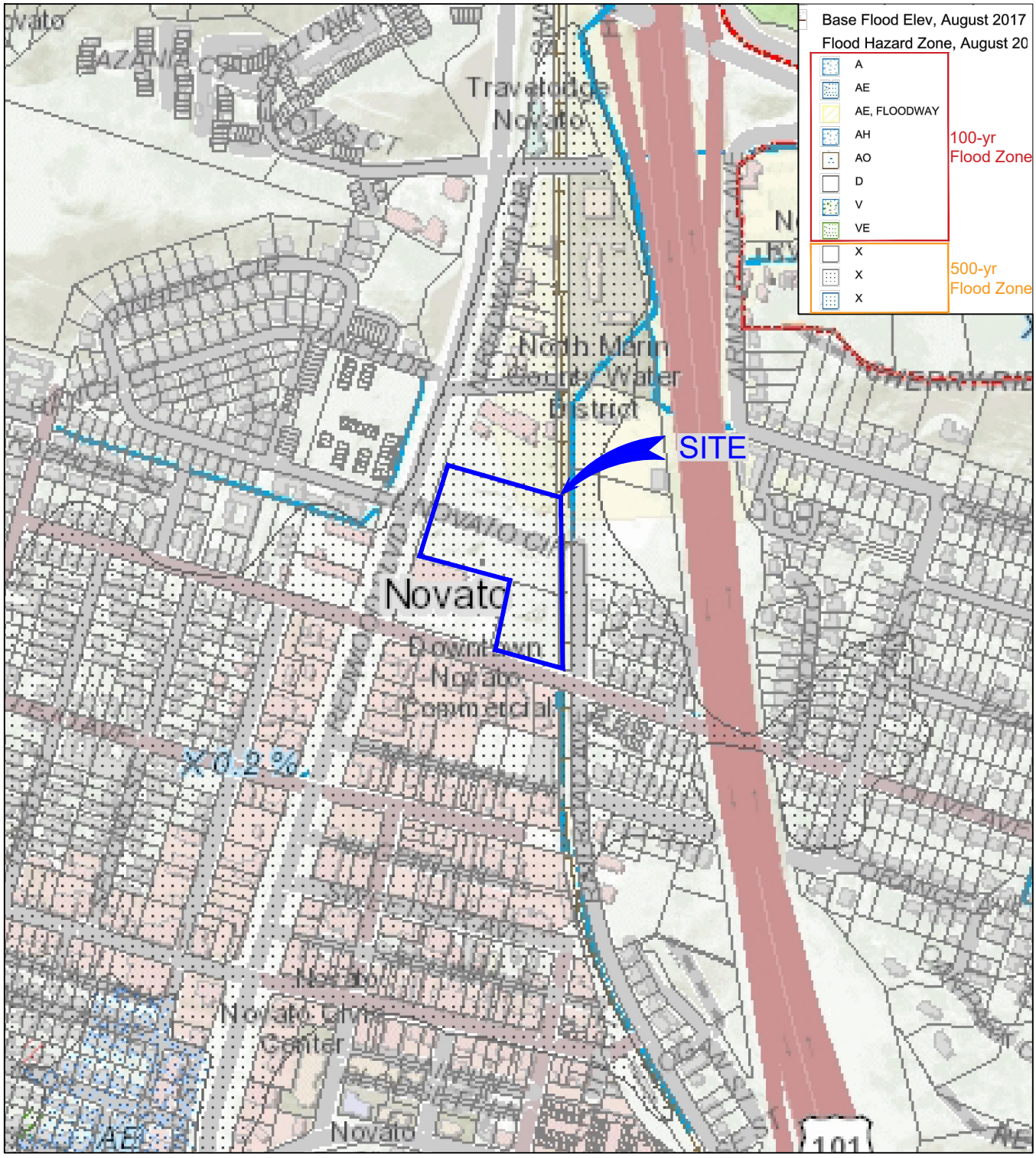
CPT-6 LIQUEFACTION ANALYSIS RESULTS

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13
FIGURE



REFERENCE: MarinMap.org, accessed 2020

NORTH

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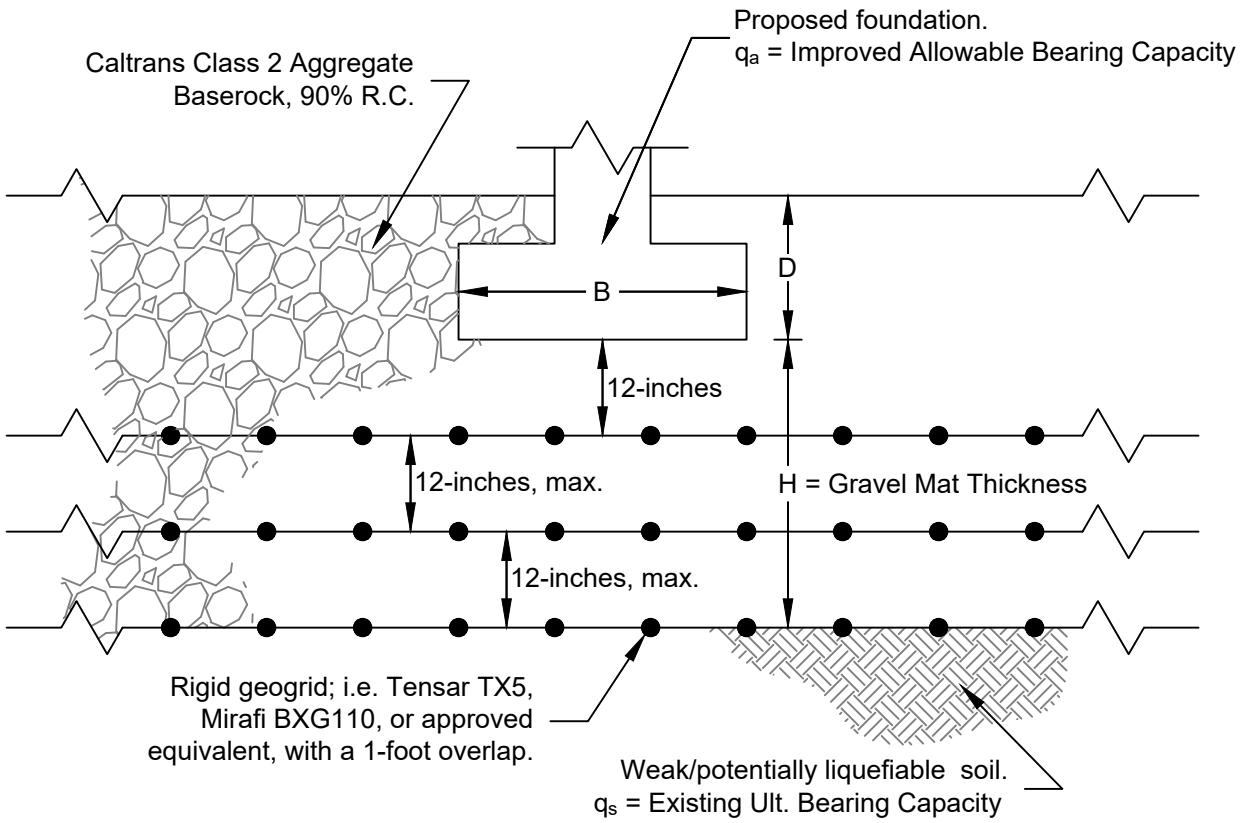
FEMA FLOOD MAP

Novato Mixed Use Development
Olive Ave and Redwood Blvd
Novato, California

Project No. 3061.001 Date: 11/11/2020

Drawn RGB
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14
FIGURE



SCHEMATIC GRAVEL MAT DETAIL

(Not to Scale)

The increase in bearing capacity gained by utilizing a gravel mat is dependent on the gravel utilized, foundation dimensions, and the thickness of the gravel mat. Miller Pacific Engineering Group should be consulted to determine anticipated bearing capacity increases based on the project parameters. An example of the potential bearing capacity increase is given below:

B = 1.5 ft
D = 1.5 ft
q_s = 750 psf
H = 3.0 ft
q_a = 3,500 psf

Note: The allowable bearing capacity, q_a, is determined utilizing a Factor of Safety of 2.0. Utilizing a Factor of Safety of 2.0 reduces the potential of total post liquefaction settlement to less than 2.0-inches and differential settlement to less than 1.0-inch over a 30-foot span.

Ref.: Tensar International Corporation, "Soil Liquefaction Solutions - Design of TriAx Stabilized Gravel Rafts to Reduce Liquefaction Effects," Tensar Technical Note FDN 1, 2018.

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SCHEMATIC GRAVEL MAT DETAIL

Novato Mixed Use Development
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Project No. 3061.001 Date: 11/11/2020

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15
FIGURE

APPENDIX A:
SUBSURFACE EXPLORATION AND LABORATORY TESTING

1.0 Subsurface Exploration

We explored subsurface conditions at the site by drilling four test borings utilizing truck mounted drilling equipment with 4-inch solid stem augers on October 1st and 2nd, 2020. The approximate boring locations are shown on Figure 2. The borings were drilled to a maximum depth of 51.5-feet below the ground surface.

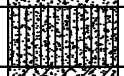
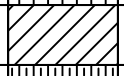
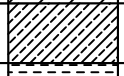
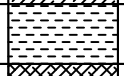
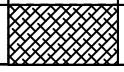
The soils encountered were logged and identified in the field in general accordance with ASTM Standard D 2487, "Field Identification and Description of Soils (Visual-Manual Procedure)." This standard is briefly explained on Figure A-1, Soil Classification Chart. The boring logs are presented on Figures A-2 through A-13. We obtained “undisturbed” samples using a 3-inch diameter, split-barrel modified California sampler with 2.5 by 6-inch brass tube liners or with a 2-inch diameter, split-barrel Standard Penetration Test (SPT) sampler. The sampler was driven with a 140-pound hammer falling 30 inches. The number of blows required to drive the samplers 18 inches was recorded and is reported on the boring logs as blows per foot for the last 12 inches of driving. The samples obtained were examined in the field, sealed to prevent moisture loss, and transported to our laboratory.

2.0 Laboratory Testing

We conducted laboratory tests on selected intact samples to verify field identifications and to evaluate engineering properties. The following laboratory tests were conducted in accordance with the ASTM standard test method cited:

- Laboratory Determination of Water (Moisture Content) of Soil, Rock, and Soil-Aggregate Mixtures, ASTM D 2216;
- Density of Soil in Place by the Drive-Cylinder Method, ASTM D 2937;
- Unconfined Compressive Strength of Cohesive Soil, ASTM D 2166;
- Amount of Material in Soils Finer Than the No. 200 (75 µm) Sieve, ASTM D 1140;
- Particle Size Distribution of Soils using Sieve Analysis, ASTM D6914;
- Liquid and Plastic Limits of Soil, ASTM D 4318;
- pH in soil, EPA 9040;
- Resistivity in Soil, SM 2510;
- Anions in soil (sulfate and chloride), EPA 300;
- California Title 22 – CAM17 Metals; and,

The moisture content, dry density, unconfined compressive strength, and percent passing the #200 sieve results are shown on the exploratory Boring Logs and the results of our sieve analyses, plasticity index, and corrosion resistance are presented on Figures A-14 through A-20. The exploratory boring logs, description of soils encountered, and the laboratory test data reflect conditions only at the location of the boring at the time they were excavated or retrieved. Conditions may differ at other locations and may change with the passage of time due to a variety of causes including natural weathering, climate and changes in surface and subsurface drainage.

MAJOR DIVISIONS		SYMBOL		DESCRIPTION
COARSE GRAINED SOILS over 50% sand and gravel	CLEAN GRAVEL	GW		Well-graded gravels or gravel-sand mixtures, little or no fines
		GP		Poorly-graded gravels or gravel-sand mixtures, little or no fines
	GRAVEL with fines	GM		Silty gravels, gravel-sand-silt mixtures
		GC		Clayey gravels, gravel-sand-clay mixtures
	CLEAN SAND	SW		Well-graded sands or gravelly sands, little or no fines
		SP		Poorly-graded sands or gravelly sands, little or no fines
	SAND with fines	SM		Silty sands, sand-silt mixtures
		SC		Clayey sands, sand-clay mixtures
FINE GRAINED SOILS over 50% silt and clay	SILT AND CLAY liquid limit <50%	ML		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
		CL		Inorganic clays of low to medium plasticity, gravely clays, sandy clays, silty clays, lean clays
		OL		Organic silts and organic silt-clays of low plasticity
	SILT AND CLAY liquid limit >50%	MH		Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts
		CH		Inorganic clays of high plasticity, fat clays
		OH		Organic clays of medium to high plasticity
HIGHLY ORGANIC SOILS		PT		Peat, muck, and other highly organic soils
ROCK				Undifferentiated as to type or composition

KEY TO BORING AND TEST PIT SYMBOLS

CLASSIFICATION TESTS

PI	PLASTICITY INDEX
LL	LIQUID LIMIT
SA	SIEVE ANALYSIS
HYD	HYDROMETER ANALYSIS
P200	PERCENT PASSING NO. 200 SIEVE
P4	PERCENT PASSING NO. 4 SIEVE

SAMPLER TYPE

- MODIFIED CALIFORNIA
- STANDARD PENETRATION TEST
- THIN-WALLED / FIXED PISTON
- HAND SAMPLER
- ROCK CORE
- X DISTURBED OR BULK SAMPLE

NOTE: Test boring and test pit logs are an interpretation of conditions encountered at the excavation location during the time of exploration. Subsurface rock, soil or water conditions may vary in different locations within the project site and with the passage of time. Boundaries between differing soil or rock descriptions are approximate and may indicate a gradual transition.

STRENGTH TESTS

TV	FIELD TORVANE (UNDRAINED SHEAR)
UC	LABORATORY UNCONFINED COMPRESSION
TXCU	CONSOLIDATED UNDRAINED TRIAXIAL
TXUU	UNCONSOLIDATED UNDRAINED TRIAXIAL
	UC, CU, UU = 1/2 Deviator Stress

SAMPLER DRIVING RESISTANCE

Modified California and Standard Penetration Test samplers are driven 18 inches with a 140-pound hammer falling 30 inches per blow. Blows for the initial 6-inch drive seat the sampler. Blows for the final 12-inch drive are recorded onto the logs. Sampler refusal is defined as 50 blows during a 6-inch drive. Examples of blow records are as follows:

25	sampler driven 12 inches with 25 blows after initial 6-inch drive
85/7"	sampler driven 7 inches with 85 blows after initial 6-inch drive
50/3"	sampler driven 3 inches with 50 blows during initial 6-inch drive or beginning of final 12-inch drive

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SOIL CLASSIFICATION CHART

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Novato, California

Project No. 3061.001 Date: 10/15/2020

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A-1
FIGURE

BORING 1

EQUIPMENT: Truck-Mounted Mobile B24 with 4.0-inch Solid Flight Auger
DATE: 10/1/2020
ELEVATION: 11 - feet*
*REFERENCE: Google Earth, 2020

DEPTH meters	DEPTH feet	SAMPLE	SYMBOL (4)		BLOWS / FOOT (1)	DRY UNIT WEIGHT pcf (2)	MOISTURE CONTENT (%)	SHEAR STRENGTH psf (3)	OTHER TEST DATA	OTHER TEST DATA
0	0			Clayey SAND (SC) Dark brown, moist, medium dense, fine grained sand, ~45-50% low plasticity clay, trace gravel. [Fill]	33	117	11.6	UC 4330	P200 48.0%	
				Clayey SAND (SC) Yellow brown, moist, medium dense, fine to coarse grained sand, ~30-35% low plasticity clay, ~10-15% highly weathered subrounded to rounded gravel. [Alluvium]	47	121	14.2	UC 3340	SA P200 33.0%	
1	5			Clayey SAND (SC) Mottled orange, black and gray, moist, medium dense, fine to coarse grained sand, ~45-50% low plasticity clay. [Alluvium]	27	106	22.1	UC 2390		
2				Grades loose to medium dense.	14	104	24.0	UC 1030	P200 49.6%	LL:29 PI:5
3	10			Clayey SAND (SC) Mottled yellow brown and gray, saturated, loose, fine to coarse grained sand, ~30-35% low plasticity clay. [Alluvium]						
4										
5	15									
6	20									

▽ Water level encountered during drilling
▼ Water level measured after drilling

NOTES: (1) UNCORRECTED FIELD BLOW COUNTS
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3 = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(4) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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BORING LOG

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Project No. 3061.001 Date: 10/15/2020

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A-2
FIGURE

BORING 1 (CONTINUED)

DEPTH meters / feet	SAMPLE	SYMBOL (4)		BLOWS / FOOT (1)	DRY UNIT WEIGHT pcf (2)	MOISTURE CONTENT (%)	SHEAR STRENGTH psf (3)	OTHER TEST DATA	OTHER TEST DATA
20			Clayey SAND (SC) Mottled yellow brown and gray, saturated, loose to medium dense, fine to coarse grained sand, ~30-35% medium plasticity clay. [Alluvium]	11 14	103	24.1	UC 450	SA P200 34.1%	LL:37 PI:17
7									
25									
8									
			Sandy CLAY (CL) Light gray brown, saturated, stiff, low plasticity clay, ~25-30% fine grained sand. [Alluvium]	22		24.4		P200 77.3%	
9 30									
10									
			Clayey SAND with Gravel (SC) Light brown, saturated, very dense, fine to coarse grained sand, ~25-30% rounded to subrounded gravel, ~10-15% low plasticity clay. [Alluvium]	50/6"		13.4		SA P200 13.4%	
35									
11									
12 40									

▽ Water level encountered during drilling

▼ Water level measured after drilling

NOTES: (1) UNCORRECTED FIELD BLOW COUNTS
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3= 0.1571 x DRY UNIT WEIGHT (pcf)
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A-3
FIGURE

DEPTH meters / feet	SAMPLE	SYMBOL (4)	BORING 1 (CONTINUED)	BLOWS / FOOT (1)	DRY UNIT WEIGHT pcf (2)	MOISTURE CONTENT (%)	SHEAR STRENGTH psf (3)	OTHER TEST DATA	OTHER TEST DATA
40			Clayey SAND with Gravel (SC) Light brown, saturated, very dense, fine to coarse grained sand, ~25-30% rounded to subrounded gravel, ~10-15% low plasticity clay. [Alluvium]						
13									
45			CLAY (CH) Light gray, moist, stiff, high plasticity clay.	11		55.6			
14									
			Boring terminated at 46.5 feet. Groundwater encountered at 15.0 feet during exploration. Groundwater measured at 7.0 feet 24 hours after exploration.						
15									
50									
16									
55									
17									
18									
60									

▽ Water level encountered during drilling

▼ Water level measured after drilling

NOTES: (1) UNCORRECTED FIELD BLOW COUNTS
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3= 0.1571 x DRY UNIT WEIGHT (pcf)
(3) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
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A-4
FIGURE

BORING 2

EQUIPMENT: Truck-Mounted Mobile B24 with 4.0-inch Solid Flight Auger
DATE: 10/1/2020
ELEVATION: 9 - feet*
*REFERENCE: Google Earth, 2020

DEPTH meters	DEPTH feet	SAMPLE	SYMBOL (4)		BLOWS / FOOT (1)	DRY UNIT WEIGHT pcf (2)	MOISTURE CONTENT (%)	SHEAR STRENGTH psf (3)	OTHER TEST DATA	OTHER TEST DATA
0	0			Clayey SAND with Gravel (SC) Brown, dry, dense, fine to medium grained sand, ~10-15% medium plasticity clay, ~15-20% subrounded gravel. [Fill]	62	116	8.4	UC 1490		LL:40 PI:19
1				CLAY with Sand (CH) Dark brown, moist, stiff, high plasticity clay, ~10-15% fine grained sand. [Alluvium]						
	5				14	108	20.0	UC 2140		
2										
3	10			Sandy CLAY with Gravel (CL) Light yellow brown, moist to wet, stiff, low plasticity clay, ~25-30% fine to coarse grained sand, ~10-15% subrounded gravel. [Alluvium]	14	113	17.3			LL:25 PI:10
4										
	15			Clayey SAND (SC) Gray brown, saturated, medium dense, fine to medium grained sand, ~35-40% low plasticity clay. [Alluvium]	25		30.4		P200 36.7%	LL:29 PI:12
5										
6	20			SAND with Clay and Gravel (SW) Light brown, saturated, medium dense, fine to medium grained sand, ~40-45% subrounded gravel, ~10-15% medium plasticity clay. [Alluvium]						

▽ Water level encountered during drilling
▼ Water level measured after drilling

NOTES: (1) UNCORRECTED FIELD BLOW COUNTS
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3 = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
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A-5
FIGURE

BORING 2 (CONTINUED)

DEPTH meters	DEPTH feet	SAMPLE	SYMBOL (4)	BLOWS / FOOT (1)	DRY UNIT WEIGHT pcf (2)	MOISTURE CONTENT (%)	SHEAR STRENGTH psf (3)	OTHER TEST DATA	OTHER TEST DATA
20									
			SAND with Clay and Gravel (SW) Light brown, saturated, medium dense, fine to medium grained sand, ~40-45% subrounded gravel, ~10-15% medium plasticity clay. [Alluvium]	26 11		12.0		SA P200 10.5%	
7									
	25								
8									
			Clayey SAND with Gravel (SC) Light gray brown, wet, loose to medium dense, fine to medium grained sand, medium plasticity clay. [Alluvium]	15 19		26.1 25.1			
9	30								
10			SAND with Clay and Gravel (SW) Light red brown, saturated, medium dense, fine to medium grained sand, ~40-45% subrounded gravel, ~10-15% medium plasticity clay. [Alluvium]						
	35								
11									
12	40								

▽ Water level encountered during drilling

▼ Water level measured after drilling

NOTES: (1) UNCORRECTED FIELD BLOW COUNTS
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3= 0.1571 x DRY UNIT WEIGHT (pcf)
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A-6
FIGURE

BORING 2 (CONTINUED)

DEPTH meters / feet	SAMPLE	SYMBOL (4)		BLOWS / FOOT (1)	DRY UNIT WEIGHT pcf (2)	MOISTURE CONTENT (%)	SHEAR STRENGTH psf (3)	OTHER TEST DATA	OTHER TEST DATA
40			SAND with Clay and Gravel (SW) Light red brown, saturated, very loose, fine to medium grained sand, ~40-45% subrounded gravel, ~10-15% medium plasticity clay. [Alluvium]	3		17.2		P200 10.0%	
13									
45									
14									
15									
50			CLAY (CH) Light gray, moist, soft, high plasticity clay.	5		69.0		P200 94.2%	
			Boring terminated at 51.5 feet. Groundwater encountered at 8.0 feet during exploration. Groundwater measured at 6.0 feet 2 hours after exploration.						
16									
55									
17									
18									
60									

▽ Water level encountered during drilling

▼ Water level measured after drilling

NOTES: (1) UNCORRECTED FIELD BLOW COUNTS
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3= 0.1571 x DRY UNIT WEIGHT (pcf)
(3) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
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A-7
FIGURE

BORING 3

EQUIPMENT: Truck-Mounted Mobile B24 with 4.0-inch Solid Flight Auger
DATE: 10/2/2020
ELEVATION: 10 - feet*
*REFERENCE: Google Earth, 2020

DEPTH meters	DEPTH feet	SAMPLE	SYMBOL (4)		BLOWS / FOOT (1)	DRY UNIT WEIGHT pcf (2)	MOISTURE CONTENT (%)	SHEAR STRENGTH psf (3)	OTHER TEST DATA	OTHER TEST DATA
0	0			Clayey GRAVEL with Sand (GC) Light dark brown, dry to moist, medium dense, angular gravel, clay and sand varies. [Fill]	30	113	13.1	UC 2410		
1				Clayey SAND (SC) Dark brown, moist, medium dense, fine grained sand, ~30-35% low plasticity clay, trace gravel. [Alluvium]						
	5							UC 2040		
2				Sandy CLAY (CL) Mottled gray and yellow, moist, stiff, medium plasticity clay, ~35-40% fine grained sand, trace gravel. [Alluvium]	23	115 110	16.1 19.2	UC 2830	P200 64.4%	
3	10				23	105	22.5	UC 2250		
4										
	15			Clayey SAND with Gravel (SC) Red brown, saturated, medium dense, fine to coarse grained sand, ~35-40% subrounded gravel, ~10-15% medium plasticity clay. [Alluvium]	35		11.8		SA P200 14.9%	
5										
6	20			Sandy CLAY (CL) Mottled gray and yellow brown, wet, stiff, medium plasticity clay, ~40-45% fine grained sand. [Alluvium]						

▽ Water level encountered during drilling
▼ Water level measured after drilling

NOTES: (1) UNCORRECTED FIELD BLOW COUNTS
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3 = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
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A-8
FIGURE

BORING 3 (CONTINUED)

DEPTH meters	DEPTH feet	SAMPLE	SYMBOL (4)	BLOWS / FOOT (1)	DRY UNIT WEIGHT pcf (2)	MOISTURE CONTENT (%)	SHEAR STRENGTH psf (3)	OTHER TEST DATA	OTHER TEST DATA
	20								
				18	101	25.8	UC 1000	P200 58.1%	
7									
	25								
								SA P200 16.3%	
8				26	114	17.3			
				11					
9	30								
10									
	35								
				14		13.1			
11									
				16		17.9		P200 13.7%	
12									
	40								

Sandy CLAY (CL)
Mottled gray and yellow brown, wet, stiff, medium plasticity clay, ~40-45% fine grained sand. [Alluvium]

Clayey SAND (SC)
Red brown, saturated, medium dense, fine to coarse grained sand, ~15-20% medium plasticity clay, ~10-15% subrounded gravel. [Alluvium]

▽ Water level encountered during drilling
▼ Water level measured after drilling

NOTES: (1) UNCORRECTED FIELD BLOW COUNTS
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3= 0.1571 x DRY UNIT WEIGHT (pcf)
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Project No. 3061.001 Date: 10/15/2020

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A-9
FIGURE

DEPTH meters / feet	SAMPLE	SYMBOL (4)	BORING 3 (CONTINUED)	BLOWS / FOOT (1)	DRY UNIT WEIGHT pcf (2)	MOISTURE CONTENT (%)	SHEAR STRENGTH psf (3)	OTHER TEST DATA	OTHER TEST DATA
40			Clayey SAND (SC) Red brown, saturated, medium dense, fine to coarse grained sand, ~15-20% medium plasticity clay, ~10-15% subrounded gravel. [Alluvium]						
13			CLAY (CH) Light gray, moist, soft, high plasticity clay.			48.8			
45			Boring terminated at 45.0 feet. Groundwater encountered at 6.0 feet during exploration.						
14									
15									
50									
16									
55									
17									
18									
60									

▽ Water level encountered during drilling
▼ Water level measured after drilling

NOTES: (1) UNCORRECTED FIELD BLOW COUNTS
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3= 0.1571 x DRY UNIT WEIGHT (pcf)
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Project No. 3061.001 Date: 10/15/2020

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A-10
FIGURE

BORING 4

EQUIPMENT: Truck-Mounted Mobile B24 with 4.0-inch Solid Flight Auger
DATE: 10/2/2020
ELEVATION: 12 - feet*
*REFERENCE: Google Earth, 2020

DEPTH meters	DEPTH feet	SAMPLE	SYMBOL (4)		BLOWS / FOOT (1)	DRY UNIT WEIGHT pcf (2)	MOISTURE CONTENT (%)	SHEAR STRENGTH psf (3)	OTHER TEST DATA	OTHER TEST DATA
0	0			Clayey GRAVEL with Sand (GC) Light dark brown, dry to moist, medium dense, angular gravel, clay and sand varies. [Fill]	31	102	13.4	UC 1540		
				CLAY with Sand (CL) Black, moist, stiff, low plasticity clay, ~10-15% fine grained sand. [Alluvium]						
1	5				18	111	19.2	UC 2140		
2				Sandy CLAY (CL) Mottled orange and gray, moist, stiff, medium plasticity clay, ~25-30% fine grained sand. [Alluvium]						
3	10				24	114	18.0	UC 3150		LL:33 PI:15
				Grades very stiff.	30	126	13.3			
5	15									
6	20			Clayey SAND with Gravel (SC) Red brown, saturated, very loose, fine to coarse grained sand, ~35-40% subrounded gravel, ~10-15% medium plasticity clay. [Alluvium]						

▽ Water level encountered during drilling
▼ Water level measured after drilling

NOTES: (1) UNCORRECTED FIELD BLOW COUNTS
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3 = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
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Project No. 3061.001 Date: 10/15/2020

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A-11
FIGURE

BORING 4 (CONTINUED)

DEPTH meters / feet	SAMPLE	SYMBOL (4)		BLOWS / FOOT (1)	DRY UNIT WEIGHT pcf (2)	MOISTURE CONTENT (%)	SHEAR STRENGTH psf (3)	OTHER TEST DATA	OTHER TEST DATA
20			Clayey SAND with Gravel (SC) Red brown, saturated, very loose, fine to coarse grained sand, ~35-40% subrounded gravel, ~10-15% medium plasticity clay. [Alluvium]	6				SA P200 14.5%	
				49		23.8			
7			Sandy CLAY (CH) Light gray and red brown, moist, very stiff, high plasticity clay, ~25-30% fine grained sand. [Alluvium]						
25									
8				49		25.8			
9									
30									
						26.2			
10									
35									
11									
12									
40									

▽ Water level encountered during drilling

▼ Water level measured after drilling

NOTES: (1) UNCORRECTED FIELD BLOW COUNTS
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3= 0.1571 x DRY UNIT WEIGHT (pcf)
(3) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(4) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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Project No. 3061.001 Date: 10/15/2020

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A-12
FIGURE

BORING 4 (CONTINUED)

DEPTH meters / feet	SAMPLE	SYMBOL (4)		BLOWS / FOOT (1)	DRY UNIT WEIGHT pcf (2)	MOISTURE CONTENT (%)	SHEAR STRENGTH psf (3)	OTHER TEST DATA	OTHER TEST DATA
40			Sandy CLAY (CH) Light gray and red brown, moist, very stiff, high plasticity clay, ~25-30% fine grained sand. [Alluvium]	26		20.4			
13									
45									
14									
15			Clayey SAND with Gravel (SC) Light gray, moist, medium dense, fine to coarse grained sand, ~20-25% subrounded gravel, ~15-20% medium plasticity clay. [Alluvium]						
50				26		14.4		SA P200 17.6%	
			Boring terminated at 51.5 feet. Groundwater encountered at 13.0 feet during exploration. Groundwater measured at 8.0 feet upon completion of exploration.						
16									
55									
17									
18									
60									

▽ Water level encountered during drilling

▼ Water level measured after drilling

NOTES: (1) UNCORRECTED FIELD BLOW COUNTS
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3= 0.1571 x DRY UNIT WEIGHT (pcf)
(3) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
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BORING LOG

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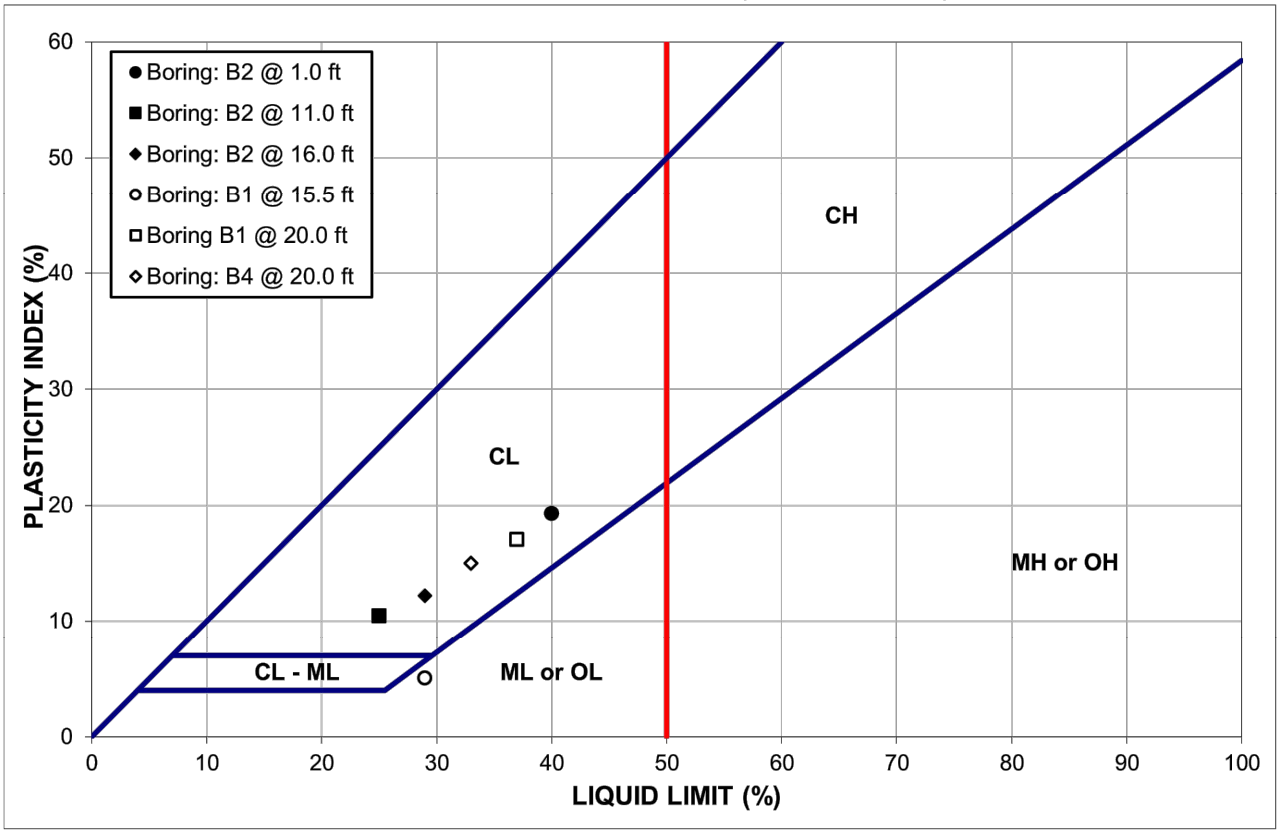
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A-13
FIGURE

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ATTERBERG LIMITS TEST (ASTM D 4318)



Sample	Classification	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)
Boring: B1 @ 15.5 ft	Clayey SAND (SC)	29	24	5
Boring: B1 @ 20.0 ft	Clayey SAND (SC)	37	20	17
Boring: B2 @ 1.0 ft	Clayey SAND with Gravel (SC)	40	21	19
Boring: B2 @ 11.0 ft	Sandy CLAY with Gravel (CL)	25	15	10
Boring: B2 @ 16.0 ft	Clayey SAND (SC)	29	17	12
Boring: B4 @ 11.0 ft	Sandy CLAY (CL)	33	18	15

PI = 0-3: Non-Plastic
PI = 3-15: Slightly Plastic
PI = 15-30: Medium Plasticity
PI = >30: High Plasticity

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PLASTICITY INDEX TEST RESULTS

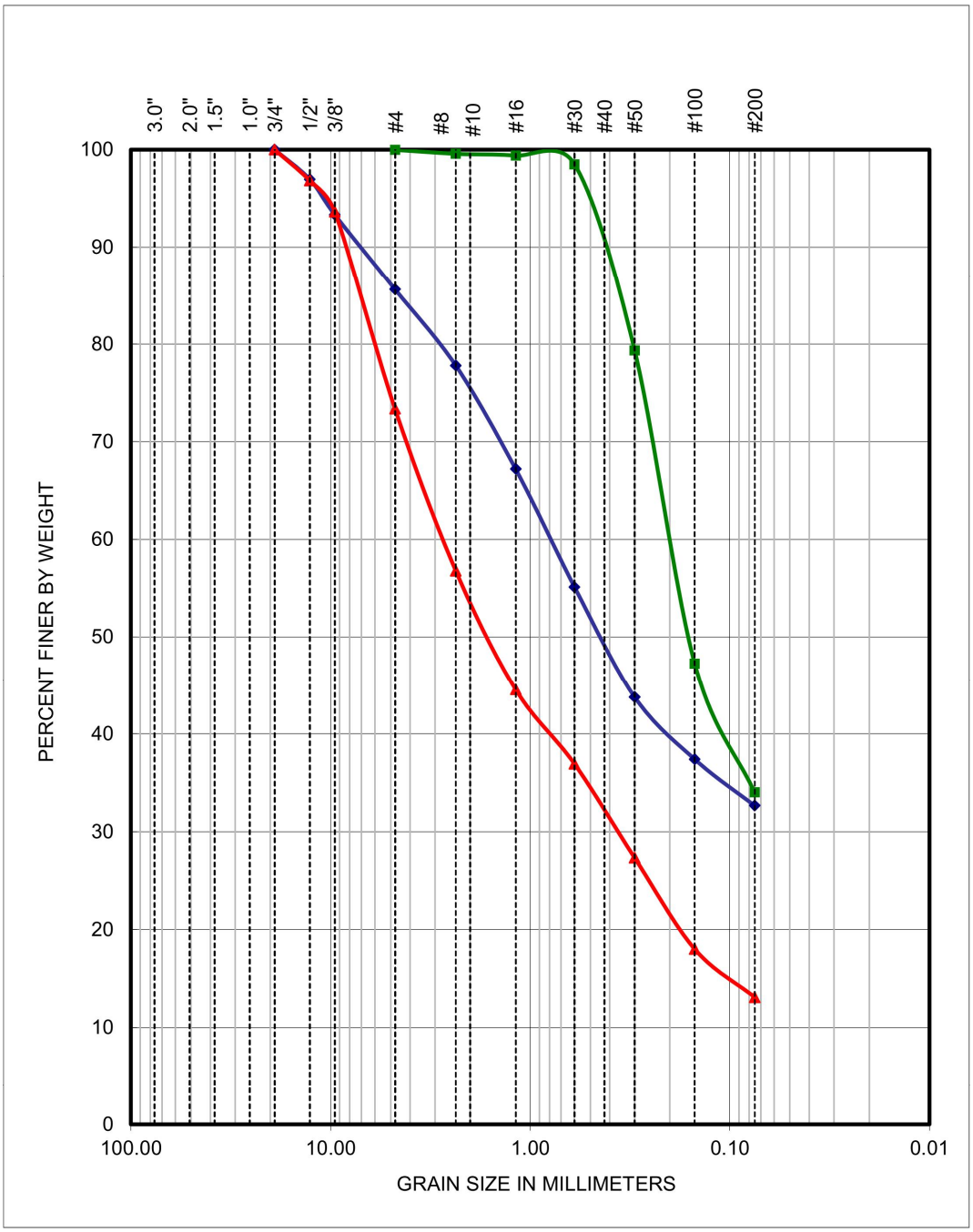
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Project No. 3061.001 Date: 10/15/2020

Drawn MMT
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A-14
FIGURE

MILLER PACIFIC ENGINEERING GROUP
PARTICLE SIZE ANALYSIS - ASTM D 6913 & ASTM D 1140



SYMBOL	SAMPLE SOURCE	CLASSIFICATION
◆	B1 @ 6.0'	Clayey SAND (SC)
■	B1 @ 20.0'	Clayey SAND (SC)
▲	B1 @ 35.0'	Clayey SAND with Gravel (SC)

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SIEVE ANALYSIS TEST RESULTS

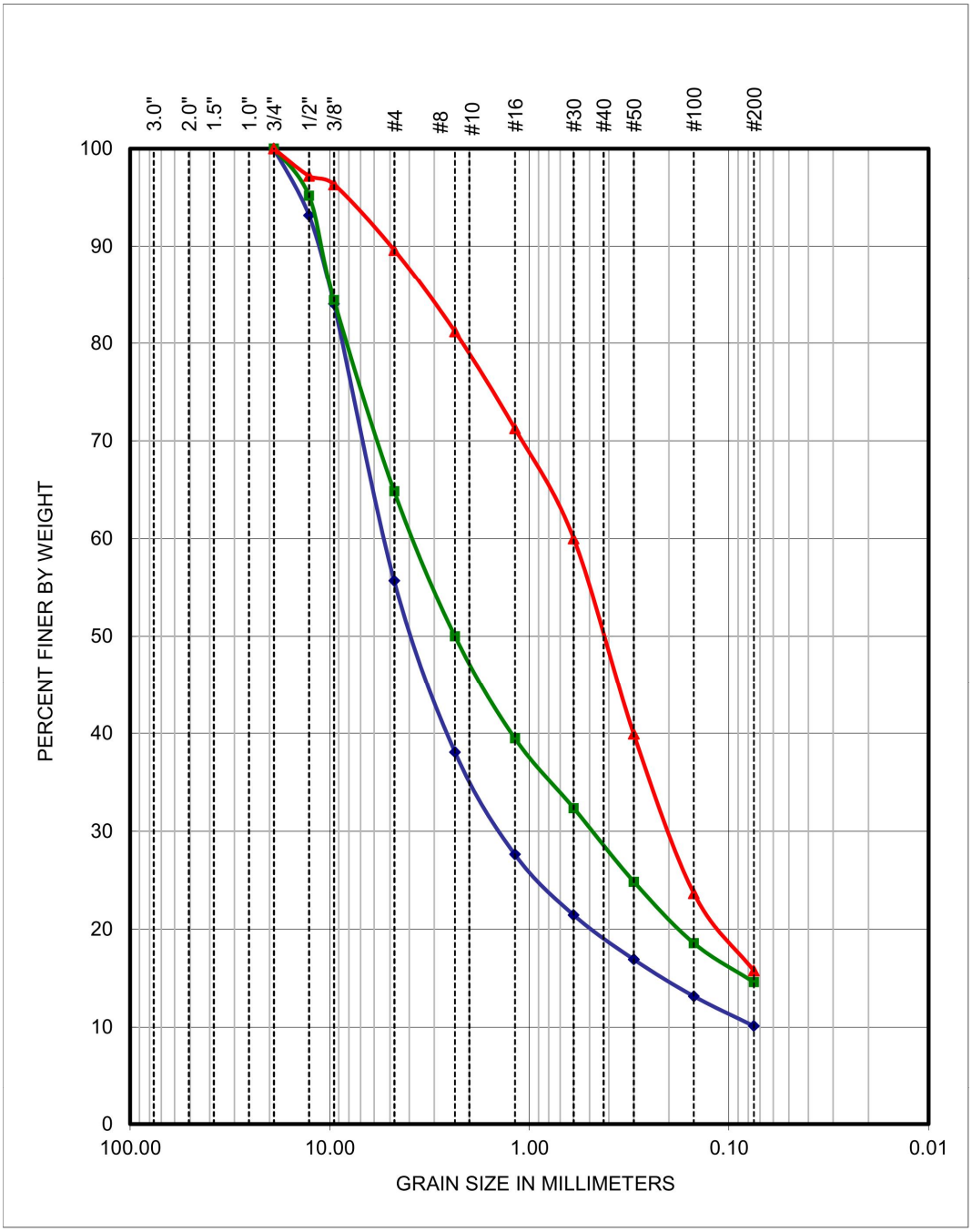
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A-15
FIGURE

MILLER PACIFIC ENGINEERING GROUP
PARTICLE SIZE ANALYSIS - ASTM D 6913 & ASTM D 1140



SYMBOL	SAMPLE SOURCE	CLASSIFICATION
	B2 @ 21.0'	SAND with Clay and Gravel (SW)
	B3 @ 16.0'	Clayey SAND with Gravel (SC)
	B3 @ 26.0'	Clayey SAND (SC)

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SIEVE ANALYSIS TEST RESULTS

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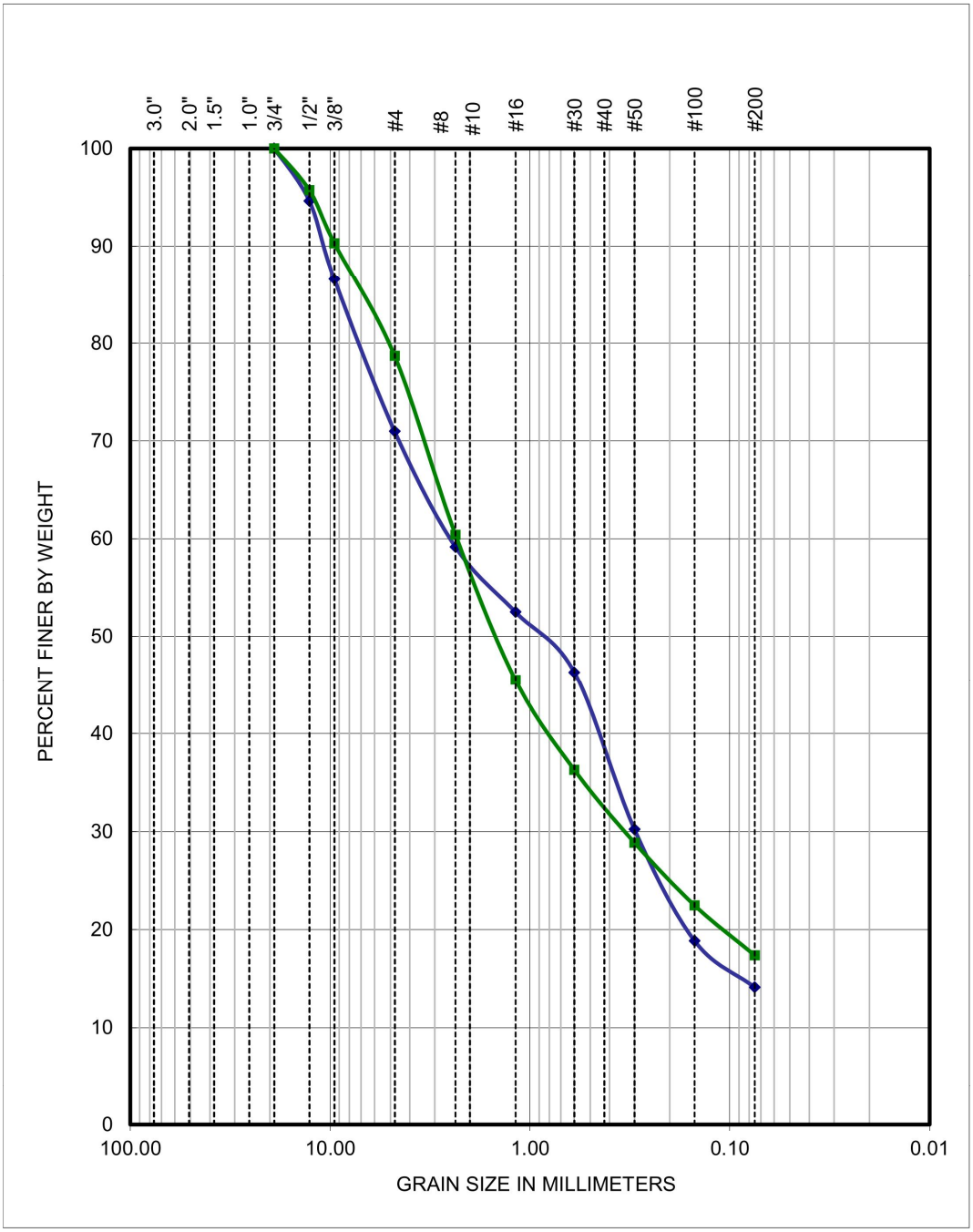
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A-16
FIGURE

MILLER PACIFIC ENGINEERING GROUP

PARTICLE SIZE ANALYSIS - ASTM D 6913 & ASTM D 1140



SYMBOL	SAMPLE SOURCE	CLASSIFICATION
◆	B4 @ 21.5'	Clayey SAND with Gravel (SC)
■	B4 @ 50.0'	Clayey SAND with Gravel (SC)

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SIEVE ANALYSIS TEST RESULTS

Novato Mixed Use Development
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A-17
FIGURE

E T S

Environmental Technical Services

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(707) 778-9605/FAX 778-9612
e-mail: *entech@pacbell.net*

-Soil, Water & Air Testing & Monitoring
-Analytical Labs
-Technical Support

Serving people and the environment so that both benefit.

COMPANY: Miller Pacific Engineering Group, 504 Redwood Blvd., Suite 220, Novato, CA 94947				ANALYST(S)	SUPERVISOR
ATTN: Ben Pappas			DATE of	L. Quijano	S. Santos
JOB NAME: Mix-Use Facility, Novato, California.		DATE RECEIVED	COMPLETION	G. Hernandez	LAB DIRECTOR
JOB #: 3061.001		10/8/2020	10/16/2020		G.S. Conrad PhD

Cal Test 643

LAB SAMPLE NUMBER	SAMPLE ID	DESCRIPTION of SOIL and/or SEDIMENT	SOIL pH -log[H+]	MINIMUM AVE. RESISTIVITY Ohm-cm	ELECTRICAL CONDUCTIVITY µmhos/cm	SULFATE SO4 ppm	CHLORIDE Cl ppm
08463-1	MUF1/N	Native Soil B1-B4 @ 0.0'-5.0'	**6.43**	**1,641**	**[609]**	**96**	**525**
Method	Detection	Limits --->	---	1	0.1	1	1

LAB SAMPLE NUMBER	SAMPLE ID	DESCRIPTION of SOIL and/or SEDIMENT	SALINITY ECe dS/cm	SOLUBLE SULFIDES (S=) ppm	SOLUBLE CYANIDES (CN=) ppm	REDOX mV	PERCENT MOISTURE %
Method	Detection	Limits --->	---	0.1	0.1	1	0.1

COMMENTS

Resistivity is well over 1,500 ohm-cm, i.e., mediocre; soil reaction (i.e., pH) is mildly acidic; sulfate is low (@ <200 ppm), but chloride is elevated (@ >500 ppm). CalTrans (CT) times to perforation of galvanized steel and full depth pitting time (following Uhlig) for otherwise unprotected steel in this soil are determined based on the pertinent parameters [see the table at left below]. Sulfate should not have any adverse impact on concrete, cement, mortar or grout; but, chloride could have some adverse impact on rebar or buried steel over the long term. Based on Cl concentration, calculated time to corrosion is 47.5 yrs. Based on the tested parameters, a point range for this soil can be determined [see table below on right]. Lime or mild cement treatment of this soil could be of benefit in that raising soil pH to the 7.5-8.5 range would increase times to perforation as indicated below. But such treatment may or may not be practical depending on the circumstances. To improve metals longevity any more in this soil would require steel upgrading or other actions. At times, structural strength considerations may require heavier gauge steel than is used in the presented examples such that perforation and pitting times can be beyond the specified life span. Where this is not the case, then cathodic protection along with coating or wrapping steel assets is one potential solution. Some other potential options can include increased or specialized engineering fill, use of a polymer coating, or use of plastic, fiberglass or concrete assets. Standard concrete mixes should be acceptable in this soil for routine projects of typical design life, but it may be prudent to do some upgrading on rebar or buried steel.

SAMPLE ID	CT 18 ga	CT 12 ga	2 mm (Uhlig)
MUF1/N	>14 yrs	<32 yrs	~14 yrs
treated	<31 yrs	~67 yrs	~22 yrs

PARAMETER/ID	MUF1/N
pH	Ø
Rs	1-8
SO4	Ø
Cl	4
Redox	-
TOTAL POINTS	5-12

\\\\NOTES: Methods are from following sources: extractions by Cal Trans protocols as per Cal Test 417 (SO4), 422 (Cl), and 643 (pH & resistivity); &/or by ASTM Vol. 4.08 & ASTM Vol. 11.01 (=EPA Methods of Chemical Analysis, or Standard Methods); pH - ASTM G51; Spec. Cond. - ASTM D1125; resistivity - ASTM G187; redox - Pt probe/ISE; sulfate - extraction Title 22, and detection ASTM D516 (=EPA 375.4); chloride - extraction Title 22, detection ASTM D512 (=EPA 325.3); soluble sulfides - extraction by Title 22, and detection EPA 376.2 (= SMEWW 4500-S D); cyanides - extraction by Title 22, and detection by ASTM D4374 (=EPA 335.2).

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CORROSION TESTING RESULTS

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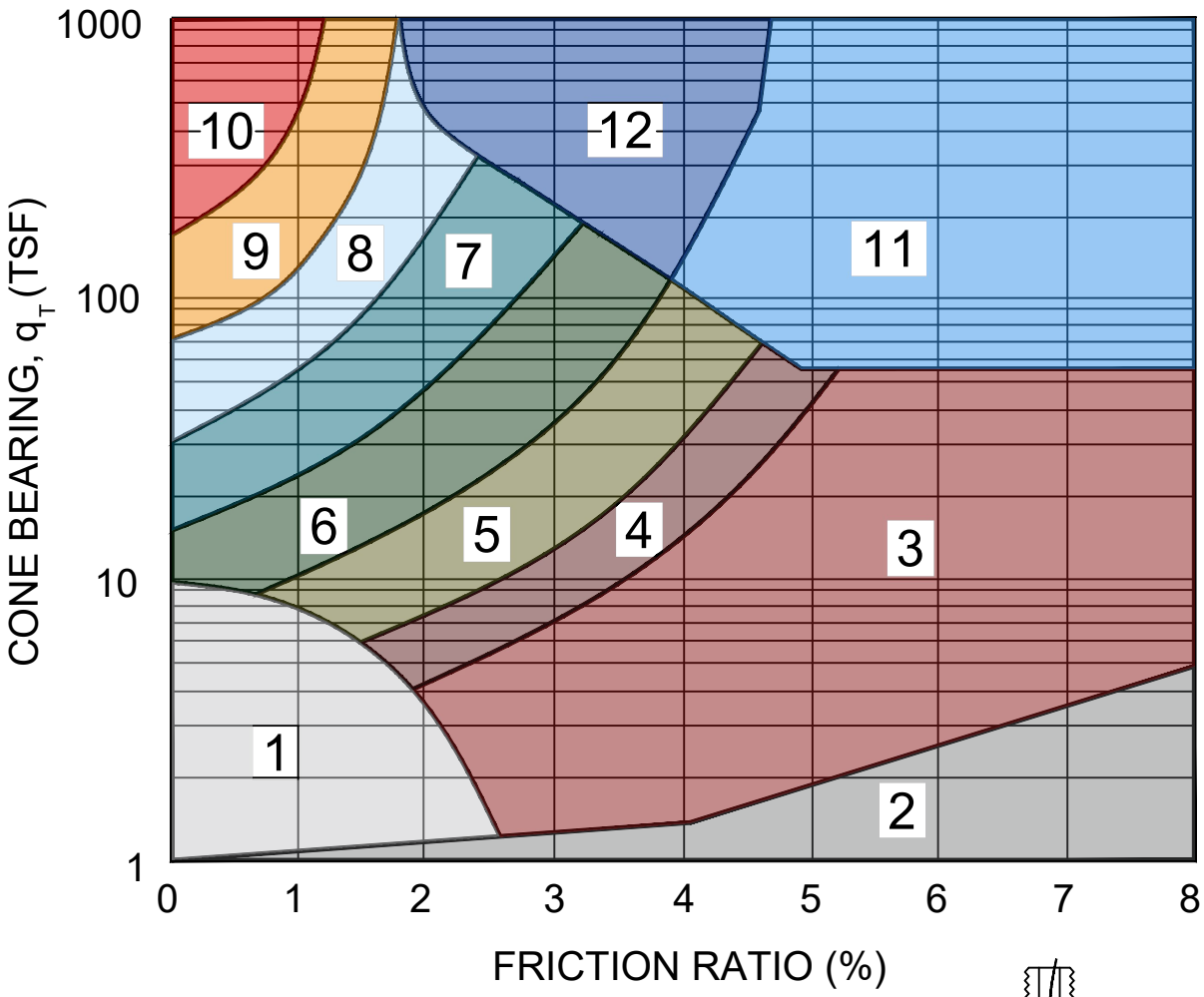
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A-18
FIGURE

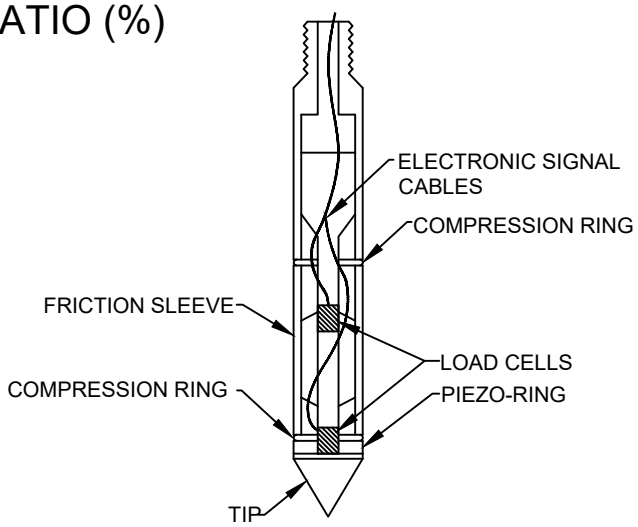
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APPENDIX B:
SUBSURFACE EXPLORATION AND LABORATORY TESTING



Zone:	Qc/N	Soil Behavior Type:
1)	2	Sensitive Fine Grained
2)	1	Organic Material
3)	1	Clay
4)	1.5	Silty Clay to Clay
5)	2	Clayey Silt to Silty Clay
6)	2.5	Sandy Silt to Clayey Silt
7)	3	Silty Sand to Sandy Silt
8)	4	Sand to Silty Sand
9)	5	Sand
10)	6	Gravelly Sand to Sand
11)	1	Very Stiff Fine Grained (*)
12)	2	Sand to Clayey Sand (*)

(*) Overconsolidated or Cemented



CONE PENETROMETER

(NO SCALE)

Reference: Robertson, P.K. (1986), "In-Situ Testing and Its Application to Geotechnical Engineering," Canadian Geotechnical Journal, Vol. 23; No. 23; No. 4, pp. 573-594

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CPT SOIL INTERPRETATION CHART

Novato Mixed Use
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Project No. 3061.001 Date: 10/15/2020

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B-1
FIGURE

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CPT-01 DATA

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B-2
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CPT-02 DATA

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B-3
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CPT-03 DATA

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B-4
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CPT-04 DATA

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B-5
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CPT-05 DATA

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B-6
FIGURE

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CPT-06 DATA

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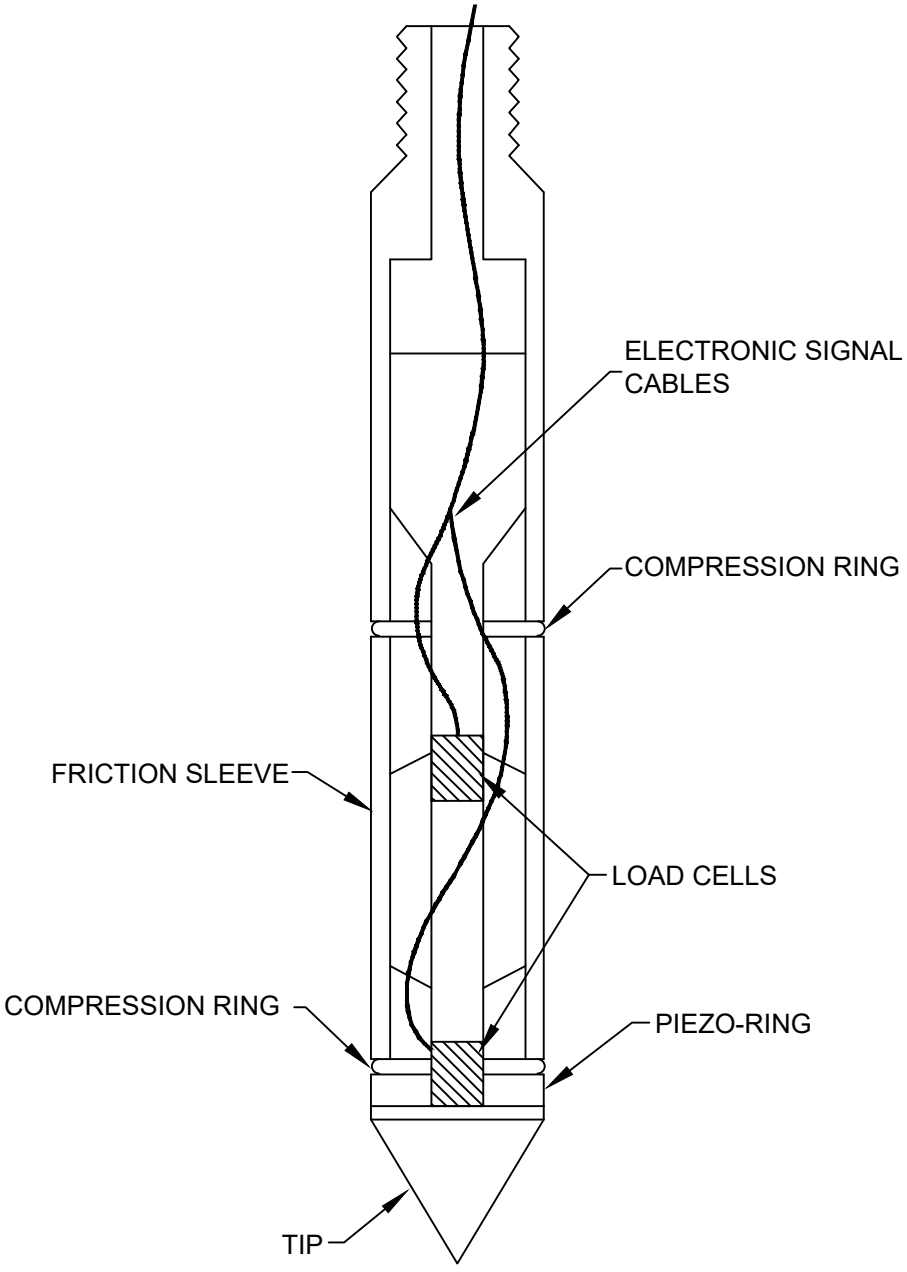
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B-7
FIGURE

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APPENDIX C:
PREVIOUS EXPLORATION BY OTHERS



CONE PENETROMETER

(NO SCALE)

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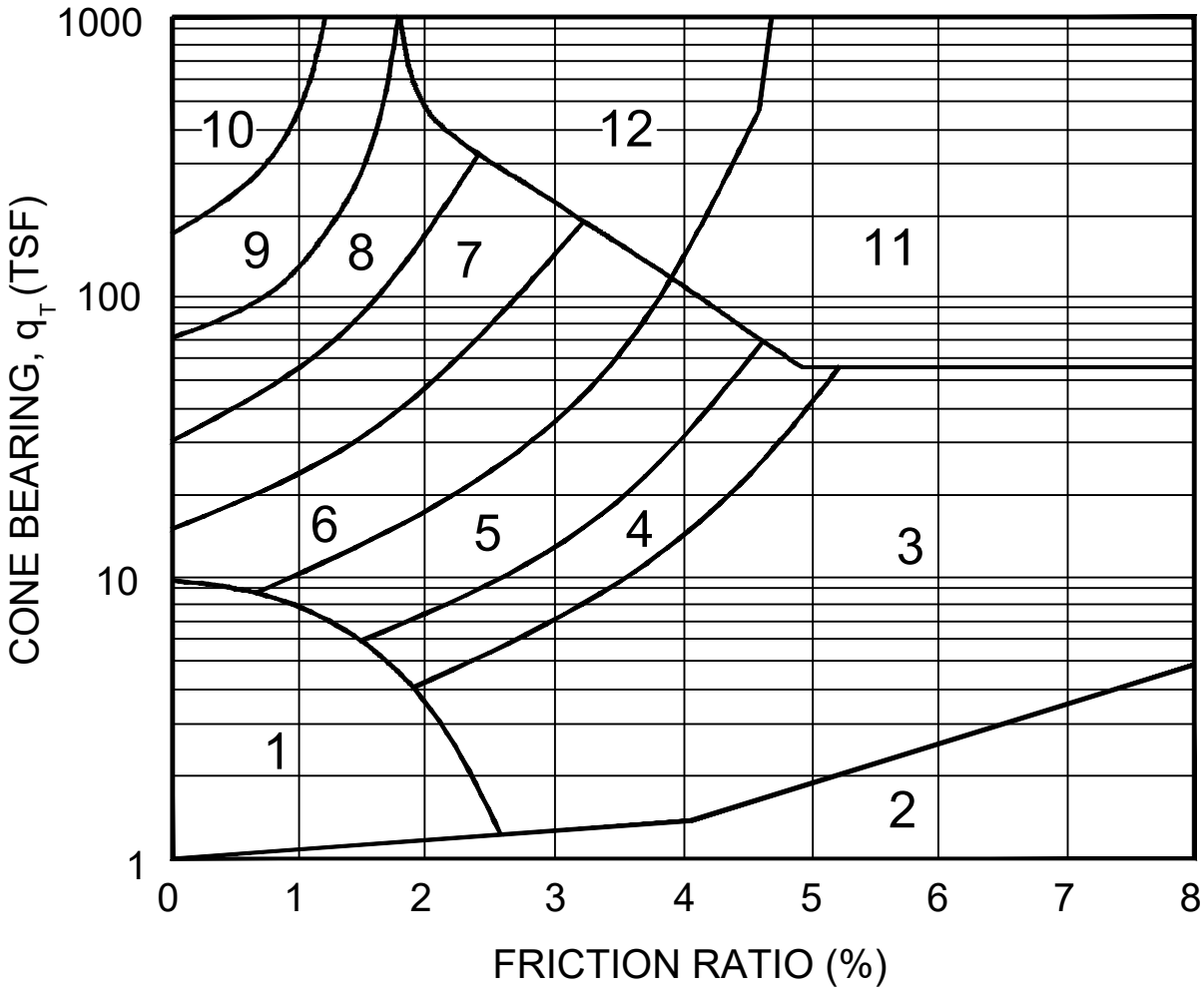
CONE PENETROMETER

The Village at Novato
7514 Redwood Boulevard
Novato, California

Project No. 2504.001 Date: 6/28/2017

Drawn MFJ
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A-1
FIGURE



Zone:	Qc/N	Soil Behavior Type:
1)	2	Sensitive Fine Grained
2)	1	Organic Material
3)	1	Clay
4)	1.5	Silty Clay to Clay
5)	2	Clayey Silt to Silty Clay
6)	2.5	Sandy Silt to Clayey Silt
7)	3	Silty Sand to Sandy Silt
8)	4	Sand to Silty Sand
9)	5	Sand
10)	6	Gravelly Sand to Sand
11)	1	Very Stiff Fine Grained (*)
12)	2	Sand to Clayey Sand (*)

(*) Overconsolidated or Cemented

Reference: Robertson, P.K. (1986), "In-Situ Testing and Its Application to Geotechnical Engineering," Canadian Geotechnical Journal, Vol. 23; No. 23; No. 4, pp. 573-594

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CPT SOIL INTERPRETATION CHART

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Project No. 2504.001 Date: 6/28/2017

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A-2
FIGURE

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CPT-1 PLOT

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A-3
FIGURE

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CPT-2 PLOT

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A-4
FIGURE

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CPT-3 PLOT

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A-5
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CPT-4 PLOT

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A-6
FIGURE

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CPT-5 PLOT

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A-7
FIGURE

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CPT-6 PLOT

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Project No. 2504.001 Date: 6/28/2017

Drawn MFJ
Checked

A-8
FIGURE

Other Laboratory Tests	Pocket Penetrometer (ksf)	Moisture Content (%)	Dry Density (pcf)	% Passing #200 sieve	Blows/Foot * Sample	DEPTH (FEET)	
						0	ORANGE-BROWN GRAVELLY SILT (ML), medium stiff, moist (Fill)
		12.7	119		19	1	ORANGE-BROWN SILTY GRAVEL (GM), medium dense, moist (Fill)
						2	DARK ORANGE-BROWN GRAVELLY CLAY (CL), medium stiff, moist (Fill)
						3	
						4	MOTTLED ORANGE-GRAY-BROWN SILTY SAND (SM), medium dense, moist to wet
		15.6	116		9	5	
						6	free water stabilized at 6.5 feet
						7	MOTTLED GRAY-BROWN SANDY CLAY (CL), medium stiff, saturated
		20.8	108		14	8	
						9	
						10	
						11	gravels encountered below 11.5 feet
						12	
						13	ORANGE-BROWN CLAYEY GRAVEL (GC), loose to medium dense, saturated
						14	
		24.1	101		8	15	GRAY-ORANGE-CLAYEY SAND (SC), loose, saturated
						16	
						17	
						18	
						19	ORANGE-GRAY-BROWN CLAYEY SAND WITH GRAVEL (SC), loose, saturated
22.3% Retained on #4 sieve				18.0	9	20	
							BOTTOM OF BORING 1 @ 20.5 FEET

EQUIPMENT: 4" Flight Auger
LOGGED BY: G.M.
ELEVATION: **
START DATE: 6-10-05
FINISH DATE: 6-10-05

* Converted to equivalent standard penetration blow counts.
** Existing ground surface at time of drilling.

HERZOG GEOTECHNICAL CONSULTING ENGINEERS

Job No: 1158-01-05
Appr:
Drwn: LPDD
Date: JUL 2005

LOG OF BORING 1A

7514-7518 Redwood Blvd.
Novato, California

PLATE 2

EQUIPMENT: 4" Flight Auger
LOGGED BY: G.M.
ELEVATION: **
START DATE: 6-10-05
FINISH DATE: 6-10-05

Other Laboratory Tests	Pocket Penetrometer (ksf)	Moisture Content (%)	Dry Density (pcf)	% Passing #200 sieve	Blows/Foot * Sample	DEPTH (FEET)	
						0	3" ASPHALT CONCRETE
						1	BROWN CLAYEY GRAVEL (GC), medium dense, moist (Baserock Fill)
TxUU, see Plate 8		14.1	118		16	2	ORANGE-BROWN GRAVELLY CLAY (CL), medium stiff, moist (Fill)
						3	
						4	
TxUU, see Plate 9		14.8	116		8	5	
						6	BLACK SANDY SILT (ML), soft to medium stiff, moist (Old Topsoil)
						7	▼ free water stabilized at 7 feet
						8	MOTTLED ORANGE-BLUE-GRAY SANDY CLAY (CH), medium stiff to stiff, saturated
						9	
TxUU, see Plate 10		18.7	112		18	10	
						11	
						12	
						13	MOTTLED ORANGE-GRAY-CLAYEY SAND (SC), loose, saturated
					8	14	
				34.9		15	
						16	
						17	MOTTLED ORANGE-GRAY SANDY CLAY (CL), soft, saturated
						18	
					9	19	
		27.1				20	
							BOTTOM OF BORING 2 @ 20.5 FEET

* Converted to equivalent standard penetration blow counts.
** Existing ground surface at time of drilling.

HERZOG GEOTECHNICAL CONSULTING ENGINEERS

Job No: 1158-01-05
Appr:
Drwn: LPDD
Date: JUL 2005

LOG OF BORING 2A

7514-7518 Redwood Blvd.
Novato, California

PLATE 3

EQUIPMENT: 4" Flight Auger
LOGGED BY: G.M.
ELEVATION: **
START DATE: 6-10-05
FINISH DATE: 6-10-05

Other Laboratory Tests	Pocket Penetrometer (ksf)	Moisture Content (%)	Dry Density (pcf)	% Passing #200 sieve	Blows/Foot *	Sample	DEPTH (FEET)	
R-value, see Plate 11					Bulk		0	DARK BROWN SANDY SILT (ML), soft, moist (Fill)
							1	BROWN CLAYEY GRAVEL (GC), loose to medium dense, moist (Fill)
		14.1	115		8		2	
		33.1	74		12		3	BLACK SANDY CLAY (CH), medium stiff, moist (Old Topsoil)
							4	
							5	ORANGE-GRAY SANDY CLAY (CH), soft to medium stiff, moist
		23.3	101		8		6	

BOTTOM OF BORING 3 @ 6.5 FEET
No Free Water Encountered

* Converted to equivalent standard penetration blow counts.
** Existing ground surface at time of drilling.

HERZOG GEOTECHNICAL CONSULTING ENGINEERS

Job No: 1158-01-05
Appr:
Drwn: LPDD
Date: JUN 2005

LOG OF BORING 3A

7514-7518 Redwood Blvd.
Novato, California

PLATE 4

Other Laboratory Tests	Pocket Penetrometer (ksf)	Moisture Content (%)	Dry Density (pcf)	% Passing #200 sieve	Blows/Foot *	Sample	DEPTH (FEET)	
							0	GRAY SILTY GRAVEL (GM), loose, dry to moist (Fill)
							1	YELLOW-BROWN SANDY SILT (ML), medium stiff, moist (Fill)
		6.2	127		15		2	BROWN SILTY GRAVEL (GM), medium dense, moist (Fill)
							3	
		17.7	107		12		4	BLACK SANDY CLAY (CL), medium stiff, moist (Old Topsoil)
							5	YELLOW-GRAY-BROWN SANDY CLAY (CH), stiff, moist
		20.9	109		15		6	

EQUIPMENT: 4" Flight Auger
LOGGED BY: G.M.
ELEVATION: **
START DATE: 6-10-05
FINISH DATE: 6-10-05

BOTTOM OF BORING 4 @ 6.5 FEET
No Free Water Encountered

* Converted to equivalent standard penetration blow counts.
** Existing ground surface at time of drilling.

HERZOG GEOTECHNICAL CONSULTING ENGINEERS

Job No: 1158-01-05
Appr: CH
Drwn: LPDD
Date: JUN 2005

LOG OF BORING 4A

7514-7518 Redwood Blvd.

Novato, California

PLATE 5

Other Laboratory Tests	Pocket Penetrometer (ksf)	Moisture Content (%)	Dry Density (pcf)	% Passing #200 sieve	Blows/Foot *	Sample	DEPTH (FEET)	
							0	BROWN SANDY SILT (ML), soft to medium stiff, moist, with gravels (Fill)
		14.6	107		8		1	DARK BROWN SANDY SILT (ML), soft to medium stiff, moist (Old Topsoil)
		15.8	115		9		2	YELLOW-GRAY CLAYEY SAND (SC), loose to medium dense, moist
		20.5	107		20		3	BROWN SANDY CLAY (CL), stiff, wet
							4	BOTTOM OF BORING 5 @ 6.5 FEET No Free Water Encountered
							5	
							6	

EQUIPMENT: 4" Flight Auger
LOGGED BY: G.M.
ELEVATION: **
START DATE: 6-10-05
FINISH DATE: 6-10-05

* Converted to equivalent standard penetration blow counts.
** Existing ground surface at time of drilling.

HERZOG GEOTECHNICAL CONSULTING ENGINEERS

Job No: 1158-01-05
Appr:
Drwn: LPDD
Date: JUN 2005

LOG OF BORING 5A

7514-7518 Redwood Blvd.

Novato, California

PLATE 6

MAJOR DIVISIONS					TYPICAL NAMES
COARSE GRAINED SOILS More than Half > #200 sieve	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW		WELL GRADED GRAVELS, GRAVEL-SAND
			GP		POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES
		GRAVELS WITH OVER 12% FINES	GM		SILTY GRAVELS, POORLY GRADED GRAVEL-SAND-SILT MIXTURES
			GC		CLAYEY GRAVELS, POORLY GRADED GRAVEL-SAND-CLAY MIXTURES
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS WITH LITTLE OR NO FINES	SW		WELL GRADED SANDS, GRAVELLY SANDS
			SP		POORLY GRADED SANDS, GRAVELLY SANDS
		SANDS WITH OVER 12% FINES	SM		SILTY SANDS, POOORLY GRADED SAND-SILT MIXTURES
			SC		CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES
FINE GRAINED SOILS More than Half < #200 sieve	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML		INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS, OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL		INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL		ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH		INORGANIC SILTS, MICACEOUS OR DIATOMACIOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH		INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH		ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			Pt		PEAT AND OTHER HIGHLY ORGANIC SOILS

UNIFIED SOIL CLASSIFICATION SYSTEM

			Shear Strength, psf / Confining Pressure, psf	
Consol	Consolidation	Tx	2630 (240)	Unconsolidated Undrained Triaxial
LL	Liquid Limit (in %)	Tx sat	2100 (575)	Unconsolidated Undrained Triaxial, saturated prior to test
PL	Plastic Limit (in %)	DS	3740 (960)	Unconsolidated Undrained Direct Shear
PI	Plasticity Index	TV	1320	Torvane Shear
Gs	Specific Gravity	UC	4200	Unconfined Compression
SA	Sieve Analysis	LVS	500	Laboratory Vane Shear
■	Undisturbed Sample (2.5-inch ID)	FS	Free Swell	
◪	2-inch-ID Sample	EI	Expansion Index	
◪	Standard Penetration Test	Perm	Permeability	
⊠	Bulk Sample	SE	Sand Equivalent	

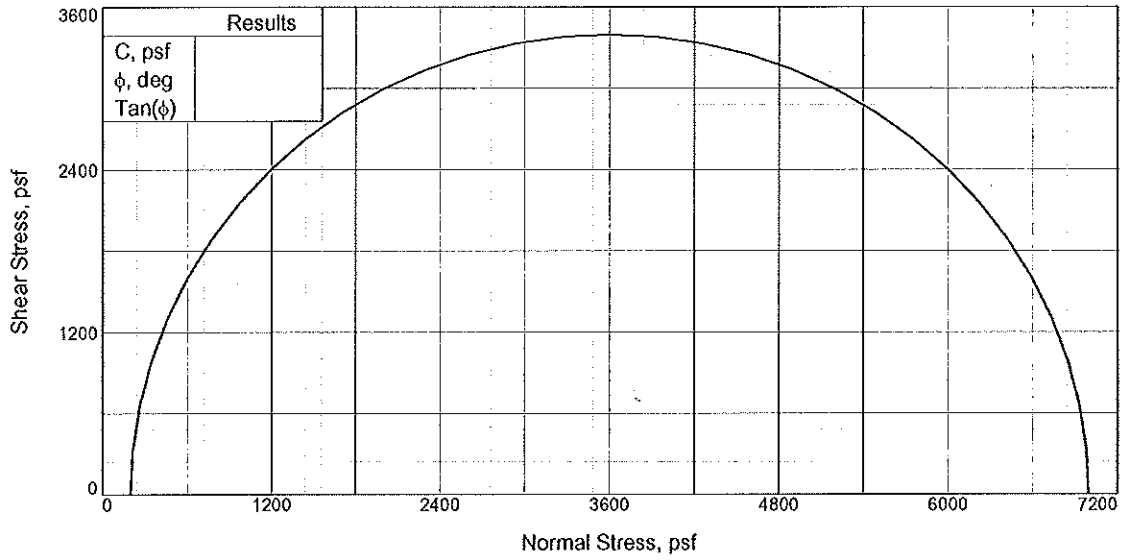
KEY TO TEST DATA

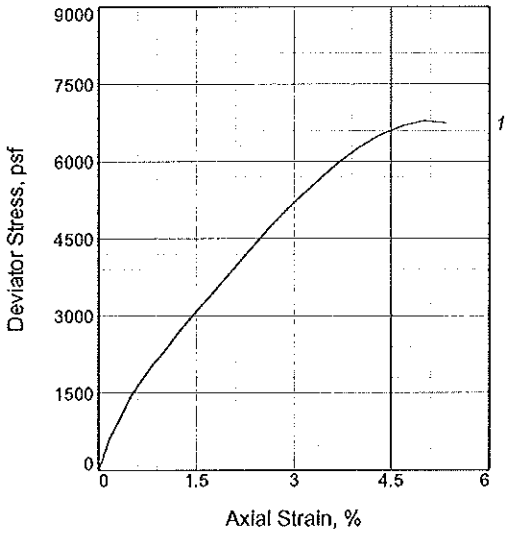
HERZOG GEOTECHNICAL CONSULTING ENGINEERS

Job No: 1158-01-05
Appr:
Drwn: LPDD
Date: JUN 2005

SOIL CLASSIFICATION CHART AND KEY TO TEST DATA
7514-7518 Redwood Blvd.
Novato, California

PLATE 7





Sample No.		1
Initial	Water Content,	14.1
	Dry Density, pcf	118.5
	Saturation,	90.1
	Void Ratio	0.4224
	Diameter, in.	2.43
	Height, in.	6.00
At Test	Water Content,	14.1
	Dry Density, pcf	118.5
	Saturation,	90.1
	Void Ratio	0.4224
	Diameter, in.	2.43
	Height, in.	6.00
Strain rate, in./min.		0.08
Back Pressure, psf		0.0
Cell Pressure, psf		200.2
Fail. Stress, psf		6793.3
Strain, %		5.0
Ult. Stress, psf		
Strain, %		
σ_1 Failure, psf		6993.4
σ_3 Failure, psf		200.2

Type of Test:
Unconsolidated Undrained

Sample Type: Undisturbed

Assumed Specific Gravity= 2.70

Boring No. B-2

Depth: 1.5'

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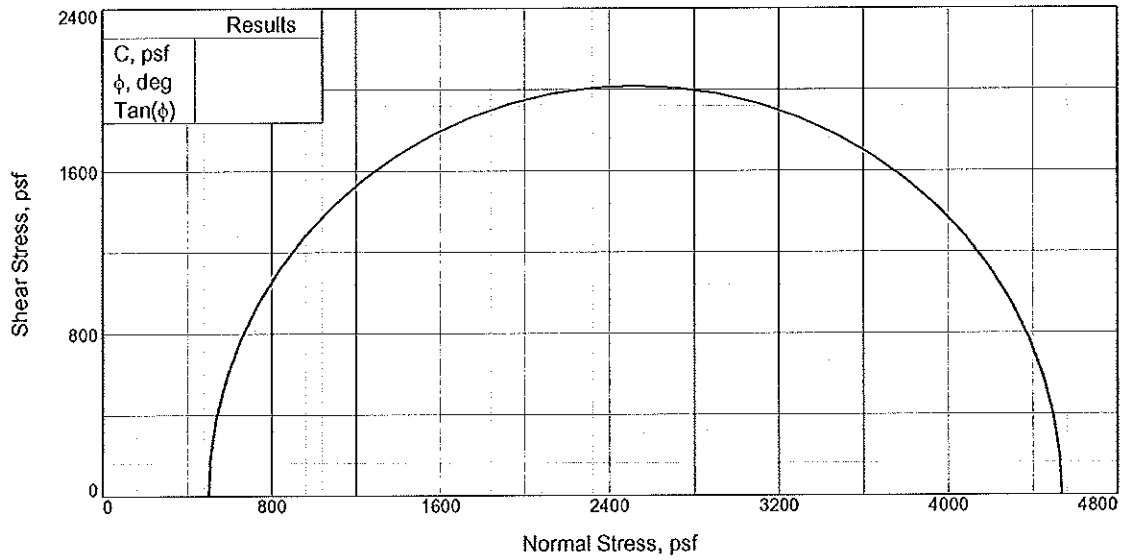
Job. No: 1158-01-05
Appr:
Drwn: LPDD
Date: JUN 2005

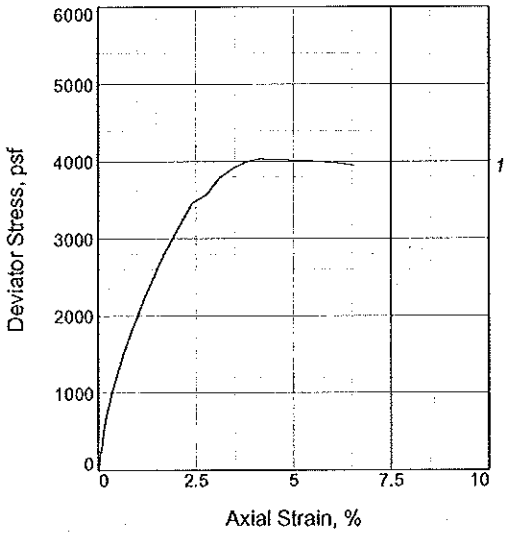
STRENGTH TEST DATA

7514-7518 Redwood Blvd.

Novato, California

PLATE 8





Sample No.		1
Initial	Water Content,	14.8
	Dry Density, pcf	116.3
	Saturation,	89.1
	Void Ratio	0.4497
	Diameter, in.	2.42
	Height, in.	5.80
At Test	Water Content,	14.8
	Dry Density, pcf	116.3
	Saturation,	89.1
	Void Ratio	0.4497
	Diameter, in.	2.42
	Height, in.	5.80
Strain rate, in./min.		0.08
Back Pressure, psf		0.0
Cell Pressure, psf		499.7
Fail. Stress, psf		4035.8
Strain, %		4.1
Ult. Stress, psf		
Strain, %		
σ_1 Failure, psf		4535.5
σ_3 Failure, psf		499.7

Type of Test:
Unconsolidated Undrained

Sample Type: Undisturbed

Assumed Specific Gravity= 2.70

Boring No. B-2

Depth: 4.5'

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CONSULTING ENGINEERS

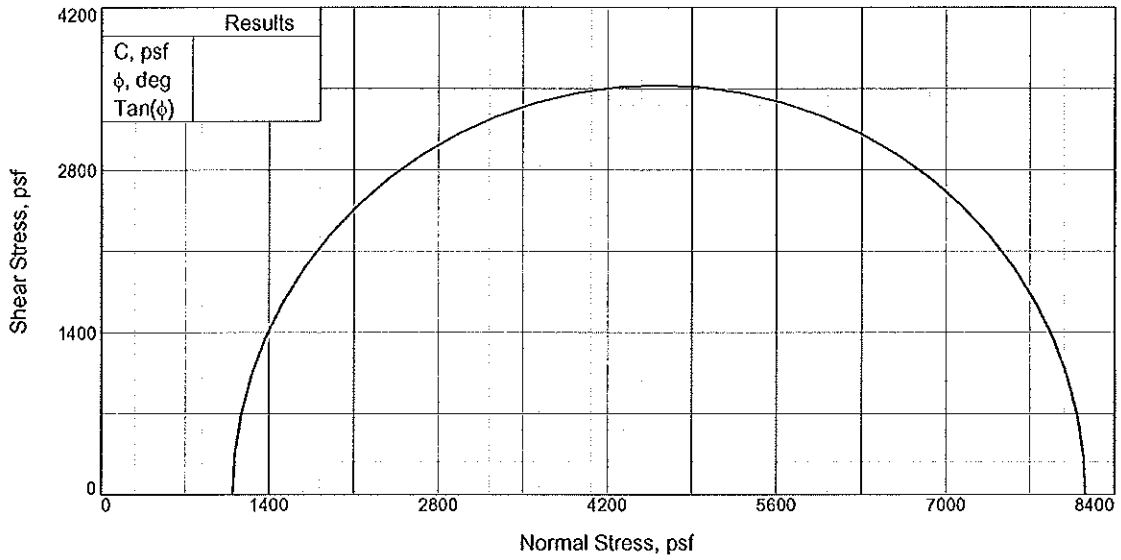
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Appr:
Drwn: LPDD
Date: JUN 2005

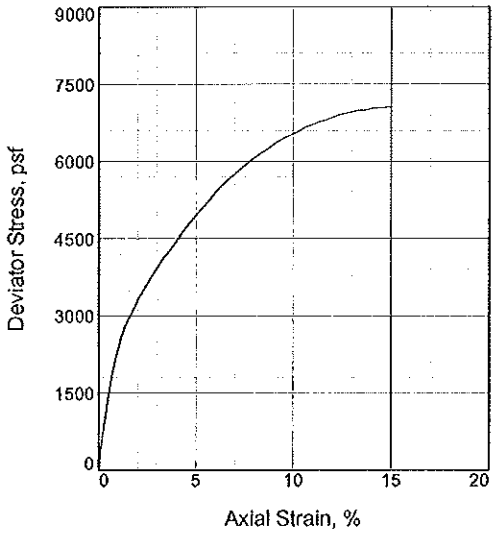
STRENGTH TEST DATA

7514-7518 Redwood Blvd.

Novato, California

PLATE 9





Sample No.		1
Initial	Water Content,	18.7
	Dry Density, pcf	111.6
	Saturation,	99.0
	Void Ratio	0.5107
	Diameter, in.	2.42
	Height, in.	6.00
At Test	Water Content,	18.7
	Dry Density, pcf	111.6
	Saturation,	99.0
	Void Ratio	0.5107
	Diameter, in.	2.42
	Height, in.	6.00
Strain rate, in./min.		0.08
Back Pressure, psf		0.0
Cell Pressure, psf		1100.2
Fail. Stress, psf		7059.7
Strain, %		15.0
Ult. Stress, psf		
Strain, %		
σ_1 Failure, psf		8159.8
σ_3 Failure, psf		1100.2

Type of Test:
Unconsolidated Undrained

Sample Type: Undisturbed

Assumed Specific Gravity= 2.70

Boring No. B-2

Depth: 9.25'

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Job. No: 1158-01-05
Appr:
Drwn: LPDD
Date: JUN 2005

STRENGTH TEST DATA

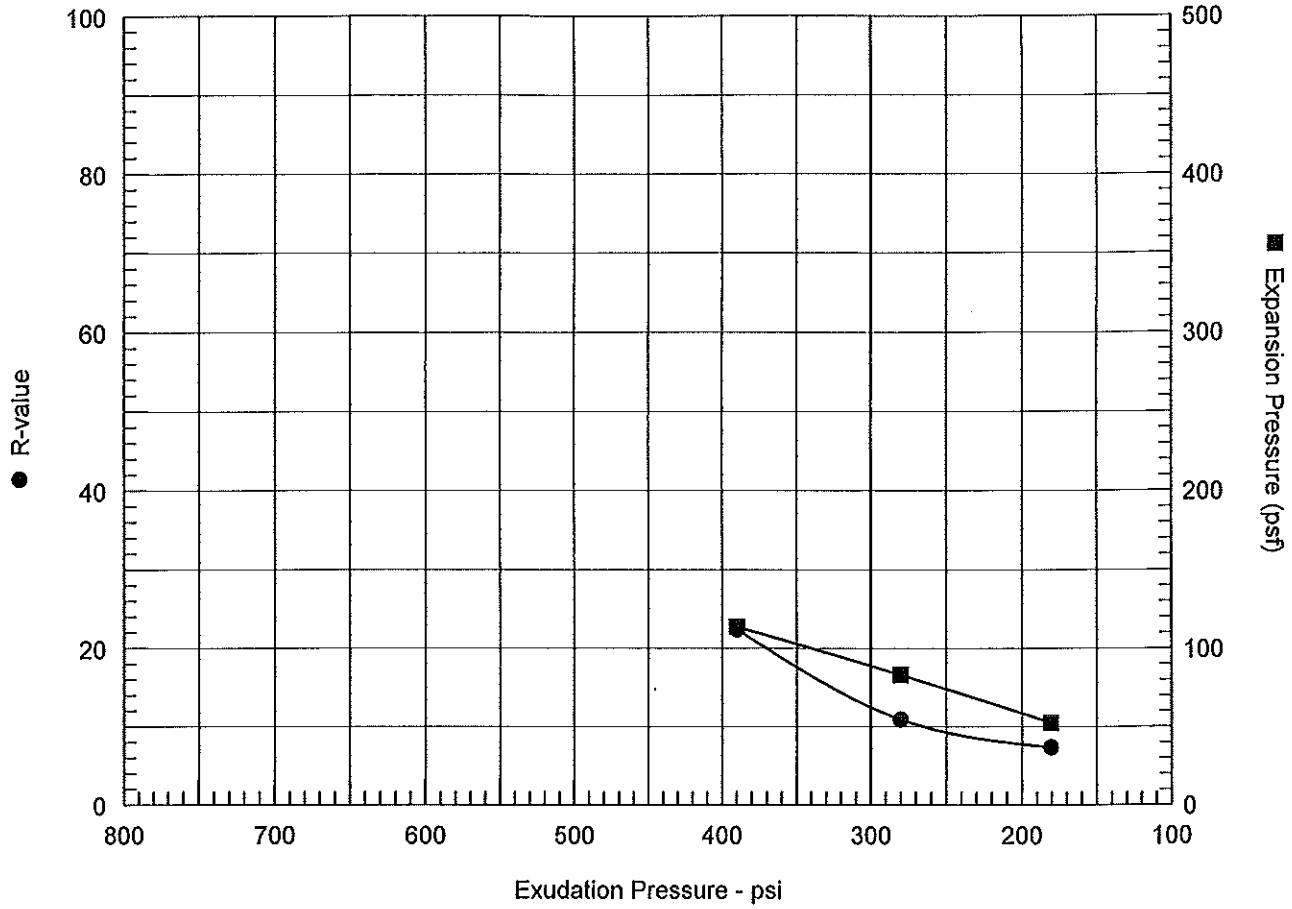
7514-7518 Redwood Blvd.

Novato, California

PLATE

10

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - Cal Test 301

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psf	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	225	120.8	13.8	114	114	2.52	390	22	22
2	155	116.0	15.9	83	136	2.52	280	11	11
3	75	115.3	15.5	52	142	2.54	181	7	7

Test Results	Material Description
R-value at 300 psi exudation pressure = 12 **Exp. pressure at 300 psi exudation pressure =** 89 psf	Brown Sandy Lean Clay W/Gravel (CL)

Project No.: 1158-01-05
Project: 7514-7518 Redwood Blvd.
Source of Sample: Bulk RV-3 **Depth:** 0.0-2.5'
Date: 6/15/2005

Tested by: GEF
Checked by: TMc
Remarks:

R-VALUE TEST REPORT

Plate 11

EQUIPMENT: Rotary Wash
LOGGED BY: G.M.
ELEVATION: **
START DATE: 8-27-02
FINISH DATE: 8-27-02

Other Laboratory Tests	Pocket Penetrometer (tsf)	Moisture Content (%)	Dry Density (pcf)	% Passing #200 sieve	Blows/Foot *	Sample	DEPTH (FEET)	
							0	LIGHT BROWN SILTY GRAVEL (GP), loose to medium dense, dry
		6.6	110		32/5"		1	RED-BROWN CLAYEY GRAVEL (GC), very dense, moist
							2	
							3	BROWN SANDY CLAY (CL), with gravel, stiff, moist
		10.8	114		30		4	ORANGE-BROWN SILTY SAND (SM), dense, moist, with gravel
							5	MOTTLED ORANGE-BROWN SANDY CLAY (CL), stiff, wet to saturated
		19.2	107		29		6	
							7	
							8	
							9	
							10	
Tx-UU, see Plate 11		24.0	105		25		11	
							12	
							13	
							14	
					10		15	becomes medium stiff at 15 feet
							16	
							17	
							18	GRAY SANDY CLAY (CH), soft to medium stiff, saturated
							19	
					14		20	
							21	ORANGE-BROWN GRAVELLY SAND (SP), dense, saturated
							22	
							23	
							24	
							25	
							26	
					37			

* Converted to equivalent standard penetration blow counts.
** Existing ground surface at time of drilling.

HERZOG GEOTECHNICAL CONSULTING ENGINEERS

Job No: 1158-01-02
Appr:
Drwn: LPDD
Date: APR 2004

LOG OF BORING 1

The Village at Novato

Novato, California

PLATE 2

EQUIPMENT: Rotary Wash
LOGGED BY: G.M.
ELEVATION: **
START DATE: 8-27-02
FINISH DATE: 8-27-02

Other Laboratory Tests	Pocket Penetrometer (tsf)	Moisture Content (%)	Dry Density (pcf)	% Passing #200 sieve	Blows/Foot *	Sample	DEPTH (FEET)	
							27	ORANGE-BROWN SANDY CLAY (CH), soft, saturated
					10		30	
				12	40		40	ORANGE-BROWN GRAVEL SAND (SP), dense, saturated
				24	35		45	BLUE-GRAY SILTY SAND WITH GRAVEL (SM), dense, saturated
					8		50	GRAY CLAYEY SILT (MH), soft to medium stiff, saturated
							51	BOTTOM OF BORING 1 @ 51.5 FEET Hole backfilled prior to groundwater stabilizing.

* Converted to equivalent standard penetration blow counts.
** Existing ground surface at time of drilling.

HERZOG GEOTECHNICAL CONSULTING ENGINEERS

Job No: 1158-01-02
Appr:
Drwn: LPDD
Date: APR 2004

LOG OF BORING 1

The Village at Novato

Novato, California

PLATE 3

EQUIPMENT: Rotary Wash | ELEVATION: **
LOGGED BY: G.M. | START DATE: 8-27-02
FINISH DATE: 8-27-02

Other Laboratory Tests	Pocket Penetrometer (tsf)	Moisture Content (%)	Dry Density (pcf)	% Passing #200 sieve	Blows/Foot *	Sample	DEPTH (FEET)	
							0	LIGHT BROWN SANDY SILT (ML), medium stiff, dry
		14.9	100		30		1–3	DARK BROWN SANDY CLAY (CH), very stiff, moist
LL=56, PI=35, Plate 15		21.6	98		17		3–5	ORANGE-GRAY BROWN SANDY CLAY (CH), stiff, wet
Tx-UU, see Plate 12		19.3	110		16		5–10	MOTTLED ORANGE GRAY-BROWN SANDY CLAY (CL), medium stiff to stiff, wet to saturated
				55	17		10–14	ORANGE-BROWN SANDY CLAY (CL), medium stiff, saturated
				40	2		14–17	DARK GRAY SILTY SAND (SM), loose, saturated
							17–20	GRAY SANDY CLAY (CL-CH), soft to medium stiff, moist
					45		20–22	ORANGE GRAVELLY SAND (SP), dense, saturated
					7		22–26	MOTTLED GRAY-BROWN CLAYEY SILT (MH), soft, saturated

* Converted to equivalent standard penetration blow counts.
** Existing ground surface at time of drilling.

HERZOG GEOTECHNICAL CONSULTING ENGINEERS

Job No: 1158-01-02
Appr:
Drwn: LPDD
Date: APR 2004

LOG OF BORING 2

The Village at Novato

Novato, California

PLATE 4

EQUIPMENT: **Rotary Wash** ELEVATION: **

LOGGED BY: **G.M.** START DATE: **8-27-02**

FINISH DATE: **8-27-02**

Other Laboratory Tests	Pocket Penetrometer (tsf)	Moisture Content (%)	Dry Density (pcf)	% Passing #200 sieve	Blows/Foot *	Sample	DEPTH (FEET)
							27
							28
							29
					12		30
							31
							32
							33
							34
							35
							36
							37
							38
							39
				61	18		40
							41
							42
							43
							44
							45
							46
							47
							48
							49
					22		50
							51

MOTTLED GRAY-BROWN SANDY SILT (ML), medium stiff, saturated

GRAY CLAYEY SILT (MH), medium stiff to stiff, saturated

BOTTOM OF BORING 2 @ 51.5 FEET
Hole backfilled prior to groundwater stabilizing.

* Converted to equivalent standard penetration blow counts.

** Existing ground surface at time of drilling.

HERZOG GEOTECHNICAL CONSULTING ENGINEERS

Job No: 1158-01-02

Appr:

Drwn: LPDD

Date: APR 2004

LOG OF BORING 2

The Village at Novato

Novato, California

PLATE 5

EQUIPMENT: Flight Auger
LOGGED BY: G.M.
ELEVATION: **
START DATE: 8-27-02
FINISH DATE: 8-27-02

Other Laboratory Tests	Pocket Penetrometer (tsf)	Moisture Content (%)	Dry Density (pcf)	% Passing #200 sieve	Blows/Foot *	Sample	DEPTH (FEET)	
							0	ORANGE-BROWN GRAVELLY CLAY (CL), soft, moist
		21.6	98		10		1	DARK GRAY SANDY CLAY (CH), medium stiff, moist
					6		2	ORANGE-BROWN SANDY CLAY (CH), soft, moist
							3	
							4	▽ groundwater encountered at 4 feet
							5	ORANGE-BROWN CLAYEY SAND (SC), loose to medium dense, saturated, with gravel
				15	19		6	
							7	ORANGE-BROWN SANDY GRAVEL (GP), medium dense, saturated
							8	
							9	ORANGE-BROWN SILTY SAND (SM), medium dense, saturated, with gravel
							10	
				22	24		11	
							12	
							13	
							14	
							15	BROWN CLAYEY SAND WITH GRAVEL (SC), dense, saturated
					45		16	BOTTOM OF BORING 3 @ 16 FEET

* Converted to equivalent standard penetration blow counts.
** Existing ground surface at time of drilling.

HERZOG GEOTECHNICAL CONSULTING ENGINEERS

Job No: 1158-01-02
Appr:
Drwn: LPDD
Date: APR 2004

LOG OF BORING 3

The Village at Novato

Novato, California

PLATE 6

EQUIPMENT: Flight Auger
LOGGED BY: G.M.
ELEVATION: **
START DATE: 8-27-02
FINISH DATE: 8-27-02

Other Laboratory Tests	Pocket Penetrometer (tsf)	Moisture Content (%)	Dry Density (pcf)	% Passing #200 sieve	Blows/Foot *	Sample	DEPTH (FEET)	
							0	LIGHT BROWN SANDY SILT (ML), medium stiff, dry, with gravels
		7.8	118		22		1	
							2	DARK BROWN SANDY CLAY, stiff, moist
Tx-UU, see Plate 13		14.0	114		21		3	
							4	
							5	
							6	ORANGE-GRAY BROWN SANDY CLAY (CH), medium stiff to stiff, moist
		15.1	117		31		7	
							8	ORANGE-BROWN CLAYEY GRAVEL (GC), dense, moist
							9	
							10	ORANGE-GRAY-BROWN CLAYEY GRAVEL WITH SAND (GC), medium dense to dense, saturated
		12.5	122		27		11	
							12	
							13	
							14	ORANGE-GRAY-BROWN SANDY GRAVEL (GP), medium dense, saturated
							15	
					23		16	

BOTTOM OF BORING 4 @ 16.5 FEET
Hole backfilled prior to groundwater stabilizing.

* Converted to equivalent standard penetration blow counts.
** Existing ground surface at time of drilling.

HERZOG GEOTECHNICAL CONSULTING ENGINEERS

Job No: 1158-01-02
Appr:
Drwn: LPDD
Date: APR 2004

LOG OF BORING 4

The Village at Novato

Novato, California

PLATE 7

EQUIPMENT: Flight Auger
LOGGED BY: G.M.
ELEVATION: **
START DATE: 8-27-02
FINISH DATE: 8-27-02

Other Laboratory Tests	Pocket Penetrometer (tsf)	Moisture Content (%)	Dry Density (pcf)	% Passing #200 sieve	Blows/Foot *	Sample	DEPTH (FEET)	
							0	LIGHT BROWN SANDY SILT (ML), soft, dry to moist
LL=59, PI=38, Plate 15					13		2	DARK BROWN SANDY CLAY (CH), medium stiff, moist
Tx-UU, see Plate 14		22.8	103		13		4	MOTTLED ORANGE-GRAY, DARK GRAY-BROWN SANDY CLAY (CH), medium stiff, moist
		13.5	117		27		7	ORANGE-LIGHT BROWN GRAY GRAVELLY CLAY (CL-CH), stiff, moist
		18.8	109		26		9	MOTTLED ORANGE-GRAY SANDY CLAY (CH), stiff, moist
							10	▽ free water encountered at 10 feet
								BOTTOM OF BORING 5 @ 10.5 FEET

* Converted to equivalent standard penetration blow counts.
** Existing ground surface at time of drilling.

HERZOG GEOTECHNICAL CONSULTING ENGINEERS

Job No: 1158-01-02
Appr:
Drwn: LPDD
Date: APR 2004

LOG OF BORING 5

The Village at Novato

Novato, California

PLATE 8

EQUIPMENT: Flight Auger
LOGGED BY: G.M.
ELEVATION: **
START DATE: 8-29-02
FINISH DATE: 8-29-02

Other Laboratory Tests	Pocket Penetrometer (tsf)	Moisture Content (%)	Dry Density (pcf)	% Passing #200 sieve	Blows/Foot *	Sample	DEPTH (FEET)	
							0	GRAY-BROWN SANDY GRAVEL (GP), medium dense, moist (Baserock)
		15.7	112		12		1	DARK BROWN SANDY SILT (CL), soft to medium stiff, moist
							2	
							3	
		14.0	114		13		4	ORANGE-BROWN GRAVELLY SAND WITH CLAY (SP), medium dense, moist
							5	ORANGE-BROWN GRAVELLY CLAY (CL), stiff, moist
		15.0	117		23		6	

BOTTOM OF BORING 6 @ 6.5 FEET
Hole backfilled prior to groundwater stabilizing.

* Converted to equivalent standard penetration blow counts.
** Existing ground surface at time of drilling.

HERZOG GEOTECHNICAL CONSULTING ENGINEERS

Job No: 1158-01-02
Appr:
Drwn: LPDD
Date: APR 2004

LOG OF BORING 6

The Village at Novato

Novato, California

PLATE 9

MAJOR DIVISIONS					TYPICAL NAMES
COARSE GRAINED SOILS More than Half > #200 sieve	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW		WELL GRADED GRAVELS, GRAVEL-SAND
			GP		POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES
		GRAVELS WITH OVER 12% FINES	GM		SILTY GRAVELS, POORLY GRADED GRAVEL-SAND-SILT MIXTURES
			GC		CLAYEY GRAVELS, POORLY GRADED GRAVEL-SAND-CLAY MIXTURES
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS WITH LITTLE OR NO FINES	SW		WELL GRADED SANDS, GRAVELLY SANDS
			SP		POORLY GRADED SANDS, GRAVELLY SANDS
		SANDS WITH OVER 12% FINES	SM		SILTY SANDS, POOORLY GRADED SAND-SILT MIXTURES
			SC		CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES
FINE GRAINED SOILS More than Half < #200 sieve	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML		INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS, OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL		INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL		ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH		INORGANIC SILTS, MICACEOUS OR DIATOMACIOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH		INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH		ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			Pt		PEAT AND OTHER HIGHLY ORGANIC SOILS

UNIFIED SOIL CLASSIFICATION SYSTEM

			Shear Strength, psf / Confining Pressure, psf	
Consol	Consolidation	Tx	2630 (240)	Unconsolidated Undrained Triaxial
LL	Liquid Limit (in %)	Tx sat	2100 (575)	Unconsolidated Undrained Triaxial, saturated prior to test
PL	Plastic Limit (in %)	DS	3740 (960)	Unconsolidated Undrained Direct Shear
PI	Plasticity Index	TV	1320	Torvane Shear
Gs	Specific Gravity	UC	4200	Unconfined Compression
SA	Sieve Analysis	LVS	500	Laboratory Vane Shear
■	Undisturbed Sample (2.5-inch ID)	FS	Free Swell	
◪	2-inch-ID Sample	EI	Expansion Index	
◧	Standard Penetration Test	Perm	Permeability	
☒	Bulk Sample	SE	Sand Equivalent	

KEY TO TEST DATA

HERZOG GEOTECHNICAL CONSULTING ENGINEERS

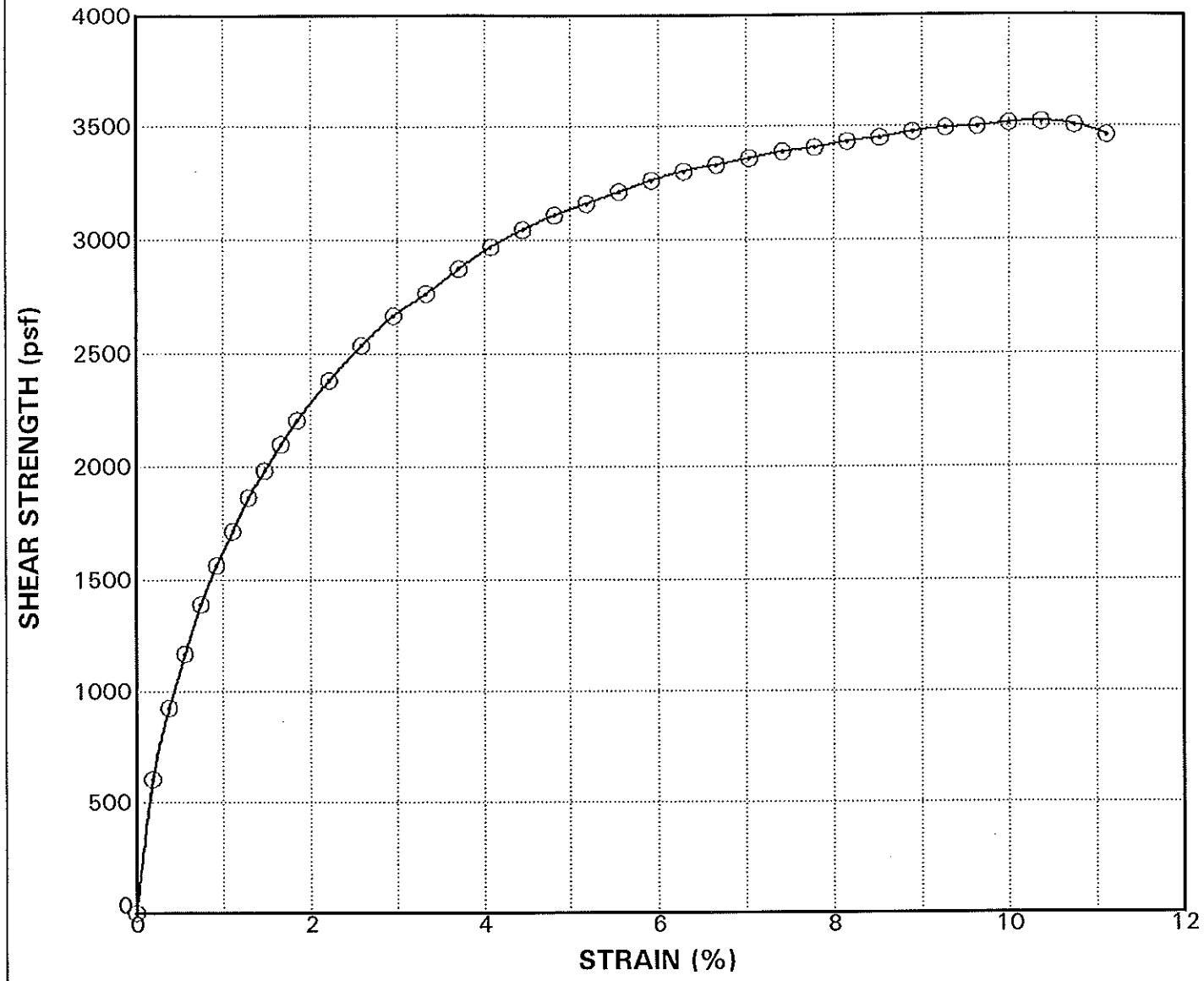
Job No: 1158-01-02
Appr:
Drwn: CD
Date: SEP 2002

SOIL CLASSIFICATION CHART AND KEY TO TEST DATA

The Village at Novato

Novato, California

PLATE 10



Sample Source	Classification	Type of Test	Confinement Pressure (psf)	Ultimate Strength (psf)	Strain (%)	Dry Density (pcf)	Moisture Content (%)
⊙ Bor. 1 @ 10.5'	Mottled Orange-Brown Sandy Clay (CL)	Tx-UU	1300	3517	10	105	24.0

UC = Unconfined Compression (ASTM D 2166)

TxUU = Unconsolidated Undrained Triaxial (ASTM D 2850)

HERZOG
GEOTECHNICAL
CONSULTING ENGINEERS

Job No: 1158-01-02

Appr:

Drwn: CD

Date: SEP 2002

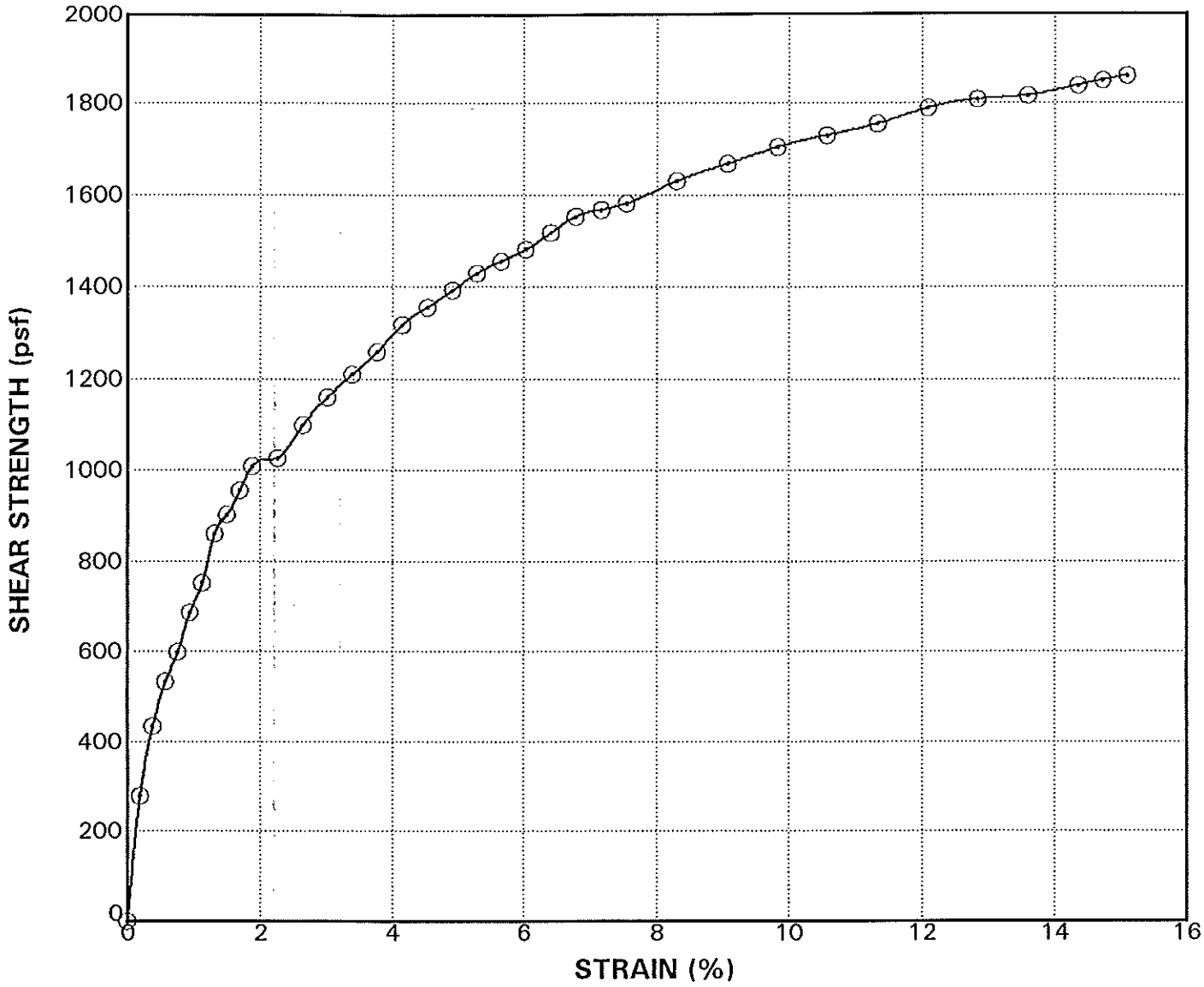
STRENGTH TEST DATA

The Village at Novato

Novato, California

PLATE

11



Sample Source	Classification	Type of Test	Confinement Pressure (psf)	Ultimate Strength (psf)	Strain (%)	Dry Density (pcf)	Moisture Content (%)
⊙ Bor. 2 @ 5.5'	Mottled Orange-Gray-Brown Sandy Clay (CL)	Tx-UU	700	1860	15	110	19.3

UC = Unconfined Compression (ASTM D 2166)

TxUU = Unconsolidated Undrained Triaxial (ASTM D 2850)

HERZOG
GEOTECHNICAL
CONSULTING ENGINEERS

Job No: 1158-01-02
Appr:
Drwn: CD
Date: SEP 2002

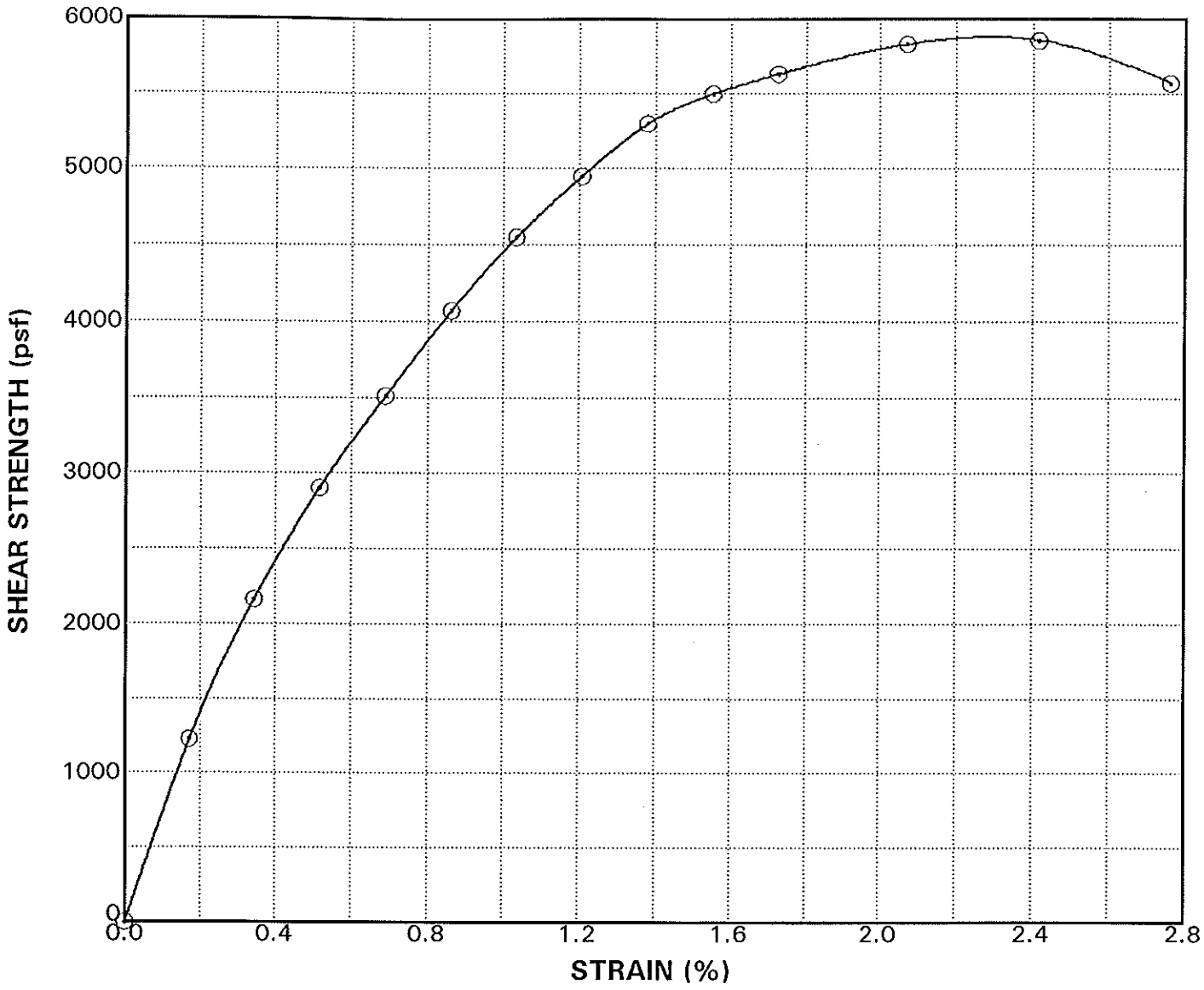
STRENGTH TEST DATA

The Village at Novato

Novato, California

PLATE

12



Sample Source	Classification	Type of Test	Confinement Pressure (psf)	Ultimate Strength (psf)	Strain (%)	Dry Density (pcf)	Moisture Content (%)
⊙ Bor. 4 @ 3.5'	Dark Brown Sandy Clay (CL)	Tx-UU	450	5847	2	114	14.0

UC = Unconfined Compression (ASTM D 2166)

TxUU = Unconsolidated Undrained Triaxial (ASTM D 2850)

HERZOG
GEOTECHNICAL
CONSULTING ENGINEERS

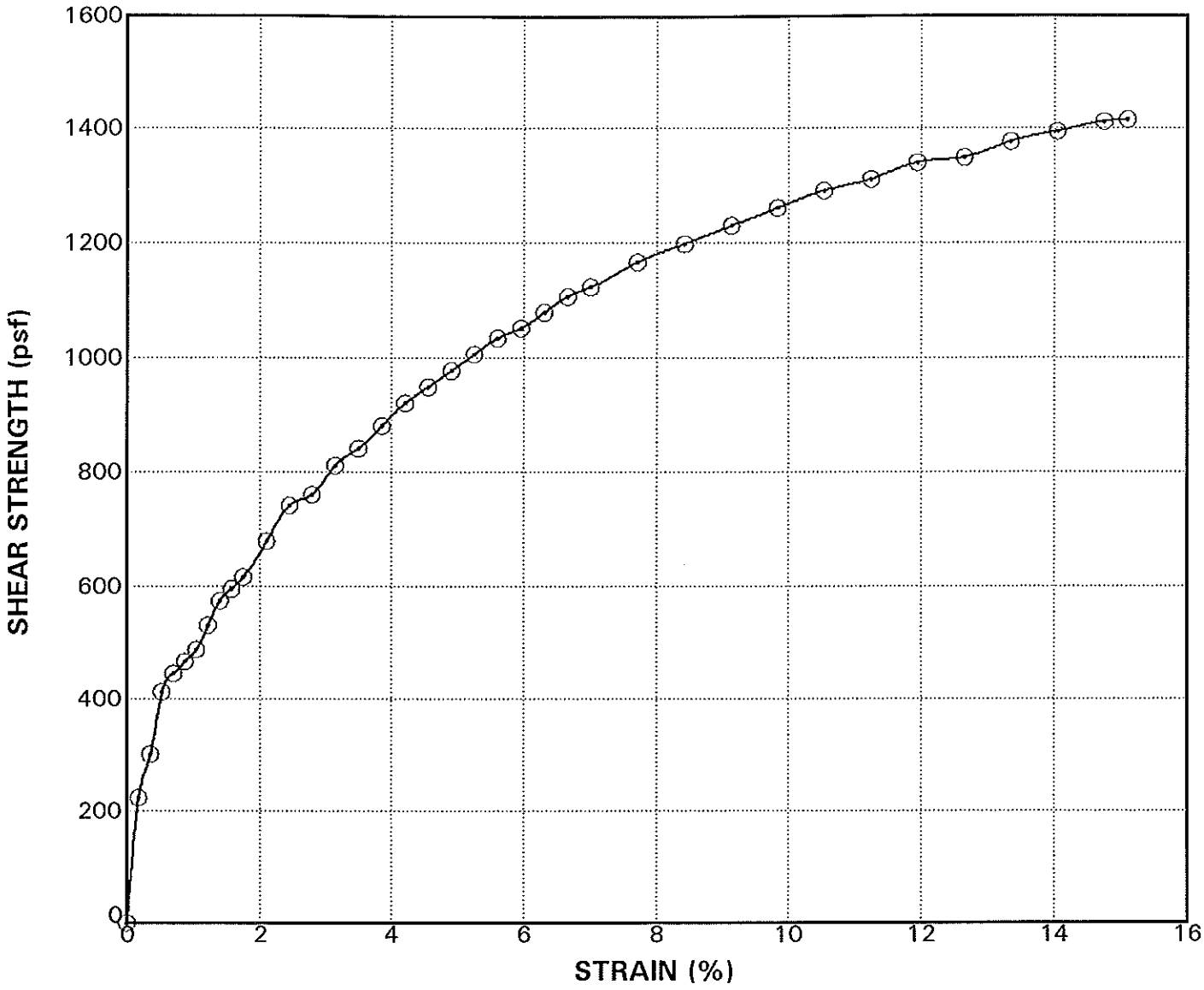
Job No: 1158-01-02
Appr:
Drwn: CD
Date: SEP 2002

STRENGTH TEST DATA

The Village at Novato

Novato, California

PLATE 13



Sample Source	Classification	Type of Test	Confinement Pressure (psf)	Ultimate Strength (psf)	Strain (%)	Dry Density (pcf)	Moisture Content (%)
⊙ Bor. 5 @ 3.8'	Mottled Orange-Gray, Dark Gray-Brown Sandy Clay (CH)	Tx-UU	475	1414	15	103	22.8

UC = Unconfined Compression (ASTM D 2166)

TxUU = Unconsolidated Undrained Triaxial (ASTM D 2850)

HERZOG
GEOTECHNICAL
CONSULTING ENGINEERS

Job No: 1158-01-02
Appr:
Drwn: CD
Date: SEP 2002

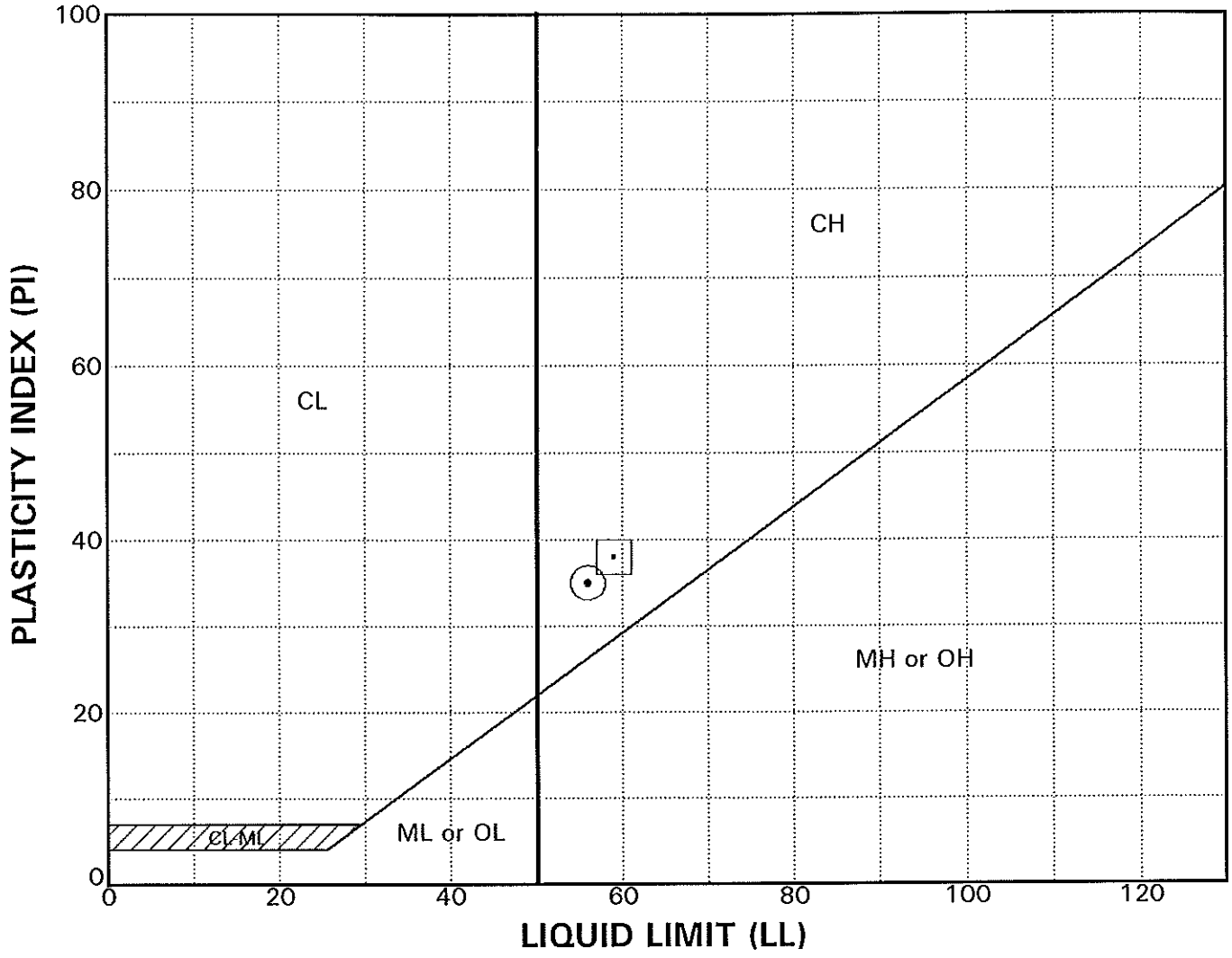
STRENGTH TEST DATA

The Village at Novato

Novato, California

PLATE

14



SAMPLE SOURCE	CLASSIFICATION	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX (%)	% PASSING #200 SIEVE
⊙ Boring 2 @ 3.5'	Orange-Gray Brown Sandy Clay (CH)	56	21	35	
⊡ Boring 5 @ 1.8'	Dark Brown Sandy Clay (CH)	59	21	38	

HERZOG
GEOTECHNICAL
CONSULTING ENGINEERS

Job No: 1158-01-02
Appr: CH
Drwn: CD
Date: SEP 2002

PLASTICITY CHART

The Village at Novato

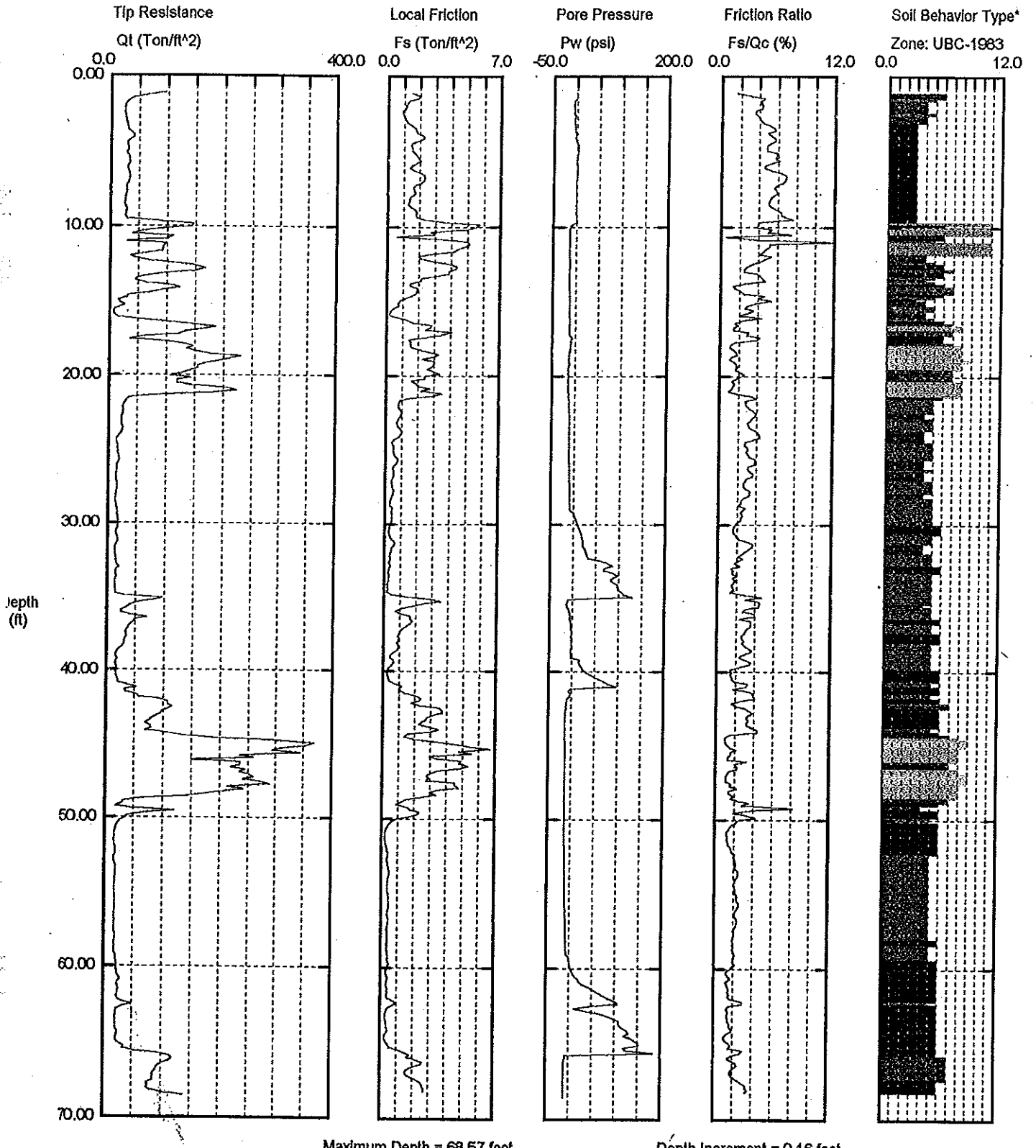
Novato, California

PLATE
15

Precision Sampling

Operator: C TATUM
Sounding: edc007
Cone Used: 465

CPT Date/Time: 02-06-01 09:07
Location: Haven Novato
Job Number: ec-4



Maximum Depth = 68.57 feet

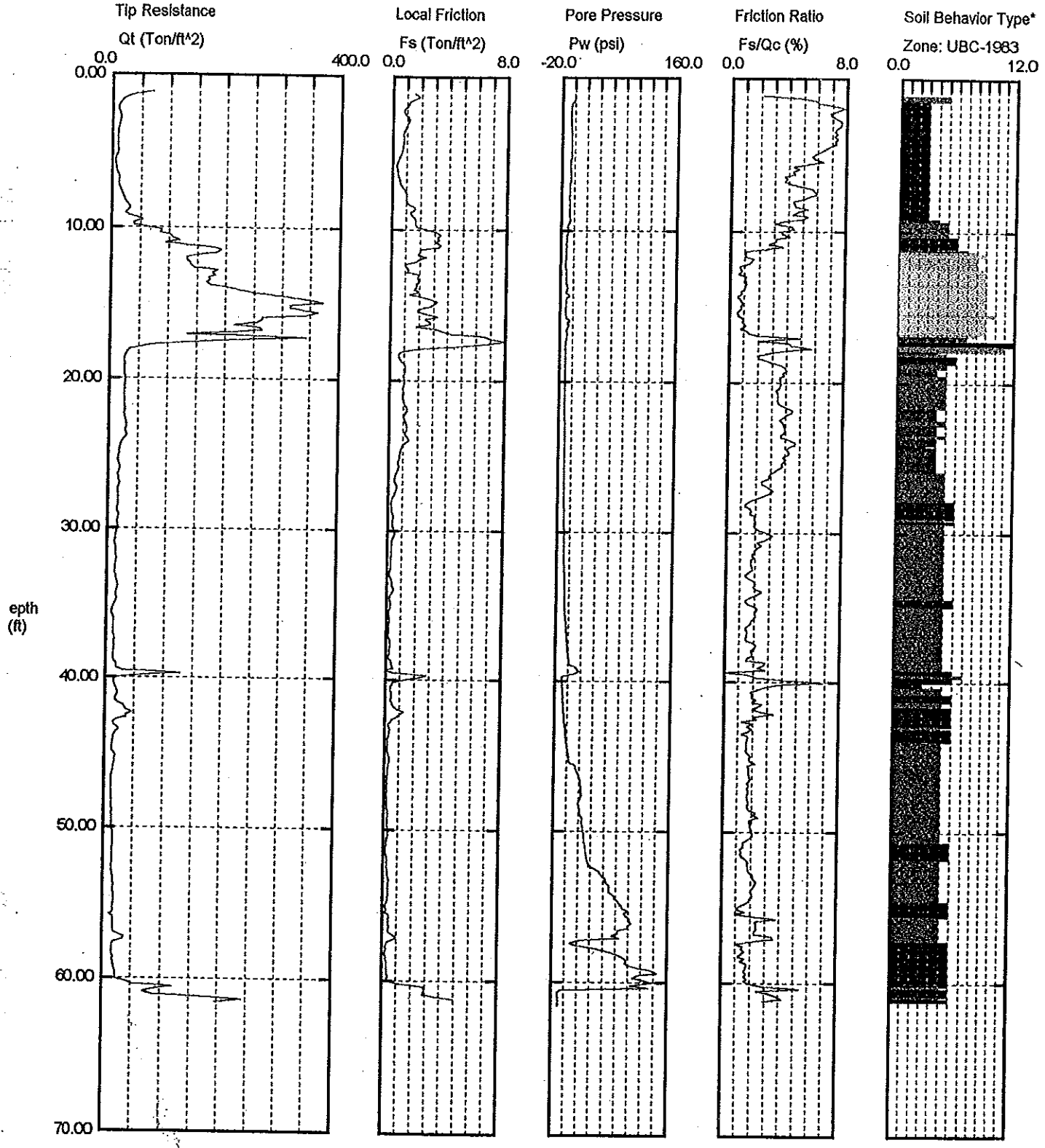
Depth Increment = 0.16 feet

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

Precision Sampling

Operator: C TATUM
Sounding: edc008
Cone Used: 465

CPT Date/Time: 02-06-01 12:02
Location: Haven Novato
Job Number: ec-5



Maximum Depth = 61.52 feet

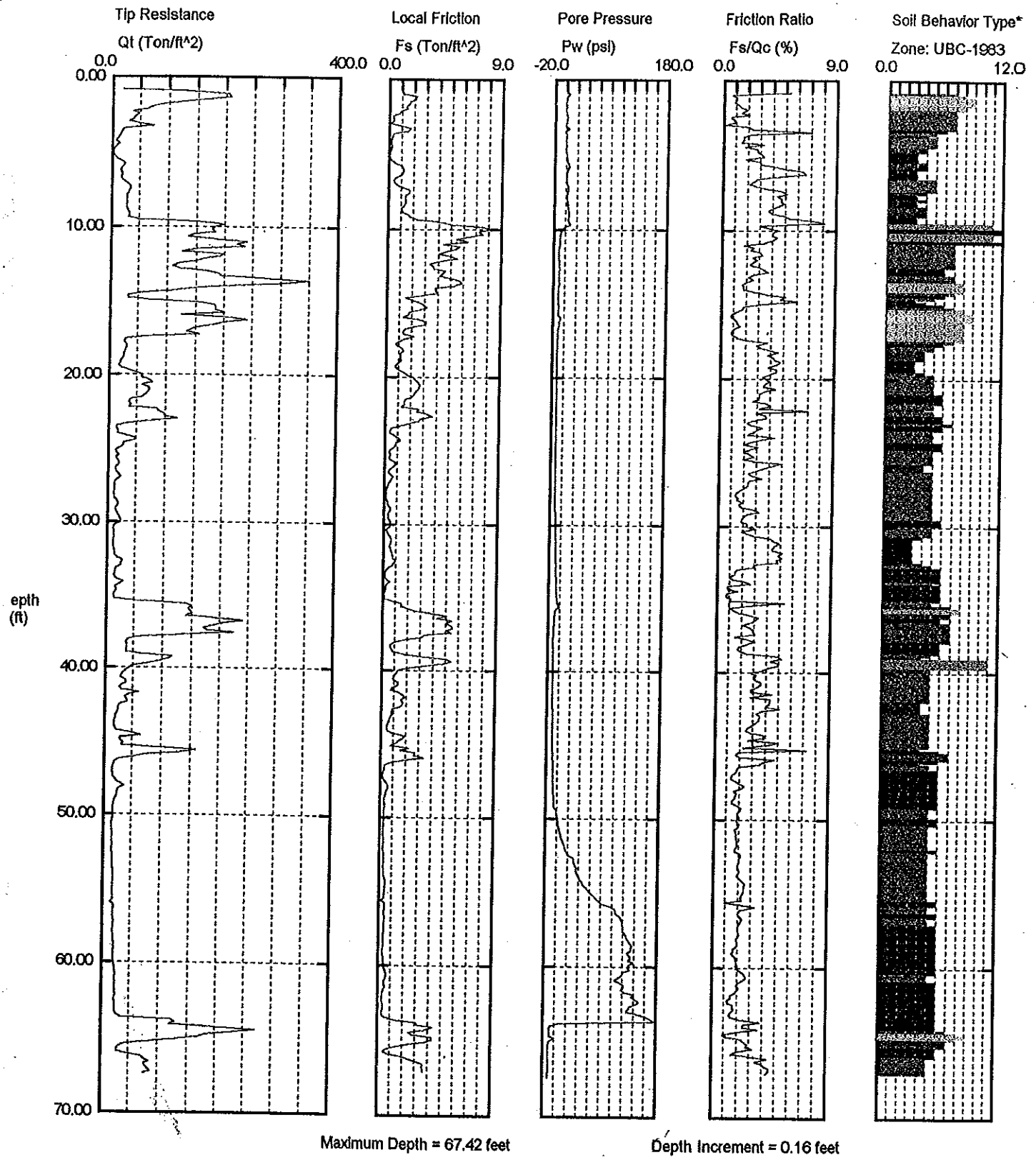
Depth Increment = 0.16 feet

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

Precision Sampling

Operator: C TATUM
Sounding: edc009
Cone Used: 465

CPT Date/Time: 02-06-01 15:10
Location: Haven Novato
Job Number: ec-6



Maximum Depth = 67.42 feet

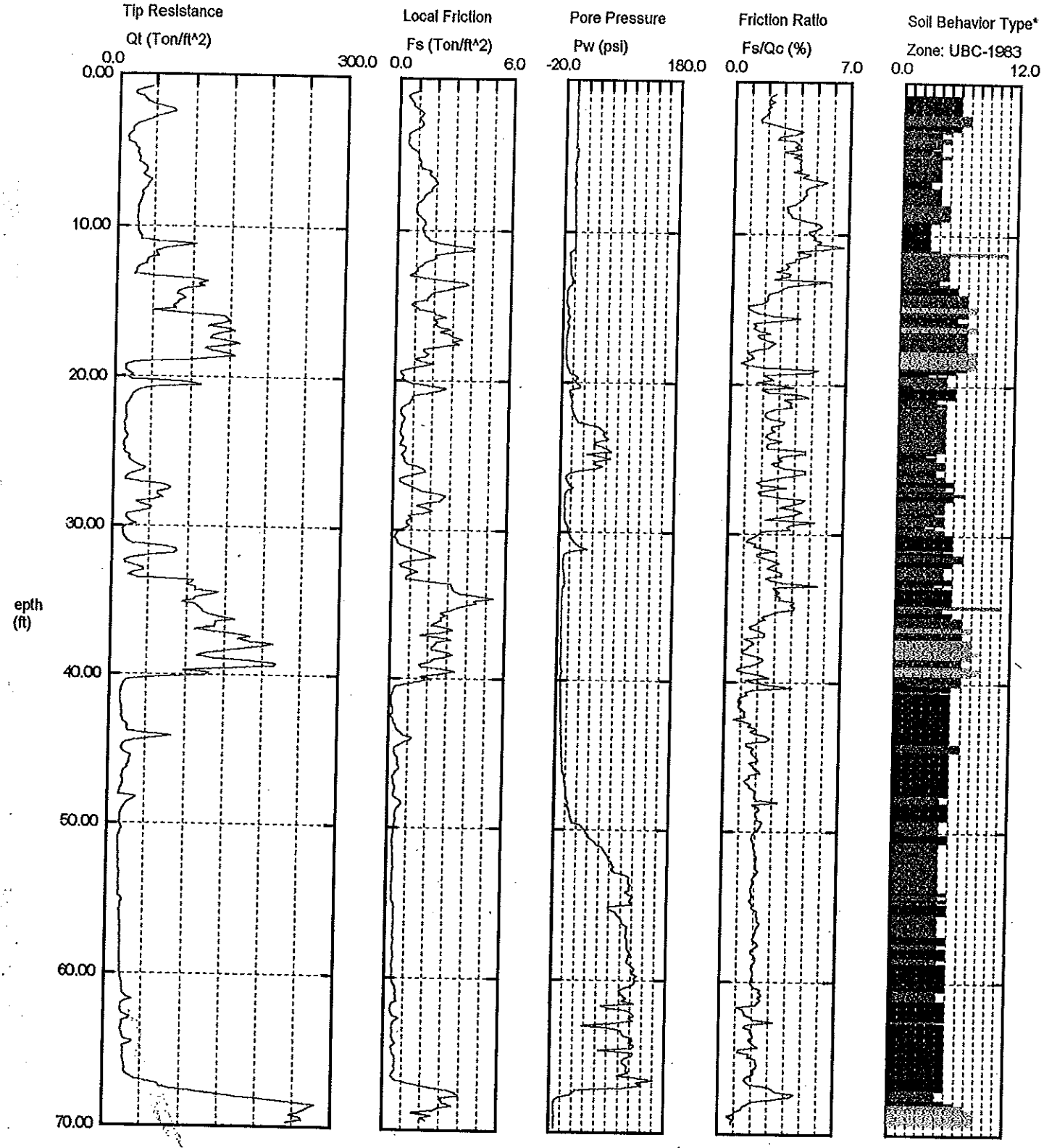
Depth Increment = 0.16 feet

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

Precision Sampling

Operator: C TATUM
Sounding: edc010
Cone Used: 465

CPT Date/Time: 02-07-01 10:35
Location: Haven Novato
Job Number: ec-7



Maximum Depth = 69.72 feet

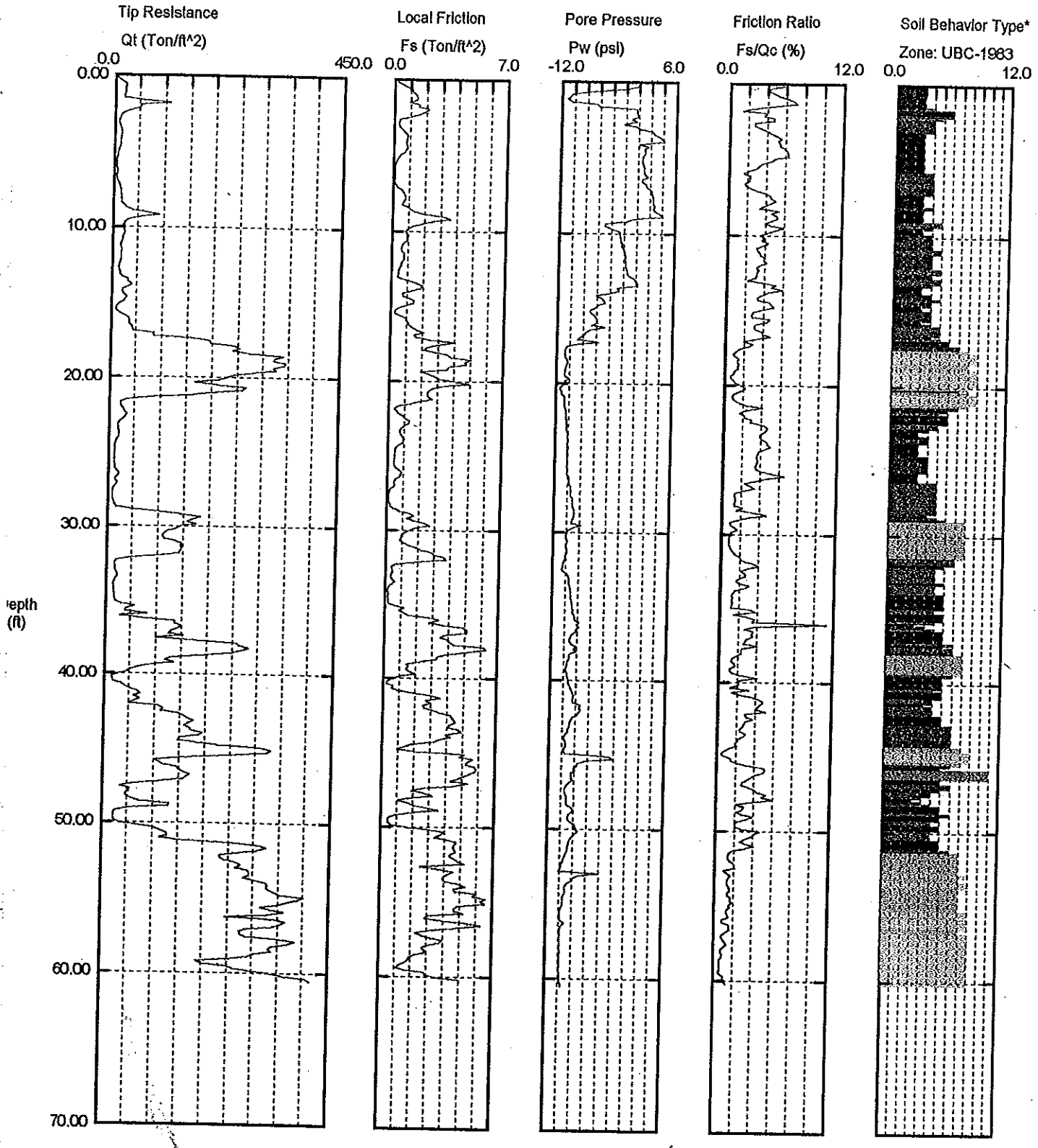
Depth Increment = 0.16 feet

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

Precision Sampling

Operator: C TATUM
Sounding: edc001
Cone Used: 465

CPT Date/Time: 01-30-01 12:40
Location: Haven Novato
Job Number: ec-9



Maximum Depth = 60.53 feet

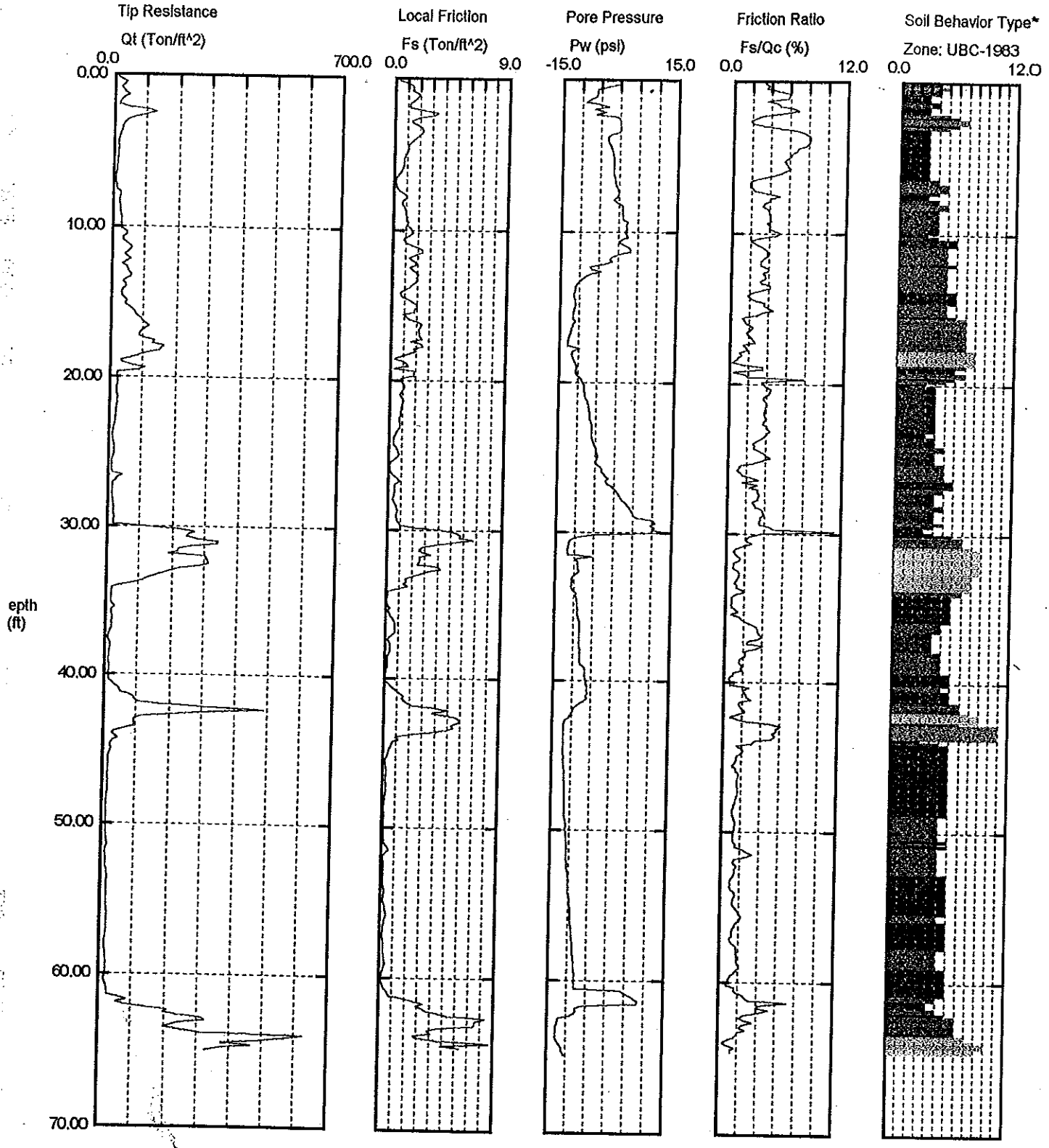
Depth Increment = 0.16 feet

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

Precision Sampling

Operator: C TATUM
Sounding: edc002
Cone Used: 465

CPT Date/Time: 01-31-01 09:16
Location: Haven Novato
Job Number: ec-10



Maximum Depth = 64.96 feet

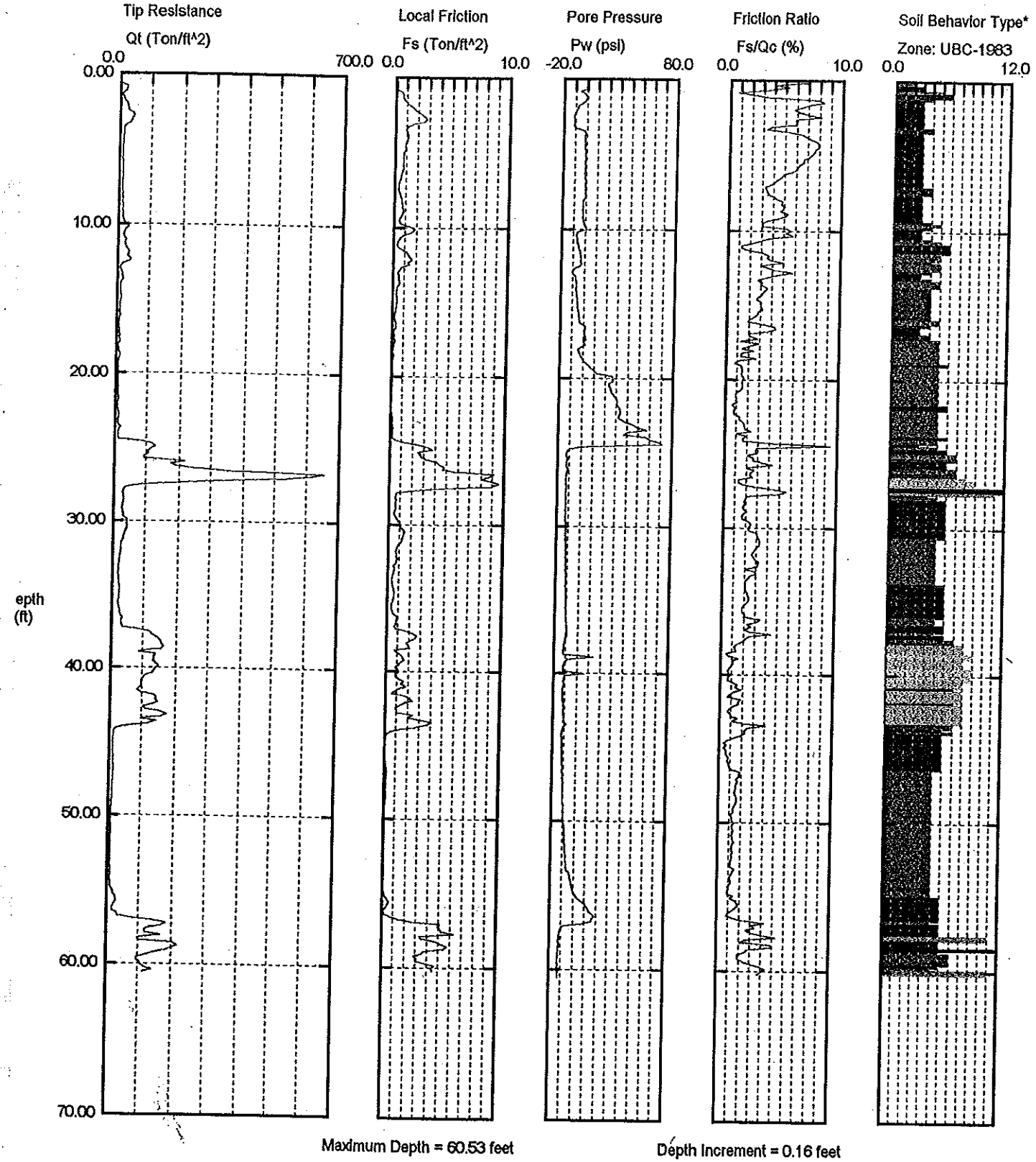
Depth Increment = 0.16 feet

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

Precision Sampling

Operator: C TATUM
Sounding: edc004
Cone Used: 465

CPT Date/Time: 02-01-01 09:13
Location: Haven Novato
Job Number: ec-11



Maximum Depth = 60.53 feet

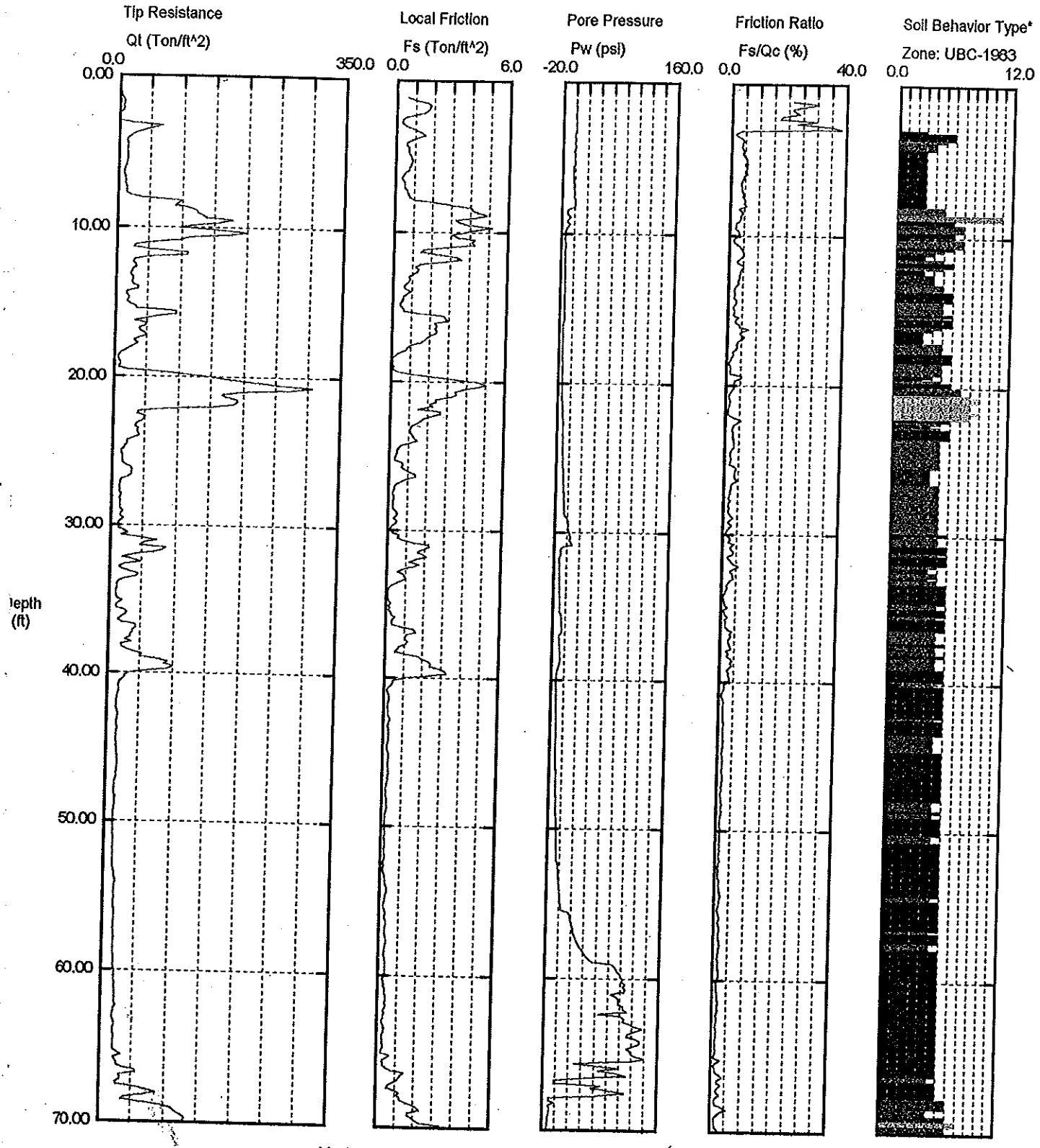
Depth Increment = 0.16 feet

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

Precision Sampling

Operator: C TATUM
Sounding: edc011
Cone Used: 465

CPT Date/Time: 02-07-01 13:42
Location: Haven Novato
Job Number: ec-12



Maximum Depth = 70.54 feet

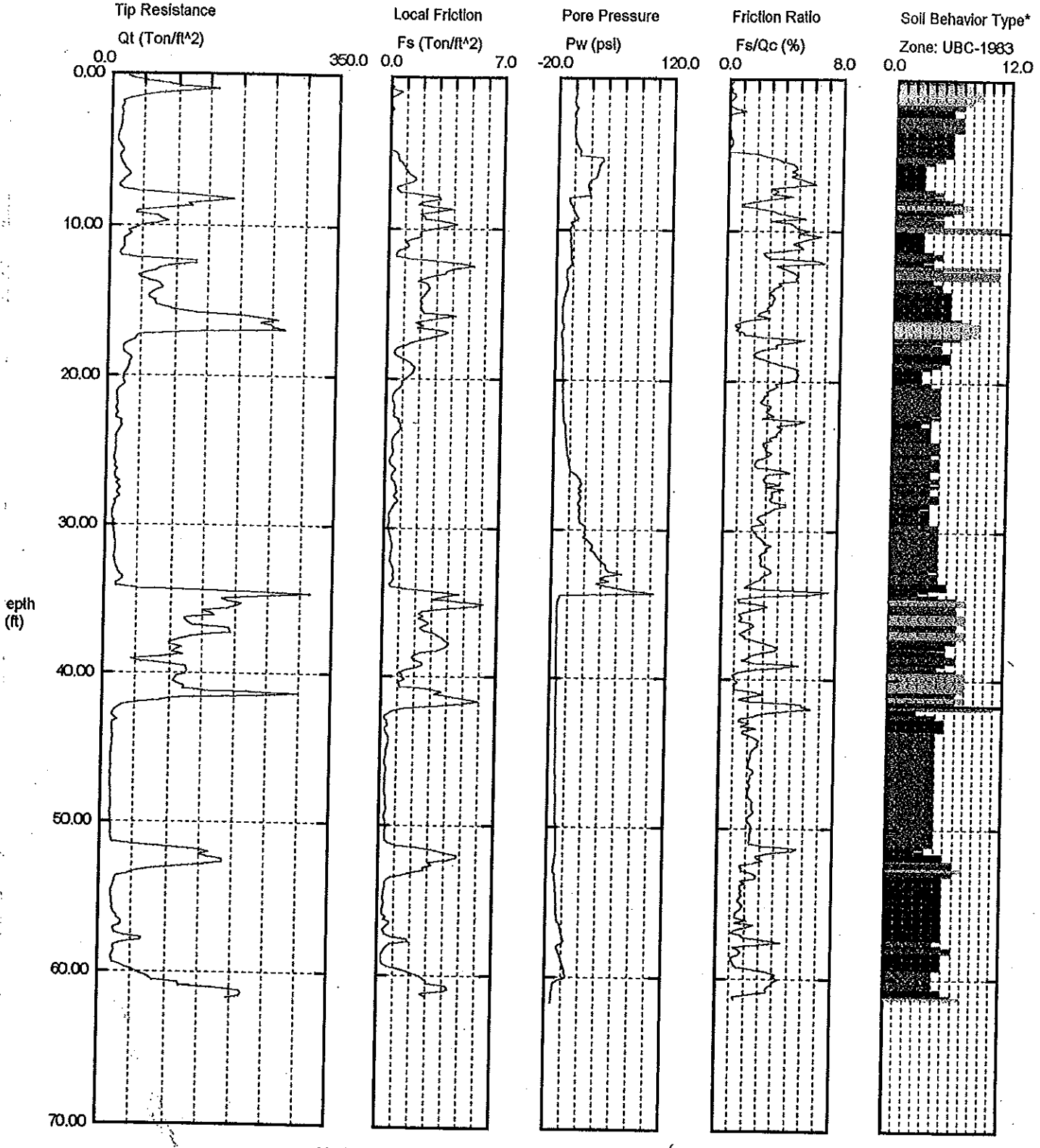
Depth Increment = 0.16 feet

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

Precision Sampling

Operator: C TATUM
Sounding: edc003
Cone Used: 465

CPT Date/Time: 01-31-01 13:04
Location: Haven Novato
Job Number: ec-13



Maximum Depth = 61.68 feet

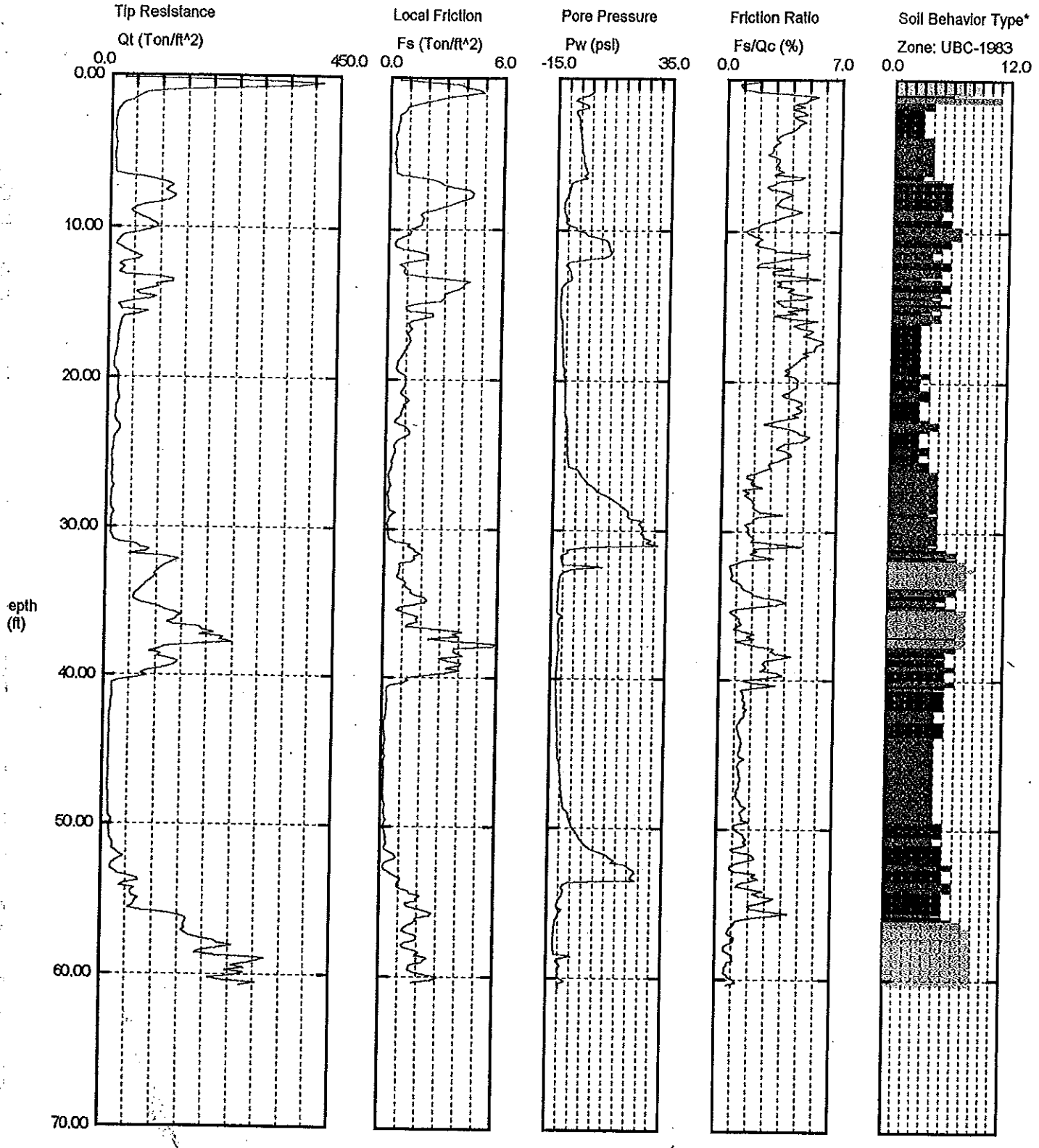
Depth Increment = 0.16 feet

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

Precision Sampling

Operator: C TATUM
Sounding: edc005
Cone Used: 465

CPT Date/Time: 02-01-01 14:16
Location: Haven Novato
Job Number: ec-14



Maximum Depth = 60.70 feet

Depth Increment = 0.16 feet

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

APPENDIX D:
RISK TARGETED MAXIMUM CONSIDERED
EARTHQUAKE (MCE_R) GROUND MOTION HAZARD ANALYSIS

Due to the presence of sandy soil layers beneath the building site that are prone to liquefaction, we judge the site should be classified as "Site Class F" per the 2019 California Building Code. However, per section 20.3.1 of the ASCE 7-16, an equivalent linear site-specific response analysis (i.e., SHAKE, DeepSoil, etc.) is not required if the proposed structure has a fundamental period of less than 0.5 seconds. We anticipate the proposed structures will have fundamental periods less than 0.5-seconds; therefore, based on the harmonic mean of the blow counts we recommend classifying the site as a "Site Class D".

The ASCE 7-16 mapped spectral acceleration parameters at a period of 0.2-second, S_S, and 1.0-second, S_1, at the project site are 1.50 g and 0.60 g, respectively. Per ASCE 7-16 Table 11.4-1 a Site-Specific Ground Motion shall be developed per Section 11.4.8 for S_S values greater than 1.0 g for Site Class E sites and all cases for Site Class F sites. Additionally, a Site-Specific Ground Motion Hazard Analysis shall be performed per ASCE 7-16 Section 11.4.8 if the S_1 value is greater than 0.2 g for Site Class D, greater than 1.0 g for Site Class E, and all cases for Site Class F. Therefore, per ASCE 7-16 Section 11.4.8, we performed a Site-Specific Ground Motion Hazard Analysis per ASCE 7-16 Section 21.2, as described in the sections below.

Probabilistic (MCE_R) Ground Motions: Method 1

A probabilistic acceleration response spectrum, corresponding to a 2% chance of exceedance in 50-years (2,475 return period) was generated utilizing the United States Geologic Survey (USGS) online Unified Hazard Tool (https://earthquake.usgs.gov/hazards/interactive/, accessed 2019) for a Site Class D soil profile (V_{S30} = 270 m/s) an the Dynamic: Conterminous U.S. 2014 (v4.2.0) model. The accelerations given were modified by the risk coefficients C_{RS} and C_{R1}, 0.92 and 0.91, respectively. The accelerations were further converted to the probabilistic spectral response acceleration in the maximum horizontal response utilizing the procedures outlined by Shahi and Baker, 2013. These modifications to the probabilistic spectra correspond to a response with a risk targeted level of 1% probability of collapse within a 50-year period. The resulting probabilistic MCE_R values and spectra are presented on Figures D-1 and D-2, respectively.

Deterministic (MCE_R) Ground Motions

A deterministic acceleration response spectrum was generated utilizing the NGA attenuation models outlined by Abrahamson, Silva & Kamai (2014); Boore, Stewart, Seyhan & Atkinson (2014); Campbell & Borzognia (2014); and Chiou & Youngs (2014) NGA2 West models for a Site Class D (V_{S30} = 270 m/s). The geometric average of the 84th percentile spectral accelerations from the aforementioned attenuation relationships were modified for the probabilistic spectral response acceleration in the maximum horizontal direction, utilizing the procedures outlined by Shahi and Baker, 2013. The resulting deterministic MCER values and spectra are shown on Figures D-1 and D-2, respectively. The deterministic MCE_R spectra shall not be less than the Lower Limit Deterministic MCE_R Response Spectrum, as described in ASCE 7-16 Figure 21.2-1 which is tabulated and plotted on Figures D-1 and D-2, respectively.

Site Specific MCE_R

The site specific MCE_R spectral response acceleration at any period shall be taken as the lesser of the response accelerations from the probabilistic ground motions and the deterministic ground motions and is presented on Figure C-3. Additionally, per ASCE 7-16 Section 21.3, the design spectral response acceleration at any period is equal to 2/3^{rds} the MCE_R Response Spectrum, as shown on Figure D-3.

Per ASCE 7-16 Section 21.4, the MCE_R spectral response acceleration parameters shall be taken from the Site-Specific Spectrum defined as follows and are presented on Figure D-3:

- S_{DS} – The S_{DS} parameter shall be taken as 90% of the maximum spectral acceleration, S_a, obtained from the site-specific spectrum, at any period between 0.2 and 5.0-seconds. However, the values obtained shall not be less than 80% of the values determined in accordance with ASCE 7-16 Section 11.4.5.
- S_{D1} – The S_{D1} parameter shall be taken as the maximum value of the product, TS_a, for periods between 1.0 and 2.0-seconds for Site Class C and B sites; and periods between 1.0 and 5.0-seconds for Site Class D, E & F sites. However, the values obtained shall not be less than 80% of the values determined in accordance with ASCE 7-16 Section 11.4.5.
- S_{MS} – The S_{MS} parameter is equal to 1.5 times the S_{DS} value, but not less than 80% of the values determined in accordance with ASCE 7-16 Section 11.4.4.
- S_{M1} – The S_{M1} parameter is equal to 1.5 times the S_{D1} value, but not less than 80% of the values determined in accordance with ASCE 7-16 Section 11.4.4.

ASCE 7-16
SITE SPECIFIC RISK-TARGETED
MAXIMUM CONSIDERED EARTHQUAKE (MCE_R)

Project Name: Novato Mixed Use Development
Project Numb: 3061.001

Latitude: 38.1119
Longitude: -122.5670

General Seismic Parameters
ASCE 7-16 Section 11.4

Site Class:	D
S_S (g):	1.50
S_1 (g):	0.60
F_a:	1.20
F_v:	N/A
T_L (sec):	12.0
C_{RS}:	0.92
C_{R1}:	0.91

Minimum Design Spectra Parameters
ASCE 7-16 Section 21.3

Site Class:	D	S_{MS} (g):	1.50
S_S (g):	1.50	S_{M1} (g):	1.50
S_1 (g):	0.60	S_{DS} (g):	1.00
F_a:	1.00	S_{D1} (g):	1.00
F_v:	2.50	T_0 (sec):	0.20
		T_S (sec):	1.00

Deterministic MCE Screening
ASCE 7-16 (Sup #1) 21.2.3

Fa:	1.00
1.2 x Fa (g):	1.20
Max PSHA (g):	2.15
DSHA Rqd.:	**YES**

Min. Deterministic MCE
ASCE 7-16 (Sup #1) 21.2.2

Fa:	1.00
1.5 x Fa (g):	1.50
Max DSHA (g):	1.50
Min MCE Rqd.:	**YES**

Probabilistic MCE
ASCE 7-16 Section 21.2.1 - Method 1

Period (sec)	Sa_{RotD50} (g)	$Sa_{RotD100}$ / Sa_{RotD50}	$Sa_{RotD100}$ (g)	C_R	Sa (g)
0.01	0.78	1.10	0.86	0.920	0.79
0.10	1.30	1.10	1.43	0.920	1.32
0.20	1.76	1.10	1.93	0.920	1.78
0.30	2.02	1.13	2.27	0.918	2.09
0.50	2.00	1.18	2.35	0.915	2.15
0.75	1.65	1.24	2.04	0.910	1.85
1.00	1.39	1.30	1.81	0.906	1.64
2.00	0.74	1.35	1.00	0.906	0.90
3.00	0.53	1.40	0.74	0.906	0.67
4.00	0.39	1.45	0.56	0.906	0.51
5.00	0.30	1.50	0.45	0.906	0.41

Deterministic MCE
NGA West2 2014 - 84th Percentile

Period (sec)	Sa_{RotD50} (g)	$Sa_{RotD100}$ / Sa_{RotD50}	$Sa_{RotD100}$ (g)
0.01	0.52	1.10	0.57
0.02	0.52	1.10	0.57
0.03	0.53	1.10	0.58
0.05	0.59	1.10	0.64
0.08	0.71	1.10	0.78
0.10	0.83	1.10	0.91
0.15	1.02	1.10	1.12
0.20	1.15	1.10	1.26
0.25	1.23	1.11	1.37
0.30	1.29	1.13	1.45
0.40	1.30	1.15	1.50
0.50	1.25	1.18	1.47
0.75	1.02	1.24	1.26
1.00	0.85	1.30	1.10
1.50	0.61	1.33	0.80
2.00	0.46	1.35	0.62
3.00	0.30	1.40	0.42
4.00	0.21	1.45	0.30
5.00	0.15	1.50	0.23
7.50	0.07	1.50	0.11
10.00	0.04	1.50	0.06

Scaled Deterministic MCE
ASCE 7-16 (Sup #1) 21.2.2

Period (sec)	Sa (g)
0.01	0.57
0.02	0.57
0.03	0.58
0.05	0.65
0.08	0.78
0.10	0.91
0.15	1.12
0.20	1.27
0.25	1.38
0.30	1.46
0.40	1.50
0.50	1.47
0.75	1.26
1.00	1.10
1.50	0.80
2.00	0.62
3.00	0.42
4.00	0.31
5.00	0.23
7.50	0.11
10.00	0.06

Site Specific MCE_R
ASCE 7-16 Section 21.2.3

Period (sec)	Sa (g)
0.01	0.57
0.02	0.57
0.03	0.58
0.05	0.65
0.08	0.78
0.10	0.91
0.15	1.12
0.20	1.27
0.25	1.38
0.30	1.46
0.40	1.50
0.50	1.47
0.75	1.26
1.00	1.10
1.50	0.80
2.00	0.62
3.00	0.42
4.00	0.31
5.00	0.23
7.50	0.11
10.00	0.06

Site-Specific Design Spectrum
ASCE 7-16 Section 21.3

Period (sec)	Sa (g)
0.01	0.38
0.02	0.38
0.03	0.39
0.05	0.43
0.08	0.52
0.10	0.61
0.15	0.75
0.20	0.84
0.25	0.92
0.30	0.97
0.40	1.00
0.50	0.98
0.75	0.84
1.00	0.74
1.50	0.54
2.00	0.41
3.00	0.28
4.00	0.20
5.00	0.15
7.50	0.08
10.00	0.04

80% General Response Spectrum
ASCE 7-16 Section 21.3

	Period (sec)	Sa (g)	80% Sa (g)
	0.01	0.43	0.34
	0.04	0.53	0.42
	0.07	0.62	0.50
	0.11	0.72	0.57
	0.14	0.81	0.65
	0.17	0.91	0.72
T_O =	0.20	1.00	0.80
T_S =	1.00	1.00	0.80
	1.31	0.76	0.61
	1.62	0.62	0.50
	1.92	0.52	0.42
	2.23	0.45	0.36
	2.54	0.39	0.32
	2.85	0.35	0.28
	3.15	0.32	0.25
	3.46	0.29	0.23
	3.77	0.27	0.21
	4.08	0.25	0.20
	4.38	0.23	0.18
	4.69	0.21	0.17
	5.00	0.20	0.16

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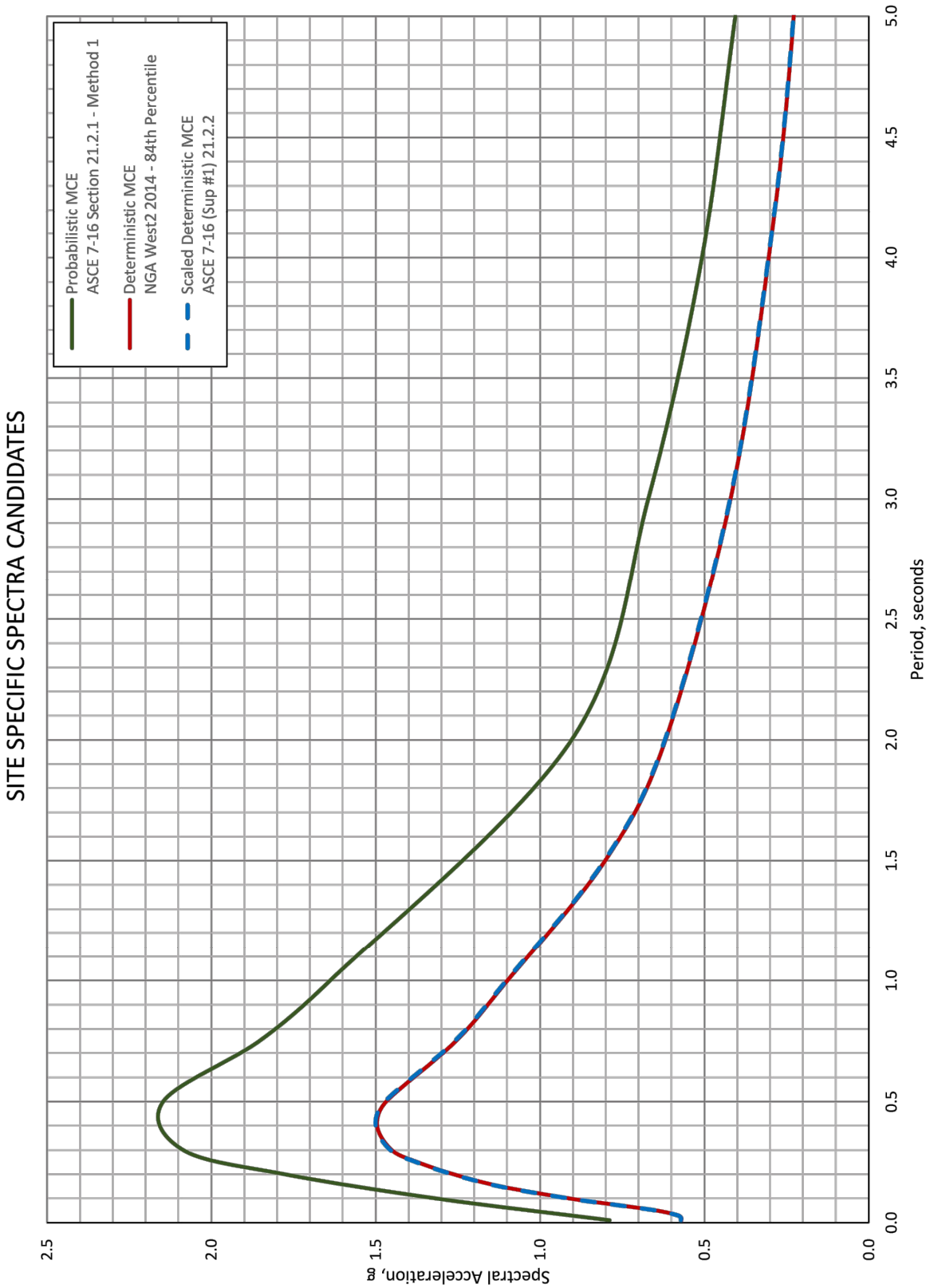
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ASCE 7-16 MCEr CALCULATIONS

Novato Mixed Use Development
Olive Ave & Redwood Blvd
Novato, California
Project No. 3061.001 Date: 11/05/20

Drawn BSP
Checked

D-1
FIGURE



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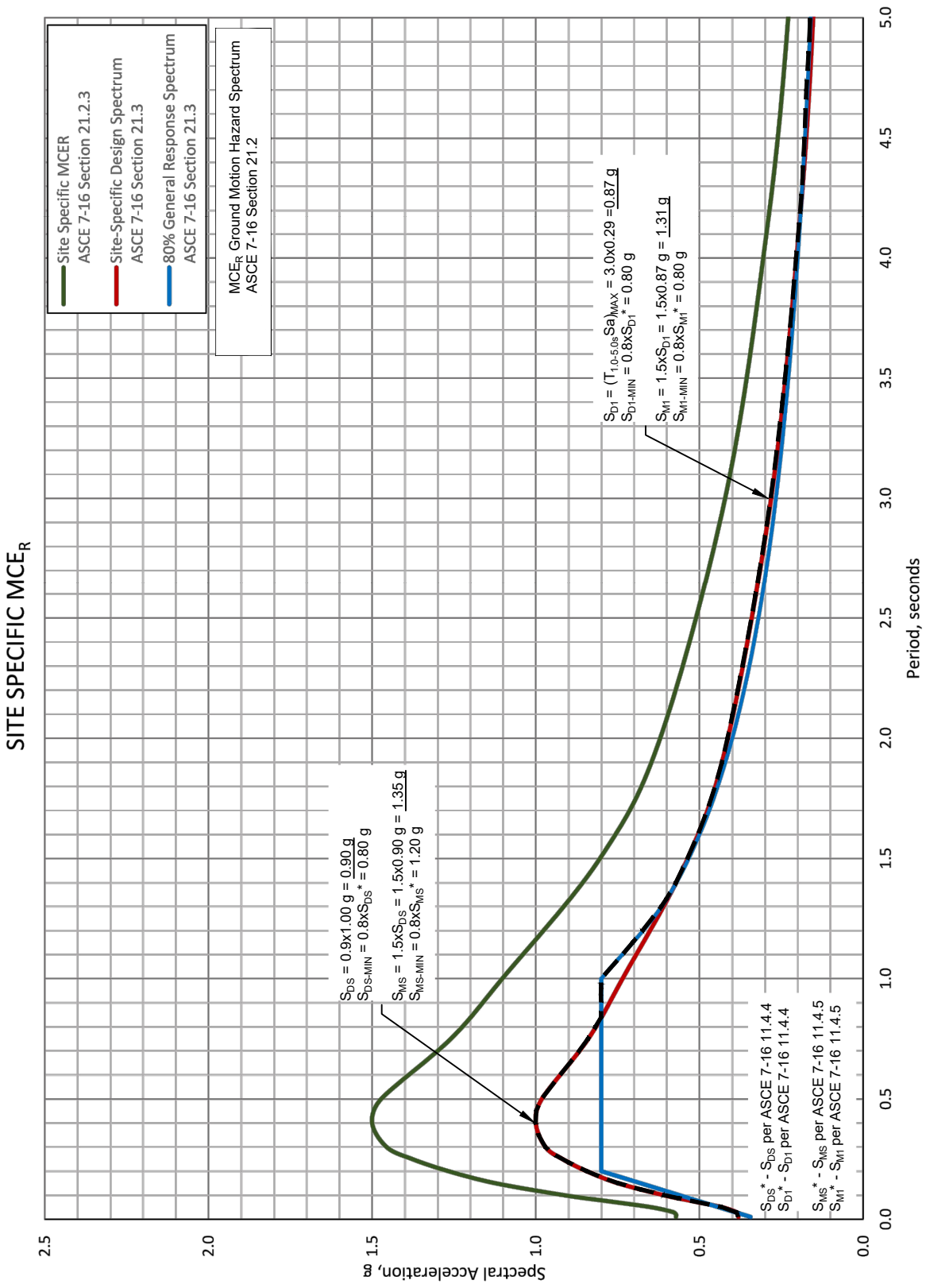
ASCE 7-16 MCEr CANDIDATE SPECTRA

Novato Mixed Use Development
Olive Ave & Redwood Blvd
Novato, California

Project No. 3061.001 Date: 11/05/2020

Drawn BSP
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D-2
FIGURE



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ASCE 7-16 MCEr DESIGN SPECTRUM

Novato Mixed Use Development
Olive Ave & Redwood Blvd
Novato, California

Project No. 3061.001 Date: 11/05/2020

Drawn BSP
Checked

D-3
FIGURE

Appendix G

Preliminary Stormwater Control Plan

Preliminary Drainage Analysis

For

Village at Novato
7530 Redwood Boulevard,
Novato, California
APN 143-011-06 & 08

JN 20084
July 6, 2021

Prepared for:
ROIC California, LLC
Richard Schoebel
11250 El Camino Real, Suite 200
San Diego, CA. 92130
rschoebel@roir@it.net





Timothy Schram, RCE 67890
My license expires 6/30/2023

Prepared by:

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civil engineering | land surveying | wastewater
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Prepared By:__3R's_____
Checked By:__CM_____

Table of Contents

1. **Drainage Narrative**
2. **Aerial Photo**
3. **Pre-Construction Hydrology Map**
4. **Post-Construction Hydrology Map**
5. **BASMAA Exhibit**
6. **Detention Volume Calculations**

Appendices

I. **Soil Analysis**

Village at Novato
Drainage Narrative

Project Description

The Village at Novato project is located at 7530 Redwood Blvd, Novato, California. The project proposes the construction of 3 buildings, two of which are residential and the third is mixed use with retail and residential uses proposed. The project also proposes a paved parking lot along with associated hardscaping and landscaping. Improvements along Redwood Boulevard are also proposed. The parcel is approximately 5.85 acres with slopes ranging between 1% and 5%. There is an existing asphalt parking lot serving the existing Trader's Joe. The majority of the runoff currently sheet flows towards an existing drainage ditch on the eastern and south side of the property for existing conditions, see attached **Aerial Photo** and **Existing Condition Map**.

Methodology

It is our understanding that there have been some drainage issues in the area, especially with the drainage ditches along the SMART property adjacent to our site. This report has been prepared to address those concerns and ensure existing drainage issues are not worsened by the proposed project. In order to ensure that existing conditions are not worsened we have prepared an analysis of the available storage within the bioretention areas to ensure they are sized to accommodate the increase in runoff for the 100-year storm event. Additional analysis of pipe sizing and hydraulic calculations will be prepared during the construction documents phase.

Post construction conditions are shown on the **Post-Construction Map.** Weighted runoff coefficients were calculated for the property for pre and post development conditions by approximating the amount of pervious and impervious areas, using 0.5 for landscaping, 0.7 for gravel, and 0.9 for impervious area.

In accordance to BASMAA Post-Construction Manual the project is classified as a Regulated Project. This type of project require runoff from the impervious area to be directed towards designated bio-retention facilities. The facilities provide the required retention and treatment for the runoff and are sized at 4% of the impervious area.
The Modified Rational Method has been used to calculate the detention volume. The idea behind the modified rational method is to determine the total storm duration that provides the required storage to offset the increase in post development runoff. The storm duration is based on the assumption that you are designing a storage area that reduces the outflow down to a predevelopment flow. For each storm duration tested the spreadsheet finds the

estimated storage volume, which is the shaded area above the estimated outflow hydrograph. This volume represents how large the storage area will need to be in order to store the runoff hydrograph while still keeping the peak outflow below the predevelopment flow. The rising and falling limbs of the inflow hydrograph have a duration equal to the time of concentration (Tc). An allowable target outflow is set (Qa) based on pre-development conditions, it is the total flow generated by the site prior to construction. Modified Rational method is an iterative process, where the storm duration (Td) is assumed to be equal to the Tc at the beginning and is varied until the storage volume (shaded gray area) is maximized. Once the maximum storage volume is achieved it can be seen that as Td/ Tc increases the required storage decreases. Therefore, the iteration is stopped once the maximum storage volume is achieved. The total available storage volume in the proposed bio-retention facilities is 6,114 ft^3. The attached **Detention Volume Calculations** show that the required storage to detain the increase in runoff from the 100-year storm is 4,750 ft^3. Therefore, the proposed bioretention facilities are adequate to detain the increase in runoff during the 100-year storm event and there will be no adverse effects to the downstream conveyance features as a result of the proposed improvements.

Conclusion

There will be an increase in runoff as a result of the improvements, so retention will be required. Retention and treatment will be provided in the proposed bio-retention facilities on-site. The analysis results demonstrate that the design onsite drainage system with proposed retention will not increase the peak discharge of onsite runoff as a result of the proposed improvements. Accordingly, the proposed site improvements will not adversely impact the existing drainage condition of the surrounding and downstream properties.

2. Aerial Photo


7530 Redwood Blvd
Legend
THIS SITE
N Redwood Dr
Golden Gate P/
Armstrong Ave
Ranch Dr
Pinheiro Cir
Cherry Hill Ln
1st St
Redwood Blvd
Railroad Ave
Elmwood Ct
Kenwood Ct
101
Mulligan Ln
Google Earth
© 2020 Google
900 ft
N

3. Pre-Construction Map



DRAINAGE AREA TABLE

DA1 =6.45 AC
(280,982 SF)

DRAINAGE ROUTING

DA1

1

DRAINAGE AREA LEGEND

- DA1 — DRAINAGE MANAGEMENT AREA
- DRAINAGE AREA BOUNDARY
- 1 — POINT OF CONCENTRATION
- LINE OF ANALYSIS
- DIRECTION OF FLOW

PRE-CONSTRUCTION MAP

30' 15' 0 15' 30' 60' 90'

Graphic Scale: 1" = 30'

NOTE:

1-FT & 5-FT CONTOURS SHOWN ARE FROM LIDAR AND ARE SHOWN FOR GRAPHIC PURPOSES ONLY

REFER TO SUBMITTED GRADING & DRAINAGE PLANS FOR INVERTS, FLOW LINES, TOP OF GRATE ELEVATIONS AND DRAINAGE SPECIFICATIONS

July 05, 2021

Pre-Construction Map

LANDS OF ROIC
7530, Novato, CA
APN 143-011-005 & 008

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4. Post-Construction Map

DRAINAGE AREA TABLE

DA1 = 6.45 AC
(280,982 SF)

DRAINAGE ROUTING

DA1

1

DRAINAGE AREA LEGEND

- DA1 — DRAINAGE MANAGEMENT AREA
- DRAINAGE AREA BOUNDARY
- 1 — POINT OF CONCENTRATION
- LINE OF ANALYSIS
- DIRECTION OF FLOW

NOTE:

1-FT & 5-FT CONTOURS SHOWN ARE FROM LIDAR AND ARE SHOWN FOR GRAPHIC PURPOSES ONLY

REFER TO SUBMITTED GRADING & DRAINAGE PLANS FOR INVERTS, FLOW LINES, TOP OF GRATE ELEVATIONS AND DRAINAGE SPECIFICATIONS

POST-CONSTRUCTION HYDROLOGY MAP

30' 15' 0 15' 30' 60' 90'

Graphic Scale: 1" = 30'

HATCHING LEGEND:

- ASPHALT CONCRETE
- PAVERS (SLD)
- HARDSCAPE
- BIO-RETENTION AREA

July 2021

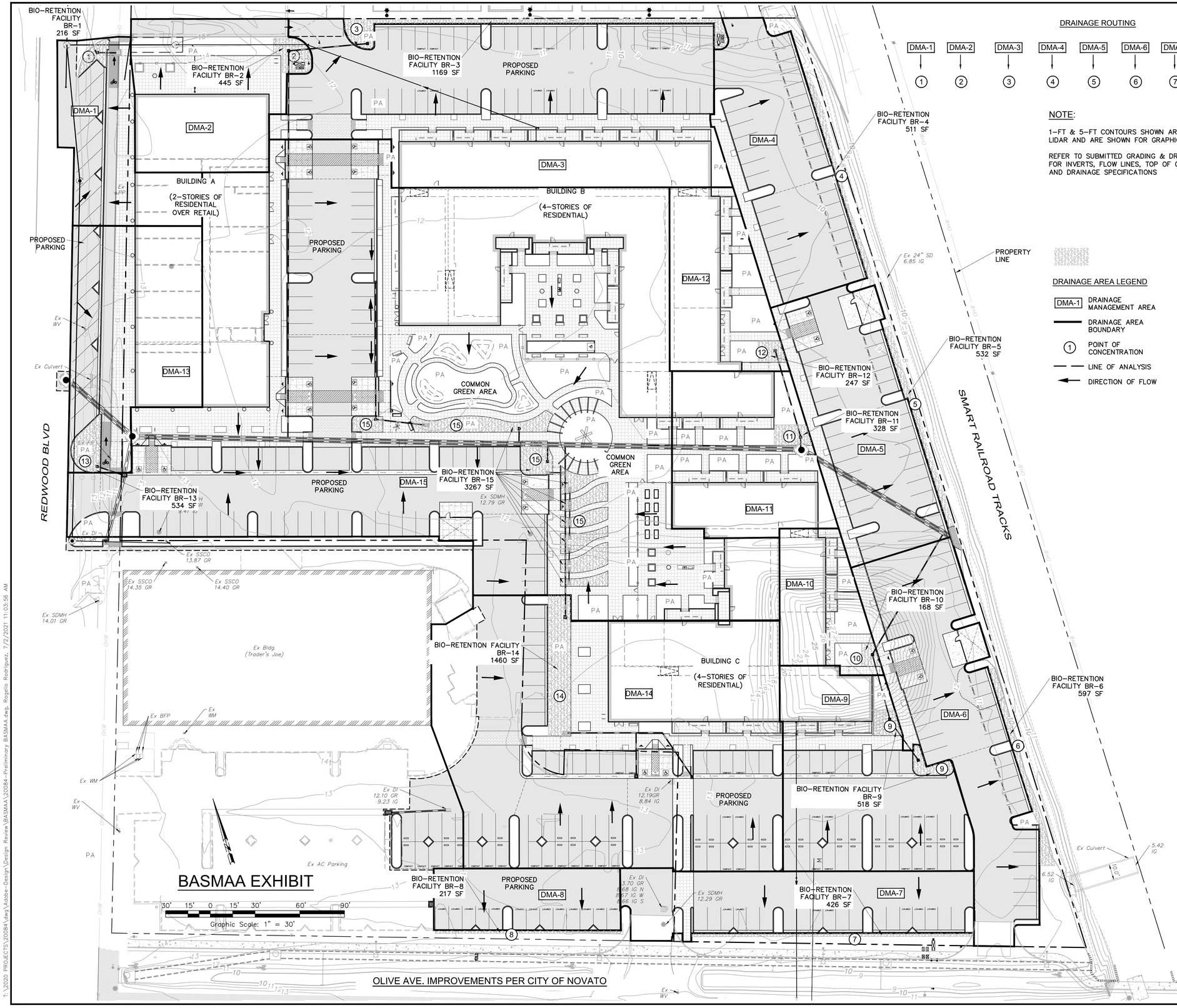
POST-CONSTRUCTION HYDROLOGY MAP

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5. BASMAA Exhibit



DRAINAGE ROUTING

DMA-1	DMA-2	DMA-3	DMA-4	DMA-5	DMA-6	DMA-7	DMA-8	DMA-9	DMA-10	DMA-11	DMA-12	DMA-13	DMA-14	DMA-15
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮

NOTE:

1–FT & 5–FT CONTOURS SHOWN ARE FROM LIDAR AND ARE SHOWN FOR GRAPHIC PURPOSES ONLY

REFER TO SUBMITTED GRADING & DRAINAGE PLANS FOR INVERTS, FLOW LINES, TOP OF GRATE ELEVATIONS AND DRAINAGE SPECIFICATIONS

DRAINAGE AREA LEGEND

- DMA-1 — DRAINAGE MANAGEMENT AREA
- DRAINAGE AREA BOUNDARY
- ① — POINT OF CONCENTRATION
- LINE OF ANALYSIS
- DIRECTION OF FLOW

DRAINAGE AREA TABLE

	DMA AREA (SF)	POST-PROJECT SURFACE TYPE	DMA RUNOFF FACTOR	DMA AREA x RUNOFF FACTOR	FACILITY NAME BR-1		
DMA-1	7269	Roof, Pavement	1	7269		Minimum	Proposed
	242	Landscape	0.1	24.2	Sizing Factor	Facility Size(SF)	Facility Size(SF)
	TOTAL			7293.2	0.04	292	216

	DMA AREA	POST-PROJECT SURFACE TYPE	DMA RUNOFF	DMA AREA x RUNOFF	FACILITY NAME BR-2		
DMA-2	8710	Roof, Pavement	1	8710		Minimum	Proposed
	1794	Landscape	0.1	179.4	Sizing Factor	Facility Size(SF)	Facility Size(SF)
	TOTAL			8889.4	0.04	356	445

	DMA AREA	POST-PROJECT SURFACE TYPE	DMA RUNOFF	DMA AREA x RUNOFF	FACILITY NAME BR-3		
DMA-3	27781	Roof, Pavement	1	27781		Minimum	Proposed
	1377	Landscape	0.1	137.7	Sizing Factor	Facility Size(SF)	Facility Size(SF)
	TOTAL			27918.7	0.04	1117	1169

	DMA AREA	POST-PROJECT SURFACE TYPE	DMA RUNOFF	DMA AREA x RUNOFF	FACILITY NAME BR-4		
DMA-4	11491	Pavement	1	11491		Minimum	Proposed
	519	Landscape	0.1	51.9	Sizing Factor	Facility Size(SF)	Facility Size(SF)
	TOTAL			11542.9	0.04	462	511

	DMA AREA	POST-PROJECT SURFACE TYPE	DMA RUNOFF	DMA AREA x RUNOFF	FACILITY NAME BR-5		
DMA-5	11939	Pavement	1	11939		Minimum	Proposed
	665	Landscape	0.1	66.5	Sizing Factor	Facility Size(SF)	Facility Size(SF)
	TOTAL			12005.5	0.04	480	532

	DMA AREA	POST-PROJECT SURFACE TYPE	DMA RUNOFF	DMA AREA x RUNOFF	FACILITY NAME BR-6		
DMA-6	14722	Pavement	1	14722		Minimum	Proposed
	248	Landscape	0.1	24.8	Sizing Factor	Facility Size(SF)	Facility Size(SF)
	TOTAL			14746.8	0.04	590	597

	DMA AREA	POST-PROJECT SURFACE TYPE	DMA RUNOFF	DMA AREA x RUNOFF	FACILITY NAME BR-7		
DMA-7	9525	Pavement	1	9525		Minimum	Proposed
	451	Landscape	0.1	45.1	Sizing Factor	Facility Size(SF)	Facility Size(SF)
	TOTAL			9570.1	0.04	383	426

	DMA AREA	POST-PROJECT SURFACE TYPE	DMA RUNOFF	DMA AREA x RUNOFF	FACILITY NAME BR-8		
DMA-8	5075	Pavement	1	5075		Minimum	Proposed
	125	Landscape	0.1	12.5	Sizing Factor	Facility Size(SF)	Facility Size(SF)
	TOTAL			5087.5	0.04	204	217

	DMA AREA	POST-PROJECT SURFACE TYPE	DMA RUNOFF	DMA AREA x RUNOFF	FACILITY NAME BR-9		
DMA-9	12510	Roof, Pavement	1	12510		Minimum	Proposed
	1389	Landscape	0.1	138.9	Sizing Factor	Facility Size(SF)	Facility Size(SF)
	TOTAL			12648.9	0.04	506	518

	DMA AREA	POST-PROJECT SURFACE TYPE	DMA RUNOFF	DMA AREA x RUNOFF	FACILITY NAME BR-10		
DMA-10	3953	Roof, Sidewalk	1	3953		Minimum	Proposed
	1189	Landscape	0.1	118.9	Sizing Factor	Facility Size(SF)	Facility Size(SF)
	TOTAL			4071.9	0.04	163	168

	DMA AREA	POST-PROJECT SURFACE TYPE	DMA RUNOFF	DMA AREA x RUNOFF	FACILITY NAME BR-11		
DMA-11	7688	Roof, Sidewalk	1	7688		Minimum	Proposed
	2711	Landscape	0.1	271.1	Sizing Factor	Facility Size(SF)	Facility Size(SF)
	TOTAL			7959.1	0.04	318	328

	DMA AREA	POST-PROJECT SURFACE TYPE	DMA RUNOFF	DMA AREA x RUNOFF	FACILITY NAME BR-12		
DMA-12	5763	Roof, Sidewalk	1	5763		Minimum	Proposed
	1844	Landscape	0.1	184.4	Sizing Factor	Facility Size(SF)	Facility Size(SF)
	TOTAL			5947.4	0.04	238	247

	DMA AREA	POST-PROJECT SURFACE TYPE	DMA RUNOFF	DMA AREA x RUNOFF	FACILITY NAME BR-13		
DMA-13	11871	Roof, Sidewalk	1	11871		Minimum	Proposed
	695	Landscape	0.1	69.5	Sizing Factor	Facility Size(SF)	Facility Size(SF)
	TOTAL			11940.5	0.04	478	534

	DMA AREA	POST-PROJECT SURFACE TYPE	DMA RUNOFF	DMA AREA x RUNOFF	FACILITY NAME BR-14		
	2657	Existing Pavement	1	2657		Minimum	Proposed
DMA-14	33070	Proposed Pavement	1	33070	Sizing Factor	Facility Size(SF)	Facility Size(SF)
	3198	Landscape	0.1	319.8			
	TOTAL			36046.8	0.04	1442	1460

	DMA AREA	POST-PROJECT SURFACE TYPE	DMA RUNOFF	DMA AREA x RUNOFF	FACILITY NAME BR-15		
DMA-15	78082	Roof, Pavement	1	78082		Minimum	Proposed
	15257	Landscape	0.1	1525.7	Sizing Factor	Facility Size(SF)	Facility Size(SF)
	TOTAL			79607.7	0.04	3184	3267

July 05, 2021

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6. Detention Volume Calculation

Incremental Rational Method Drainage Study

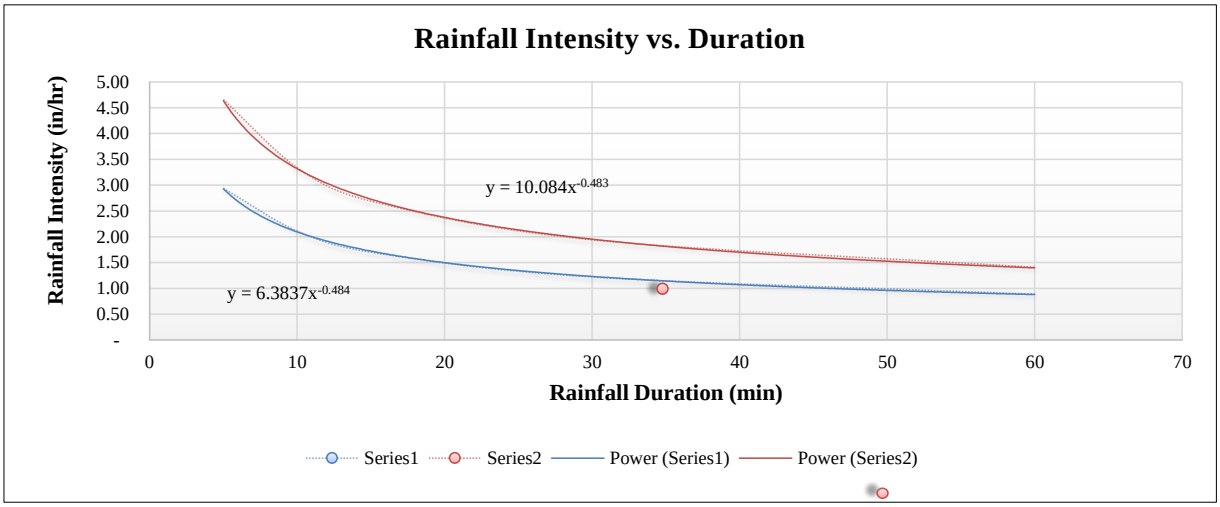
NOAA Atlas 14 Point Precipitation Frequency Estimates

https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html

Project: Novato Mix Use (Redwood Road) **Date:** 7/5/2021

JN: 20084 **Designer:** 3R's

Location: Santa Rosa, CA



NOAA Atlas 14 Data Rainfall Intensity (in/hr)		
Duration (min)	**10-yr**	**100-yr**
5	2.94	4.66
10	2.11	3.34
15	1.70	2.69
30	1.22	1.94
60	0.89	1.41

Rainfall Intensity vs Duration

$$I = a * t^{b}$$

I = intensity (in/hour)
t = time of concentration/ rainfall duration (minutes)

10-Year Trendline Values	
a =	6.3837
b =	-0.484

100-Year Trendline Values	
a =	10.084
b =	-0.483

NOAA Atlas 14, Volume 6, Version 2
Location name: Novato, California, USA*
Latitude: 38.1123°, Longitude: -122.5672°
Elevation: 10.52 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**1.63** (1.45–1.85)	**1.99** (1.76–2.26)	**2.50** (2.21–2.84)	**2.94** (2.58–3.38)	**3.58** (3.01–4.28)	**4.09** (3.37–5.03)	**4.66** (3.72–5.88)	**5.26** (4.07–6.88)	**6.13** (4.51–8.41)	**6.85** (4.85–9.78)
10-min	**1.16** (1.04–1.32)	**1.43** (1.27–1.62)	**1.79** (1.58–2.04)	**2.11** (1.85–2.42)	**2.56** (2.16–3.07)	**2.93** (2.41–3.61)	**3.34** (2.66–4.22)	**3.77** (2.92–4.93)	**4.40** (3.23–6.03)	**4.91** (3.47–7.01)
15-min	**0.940** (0.836–1.06)	**1.15** (1.02–1.30)	**1.44** (1.28–1.64)	**1.70** (1.49–1.95)	**2.06** (1.74–2.47)	**2.36** (1.94–2.90)	**2.69** (2.15–3.40)	**3.04** (2.35–3.97)	**3.54** (2.61–4.86)	**3.96** (2.80–5.65)
30-min	**0.676** (0.602–0.768)	**0.828** (0.736–0.940)	**1.04** (0.920–1.18)	**1.22** (1.07–1.41)	**1.49** (1.25–1.78)	**1.70** (1.40–2.09)	**1.94** (1.55–2.45)	**2.19** (1.69–2.86)	**2.55** (1.88–3.50)	**2.85** (2.02–4.07)
60-min	**0.492** (0.438–0.558)	**0.602** (0.535–0.684)	**0.756** (0.670–0.861)	**0.888** (0.780–1.02)	**1.08** (0.912–1.30)	**1.24** (1.02–1.52)	**1.41** (1.13–1.78)	**1.59** (1.23–2.08)	**1.86** (1.37–2.55)	**2.07** (1.47–2.96)
2-hr	**0.367** (0.327–0.416)	**0.448** (0.399–0.510)	**0.560** (0.496–0.638)	**0.654** (0.574–0.752)	**0.787** (0.664–0.942)	**0.894** (0.735–1.10)	**1.01** (0.804–1.27)	**1.13** (0.870–1.47)	**1.29** (0.952–1.77)	**1.43** (1.01–2.04)
3-hr	**0.311** (0.277–0.353)	**0.380** (0.338–0.432)	**0.474** (0.420–0.540)	**0.551** (0.484–0.635)	**0.661** (0.557–0.792)	**0.748** (0.615–0.918)	**0.838** (0.670–1.06)	**0.934** (0.722–1.22)	**1.07** (0.785–1.46)	**1.17** (0.829–1.67)
6-hr	**0.230** (0.205–0.261)	**0.282** (0.251–0.320)	**0.351** (0.311–0.400)	**0.408** (0.358–0.469)	**0.486** (0.410–0.582)	**0.547** (0.450–0.672)	**0.610** (0.488–0.772)	**0.676** (0.523–0.883)	**0.767** (0.564–1.05)	**0.838** (0.592–1.20)
12-hr	**0.155** (0.138–0.176)	**0.193** (0.172–0.219)	**0.243** (0.215–0.277)	**0.283** (0.249–0.326)	**0.339** (0.286–0.406)	**0.381** (0.314–0.469)	**0.425** (0.340–0.538)	**0.470** (0.364–0.615)	**0.532** (0.392–0.730)	**0.580** (0.410–0.828)
24-hr	**0.102** (0.092–0.116)	**0.129** (0.116–0.146)	**0.164** (0.147–0.186)	**0.192** (0.171–0.220)	**0.231** (0.200–0.273)	**0.261** (0.221–0.314)	**0.291** (0.242–0.358)	**0.322** (0.261–0.406)	**0.365** (0.285–0.477)	**0.398** (0.301–0.536)
2-day	**0.066** (0.059–0.075)	**0.083** (0.075–0.095)	**0.106** (0.095–0.121)	**0.125** (0.111–0.143)	**0.150** (0.129–0.177)	**0.169** (0.143–0.203)	**0.189** (0.157–0.232)	**0.209** (0.169–0.263)	**0.235** (0.184–0.308)	**0.256** (0.194–0.346)
3-day	**0.051** (0.046–0.058)	**0.065** (0.058–0.074)	**0.083** (0.074–0.094)	**0.097** (0.086–0.111)	**0.116** (0.101–0.137)	**0.131** (0.111–0.158)	**0.146** (0.121–0.180)	**0.161** (0.131–0.203)	**0.182** (0.142–0.238)	**0.198** (0.150–0.267)
4-day	**0.043** (0.038–0.048)	**0.054** (0.049–0.061)	**0.069** (0.062–0.078)	**0.081** (0.072–0.092)	**0.097** (0.084–0.114)	**0.109** (0.092–0.131)	**0.121** (0.101–0.149)	**0.134** (0.108–0.168)	**0.150** (0.117–0.197)	**0.163** (0.124–0.220)
7-day	**0.030** (0.027–0.033)	**0.037** (0.034–0.043)	**0.048** (0.043–0.054)	**0.056** (0.050–0.064)	**0.067** (0.058–0.079)	**0.075** (0.064–0.090)	**0.083** (0.069–0.102)	**0.092** (0.074–0.115)	**0.103** (0.080–0.134)	**0.111** (0.084–0.149)
10-day	**0.024** (0.022–0.027)	**0.031** (0.028–0.035)	**0.039** (0.035–0.044)	**0.046** (0.041–0.052)	**0.054** (0.047–0.064)	**0.061** (0.052–0.073)	**0.067** (0.056–0.083)	**0.074** (0.060–0.093)	**0.082** (0.064–0.108)	**0.089** (0.067–0.120)
20-day	**0.016** (0.014–0.018)	**0.020** (0.018–0.023)	**0.026** (0.023–0.029)	**0.030** (0.027–0.034)	**0.035** (0.031–0.042)	**0.039** (0.033–0.047)	**0.043** (0.036–0.053)	**0.047** (0.038–0.059)	**0.052** (0.040–0.068)	**0.055** (0.042–0.075)
30-day	**0.013** (0.011–0.014)	**0.016** (0.015–0.018)	**0.021** (0.018–0.023)	**0.024** (0.021–0.027)	**0.028** (0.024–0.033)	**0.031** (0.026–0.038)	**0.034** (0.028–0.042)	**0.037** (0.030–0.046)	**0.040** (0.031–0.053)	**0.043** (0.032–0.058)
45-day	**0.010** (0.009–0.012)	**0.013** (0.012–0.015)	**0.017** (0.015–0.019)	**0.019** (0.017–0.022)	**0.023** (0.020–0.027)	**0.025** (0.021–0.030)	**0.027** (0.023–0.033)	**0.029** (0.024–0.037)	**0.032** (0.025–0.042)	**0.034** (0.025–0.045)
60-day	**0.009** (0.008–0.010)	**0.012** (0.011–0.013)	**0.015** (0.013–0.017)	**0.017** (0.015–0.020)	**0.020** (0.017–0.023)	**0.022** (0.019–0.026)	**0.024** (0.020–0.029)	**0.025** (0.020–0.032)	**0.027** (0.021–0.036)	**0.029** (0.022–0.039)

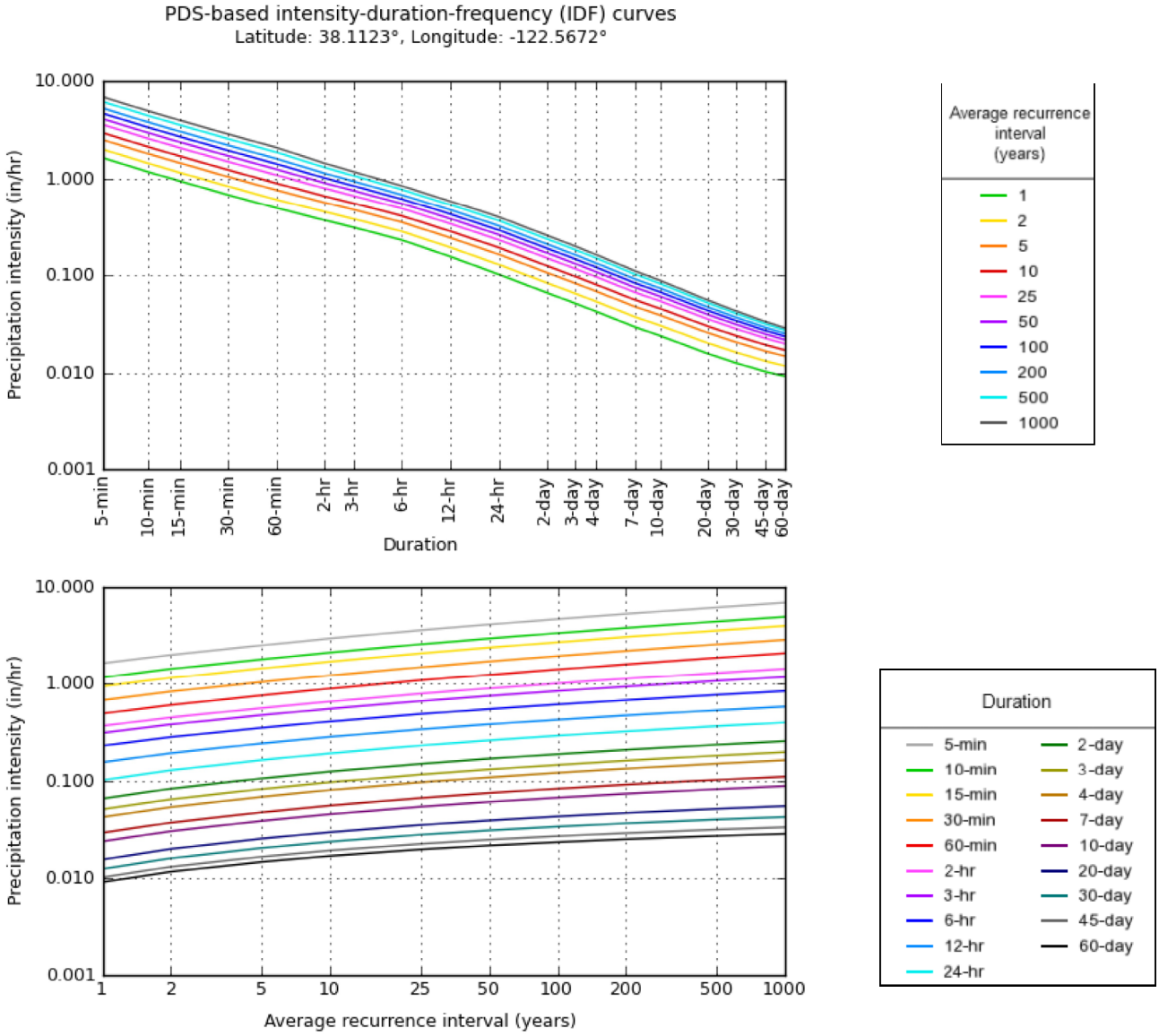
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical



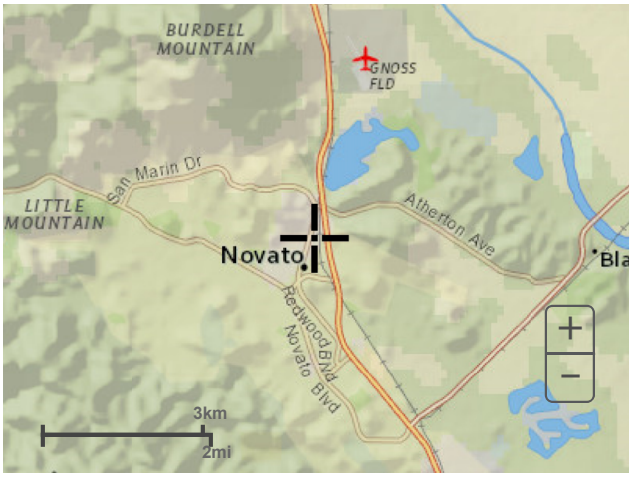
NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Tue Feb 2 23:31:45 2021

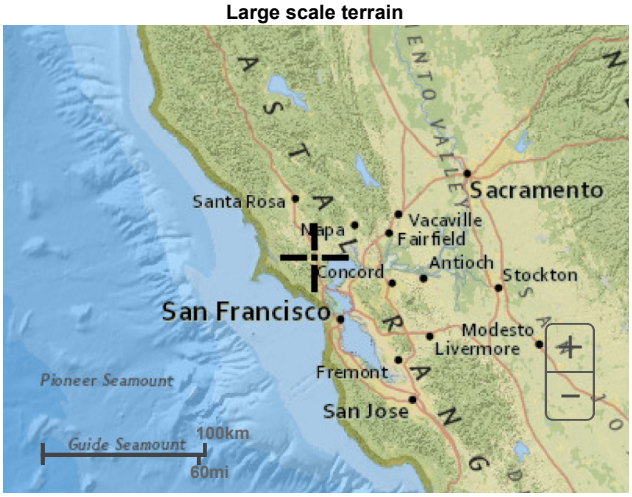
Back to Top

Maps & aerials

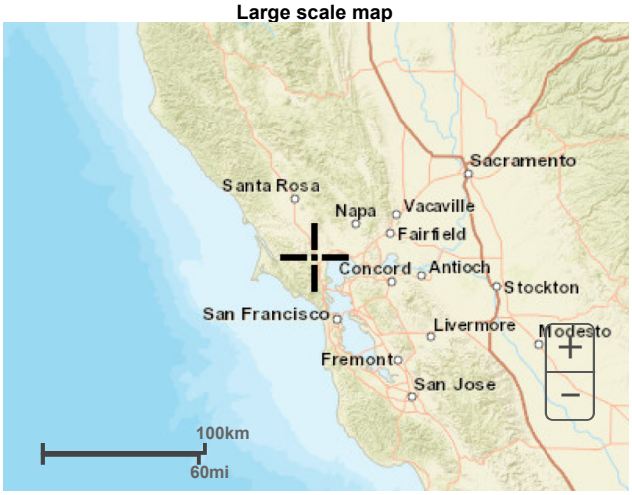
Small scale terrain



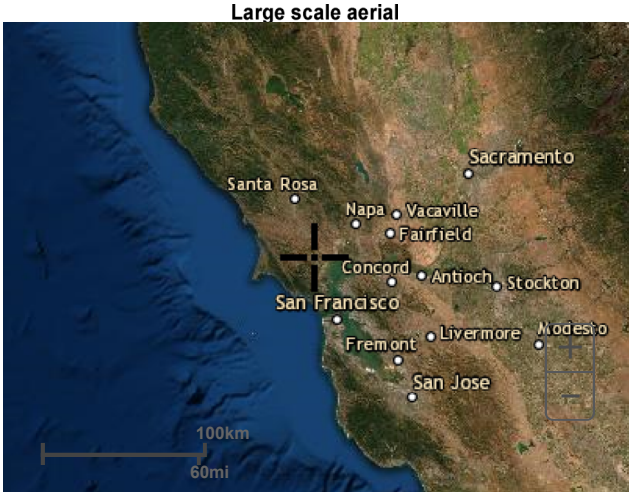
Large scale terrain



Large scale map



Large scale aerial



Back to Top

US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Detention Volume Calculations

(Modified Rational Method, 100-yr)

Date: 7/6/2021

Project: **Village at Novato**

SITE DATA:

DA1 = **6.45** (acres)

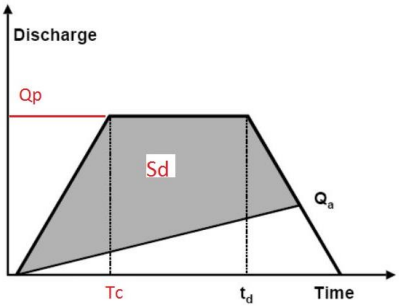
Pre-construction, 100-yr:

C_{PRE} = **0.56**

$T_{C,PRE}$ = **10.00** min

Intensity: $From\ NOAA\ Atlas\ 14$ = **3.34** inches/ hr

Allowable Flow: $Q_a = CiA$ = **12.07** cfs



Post-construction, 100-yr:

C_{POST} = **0.84**

$T_{C,POST}$ = **10.00** min

Required Storage Volume:

$$S_d = (Q_p * t_d - Q_a * (t_d + Tc)/2) * 60$$

PRE & POST CONSTRUCTION RUNOFF COEFFICIENT

	A_T	A_V	A_G	A_P	C_T
$Area_{Pre}$	6.45	5.26	0.44	0.75	0.56
$Area_{Post}$	6.45	0.96	0.00	5.49	0.84

NOTE:

Vegetated area :	C_V =	0.50	(=Pre-construction)
Gravel	C_G=	0.70	
Residential area :	C_P =	0.90	
Mixed area :	C =	$(A_V / SA)*C_V + (A_P / SA)*C_P + (A_G/SA)*C_G$	

Storm Duration*		Rainfall Intensity	Peak Flow	Required Storage	Note
t_d/Tc	t_d (min)	I_{td} (in/hr)	Q_P (cfs)	S_d (ft^3)	
0.75	7.50	3.500	18.97	2,202	
1.00	10.00	3.000	16.26	2,516	
1.25	12.50	2.800	15.18	3,238	
1.50	15.00	2.600	14.09	3,633	
1.75	17.50	2.500	13.55	4,273	
2.00	20.00	2.400	13.01	4,750	MAX
2.25	22.50	2.200	11.93	4,333	
2.50	25.00	2.100	11.38	4,404	
2.75	27.50	2.000	10.84	4,312	
3.00	30.00	1.950	10.57	4,545	
3.25	32.50	1.850	10.03	4,169	
3.50	35.00	1.800	9.76	4,198	
3.75	37.50	1.750	9.49	4,147	
4.00	40.00	1.700	9.21	4,015	
4.25	42.50	1.670	9.05	4,077	
4.50	45.00	1.640	8.89	4,091	
4.75	47.50	1.600	8.67	3,901	
5.00	50.00	1.570	8.51	3,809	

*** Storm Duration: t_d/Tc= 1 ~ 5**

Soil Analysis


122° 34' 6" W
122° 33' 57" W
38° 6' 47" N
38° 6' 37" N
537830
537860
537890
537920
537950
537980
538010
538040
4218450
4218420
4218390
4218360
4218330
4218300
4218270
4218240
4218210
4218180
Redwood
El Novato Ct
202
Olive
Olive Ave
Soil Map may not be valid at this scale.
Map Scale: 1:1,480 if printed on A portrait (8.5" x 11") sheet.
N
Meters
0 20 40 80 120
Feet
0 50 100 200 300
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Marin County, California
Survey Area Data: Version 14, May 29, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 22, 2019—Apr 25, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
202	Urban land-Xerorthents complex, 0 to 9 percent slopes	6.8	100.0%
Totals for Area of Interest		**6.8**	**100.0%**

Marin County, California

202—Urban land-Xerorthents complex, 0 to 9 percent slopes

Map Unit Setting

National map unit symbol: hf4d
Elevation: 0 to 500 feet
Mean annual precipitation: 20 to 30 inches
Mean annual air temperature: 55 to 63 degrees F
Frost-free period: 270 to 350 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 70 percent
Xerorthents and similar soils: 20 percent
Minor components: 9 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Landform: Valley floors
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear

Interpretive groups

Land capability classification (irrigated): 8
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Description of Xerorthents

Setting

Landform: Tidal flats, valley floors
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Base slope, tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Earth spread deposits derived from igneous, metamorphic and sedimentary rock

Properties and qualities

Slope: 0 to 9 percent
Depth to restrictive feature: More than 80 inches
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Interpretive groups

Land capability classification (irrigated): 8s

Land capability classification (nonirrigated): 8s
Hydric soil rating: No

Minor Components

Hydraquents
Percent of map unit: 2 percent
Landform: Tidal flats
Landform position (two-dimensional): Backslope
Hydric soil rating: Yes

Reyes
Percent of map unit: 1 percent
Landform: Salt marshes
Landform position (two-dimensional): Backslope
Hydric soil rating: Yes

Blucher
Percent of map unit: 1 percent
Hydric soil rating: No

Slopes more than 9 percent
Percent of map unit: 1 percent
Hydric soil rating: No

Cole
Percent of map unit: 1 percent
Hydric soil rating: No

Unnamed, briefly flooded soils
Percent of map unit: 1 percent
Hydric soil rating: No

Ballard
Percent of map unit: 1 percent
Hydric soil rating: No

Novato
Percent of map unit: 1 percent
Landform: Salt marshes
Landform position (two-dimensional): Backslope
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Marin County, California
Survey Area Data: Version 14, May 29, 2020

Appendix H

Noise and Vibration Analysis

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat ########
Case Descr 21-11735 Village at Novato

---- Receptor #1 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Residential	Residential	80	70	70

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Compactor (ground)	No	20		83.2	120	0
Excavator	No	40		80.7	120	0
Slurry Trenching Mach	No	50		80.4	120	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Compactor (ground)	75.6	68.6	N/A	N/A	N/A	N/A	N/A
Excavator	73.1	69.1	N/A	N/A	N/A	N/A	N/A
Slurry Trenching Mach	72.8	69.7	N/A	N/A	N/A	N/A	N/A
Total	75.6	74	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Residential	Residential	80	70	70

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Compactor (ground)	No	20		83.2	350	0
Excavator	No	40		80.7	350	0
Slurry Trenching Mach	No	50		80.4	350	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Compactor (ground)	66.3	59.3	N/A	N/A	N/A	N/A	N/A
Excavator	63.8	59.8	N/A	N/A	N/A	N/A	N/A

Slurry Trenching Mach	63.5	60.4	N/A	N/A	N/A	N/A	N/A
Total	66.3	64.7	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #3 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Residential Commercia		85	85	85

Equipment

Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Compactor (ground)	No	20		83.2	205	0
Excavator	No	40		80.7	205	0
Slurry Trenching Mach	No	50		80.4	205	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Compactor (ground)	71	64	N/A	N/A	N/A	N/A	N/A
Excavator	68.5	64.5	N/A	N/A	N/A	N/A	N/A
Slurry Trenching Mach	68.1	65.1	N/A	N/A	N/A	N/A	N/A
Total	71	69.3	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

		Noise Limit Exceedance (dBA)				
	Day		Evening		Night	
Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

		Noise Limit Exceedance (dBA)				
	Day		Evening		Night	
Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

Noise Limit Exceedance (dBA)						
	Day		Evening		Night	
Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

Groundborne Noise and Vibration Modeling

Notes
The reference distance is measured from the nearest anticipated point of construction equipment to the nearest structure.

	Reference Level Inputs			
Equipment	PPV_{ref} (in/sec)	Lv_{ref} (VdB)	RMS_{ref} (in/sec)	Reference Distance
Vibratory Roller	0.21	94	0.050	25
Hoe Ram	0.089	87	0.022	25
Large bulldozer	0.089	87	0.022	25
Caisson drilling	0.089	87	0.022	25
Loaded trucks	0.076	83	0.014	25
Jack hammer	0.035	79	0.009	25
Small bulldozer	0.003	58	0.001	25

	Vibration Level at Receiver			
Equipment	Distance (feet)	PPV_x (in/sec)	Lv_x (VdB)	RMS_x (in/sec)
Vibratory Roller	48	0.1025	88	0.024
Hoe Ram	48	0.0434	81	0.011
Large bulldozer	48	0.0434	81	0.011
Caisson drilling	48	0.0434	81	0.011
Loaded trucks	48	0.0371	77	0.007
Jack hammer	48	0.0171	73	0.004
Small bulldozer	48	0.0015	52	0.000

	Vibration Contours		
	Distance to (feet)		
Equipment	0.200 PPV	72.0 VdB	0.0080 RMS
Vibratory Roller	26	250	133
Hoe Ram	12	120	64
Large bulldozer	12	120	64
Caisson drilling	12	120	64
Loaded trucks	10	79	42
Jack hammer	5	52	28
Small bulldozer	1	6	3

Source
California Department of Transportation (Caltrans). 2013. Transportation and Construction Last Updated: 4/11/2019

Appendix ___

Rincon FHWA Traffic Noise Model

rincon

Model Input

Project Name :	Village at Novato
Project Number :	21-11735
Modeling Condition :	Existing
Ground Type :	Hard
Metric (L_{eq}, L_{dn}, CNEL) :	Ldn

Peak ratio to ADT:	
Traffic Desc. (Peak or ADT) :	ADT

Segment Number	Roadway	Segment		Traffic Volume	Speed (mph)	Distance to Centerline	Vehicle Cassification Mix (%)					24-Hour Traffic Distribution (%)			K-Factor
		From	To				Automobiles	Motorcycles	Bus	Medium Trucks	Heavy Trucks	Day	Evening	Night	
1	Redwood Boulevard	Redwood Boulevard	San Marin Drive-Ather	11,840	45	50	94			3	3	80	5	15	
2	Redwood Boulevard	Redwood Boulevard	Golden Gate Place-Rar	11,210	45	50	94			3	3	80	5	15	
3	Redwood Boulevard	Redwood Boulevard	Olive Avenue	15,180	45	50	94			3	3	80	5	15	
4	Redwood Boulevard	Redwood Boulevard	Vallejo Avenue (west)	5,130	45	50	94			3	3	80	5	15	
5	Redwood Boulevard	Redwood Boulevard	Vallejo Avenue (east)	6,420	45	50	94			3	3	80	5	15	
6	Redwood Boulevard	Redwood Boulevard	Grant avenue	14,950	45	50	94			3	3	80	5	15	

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Model Results

Project Number :	Village at Novato
Modeling Condition :	21-11735
Ground Type :	Existing
Metric (Leq, Ldn, CNEL) :	Ldn

Segment Number	Roadway	Segment		Noise Levels (dB) Ldn					
		From	To	Automobiles	Motorcycles	Bus	Medium Trucks	Heavy Trucks	Total
1	Redwood Boulevard	Redwood Boulevard	San Marin Drive-Ather	66.5	0.0	0.0	58.2	62.9	68.5
2	Redwood Boulevard	Redwood Boulevard	Golden Gate Place-Rar	66.3	0.0	0.0	58.0	62.6	68.3
3	Redwood Boulevard	Redwood Boulevard	Olive Avenue	67.6	0.0	0.0	59.3	63.9	69.6
4	Redwood Boulevard	Redwood Boulevard	Vallejo Avenue (west)	62.9	0.0	0.0	54.6	59.2	64.9
5	Redwood Boulevard	Redwood Boulevard	Vallejo Avenue (east)	63.9	0.0	0.0	55.6	60.2	65.8
6	Redwood Boulevard	Redwood Boulevard	Grant avenue	67.5	0.0	0.0	59.2	63.9	69.5

Distance to Traffic Noise Contours (feet)				
70 dB	65 dB	60 dB	55 dB	50 dB
35	112	354	1,120	3,540
34	106	335	1,060	3,352
45	144	454	1,435	4,539
15	49	153	485	1,534
19	61	192	607	1,920
45	141	447	1,414	4,470

Appendix ___

Rincon FHWA Traffic Noise Model

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Model Input

Project Name :	Village at Novato
Project Number :	21-11735
Modeling Condition :	Existing Plus Project
Ground Type :	Hard
Metric (L_{eq}, L_{dn}, CNEL) :	Ldn

Peak ratio to ADT:	
Traffic Desc. (Peak or ADT) :	ADT

Segment Number	Roadway	Segment		Traffic Volume	Speed (mph)	Distance to Centerline	Vehicle Cassification Mix (%)					24-Hour Traffic Distribution (%)			K-Factor
		From	To				Automobiles	Motorcycles	Bus	Medium Trucks	Heavy Trucks	Day	Evening	Night	
1	Redwood Boulevard	Redwood Boulevard	San Marin Drive-Ather	12,320	45	50	94			3	3	80	5	15	
2	Redwood Boulevard	Redwood Boulevard	Golden Gate Place-Rar	11,690	45	50	94			3	3	80	5	15	
3	Redwood Boulevard	Redwood Boulevard	Olive Avenue	15,630	45	50	94			3	3	80	5	15	
4	Redwood Boulevard	Redwood Boulevard	Vallejo Avenue (west)	5,310	45	50	94			3	3	80	5	15	
5	Redwood Boulevard	Redwood Boulevard	Vallejo Avenue (east)	6,690	45	50	94			3	3	80	5	15	
6	Redwood Boulevard	Redwood Boulevard	Grant avenue	15,250	45	50	94			3	3	80	5	15	

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Model Results

Project Number :	Village at Novato
Modeling Condition :	21-11735
Ground Type :	Existing Plus Project
Metric (Leq, Ldn, CNEL) :	Ldn

Segment Number	Roadway	Segment		Noise Levels (dB) Ldn					
		From	To	Automobiles	Motorcycles	Bus	Medium Trucks	Heavy Trucks	Total
1	Redwood Boulevard	Redwood Boulevard	San Marin Drive-Ather	66.7	0.0	0.0	58.4	63.0	68.7
2	Redwood Boulevard	Redwood Boulevard	Golden Gate Place-Rar	66.5	0.0	0.0	58.2	62.8	68.4
3	Redwood Boulevard	Redwood Boulevard	Olive Avenue	67.7	0.0	0.0	59.4	64.1	69.7
4	Redwood Boulevard	Redwood Boulevard	Vallejo Avenue (west)	63.0	0.0	0.0	54.7	59.4	65.0
5	Redwood Boulevard	Redwood Boulevard	Vallejo Avenue (east)	64.0	0.0	0.0	55.8	60.4	66.0
6	Redwood Boulevard	Redwood Boulevard	Grant avenue	67.6	0.0	0.0	59.3	64.0	69.6

Distance to Traffic Noise Contours (feet)				
70 dB	65 dB	60 dB	55 dB	50 dB
37	116	368	1,165	3,684
35	111	350	1,105	3,496
47	148	467	1,478	4,674
16	50	159	502	1,588
20	63	200	633	2,000
46	144	456	1,442	4,560

Appendix ___

Rincon FHWA Traffic Noise Model

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Model Input

Project Name :	Village at Novato
Project Number :	21-11735
Modeling Condition :	Cumulative
Ground Type :	Hard
Metric (L_{eq}, L_{dn}, CNEL) :	Ldn

Peak ratio to ADT:	
Traffic Desc. (Peak or ADT) :	ADT

Segment Number	Roadway	Segment		Traffic Volume	Speed (mph)	Distance to Centerline	Vehicle Cassification Mix (%)					24-Hour Traffic Distribution (%)			K-Factor
		From	To				Automobiles	Motorcycles	Bus	Medium Trucks	Heavy Trucks	Day	Evening	Night	
1	Redwood Boulevard	Redwood Boulevard	San Marin Drive-Ather	17,110	45	50	94			3	3	80	5	15	
2	Redwood Boulevard	Redwood Boulevard	Golden Gate Place-Rar	16,540	45	50	94			3	3	80	5	15	
3	Redwood Boulevard	Redwood Boulevard	Olive Avenue	19,490	45	50	94			3	3	80	5	15	
4	Redwood Boulevard	Redwood Boulevard	Vallejo Avenue (west)	8,120	45	50	94			3	3	80	5	15	
5	Redwood Boulevard	Redwood Boulevard	Vallejo Avenue (east)	9,180	45	50	94			3	3	80	5	15	
6	Redwood Boulevard	Redwood Boulevard	Grant avenue	21,470	45	50	94			3	3	80	5	15	

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Model Results

Project Number :	Village at Novato
Modeling Condition :	21-11735
Ground Type :	Cumulative
Metric (Leq, Ldn, CNEL) :	Ldn

Segment Number	Roadway	Segment		Noise Levels (dB) Ldn					
		From	To	Automobiles	Motorcycles	Bus	Medium Trucks	Heavy Trucks	Total
1	Redwood Boulevard	Redwood Boulevard	San Marin Drive-Ather	68.1	0.0	0.0	59.8	64.5	70.1
2	Redwood Boulevard	Redwood Boulevard	Golden Gate Place-Rar	68.0	0.0	0.0	59.7	64.3	70.0
3	Redwood Boulevard	Redwood Boulevard	Olive Avenue	68.7	0.0	0.0	60.4	65.0	70.7
4	Redwood Boulevard	Redwood Boulevard	Vallejo Avenue (west)	64.9	0.0	0.0	56.6	61.2	66.9
5	Redwood Boulevard	Redwood Boulevard	Vallejo Avenue (east)	65.4	0.0	0.0	57.1	61.8	67.4
6	Redwood Boulevard	Redwood Boulevard	Grant avenue	69.1	0.0	0.0	60.8	65.5	71.1

Distance to Traffic Noise Contours (feet)				
70 dB	65 dB	60 dB	55 dB	50 dB
51	162	512	1,618	5,116
49	156	495	1,564	4,946
58	184	583	1,843	5,828
24	77	243	768	2,428
27	87	275	868	2,745
64	203	642	2,030	6,420

Appendix ___

Rincon FHWA Traffic Noise Model

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Model Input

Project Name :	Village at Novato		
Project Number :	21-11735		
Modeling Condition :	Cumulative Plus Project		
Ground Type :	Hard	**Peak ratio to ADT:**	
Metric (L_{eq}, L_{dn}, CNEL) :	Ldn	**Traffic Desc. (Peak or ADT) :**	ADT

Segment Number	Roadway	Segment		Traffic Volume	Speed (mph)	Distance to Centerline	Vehicle Cassification Mix (%)					24-Hour Traffic Distribution (%)			K-Factor
		From	To				Automobiles	Motorcycles	Bus	Medium Trucks	Heavy Trucks	Day	Evening	Night	
1	Redwood Boulevard	Redwood Boulevard	San Marin Drive-Ather	17,590	45	50	94			3	3	80	5	15	
2	Redwood Boulevard	Redwood Boulevard	Golden Gate Place-Rar	17,020	45	50	94			3	3	80	5	15	
3	Redwood Boulevard	Redwood Boulevard	Olive Avenue	19,940	45	50	94			3	3	80	5	15	
4	Redwood Boulevard	Redwood Boulevard	Vallejo Avenue (west)	8,300	45	50	94			3	3	80	5	15	
5	Redwood Boulevard	Redwood Boulevard	Vallejo Avenue (east)	9,450	45	50	94			3	3	80	5	15	
6	Redwood Boulevard	Redwood Boulevard	Grant avenue	21,770	45	50	94			3	3	80	5	15	

rincon

Model Results

Project Number :	Village at Novato
Modeling Condition :	21-11735
Ground Type :	Cumulative Plus Project
Metric (Leq, Ldn, CNEL) :	Ldn

Segment Number	Roadway	Segment		Noise Levels (dB) Ldn					
		From	To	Automobiles	Motorcycles	Bus	Medium Trucks	Heavy Trucks	Total
1	Redwood Boulevard	Redwood Boulevard	San Marin Drive-Ather	68.2	0.0	0.0	59.9	64.6	70.2
2	Redwood Boulevard	Redwood Boulevard	Golden Gate Place-Rar	68.1	0.0	0.0	59.8	64.4	70.1
3	Redwood Boulevard	Redwood Boulevard	Olive Avenue	68.8	0.0	0.0	60.5	65.1	70.8
4	Redwood Boulevard	Redwood Boulevard	Vallejo Avenue (west)	65.0	0.0	0.0	56.7	61.3	67.0
5	Redwood Boulevard	Redwood Boulevard	Vallejo Avenue (east)	65.5	0.0	0.0	57.3	61.9	67.5
6	Redwood Boulevard	Redwood Boulevard	Grant avenue	69.2	0.0	0.0	60.9	65.5	71.1

Distance to Traffic Noise Contours (feet)				
70 dB	65 dB	60 dB	55 dB	50 dB
53	166	526	1,663	5,260
51	161	509	1,609	5,089
60	189	596	1,886	5,963
25	78	248	785	2,482
28	89	283	894	2,826
65	206	651	2,059	6,510

Appendix ___

Rincon FHWA Traffic Noise Model

rincon

Model Input

Project Name :	Village at Novato		
Project Number :	21-11735		
Modeling Condition :	Cumulative Plus Project		
Ground Type :	Hard	**Peak ratio to ADT:**	
Metric (L_{eq}, L_{dn}, CNEL) :	Ldn	**Traffic Desc. (Peak or ADT) :**	ADT

Segment Number	Roadway	Segment		Traffic Volume	Speed (mph)	Distance to Centerline	Vehicle Cassification Mix (%)					24-Hour Traffic Distribution (%)			K-Factor
		From	To				Automobiles	Motorcycles	Bus	Medium Trucks	Heavy Trucks	Day	Evening	Night	
1	Redwood Boulevard - Exterior	Grant Avenue	San Marin Dr - Atherto	21,470	45	405	94			3	3	80	5	15	
2	Redwood Boulevard - Interior	Grant Avenue	San Marin Dr - Atherto	21,470	45	110	94			3	3	80	5	15	
3	Olive Avenue - Exterior	1st Street	Railroad Avenue	6,860	25	250	94			3	3	80	5	15	
4	Olive Avenue - Interior	2nd Street	Railroad Avenue	6,860	25	200	94			3	3	80	5	15	

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Model Results

Project Number :	Village at Novato
Modeling Condition :	21-11735
Ground Type :	Cumulative Plus Project
Metric (Leq, Ldn, CNEL) :	Ldn

Segment Number	Roadway	Segment		Noise Levels (dB) Ldn					
		From	To	Automobiles	Motorcycles	Bus	Medium Trucks	Heavy Trucks	Total
1	Redwood Boulevard - Exterior	Grant Avenue	San Marin Dr - Atherto	60.0	0.0	0.0	51.7	56.4	62.0
2	Redwood Boulevard - Interior	Grant Avenue	San Marin Dr - Atherto	65.7	0.0	0.0	57.4	62.0	67.7
3	Olive Avenue - Exterior	1st Street	Railroad Avenue	55.5	0.0	0.0	47.9	53.4	58.1
4	Olive Avenue - Interior	2nd Street	Railroad Avenue	56.5	0.0	0.0	48.8	54.4	59.0

Distance to Traffic Noise Contours (feet)				
70 dB	65 dB	60 dB	55 dB	50 dB
64	203	642	2,030	6,420
64	203	642	2,030	6,420
16	51	160	505	1,598
16	51	160	505	1,598

Redwood Boulevard	Redwood Boulevard	San Marin Drive-Atherton A
Redwood Boulevard	Redwood Boulevard	Golden Gate Place-Ranch
Redwood Boulevard	Redwood Boulevard	Olive Avenue
Redwood Boulevard	Redwood Boulevard	Vallejo Avenue (west)
Redwood Boulevard	Redwood Boulevard	Vallejo Avenue (east)
Redwood Boulevard	Redwood Boulevard	Grant avenue

68.5	68.7	0.2	70.1	70.2	0.1
68.3	68.4	0.2	70.0	70.1	0.1
69.6	69.7	0.1	70.7	70.8	0.1
64.9	65.0	0.1	66.9	67.0	0.1
65.8	66.0	0.2	67.4	67.5	0.1
69.5	69.6	0.1	71.1	71.1	0.1

				K-Factor = figure 2	10
		Segment		**Existing**	
Intersection	**Roadway**	**From**	To	**PM Peak Hour**	**ADT**
1	Redwood Boulevard	Redwood Boulevard	Marin Drive-Atherton Av	1184	11840
2	Redwood Boulevard	Redwood Boulevard	den Gate Place-Ranch D	1121	11210
3	Redwood Boulevard	Redwood Boulevard	Olive Avenue	1518	15180
4	Redwood Boulevard	Redwood Boulevard	Vallejo Avenue (west)	513	5130
5	Redwood Boulevard	Redwood Boulevard	Vallejo Avenue (east)	642	6420
6	Redwood Boulevard	Redwood Boulevard	Grant avenue	1495	14950

figure 2 + 6		figure 4		figure 4 + 6	
Existing Plus Project		**Future Traffic Noise**		**Future Plus Project**	
PM Peak Hour	**ADT**	**PM Peak Hour**	**ADT**	**PM Peak Hour**	**ADT**
1232	12320	1711	17110	1759	17590
1169	11690	1654	16540	1702	17020
1563	15630	1949	19490	1994	19940
531	5310	812	8120	830	8300
669	6690	918	9180	945	9450
1525	15250	2147	21470	2177	21770