PROPOSED MITIGATED NEGATIVE DECLARATION AND INITIAL STUDY

Windsor Estates 3 Subdivision
General Plan Amendment, Rezone, and Tentative Map

Prepared for:

City of Shasta Lake

September 2020

637-01

ENPLAN
3179 Bechelli Lane Suite 100
Redding, CA 96002

PROPOSED MITIGATED NEGATIVE DECLARATION

LEAD AGENCY:	City of Shasta Lake
PROJECT PROPONENT:	Cornerstone Development Group
PROJECT NAME:	**Windsor Estates 3 Subdivision**
PROJECT SUMMARY:	The project includes a Tentative Subdivision Map that would subdivide ±35 net acres into 80 lots. The project also includes a General Plan Amendment for a portion of the property from Light Industrial (IL) to Suburban Residential (SR) and a rezone from Unclassified (U) and Single-Family Residential-12,000 square-foot minimum lot size (R-1-B-12) to Planned Development. Main access to the subdivision would be from Pine Grove Avenue. Chaucer Way in the northern end of Phase 2 of the Windsor Estates Subdivision would be extended to Pine Grove Avenue.
LOCATION:	The project is located within the City of Shasta Lake in Shasta County on the south side of Pine Grove Avenue, generally west of Cascade Boulevard and east of Ashby Road. *See **Figures 1** and **2** of the Initial Study.*

Findings / Determination

As documented in the Initial Study, project implementation could result in loss of forestry resources, increased air emissions, possible effects to special-status wildlife species, disturbance of nesting birds (if present), introduction and spread of noxious weeds during construction, impacts to cultural and tribal cultural resources (if present), unstable soil conditions, disturbance of paleontological resources (if present), increased runoff due to the addition of impervious surfaces, temporarily increased noise and vibration levels, and temporarily increased risk of wildfires.

Design features incorporated into the project would avoid or reduce certain potential environmental impacts, as would compliance with existing regulations and permit conditions. Remaining impacts can be reduced to levels that are less than significant through implementation of the mitigation measures presented in Section 1.11 of the Initial Study. Because the City of Shasta Lake will adopt mitigation measures as conditions of project approval and will be responsible for ensuring their implementation, it has been determined that the project will not have a significant adverse impact on the environment.

Final Mitigated Negative Declaration approved by the City Council of the City of Shasta Lake on _____, 2020, by Resolution _____.

INITIAL STUDY

WINDSOR ESTATES 3 SUBDIVISION

GENERAL PLAN AMENDMENT, REZONE, AND TENTATIVE MAP

CITY OF SHASTA LAKE

LEAD AGENCY:

City of Shasta Lake
P.O. Box 777
Shasta Lake, CA
530.275.7400

PREPARED BY:

ENPLAN
3179 Bechelli Lane, Suite 100
Redding, CA 96002
530.221.0440

September 2020

INITIAL STUDY, WINDSOR ESTATES 3
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Appendix B	Biological Resource Assessment, Mission Hills Subdivision (now Windsor 3 Subdivision). Gallaway Enterprises. 2018.
Appendix C	Tree Inventory, Windsor Estates 3. Sharrah Dunlap Sawyer, 2020.
Appendix D	Geotechnical Investigation Report. Brown & Mills, Inc., 2003. Update to Geotechnical Report. CGI Technical Services, Inc., 2020.
Appendix E	Entitlement Level Storm Drainage Analysis. Sharrah Dunlap Sawyer, 2020.
Appendix F	Environmental Noise Assessment. Bollard Acoustical Consultants, Inc., 2006.
Appendix G	Traffic Impact Study. W-Trans, 2020.

SECTION 1.0 INTRODUCTION

1.1 PROJECT SUMMARY

Project Title:	**Windsor Estates 3 Subdivision**
Lead Agency Name and Address:	**City of Shasta Lake** P.O. Box 777 Shasta Lake, CA 96019
Contact Person and Phone Number:	**Peter Bird, Associate Planner** 530.275.7416
Environmental Consultant:	**ENPLAN** 3179 Bechelli Lane Redding, CA 96002
Project Proponent	**Mike Nadeker** **Cornerstone Development Group** PO Box 71101 Shasta Lake, CA 96019

1.2 PURPOSE OF STUDY

The City of Shasta Lake (City), as Lead Agency, has prepared this Initial Study to provide the general public and interested public agencies with information about the potential environmental impacts of the proposed Windsor Estates 3 Subdivision project (proposed project). Details about the proposed project are included in Section 3.0 (Project Description) of this Initial Study.

This Initial Study has been prepared in accordance with the California Environmental Quality Act (CEQA) of 1970 (as amended), codified in California Public Resources Code (PRC) §21000 et seq., and the State CEQA Guidelines in the Code of Regulations, Title 14, Division 6, Chapter 3. Pursuant to these regulations, this Initial Study identifies potentially significant impacts and, where applicable, includes mitigation measures that would reduce all identified environmental impacts to less-than-significant levels. This Initial Study supports a Mitigated Negative Declaration (MND) pursuant to CEQA Guidelines §15070.

1.3 EVALUATION TERMINOLOGY

The environmental analysis in Section 4.0 is patterned after the Initial Study Checklist recommended in the State CEQA Guidelines. For the evaluation of potential impacts, the questions in the Initial Study Checklist are stated and an answer is provided according to the analysis undertaken as part of the Initial Study. The analysis considers the long-term, direct, indirect, and cumulative impacts of the proposed project. To each question, there are four possible responses:

- **No Impact.** The proposed project will not have any measurable environmental impact on the environment.
- **Less-Than-Significant Impact.** The proposed project has the potential to impact the environment; however, this impact will be below established thresholds of significance.
- **Potentially Significant Impact Unless Mitigation Incorporated.** The proposed project has the potential to generate impacts which may be considered a significant effect on the environment;

however, mitigation measures or changes to the proposed project's physical or operational characteristics can reduce these impacts to levels that are less than significant.

- **Potentially Significant Impact**. The proposed project will have significant impacts on the environment, and additional analysis is required to determine if it is feasible to adopt mitigation measures or project alternatives to reduce these impacts to less than significant levels.

1.4 ORGANIZATION OF THE INITIAL STUDY

This document is organized into the following sections:

Section 1.0: **Introduction:** Describes the purpose, contents, and organization of the document and provides a summary of the proposed project.

Section 2.0: **CEQA Determination:** Identifies the determination of whether impacts associated with development of the proposed project are significant, and what, if any, additional environmental documentation may be required.

Section 3.0: **Project Description:** Includes a detailed description of the proposed project.

Section 4.0: **Environmental Impact Analysis:** Contains the Environmental Checklist from CEQA Guidelines Appendix G with a discussion of potential environmental effects associated with the proposed project. Mitigation measures, if necessary, are noted following each impact discussion.

Section 5.0: **List of Preparers**

Section 6.0: **Abbreviations and Acronyms**

Appendices: Contains information to supplement Section 4.0.

1.5 PROJECT LOCATION

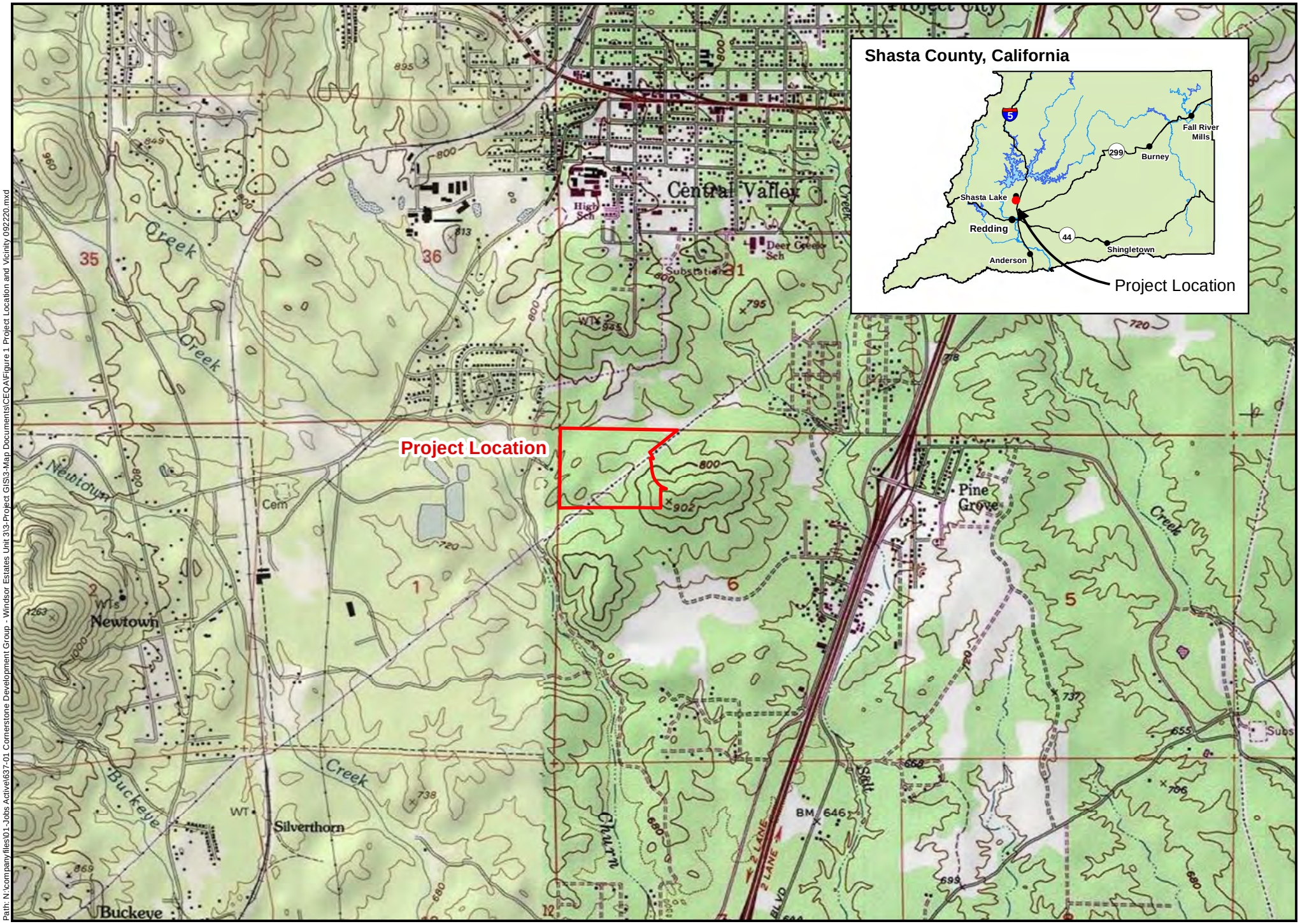
The City of Shasta Lake is located both east and west of Interstate 5 (I-5), generally south of Lake Shasta and north of the City of Redding. As shown in **Figure 1** and **Figure 2**, the project site is located on the south side of Pine Grove Avenue, generally west of Cascade Boulevard and east of Coeur D'Alene Avenue in Section 6, Township 32N, Range 4W, of the U.S. Geological Survey (USGS) Project City 7.5-minute quadrangle; Latitude 40° 39' 50"; Longitude -122° 22' 20" (centroid).

The proposed project would involve all or portions the following Assessor's Parcels (refer to **Figure 2** for parcel locations):

075-010-014, -029, -and -030: These parcels are owned by Cornerstone Development Group and are proposed for residential development.

075-010-029 (north of Pine Grove): This portion of parcel 075-010-029 is located on the north side of Pine Grove Avenue. No development or other action is proposed for this portion of the parcel; it is noted in this document only because it is part of a legal parcel on which development is proposed.

075-010-015: This parcel is owned by the City of Shasta Lake and is part of a planned road corridor between Pine Grove Avenue and Risstay Way. This segment of road would be constructed as part of the proposed project.



Path: N:\company files\01-Jobs Active\637-01 Cornerstone Development Group - Windsor Estates Unit 3\3-Project GIS\3-Map Documents\CEQA\Figure 1 Project Location and Vicinity 092220.mxd

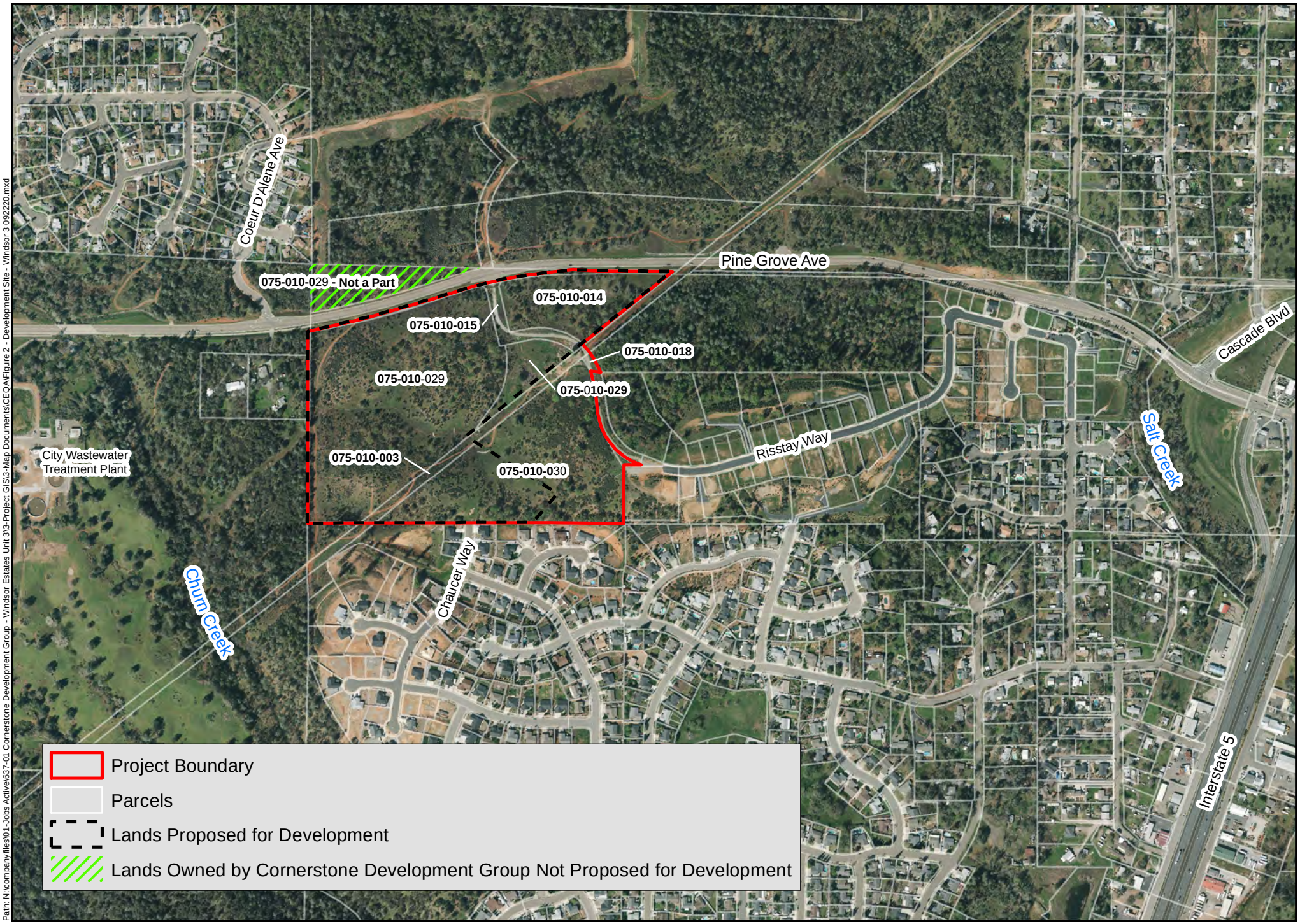
All depictions are approximate. Not a survey product. 09.22.20

Feet
0 2,000

Figure 1

Project Location and Vicinity

ENPLAN



Path: N:\company files\01-Jobs Active\637-01 Cornerstone Development Group - Windsor Estates Unit 3\3-Project GIS\3-Map Documents\CEQA\Figure 2 - Development Site - Windsor 3 092220.mxd

All depictions are approximate. Not a survey product. 09.22.20

0 650 Feet

Figure 2

Project Site

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075-010-018: This parcel is owned by the City of Shasta Lake and is part of a planned road corridor between Pine Grove Avenue and Risstay Way. No development action is proposed for this parcel; however, it is included in the proposed General Plan Amendment and rezoning.

075-010-003: This parcel is owned by Pacific Gas & Electric Company and contains overhead power lines. Roads would be constructed across this parcel and cut/fill slopes would be constructed on the parcel.

For purposes of this Initial Study, "study area" and "project site" shall mean the project footprint, which includes building sites, access roads, driveways, and areas in which utilities and detention basins would be installed. The study area excludes that portion of parcel 075-010-029 located north of Pine Grove Avenue, shown as "Not a Part" on Figure 2.

Coincidentally with the application process for the Project, the Shasta County Assessor's Office modified the Assessor's Parcel Numbers for the project site. The following table should be used as a cross-reference for Assessor's Parcel Numbers that may be cited in this Initial Study and supporting documents.

Current APN	Historic APN
075-010-029	075-010-009, -023, -024
075-010-030	075-010-026

1.6 ENVIRONMENTAL SETTING

General Plan Designations:	Suburban Residential (SR) and Light Industrial (IL). The project includes a General Plan amendment to designate the entire project site as SR (not including the remainder parcel).
Zoning:	Single-Family Residential - 12,000 square-foot minimum (R-1-B-12) and Unclassified (U). The project includes rezoning the entire project site to Planned Development (PD) (not including the remainder parcel).
Surrounding Land Uses:	Properties south of the project site include single-family residences in previous phases of the Windsor Estates Subdivision. Single-family residences in the Deer Creek Manor Subdivision are located to the east. Properties to the west include two single-family residences and the City's Wastewater Treatment Plant. Pine Grove Avenue borders the project site to the north. Properties north of Pine Grove Avenue in the project area include single-family residences in the Coeur D'Alene Avenue Subdivision to the northwest, and undeveloped land to the north. Churn Creek is located ±700 feet west of the project site.
Topography:	Elevations in the project site range between ±750 feet and ±840 feet above mean sea level. The study area is characterized by gently rolling terrain with moderately steep slopes in the southeastern area of the site. The overall topographical gradient slopes gradually downward toward the southwest.
Plant Communities/ Wildlife Habitats:	Natural communities in the project site include stream/riverine, wetland, blue oak-foothill pine (gray pine) woodland, mixed chaparral, and annual grassland. The dominant vegetation community is blue oak woodland; common species include blue oak, gray pine, live oak, and toyon, and occasional black oaks. Mixed chaparral habitat also occurs in the project site and is characterized by common manzanita, buckbrush, poison oak, and the occasional toyon, blue oak, and foothill pine. Stream/riverine habitat includes three ephemeral streams; all three streams flow to Churn Creek, a tributary to the Sacramento River. Wetland features on the project site include three seasonal swales.
Climate:	The study area is characterized by a Mediterranean climate with cool, wet winters and hot, dry summers. The average annual high temperature is about 73 degrees Fahrenheit (°F). The average annual low temperature is about 52° F. Monthly average temperatures range from a high of 95° F in July to a low of 40° F in January. Daily high temperatures commonly exceed 100° F during the summer. Precipitation averages about 65 inches per year.

1.7 TRIBAL CULTURAL RESOURCES CONSULTATION

Assembly Bill (AB) 52 (2014)

Public Resources Code (PRC) §21084.2 (AB 52, 2014) 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."* Pursuant to PRC §21080.3.1, a lead agency is required to consult with a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project if the tribe requested to the lead agency to be informed through formal notification of proposed projects in the area and the tribe responds within 30 days of receipt of the formal notification and requests the consultation.

According to the City, as of August 15, 2020, only one tribe, the Wintu Tribe of Northern California, has requested formal notification of proposed projects in the geographical area.

As discussed in Section 4.5 under Questions A and B, on June 21, 2019, the City sent a letter to the Tribe providing detailed information on the proposed project and describing the AB 52 consultation process. A written response was received from Kelli Hayward on June 26, 2019, stating that the Wintu Tribe would like to engage in formal consultation with the City.

The City met with Ms. Hayward on the project site on February 20, 2020. On March 2, 2020, Ms. Hayward provided written comments to the City and stated that there are recorded Native American villages and sites in the general project area. In addition, due to the presence of waterways in the area, including Churn Creek west of the project site, the likelihood that the Wintu gathered and hunted in the area is high. Ms. Hayward stated that the Tribe feels that a Wintu monitor should be present during earth-disturbing activities. In addition, she recommends that training in identifying cultural resources and treating tribal cultural resources with dignity and respect to the Wintu and their history be provided to all construction workers, project supervisors, developers, and inspectors. As documented in Sections 4.5 (Cultural Resources) and 4.18 (Tribal Cultural Resources), mitigation measures are included to address these concerns.

Therefore, with implementation of the mitigation measures identified in Sections 4.5 and 4.18, the requirements of PRC §21080.3.1 have been satisfied.

Senate Bill (SB) 18 (2004) Traditional Tribal Cultural Places

California Government Code (CGC) §65352.3 (SB 18, 2004) requires local governments to contact tribal organizations identified by the Native American Heritage Commission (NAHC) prior to adopting or amending a general plan or specific plan, and prior to designating open space. The intent of SB 18 is to provide Native American tribes an opportunity to participate in land use decisions for the purpose of protecting or mitigating impacts to Native American cultural resources and sacred sites.

As discussed in Section 4.5 under Questions A and B, to satisfy CGC §65352.3 requirements, the City requested a list of Native American representatives and organizations from the NAHC for purposes of conducting the SB 18 consultation. On October 30, 2019, the City sent comment solicitation letters to the representatives and organizations that were identified by the NAHC.

On November 15, 2019, John Hayward of the Nor-Rel-Muk Wintu Nation responded to the City's letter and stated that the Nor-Rel-Muk Wintu had concerns regarding this project due to past prehistoric activity in the vicinity of the project site. Mr. Hayward requested a monitor for the project. The City spoke with Mr. Hayward in February 2020 and explained that the Wintu Tribe of Northern California expressed similar concerns. Mr. Hayward stated that he was not opposed to the Wintu Tribe providing the Native American monitor. Mr. Hayward did not express any additional concerns or request additional mitigation measures.

Therefore, with implementation of the mitigation measures identified in Sections 4.5 (Cultural Resources) and 4.18 (Tribal Cultural Resources), the requirements of CGC §65352.3 have been satisfied.

1.8 APPLICABLE REGULATIONS

California Subdivision Map Act

The California Subdivision Map Act (SMA) (Government Code §66411-66499 *et seq.*) includes regulations pertaining to the design and improvement of subdivisions, with consideration given to adjoining areas. Because the proposed land division would create 80 lots, a tentative subdivision map and final map are required. Pursuant to §66474 of the SMA, a governing body must deny approval of a tentative map if it makes any of the following findings:

1. That the proposed map is not consistent with applicable general and specific plans as specified in §65451 of the SMA.
2. That the design or improvement of the proposed subdivision is not consistent with applicable general and specific plans.
3. That the site is not physically suitable for the type of development.
4. That the site is not physically suitable for the proposed density of development.
5. That the design of the subdivision or the proposed improvements is likely to cause substantial environmental damage or substantially and avoidably injure fish or wildlife or their habitat.
6. That the design of the subdivision or type of improvements is likely to cause serious public health problems.
7. That the design of the subdivision or the type of improvements will conflict with easements, acquired by the public at large, for access through or use of, property within the proposed subdivision. In this connection, the governing body may approve a map if it finds that alternate easements, for access or for use, will be provided, and that these will be substantially equivalent to ones previously acquired by the public. This subsection shall apply only to easements of record or to easements established by judgment of a court of competent jurisdiction and no authority is hereby granted to a legislative body to determine that the public at large has acquired easements for access through or use of property within the proposed subdivision.

Shasta Lake Municipal Code

Title 16 (Subdivisions)

Shasta Lake Municipal Code (SLMC), Title 16, §16.08.130 states that in addition to the provisions for disapproval of a tentative map contained in the Subdivision Map Act, a map shall be disapproved or deemed to be disapproved if any of the following findings are made:

1. The only practical use of the property included in the proposed subdivision is a use prohibited by law, or the map does not comply with SLMC Chapter 16.08, the Map Act, other applicable provisions of law or with accepted planning or engineering standards;
2. Required rezoning has not been adopted by the city council. If required rezoning has been adopted by the council but is not yet effective when the map is approved, the approval is contingent upon the effectiveness of the rezoning;
3. There is insufficient information upon which to approve the map.

Additionally, SLMC §16.12.060 states that if a soils investigation report has been prepared, the name and registration number of the engineer who prepared it and the date of the report shall be noted on the face of the map. Approval of the map does not constitute approval of the preliminary soils report, soils investigation report or the engineer's statement of soil conditions.

Title 17 (Zoning)

SLMC Title 17, §17.92.080 states that the regulations of any zone district established pursuant to this title may be amended by changing the boundaries of districts, reclassifying land from one district to another district(s), or by changing any other provisions thereof whenever the amendments would further the public necessity, convenience and general welfare.

1.9 REGULATORY REQUIREMENTS

Permits and approvals that may be necessary for construction and operation of the proposed project are identified below.

City of Shasta Lake:

- Approval of a General Plan Amendment for a portion of the property.
- Approval of a Rezone for the entire property.
- Approval of a Tentative Subdivision Map.
- Adoption of a Mitigated Negative Declaration pursuant to CEQA.
- Adoption of a Mitigation Monitoring and Reporting Program for the project that incorporates the mitigation measures identified in this Initial Study.
- Approval of a Grading Permit pursuant to SLMC Chapter 15.08 (Grading, Erosion Control, and Hillside Development), Section 15.08.040 (Permits Required).
- Approval of a Post-Construction Operations and Maintenance Plan in accordance with National Pollution Discharge Elimination System (NPDES) General Permit CAS000004, *Waste Discharge Requirements for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems (MS4)* (Water Quality Order 2013-0001-DWQ, as amended).
- Approval of building permits for construction of the residences.

State Water Resources Control Board (SWRCB)/Central Valley Regional Water Quality Control Board (CVRWQCB):

- Coverage under the NPDES permit for *Discharges of Storm Water Runoff Associated with Construction Activity* (currently Order No. 2009-009-DWQ). Permit coverage may be obtained by submitting a Notice of Intent to the SWRCB. The permitting process requires the development and implementation of an effective Storm Water Pollution Prevention Plan (SWPPP) that includes Best Management Practices (BMPs) to reduce pollutants and any additional controls necessary to meet water quality standards.

1.10 ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED

The environmental factors checked below would be potentially affected by the proposed project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages. Impacts to these resources are evaluated using the checklist included in Section 4.0. The Proposed project was determined to have a less-than-significant impact or no impact without mitigation on unchecked resource areas.

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

1.11 SUMMARY OF MITIGATION MEASURES

The following mitigation measures are proposed to reduce impacts of the proposed project to less than significant levels.

AGRICULTURE AND FORESTRY RESOURCES

Implementation of **MM 4.4.4 and 4.4.5.**

AIR QUALITY

MM 4.3.1 The following measures shall be implemented to avoid/minimize short-term air quality impacts during construction. These measures shall be included on all grading and improvement plans and/or permits.

a. During all construction activities, all architectural coatings applied shall contain a low content of volatile organic compounds (VOC) (i.e., 100 grams/liter) as required by the California Green Building Code or Shasta County AQMD, whichever is more restrictive.

b. All construction equipment shall be maintained and properly tuned in accordance with manufacturers' specifications.

c. All material excavated, stockpiled, or graded shall be sufficiently watered to prevent fugitive dust from leaving the property boundaries and causing a public nuisance or a violation of an ambient air standard. Watering shall occur at least twice daily with complete coverage of the construction area, preferably in the mid-morning and after work is completed each day.

d. All unpaved areas (including unpaved roads) with vehicle traffic shall be watered periodically or have dust palliatives applied for stabilization of dust emissions.

e. All on-site vehicles shall be limited to a speed of 15 miles per hour on unpaved roads.

f. All land clearing, grading, earth-moving, or excavation activities on the project site shall be suspended when sustained winds are expected to exceed 20 miles per hour.

g. All material transported off-site shall be either sufficiently watered or securely covered to prevent a public nuisance.

h. Prior to final occupancy, the applicant shall re-establish ground cover on the construction site through seeding and watering.

i. Off-road construction equipment shall not be left idling for periods longer than 5 minutes when not in use.

j. Trees and other vegetation cleared to accommodate the proposed project shall not be burned onsite and shall be disposed of in another lawful manner (e.g., chipping or mulching), as approved by the City.

BIOLOGICAL RESOURCES

MM 4.4.1 In order to avoid impacts to tree-roosting bats, one of the following measures shall be implemented:

a. Prior to commencement of tree removal, a qualified bat biologist (i.e., an experienced bat biologist holding a California Department of Fish and Wildlife [CDFW] Scientific Collecting Permit) shall conduct a tree habitat assessment to identify trees with suitable bat roosting habitat (e.g., cavities, crevices, exfoliating bark, etc.).

Trees determined to have suitable roosting habitat shall be removed only outside of the maternity season and winter season during the following times, or as otherwise approved/recommended by a qualified bat biologist.

1. Between approximately March 1 (or after evening temperatures rise above 45ºF, and/or no more than ½ " of rainfall within 24 hours occurs), and April 15; or
2. Between approximately September 1 and October 15 (or before evening temperatures fall below 45ºF, and/or more than ½ " of rainfall within 24 hours occurs).

Trees shall be removed using the following two-step process to allow bats the opportunity to abandon the roost prior to tree removal. The two-step removal of bat habitat trees shall be conducted over two consecutive days.

On day 1, non-habitat features (i.e., branches without cavities, crevices, or exfoliating bark) on bat habitat trees, shall be removed by hand (e.g., using chainsaws), and chippers shall be used wherever possible; this will cause a level of noise and vibration disturbance sufficient to cause bats to choose not to return to the tree for a few days after they emerge to forage.

A qualified bat biologist experienced with two-step removal procedures shall instruct and provide initial supervision of tree cutting crews on day 1 so that they do not accidentally remove potential habitat features, which could result in direct mortality of bats.

On the following day, the trees are removed. Any new tree cutting crew members added to the crew shall require instruction and initial supervision by a qualified bat biologist.

b. If trees are removed outside of the time periods described under **MM 4.4.1(a)** above (or a time period otherwise approved/recommended by a qualified bat biologist), the following steps shall be taken prior to tree removal:

A night emergence survey shall be conducted by a qualified bat biologist during acceptable weather conditions (taking into consideration rain, high winds, and night

temperatures) to identify the presence of bats. Alternatively, if conditions allow, the bat biologist shall physically inspect roosts for the presence or absence of bats. The results of the survey shall be submitted to CDFW upon completion.

If no active roosts are found no further action is required. If a roost is determined to be occupied, a suitable non-disturbance buffer, determined by the bat biologist in consultation with CDFW, shall be established until the young are capable of flight, as determined through additional monitoring by a qualified bat biologist.

The survey shall be conducted no more than one week prior to the initiation of tree removal. If tree removal is delayed or suspended for more than one week after the survey, a subsequent survey shall be conducted.

MM 4.4.2 All construction-related activities, including staging, stockpiling of soils, and storage of construction equipment and materials, shall maintain a minimum 50-foot buffer from the upland edge of all wetlands and other waters of the U.S. and State that are outside the project footprint.

The City, in consultation with the California Department of Fish and Wildlife, may approve a smaller buffer. Prior to commencement of any earth disturbance (e.g., clearing, grading, trenching, etc.), a qualified biologist, in consultation with the project engineer, shall delineate the buffer zones with temporary fencing. The buffer areas shall be periodically inspected by a qualified biologist throughout project construction to ensure the fencing is properly maintained.

MM 4.4.3 The following measures shall be implemented to ensure adequate replacement of protected trees (any living tree, except gray pine, having at least one trunk of ten inches or more diameter at breast height):

a. Prior to issuance of a grading permit, a map exhibit depicting the species and size of protected trees proposed for removal shall be provided to the Development Services Director or his/her designee in order to determine tree replacement requirements.

b. Once a determination is made regarding the number of protected trees to be removed, a Tree Replacement Plan shall be prepared by a certified arborist or landscape architect. In order to satisfy the intent of the City's Tree Conservation Ordinance, the Tree Replacement Plan shall prescribe one or a combination of the following measures:

    1. Three fifteen-gallon trees shall be planted on-site for each protected tree removed. This could include tree planting in on-site open space areas, street trees along Pine Grove Avenue, or additional trees planted on individual parcels. The size of a fifteen-gallon replacement tree may be increased to a 24-inch box and count as two replacement trees.

        The Tree Replacement Plan shall identify the species, size, and location of all replacement trees. The replacement trees shall be native trees; and/or

    2. An alternative site(s) within the City limits shall be identified for additional tree planting that is required to satisfy the tree replacement ratio. Alternative sites may include, but are not limited to, local parks, schools, and public rights-of-way; and/or

    3. An in-lieu fee shall be paid to the City to purchase trees that will be planted on public property, such as parks, schools, public rights-of-way, or at other public facilities. The in-lieu fee shall be based on the fair market value of the number of trees required as replacement trees that cannot be accommodated elsewhere; and/or

    4. Deed restrictions shall be recorded to prohibit future development in an area of the property that contains protected trees in proportion to the number of trees proposed

for removal, with credit given for implementation of one or more of the above measures.

Prior to issuance of a grading permit, the Tree Replacement Plan shall be submitted to the Development Services Director or his/her designee for approval. Implementation of the Tree Replacement Plan shall be verified by the City's Building Official in accordance with the Plan (e.g., prior to issuance of a Certificate of Occupancy for a dwelling unit).

MM 4.4.4 Temporary construction fencing shall be installed and maintained at least six feet outside of the dripline of all oak trees to be preserved. The fencing around this "root protection zone" shall be maintained throughout construction.

a. No vehicle parking or materials stockpiling shall occur within the root protection zone.

b. To the extent feasible, no construction activities (including grading, cutting, and trenching), shall occur within the root protection zone. If trenching or other work must occur within the root protection zone, the work shall be completed under the supervision of a certified arborist.

MM 4.4.5 The potential for introduction and spread of noxious weeds shall be avoided/minimized by:

a. Using only certified weed-free erosion control materials, mulch, and seed.

b. Limiting any import or export of fill material to material that is known to be weed free.

c. Requiring the construction contractor to thoroughly wash all equipment at a commercial wash facility prior to entering the job site and upon leaving the job site.

MM 4.4.6 To prevent the inadvertent entrapment of wildlife, the construction contractor shall ensure that at the end of each workday trenches and other excavations that are over one-foot deep have been backfilled or covered with plywood or other hard material. If backfilling or covering is not feasible, one or more wildlife escape ramps constructed of earth fill or wooden planks shall be installed in the open trench.

Pipes shall be inspected for wildlife prior to capping, moving, or placing backfill over the pipes to ensure that animals have not been trapped. If animals have been trapped, they shall be allowed to leave the area unharmed.

MM 4.4.7 In order to avoid impacts to nesting migratory birds and/or raptors protected under the federal Migratory Bird Treaty Act and California Fish and Game Code §3503 and §3503.5, including their nests and eggs, one of the following shall be implemented:

a. Vegetation removal and other ground-disturbance activities associated with construction shall occur between September 1 and January 31 when birds are not nesting; or

b. If vegetation removal or ground disturbance activities occur during the nesting season, a pre-construction nesting survey shall be conducted by a qualified biologist to identify active nests in and adjacent to the work area. The survey shall take into account acoustic impacts and line-of-sight disturbances occurring as a result of the project in order to determine a sufficient survey radius to avoid nesting birds. The results of the survey shall be submitted to the California Department of Fish and Wildlife upon completion. The survey shall be conducted no more than one week prior to the initiation of construction. If construction activities are delayed or suspended for more than one week after the pre-construction survey, the site shall be resurveyed.

If active nests are found, the City of Shasta Lake shall consult with the California Department of Fish and Wildlife and the U.S. Fish and Wildlife Service regarding appropriate action to comply with the Migratory Bird Treaty Act and California Fish and Game Code §3503. Compliance measures may include, but are not limited to,

exclusion buffers, sound-attenuation measures, seasonal work closures based on the known biology and life history of the species identified in the survey, as well as ongoing monitoring by biologists.

CULTURAL RESOURCES

MM 4.5.1 In the event of any inadvertent discovery of cultural resources (i.e., burnt animal bone, midden soils, projectile points or other humanly-modified lithics, historic artifacts, etc.), all work within 50 feet of the find shall be halted until a professional archaeologist can evaluate the significance of the find in accordance with PRC §21083.2(g) and §21084.1, and CEQA Guidelines §15064.5(a). If any find is determined to be significant by the archaeologist, the City shall meet with the archaeologist to determine the appropriate course of action. If necessary, a Treatment Plan prepared by an archeologist outlining recovery of the resource, analysis, and reporting of the find shall be prepared. The Treatment Plan shall be reviewed and approved by the City prior to resuming construction.

MM 4.5.2 Prior to commencement of any earth disturbance (e.g., clearing, grading, trenching, etc.), all construction personnel participating in the earth-disturbing activities and their supervisors shall receive training from a qualified archaeologist and/or Native American representative regarding cultural and tribal cultural resources that may be present in the project site. Representatives from the Wintu Tribe of Northern California & Toyon-Wintu Center shall be given the opportunity to review the training materials and participate in the initial training.

At a minimum, the training shall include a discussion of pertinent laws protecting cultural and tribal cultural resources, examples of resources that could be encountered in the project site, and procedures to be followed if resources are found.

If new personnel are added to the project, the City shall ensure that they receive the mandatory training before starting work. The initial training session may be videotaped and presented to new personnel to satisfy the sensitivity training requirement.

MM 4.5.3 A minimum of one week in advance of any ground-disturbing activities (e.g., tree removal, clearing, grading, trenching, etc.), the Wintu Tribe of Northern California & Toyon-Wintu Center shall be notified and offered the opportunity for a Native American representative to voluntarily monitor ground-disturbing activities.

MM 4.5.4 In the event that cultural resources or human remains of Native American descent are identified during earth disturbance, the Wintu Tribe of Northern California & Toyon Wintu Center shall be requested to provide a Native American monitor to observe subsequent earth-disturbing construction activities on potentially sensitive lands. Costs associated with such Native American monitoring shall be the responsibility of the Developer.

MM 4.5.5 In the event that human remains are encountered during construction activities, the City shall comply with §15064.5 (e) (1) of the CEQA Guidelines and PRC §7050.5. All project-related ground disturbance within 100 feet of the find shall be halted until the County coroner has been notified. If the coroner determines that the remains are Native American, the coroner will notify the NAHC to identify the most likely descendants of the deceased Native Americans. Project-related ground disturbance in the vicinity of the find shall not resume until the process detailed in §15064.5 (e) has been completed.

GEOLOGY AND SOILS

Implementation of **MM 4.9.1.**

MM 4.7.1 Prior to issuance of a grading permit, additional geotechnical testing shall be conducted as recommended in the January 17, 2020, CGI Technical Services, Inc., *Update to Geotechnical Report, Windsor Estates III, Shasta Lake, California.* Testing shall be

conducted by a California registered geotechnical engineer, certified engineering geologist, or other qualified professional approved by the City Engineer or his/her designee.

MM 4.7.2 Prior to issuance of a grading permit, grading/improvement plans and other applicable plans shall be reviewed by a California registered geotechnical engineer, certified engineering geologist, or other qualified professional approved by the City Engineer or his/her designee to ensure that all recommendations included in the January 7, 2003, Brown & Mills, Inc., *Geotechnical Investigation Report, Proposed Residential Subdivision, Deer Creek Manor, Pine Grove Avenue, Shasta Lake, CA* are implemented. Applicable notes shall be placed on the attachment sheet to the improvement plans and in applicable project plans and specifications.

MM 4.7.3 Site earthwork activities shall be monitored by a qualified professional approved by the City Engineer or his/her designee as recommended in the January 7, 2003, Brown & Mills, Inc., *Geotechnical Investigation Report, Proposed Residential Subdivision, Deer Creek Manor, Pine Grove Avenue, Shasta Lake, CA*.

MM 4.7.4 If paleontological resources (fossils) are discovered during construction, all work within a 60-foot radius of the find shall be halted until a professional paleontologist can evaluate the significance of the find. If any find is determined to be significant by the paleontologist, the City shall meet with the paleontologist to determine the appropriate course of action. If necessary, a Treatment Plan prepared by a paleontologist outlining recovery of the resource, analysis, and reporting of the find shall be prepared. The Treatment Plan shall be reviewed and approved by the City prior to resuming construction.

HAZARDS AND HAZARDOUS MATERIALS

MM 4.9.1 If blasting is required, prior to commencement of blasting activities, a Blasting Plan shall be prepared and submitted to the City's Building Official for review and approval to ensure that potential impacts with respect to noise, vibration, safety, and security are adequately addressed. All work shall be conducted under the direct supervision of a blaster holding a current license issued by Cal/OSHA.

The Blasting Plan shall include, at a minimum, the following:

a. Identification of licensed blaster(s) who will be conducting/supervising the work.

b. Plans, drawn to scale, showing blasting locations and distances from neighboring dwelling units and other structures.

c. Identification of type and quantity of explosives, description of detonation devices, and description of the extent and duration of the blasting.

d. Identification of Best Management Practices (e.g., matting or covering the blast area, etc.) that will be implemented to minimize noise and vibration from blasting and prevent structural damage and potential impacts to human health, safety, and the environment from the use of explosives.

e. Procedures for pre-blast and post-blast structural inspections for structures within 300 feet of the blast site.

f. Blasting notification procedures and a list of agencies/entities and potentially affected sensitive receptors to be notified. At a minimum, sensitive receptors within 300 feet of the blast site must be notified a minimum of 24 hours prior to blasting activities.

MM 4.9.2 During construction, all areas in which work will be completed using spark-producing equipment shall be cleared of dried vegetation or other materials that could serve as fire

fuel. To the extent feasible, the contractor shall keep these areas clear of combustible materials in order to maintain a fire break.

HYDROLOGY AND WATER QUALITY

MM 4.10.1 Grading/improvement plans and specifications shall be prepared and signed by a civil engineer or other licensed professional as authorized by the California Business and Professions Code and shall incorporate best management practices (BMPs) to ensure compliance with the *NPDES General Permit for Waste Discharges from Small Municipal Separate Storm Sewer Systems (MS4s)* and Chapter 13.36 (Storm Water Quality Management) of the Shasta Lake Municipal Code.

Temporary and permanent BMPs shall be designed and constructed in accordance with the California Stormwater Quality Association (CASQA) BMP Handbook or equivalent handbook approved by the City. Plans shall be accompanied by an Operations and Maintenance Plan for the ongoing maintenance of post-construction measures in accordance with the Phase II MS4 permit.

Prior to issuance of a grading permit or building permit, the plans and specifications shall be reviewed to ensure compliance with the applicable storm water regulations. In accordance with the Phase II MS4 permit, plan reviewers must be certified as a Qualified Storm Water Pollution Prevention Plan (SWPPP) Developer (QSD), pursuant to a State Water Board-sponsored program.

Prior to issuance of a Certificate of Occupancy, BMPs shall be inspected by a QSD or a certified Qualified SWPPP Practitioner (QSP) as required by the Phase II MS4 permit to ensure that post-construction measures have been implemented.

MM 4.10.2 The final drainage plan shall address the subdivision as a whole and shall address phasing of the subdivision to ensure that adequate detention is provided for each phase of development. The drainage plan shall be prepared by a licensed professional engineer and shall include the following:

a. Pre- and post-construction volume calculations for the 10-, 25-, and 100-year design storm events for each drainage basin; runoff detention requirements shall be met for the three basins flowing to Churn Creek and the one basin flowing to Salt Creek.

b. Verification that the existing detention basin in Phase 2, Unit 5, of the Windsor Estates subdivision has adequate capacity to accommodate flows from the proposed project.

c. Detailed improvement plans for the drainage system, including detention basins, inlets, outlets, storm drain pipes, etc., in accordance with the City's construction standards.

d. Additional information deemed necessary by the City Engineer to ensure that the project does not increase pre-development peak flows for the 10-, 25-, and 100-year design storm events.

NOISE

Implementation of **MM 4.3.1 and MM 4.9.1**

MM 4.13.1 Construction activities shall be limited to between the daytime hours of 7:00 A.M. and 7:00 P.M., Monday through Friday; and 8:00 AM to 5:00 PM on Saturdays. Construction activities shall be prohibited on Sundays and federal/state recognized holidays.

Exceptions to these limitations may be approved by the City Engineer or City Building Official, or their designees, for activities that require interruption of utility services to allow work during low demand periods, or to alleviate traffic congestion and safety hazards.

MM 4.13.2 Construction equipment shall be properly maintained and equipped with noise-reduction intake and exhaust mufflers and engine shrouds, in accordance with manufacturers' recommendations. Equipment engine shrouds shall be closed during equipment operation.

MM 4.13.3 Fixed construction equipment (e.g., compressors and generators) shall be located at the farthest practical distance from nearby residences.

MM 4.13.4 Prior to issuance of a grading permit for Phase 1 or Phase 2 of the subdivision, a qualified acoustical consultant shall review the final traffic study and grading plans to identify locations where a sound wall would be required to ensure compliance with the City's exterior noise level standards. Final improvement plans for the project shall identify the location and height of proposed sound walls. The City's Building Official shall verify that the proposed sound walls are installed in accordance with the final improvement plans.

MM 4.13.5 Prior to issuance of a building permit for any two-story structure adjacent to Pine Grove Avenue, a qualified acoustical consultant shall review the construction plans and identify whether any measures over and above California Building Code and Energy Code requirements are needed to ensure compliance with the City's interior noise standards.

TRANSPORTATION

MM 4.17.1 The following measures shall be implemented to minimize the potential for traffic hazards associated with sight distance:

a. The final improvement plans shall reflect restriping Pine Grove Avenue to include a westbound acceleration lane as recommended in the final W-Trans Traffic Impact Study for the Windsor Estates 3 project.

b. All plant material and signage within a 30-foot triangle at the intersection of Chaucer Way and Pine Grove Avenue shall be no more than two feet in height above the curb level. Trees that are trimmed so that no branches extend lower than six feet above curb level are allowed.

TRIBAL CULTURAL RESOURCES

Implementation of **MM 4.5.2 through MM 4.5.4.**

WILDFIRE

Implementation of **MM 4.9.1** and **MM 4.9.2.**

SECTION 2.0 CEQA DETERMINATION

On the basis of this initial evaluation:

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

☒ **I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION has been 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 significant effect(s) 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, if the effect is a "potentially significant impact" or "potentially significant unless mitigated." An ENVIRONMENTAL IMPACT REPORT Is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier 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.

Peter Bird Digitally signed by Peter Bird
Date: 2020.10.09 09:36:46 -07'00'

_____ _____

Peter Bird Date
Associate Planner

SECTION 3.0 PROJECT DESCRIPTION

3.1 PROJECT COMPONENTS/PHYSICAL IMPROVEMENTS

Cornerstone Development Group, Inc. (Developer), is proposing to subdivide ±52 acres (gross) into 80 lots in order to construct single-family dwelling units and associated accessory structures (see **Figures 3.1-1 and 3.1-2**). A Preliminary Grading Plan is included as **Figure 3.1-3**. Parcel sizes would range from 6,000 square feet (SF) to 16,252 SF. The 2.7-acre parcel on the north side of Pine Grove Avenue is not proposed for development at this time and is identified as a designated remainder. The net acreage of the development site (excluding the remainder parcel, road rights-of-way [ROW], easements, and steep slopes) is 35 acres; thus, the net density of the project is 2.3 dwelling units per acre.

As shown in **Figure 3-1-1**, the project is proposed to be constructed in three phases. It is estimated that installation of utilities, paving of on-site streets, and development of building pads would occur over a three- to four-month period for each phase. The timeframe for home construction would depend on market demands.

The entire project site was designated for residential development at the time the City incorporated in 1993. In 1999, in light of construction of Pine Grove Avenue between Cascade Boulevard and Ashby Road, a portion of the property that fronts Pine Grove Avenue was designated as Industrial Light (IL) to allow for warehousing, distribution, manufacturing, research and development, and similar uses.

Since that time, the City has recognized that industrial uses may not be appropriate along Pine Grove Avenue due to the proximity of existing residential uses (e.g., Windsor Estates, Coeur D'Alene, and Deer Creek Manor Subdivisions), and anticipated mixed-use commercial-residential development projects along Pine Grove Avenue (e.g., the previously proposed Heritage Grove project north/northeast of the project site).

The project includes a General Plan amendment from IL to Suburban Residential (SR) for the lands shown as IL in **Figure 3.1-4** and detailed in **Table 3.1-1**. As indicated, ±2.11 acres is public road and utility ROW that is within the boundaries shown in **Figure 3.1-4**.

Table 3.1-1
Proposed General Plan Amendment from
Light Industrial (IL) to Suburban Residential (SR)

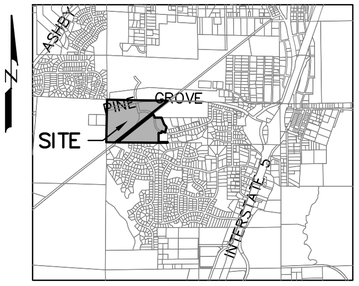
Assessor's Parcel Number	Parcel Size (Acres)
075-010-014	4.89
075-010-023 (portion)	1.2
075-010-024 (portion)	0.64
075-010-026 (portion)	0.13
075-010-003 (portion) *PG&E ROW*	0.9
075-010-015 *City Road ROW*	1.10
075-010-018 *City Road ROW*	0.11
Total Acres	**8.97**

Source: City of Shasta Lake GIS Data. 2020.

LEGEND:

- AREA OF 0–20% SLOPE (36.5 AC)
- AREA OF 20%–30% SLOPE (12.0 AC)
- AREA OF 30% AND GREATER SLOPE (3.5 AC)
- PHASE LINE
- WATERS OF THE U.S. PER DELINEATION FROM GALLAWAY ENTERPRISES DATED OCTOBER 2017

NOTES: EXISTING EASEMENTS SHOWN IN DETAIL ON SHEET 7



SITE MAP
SCALE: NTS

ADJACENT PARCEL OWNERS

1. 007-140-089
CITY OF SHASTA LAKE
P.O. BOX 777
SHASTA LAKE CITY, CA 96019

2. 007-140-079
PG&E
3600 MEADOW VIEW DR
REDDING, CA 96002

3. 075-010-003
PG&E
3600 MEADOW VIEW DR
REDDING, CA 96002

4. 075-610-001
HEATHER L & LARRY J SCOTT
4351 RISSTAY WAY
SHASTA LAKE, CA 96019

5. 075-610-011
GONZALEZ FAMILY REV
TRUST 2002
4301 RISSTAY WAY
SHASTA LAKE, CA 96019

6. 075-010-003
CITY OF SHASTA LAKE
P.O. BOX 777
SHASTA LAKE CITY, CA 96019

7. 075-610-026
MARK A GUNLOGSON JR.
P.O. BOX 493276
REDDING, CA 96049

8. 075-500-023
JAD ASSOCIATES
P.O. BOX 71101
SHASTA LAKE, CA 96079-1101

9. 075-500-022
MICHAEL J & CRYSTAL NADEKER
4335 KENSINGTON DR
SHASTA LAKE, CA 96019-2268

10. 075-500-021
THOMAS KONO
4327 KENSINGTON DR
SHASTA LAKE, CA 96019

11. 075-580-023
CHAD & SARAH M ALWARD
4197 DOYLE CT
SHASTA LAKE, CA 96019

12. 075-580-022
TIMOTHY & BRIDGET ANN DEMATTIO
4185 DOYLE CT
SHASTA LAKE, CA 96019

13. 075-580-021
AMANDA & KARL CARRICK
4173 DOYLE CT
SHASTA LAKE, CA 96019

14. 075-580-020
ALBERT & DIANA WILLOUGHBY
REV TRUST
4159 DOYLE CT
SHASTA LAKE, CA 96019

15. 075-580-019
BILLY RAY HEATHCOCK
4145 DOYLE CT
SHASTA LAKE, CA 96019

16. 075-580-018
SUSAN C EDWARDS FAM TRUST 1998
4137 DOYLE CT
SHASTA LAKE, CA 96019

17. 075-580-012
JOSEPH A WINTER &
MICHELLE M LIOUH
2875 CHAUCER WAY
SHASTA LAKE, CA 96019

18. 075-580-011
KENNETH K & MARGARET E KING
2876 CHAUCER WAY
SHASTA LAKE, CA 96019

19. 075-600-029
CITY OF SHASTA LAKE
P.O. BOX 777
SHASTA LAKE CITY, CA 96019

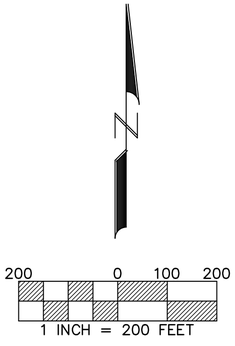
20. 075-600-033
PG&E
3600 MEADOW VIEW DR
REDDING, CA 96002

21. 075-600-032
CITY OF SHASTA LAKE
P.O. BOX 777
SHASTA LAKE CITY, CA 96019

22. 006-910-031
WILLIAM RUSS ETAL
1941 JUAREZ LANE
REDDING, CA 96003

23. 006-910-032
JACLYN CARR
3994 IDAHO WAY
SHASTA LAKE, CA 96019

24. 007-140-083
SHASTA VERDE LAND
DEVELOPMENT INC
5437 DIVERSEY DR
RANCHO PALOS VERDES, CA
90275-1727



BASIS OF BEARINGS:

BEARINGS BASED UPON TWO FOUND MONUMENTS ALONG THE NORTHERLY LINE OF SECTION 6 AS SHOWN ON RECORD MAP, BOOK 22 AT PAGE 57, TAKEN AS SOUTH 88°55'30" EAST

CLIENT:

CORNERSTONE DEVELOPMENT GROUP INC.
P.O. BOX 71101
SHASTA LAKE, CA 96079
530-275-9227

OWNER:

CORNERSTONE DEVELOPMENT GROUP INC.
P.O. BOX 71101
SHASTA LAKE, CA 96079
530-275-9227

ENGINEER:

GREG DUNBAR, P.E., LIC. # 56522
SHARRAH DUNLAP SAWYER, INC.
6590 LOCKHEED DRIVE
REDDING, CA 96002
530-221-1792

SITE DATA

A.P.# 075-010-024, 075-010-014, 075-010-026, 075-010-009, 075-010-023, 075-610-021, 075-010-020, 075-610-022
EXISTING GENERAL PLAN: SR, IL
PROPOSED GENERAL PLAN: SR
EXISTING ZONING: R-1-B-12, UNCLASSIFIED
PROPOSED ZONING: R-1
EXISTING USE: VACANT
PROPOSED USE: 80 LOT RESIDENTIAL SUBDIVISION
GROSS SITE AREA: 52.0 AC
AREA IN PINE GROVE R.O.W.: 2.6 AC
AREA IN REMAINDER: 2.7 AC
AREA IN POWER LINE EASEMENT: 2.4 AC
AREA IN STEEP SLOPE (OUTSIDE OF LOTS AND R.O.W.): 9.3 AC
NET AREA: 35.0 AC
TOTAL PROJECT UNITS: 80
GROSS DENSITY: 1.5 D.U./AC
NET DENSITY: 2.3 D.U./AC
ELECTRICITY: CITY OF SHASTA LAKE
WATER: CITY OF SHASTA LAKE
SEWER: CITY OF SHASTA LAKE
TELEPHONE: AT&T

WINDSOR ESTATES 3 TENTATIVE MAP COVER SHEET

BEING A PORTION OF THE NORTH ½ OF THE NORTHWEST ¼ OF SECTION 6, T. 32N., R. 4W., M.D.M. IN THE CITY OF SHASTA LAKE, SHASTA COUNTY, CALIFORNIA

FOR

CORNERSTONE DEVELOPMENT GROUP, INC.

BY

SHARRAH DUNLAP SAWYER, INC.
Civil Engineering • Land Planning • Surveying & Mapping
Landscape Architecture • Presentation Graphics
6590 Lockheed Drive, Redding, CA 96002
530.221.1792 voice • 530.221.8369 fax • info@sdsengineering.com

DATE: SEPTEMBER 16, 2020 SCALE: 1"=200' SHEET 1 OF 7

LEGEND:

- AREA OF 0–20% SLOPE
- AREA OF 20%–30% SLOPE
- AREA OF 30% AND GREATER SLOPE
- WATERS OF THE U.S. PER DELINEATION FROM GALLAWAY ENTERPRISES DATED OCTOBER 2017

REMAINDER

(E) ROCK–LINED DRAINAGE DITCH

PINE GROVE AVENUE
96' R.O.W.; 48' AC PAVEMENT WIDTH (MIN.)

ENTRY SIGN

20' WIDE INGRESS–EGRESS & UTILITY ESMT PER 747 OR 244 (TO BE ABANDONED)

S88°55'30"E 1929.1'

DET.

ROAD 'A'

ROAD 'B'

RD 'C'

RD 'E'

ROAD 'D'

CHAUCER WAY

25' INGRESS–EGRESS & UTILITY ESMT PER 747 OR 244

DETENTION

S0°22'22"W 1371.2'

UTILITY ESMT PER 3170 OR 321

100' ELECTRIC UTILITY EASEMENT PER 3576 OR 301

60' WIDE AREA OF DEDICATION PER RM 22–57

S51°17'37"W 2135.0'

NOT A PART

S51°17'37"W 1433.6'

60' WIDE AREA OF DEDICATION PER RM 22–57

ROAD 'F'

ROAD 'G'

CHAUCER WAY

NOT A PART

N89°58'57"W 271.6'

LOT NO.	LOT S.F.
1	11,112
2	7,700
3	8,281
4	7,390
5	7,958
6	8,693
7	16,252
8	8,564
9	8,721
10	7,606
11	7,066
12	7,054
13	6,900
14	7,234
15	7,314
16	7,460
17	10,877
18	9,314
19	8,791
20	10,171
21	9,989
22	6,000
23	6,534
24	6,912
25	7,136
26	7,224
27	8,454
28	6,861
29	6,861
30	6,861
31	7,155
32	6,000
33	7,646
34	6,631
35	6,917
36	8,438
37	8,786
38	8,187
39	7,487
40	7,584
41	7,582
42	8,106
43	6,185
44	9,535
45	7,844
46	8,228
47	8,228
48	7,892
49	7,200
50	8,063
51	8,129
52	8,129
53	8,129
54	8,129
55	8,129
56	8,129
57	13,132
58	11,374
59	11,012
60	11,806
61	14,485
62	14,485
63	14,070
64	8,800
65	8,800
66	9,264
67	9,982
68	15,577
69	15,862
70	14,299
71	9,600
72	10,391
73	10,496
74	9,740
75	13,005
76	9,378
77	10,046
78	12,121
79	10,403
80	7,395

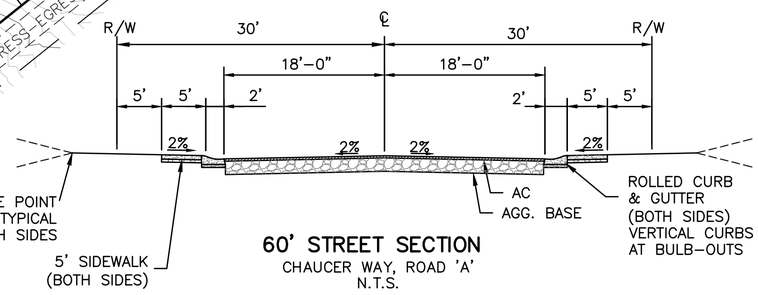
LOT DIM. / LOT DIM. / LOT NO. / LOT S.F.

SETBACKS

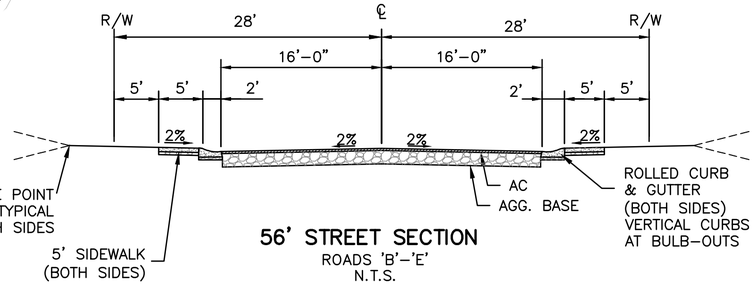
FRONT:	12' (BLDG) 20' (GARAGE)
SIDE:	5' MIN.
CORNER SIDE:	10'
REAR:	15'

20' GARAGE SETBACK
RIGHT–OF–WAY LINE
CENTER LINE

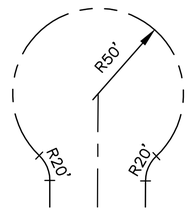
TYPICAL LOT LAYOUT
N.T.S.



60' STREET SECTION
CHAUCER WAY, ROAD 'A'
N.T.S.



56' STREET SECTION
ROADS 'B'–'E'
N.T.S.



TYP. CUL–DE–SAC RIGHT–OF–WAY
N.T.S.

N

100 0 50 100
1 INCH = 100 FEET

WINDSOR ESTATES 3 TENTATIVE SUBDIVISION MAP

BEING A PORTION OF THE NORTH ½ OF THE NORTHWEST ¼ OF SECTION 6, T. 32N., R. 4W., M.D.M. IN THE CITY OF SHASTA LAKE, SHASTA COUNTY, CALIFORNIA

FOR

CORNERSTONE DEVELOPMENT GROUP, INC.

BY

SHARRAH DUNLAP SAWYER, INC.
Civil Engineering • Land Planning • Surveying & Mapping
Landscape Architecture • Presentation Graphics
6590 Lockheed Drive, Redding, CA 96002
530.221.1792 voice • 530.221.8369 fax • info@sdsengineering.com

DATE: SEPTEMBER 16, 2020 SCALE: 1"=100'

REMAINDER

PINE GROVE AVENUE

(E) ROCK-LINED DRAINAGE DITCH

ROAD 'A'

ROAD 'B'

ROAD 'C'

ROAD 'D'

ROAD 'E'

ROAD 'F'

ROAD 'G'

CHAUCER WAY

DETENTION 741.0

DETENTION FACILITY

BOTTOM ELEVATION 740.0

DAYLIGHT

WALL (HEIGHT VARIES)

PROPOSED FREE SPAN

NOT A PART

NOTES: ALL SECTIONS OF ROADWAY WITH GRADES GREATER THAN 8% ARE LESS THAN 500 FEET IN LENGTH.

SOME EXISTING EASEMENTS ARE NOT SHOWN FOR CLARITY PURPOSES. ALL EXISTING EASEMENTS SHOWN ON SHEET 7

100 0 50 100
1 INCH = 100 FEET

LEGEND:

- AREA OF 0-20% SLOPE
- AREA OF 20%-30% SLOPE
- AREA OF 30% AND GREATER SLOPE
- WATERS OF THE U.S. PER DELINEATION FROM GALLAWAY ENTERPRISES DATED OCTOBER 2017
- PROPOSED SLOPES (2:1 UNLESS NOTED OTHERWISE)
- PROPOSED STORM DRAIN PIPE & CATCH BASIN
- EXISTING STORM DRAIN PIPE
- EXISTING TREE TO REMAIN
- EXISTING TREE TO BE REMOVED

MS4 PERMIT COMPLIANCE:
THE PROJECT WILL BE DESIGNED TO INCORPORATE LOW IMPACT DEVELOPMENT (LID) SITE DESIGN MEASURES AND HAVE STORM WATER TREATMENT MEASURES INCORPORATED INTO THE STORM DRAIN SYSTEM DESIGN IN ACCORDANCE WITH THE CITY OF SHASTA LAKE'S PHASE II MS4 PERMIT. THE CALIFORNIA PHASE II LID SIZING TOOL WILL BE USED TO DETERMINE THE REQUIRED AREA OF LID BEST MANAGEMENT PRACTICES (BMPS) TO BE IMPLEMENTED ON THE PROJECT. THE APPROPRIATE LID BMPS WILL BE INCORPORATED INTO THE PROJECT AS THE PROJECT CONDITIONS ALLOW IN ORDER TO COMPLY WITH THE CITY OF SHASTA LAKE'S MS4 REQUIREMENTS. THE FOLLOWING SITE DESIGN MEASURES AND STORM WATER TREATMENT MEASURES WILL BE CONSIDERED FOR THE PROJECT:

- AMENDED SOIL STRIPS
- AMENDED SOIL SWALES
- CAPTURE AND USE STORAGE
- INFILTRATION BASINS
- INFILTRATION GALLERIES
- INFILTRATION TRENCHES
- OVERLAND FLOW (PRESERVATION OF EXISTING VEGETATION)

WINDSOR ESTATES 3 PRELIMINARY GRADING PLAN

BEING A PORTION OF THE NORTH ½ OF THE NORTHWEST ¼ OF SECTION 6, T. 32N., R. 4W., M.D.M. IN THE CITY OF SHASTA LAKE, SHASTA COUNTY, CALIFORNIA

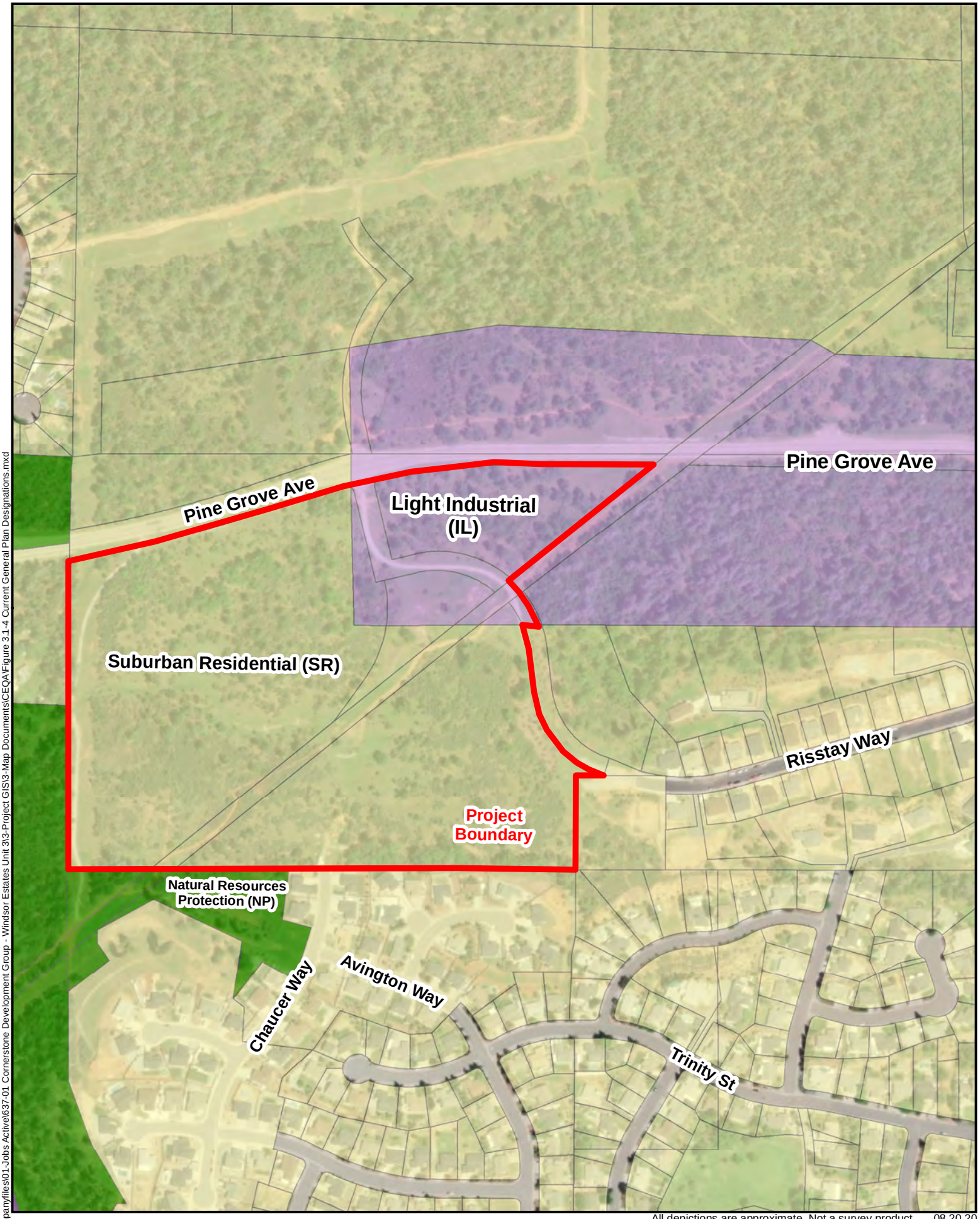
FOR

CORNERSTONE DEVELOPMENT GROUP, INC.

BY

SHARRAH DUNLAP SAWYER, INC.
Civil Engineering • Land Planning • Surveying & Mapping
Landscape Architecture • Presentation Graphics
6590 Lockheed Drive, Redding, CA 96002
530.221.1792 voice • 530.221.8369 fax • info@sdsengineering.com

DATE: SEPTEMBER 16, 2020 SCALE: 1"=100'



Path: N:\companyfiles\01-Jobs Active\637-01 Cornerstone Development Group - Windsor Estates Unit 3\3-Project GIS\3-Map Documents\CEQA\Figure 3.1-4 Current General Plan Designations.mxd

0 400 Feet

All depictions are approximate. Not a survey product. 08.20.20

Figure 3.1-4

Current General Plan Designations

ENPLAN

The project also includes a rezone of the project site. Because the remainder parcel on the north side of Pine Grove Avenue is not proposed for development, it is not included in the rezone. The current zoning designations are shown in shown in **Figure 3.1-5**.

The City has determined that the project site will be rezoned to Planned Development (PD) in accordance with SLMC Chapter 17.62. Pursuant to SLMC §17.62.040, prior to approval of the PD Zone by the City Council, the applicant must submit the following: *"a conceptual development plan for the project site showing the approximate locations of buildings, building elevations, roads, walkways, parking and landscaping, the proposed uses of the buildings and grounds, staging of the development and other information which the development services director or his or her designee may require to properly evaluate and process the application."*

In accordance with SLMC §17.62.050, prior to commencement of construction of any dwelling unit, *"detailed plans shall be submitted to the development services director or his or her designee for checking and approval to ensure reasonably close conformity with the approved conceptual development plans…".*

As shown in **Figure 3.1-2**, main access to the subdivision would be from Pine Grove Avenue. Chaucer Way in the northern end of Phase 2 of the Windsor Estates Subdivision would be extended to Pine Grove Avenue and would be constructed in accordance with City standards for a residential collector street (60-foot ROW, with two 18-foot driving lanes, and curbs, gutters, and sidewalks on both sides of the street). The remainder of the streets in the subdivision would be constructed as residential local streets (56-foot ROW, with two 16-foot driving lanes, and curbs, gutters, and sidewalks on both sides of the streets).

A sound wall along Pine Grove Avenue would be constructed to ensure compliance with the City's noise standards. The existing separated sidewalk along Pine Grove Avenue, west of the project site, would be extended along the property's frontage. Landscaping, including street trees, would be planted adjacent to the sidewalk in accordance with City requirements. Utility infrastructure (water, sewer, electric, natural gas, and telephone) would be extended to the project site from Pine Grove Avenue and/or the existing terminus of Chaucer Way. Two detention basins would be provided to control runoff during storm events (see discussion in Section 4.10).

Construction activities would include clearing, grading, excavation, trenching, underground utility installation, road paving and striping, and construction of dwelling units. It is anticipated that all work associated with initial site work, installation of utilities, construction of streets, and development of building pads, would be conducted using conventional construction equipment (e.g., excavators, scrapers, graders, dozers, backhoes, forklifts, cranes, paving equipment, etc.). Construction of dwelling units would occur using conventional construction methods. Staging for construction equipment and materials would occur on the project site.

Path: N:\companyfiles\01-Jobs Active\637-01 Cornerstone Development Group - Windsor Estates Unit 3\3-Project GIS\3-Map Documents\CEQA\Figure 3.1-5 - Current Zoning.mxd

All depictions are approximate. Not a survey product. 08.20.20

0 350 Feet

Figure 3.1-5

Current Zoning

ENPLAN

SECTION 4.0 ENVIRONMENTAL IMPACT ANALYSIS

4.1 AESTHETICS

Except as provided in Public Resources Code §21099 (Transit-Oriented Infill Projects), would the project:

Issues and Supporting Evidence	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
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 day or nighttime views in the area?	☐	☐	☒	☐

REGULATORY CONTEXT

FEDERAL

There are no federal regulations pertaining to aesthetics that apply to the proposed project.

STATE

California Scenic Highway Program

The California Scenic Highway Program, administered by the California Department of Transportation (Caltrans), was established in 1963 to preserve and protect the natural beauty of scenic highway corridors in the State. The Scenic Highway System includes a list of highways that have been designated as scenic highways as well as a list of highways that are eligible for designation as scenic highways.

LOCAL

City of Shasta Lake

The Shasta Lake General Plan includes the following implementation measures that apply to the proposed project:

Circulation and Noise Elements		
Implementation Measures:	C-(17)	As part of the development review process, include consideration of the visual aspects of a development from roadways. Aesthetic consideration shall include architectural compatibility and landscaping. Development review will include visibility requirements at intersections.

N-(6) Encourage noise attenuation programs that avoid visible sound walls, where practical. Open space, parking, accessory buildings, frontage roads, and landscaping can be used to buffer development from noise.

Shasta Lake Municipal Code (SLMC) Chapter 17.30 (One-Family Residential District), §17.30.060 includes site development standards that apply to new construction of single-family residences (e.g., setbacks, height limitations, parking). In addition, SLMC Chapter 17.84 includes standards for landscaping, lighting, etc.). Section 17.84.050 states: *"All lighting, exterior and interior, shall be designed and located so as to confine direct lighting to the premises. A light source shall not shine upon or illuminate directly on any surface other than the area required to be lighted. No lighting shall be of the type or in a location such that constitutes a hazard to vehicular traffic, either on private property or on abutting streets."*

DISCUSSION OF IMPACTS

Questions A and C

Scenic vistas are defined as expansive views of highly valued landscapes from publicly accessible viewpoints. Scenic vistas include views of natural features such as mountains, hills, valleys, water courses, outcrops, and natural vegetation, as well as man-made scenic structures. According to the Shasta Lake General Plan, there are no designated scenic vistas in the area.

Scenic resources in the study area include trees and other vegetation, streams, and open space. Portions of the project site are visible to individuals living in the Windsor Estates Subdivision (mainly on Doyle Court and the northern end of Chaucer Way). In addition, portions of the project site are visible from the western area of the Deer Creek Manor Subdivision. The site is also visible to travelers on Pine Grove Avenue and Chaucer Way.

The proposed project would have short-term visual impacts due to clearing, grading, trenching, paving, and staging of construction equipment and materials associated with installation of streets, sidewalks, utility infrastructure, storm drain/detention facilities, and Pine Grove Avenue frontage improvements (i.e., sidewalk, landscaping). Construction-related visual impacts would also occur during construction of dwelling units. However, these impacts are temporary and would cease at the end of construction.

Project components that have the potential to result in long-term visual impacts include single-family dwellings, and an earthen berm and/or sound wall along Pine Grove Avenue. In addition, the removal of mature trees from the project site would result in long-term impacts.

As stated under Regulatory Context, Implementation Measure N-(6) of the City's General Plan encourages noise attenuation that avoids visible sound walls where practical and states that open space, parking, accessory buildings, frontage roads, and landscaping also can be used to buffer development from noise in certain circumstances.

Due to the proximity of some of the parcels to Pine Grove Avenue (parcels 1 and 7 through 14), an earthen berm at a height adequate to provide sufficient noise attenuation is not feasible because noise berms occupy more space than a sound wall. In addition, according to the Caltrans Technical Noise Supplement (2013), trees, shrubs, and other vegetation do not provide effective noise attenuation unless they are dense and thick (e.g., 100 feet of dense forest or 100 horizontal feet of tall grass and thick shrubbery; therefore, use of landscaping would not be sufficient to provide adequate noise attenuation from traffic noise on Pine Grove Avenue (see Section 4.13, Noise).

The proposed sound wall would be similar in character to the existing sound wall along Pine Grove Avenue that was installed to provide noise attenuation for properties in the Deer Creek Manor Subdivision; installation of a separated sidewalk and landscaping sufficient to screen the sound wall would be included (see **Photo 4.1-1**).

Photo 4.1-1. Sound wall, separated sidewalk, and landscaping along Pine Grove Avenue.

The architectural style of dwellings is anticipated to be similar to homes recently developed in the Windsor Estates and Deer Creek Manor Subdivisions. As stated in Section 3.1, the City has determined that the project site will be rezoned to Planned Development (PD) in accordance with SLMC Chapter 17.62. Prior to approval of the PD Zone by the City Council, a conceptual development plan for the project site will be prepared and will include building elevations and development standards (e.g., building setbacks, maximum structural height, landscaping, etc.). The City's Development Services Director or his/her designee is responsible for ensuring compliance with the zoning standards prior to issuance of a building permit.

SLMC Section 12.36.070 includes tree planting standards for new development. Three 15-gallon trees must be planted on each residential parcel within a subdivision. In addition, mitigation for the removal of protected trees is required (see **MM 4.4.5**). Although **MM 4.4.5** provides flexibility and allows off-site tree planting, payment of in-lieu fees, or recordation of deed restrictions to prohibit future development of specific areas of the project site, the Developer would include tree planting along Pine Grove Avenue and additional tree planting on individual lots to satisfy **MM 4.4.5** (see discussion in Section 4.4 under Questions B and C).

Therefore, the proposed project would not substantially degrade the existing visual character or quality of public views of the site, and would not conflict with applicable zoning regulations governing scenic quality; impacts would be less than significant.

Question B

The nearest officially designated State Scenic Highway is Route 151 (Shasta Dam Boulevard), located approximately 2.4 miles northwest of the project area. The scenic route commences at the intersection of SR 151 and Lake Boulevard and continues to Shasta Dam. The proposed project would not be visible from the scenic route. Therefore, the proposed project would have no impact to scenic resources within a designated State Scenic Highway.

Question D

New sources of light and glare associated with the proposed project include exterior lighting for homes and landscaped areas, street lights, and windows. If not designed properly, the proposed project has the potential to degrade existing dark night sky conditions by introducing new sources of light and glare into the area. As stated under Regulatory Context above, SLMC §17.84.050 includes standards for exterior and interior lighting to ensure that light sources are confined to the area required to be lighted, and to ensure that lighting does not result in hazards to motor vehicles.

It is the responsibility of the City's Building Official to review construction plans and confirm compliance with the City's lighting requirements. Compliance with existing City regulations regarding lighting will ensure that the proposed project does not adversely affect day or nighttime views in the area; therefore, impacts would be less than significant and no mitigation is necessary.

CUMULATIVE IMPACTS

Potential cumulative projects in the area include growth according to the build-out projections in the City's General Plan. The proposed project would have short-term visual impacts due to clearing, trenching, grading, and staging of construction equipment and materials. Construction-related visual impacts would also occur during construction of dwelling units. However, these impacts are temporary and would cease at the end of construction.

All projects in the City also must comply with the City's site development standards and general development standards. The City's Building Official is responsible for ensuring compliance with the applicable standards prior to issuance of a building permit. In addition, all development projects in the City are subject to the City's tree planting and tree replacement requirements. Compliance with applicable development standards and tree planting and replacement requirements would ensure that the proposed project's aesthetic impacts would not be cumulatively considerable.

MITIGATION

None necessary.

DOCUMENTATION

California Department of Transportation. 2017. California State Scenic Highway Mapping System. Shasta County. https://dot.ca.gov/programs/design/lap-landscape-architecture-and-community-livability/lap-liv-i-scenic-highways. Accessed October 2019.

City of Shasta Lake. 1999. City of Shasta Lake General Plan. http://www.cityofshastalake.org/documentcenter/view/115. Accessed July 2019.

_____. 2020. City of Shasta Lake Municipal Code. https://library.municode.com/ca/shasta_lake/codes/code_of_ordinances. Accessed July 2019.

4.2 AGRICULTURE AND FOREST RESOURCES

Would the project:

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

REGULATORY CONTEXT

There are no federal or local regulations pertaining to agriculture or forest resources that apply to the proposed project.

STATE

California Farmland Mapping and Monitoring Program (FMMP)

Under the FMMP, the Department of Conservation (DOC) is responsible for mapping, monitoring, and reporting on the conversion of the State's farmland to and from agricultural use. The following mapping categories, which are determined based on soil qualities and current land use information, are included in the FMMP: prime farmland, farmland of statewide importance, unique farmland, farmland of local importance, grazing land, urban and built-up land, other land, and water.

Williamson Act

The Williamson Act (California Land Conservation Act of 1965) was enacted as a means to protect agricultural uses in the State. Under the Williamson Act, local governments can enter into contracts with private landowners to ensure that specific parcels are restricted to agricultural and related open space uses. In return, landowners receive reduced property tax assessments.

Z'berg-Nejedly Forest Practice Act of 1973

Timberland in California is managed under the provisions of the Z'Berg-Nejedly Forest Practice Act (Public Resources Code §4511 *et seq.*). PRC §4526 defines timberland as *"land, other than land owned by the federal government, which is available for, and capable of, growing a crop of trees of any commercial species used to produce lumber and other forest products, including Christmas trees."*

CAL FIRE has oversight responsibility for private forest and timberland in the State. When a private landowner converts timberland to non-timber uses (agricultural, residential, commercial, etc.), the owner must file a Timberland Conversion Permit with CAL FIRE. In addition, a timber harvest permit from CAL FIRE is required for tree cutting on private property in the following circumstance:

1. The land meets the definition of timberland pursuant to PRC §4526 **AND**
2. The trees are sold, traded, bartered, or exchanged; **OR** the area in which the trees were cut is developed with another use (e.g., house, commercial/industrial building, vineyard, etc.).

With certain limitations, some types of timber operations are exempt from the requirement to prepare a THP (e.g., harvesting dead, dying, or diseased trees, removing trees to eliminate fire fuels within 150 feet of an existing structure, etc.). A Conversion Exemption is provided for areas less than three acres.

California Timberland Productivity Act of 1982

The Timberland Productivity Act (Government Code §51104) defines timberland as privately-owned land, or land acquired for state forest purposes, which is devoted to and used for growing and harvesting timber, and which is capable of growing an average annual volume of wood fiber of at least 15 cubic feet per acre. The Act established Timberland Production Zones (TPZ) for the purpose of discouraging the premature conversion of timberland to other uses.

California Forest Legacy Program Act of 2007

The California Forest Legacy Program Act (PRC §12220) was developed to recognize the importance of California forest lands and provide a means to allow the State and owners of private forest lands to enter into conservation easements that restrict development, with compensation from the State. The Act defines forest land as *"land that can support 10% native tree cover of any species, including hardwoods, under natural conditions, and that allows for management of one or more forest resources, including timber, aesthetics, fish and wildlife, biodiversity, water quality, recreation, and other public benefits."*

DISCUSSION OF IMPACTS

Questions A, B, and D

According to the *Important Farmland in California* map published by the FMMP, areas in which improvements would occur are not designated as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance and are not subject to a Williamson Act contract. According to the City's Zoning Code, the project site is not zoned for agricultural use. In addition, no properties in the project area are in agricultural use. Therefore, the proposed project would have no impact on farmland, either directly or indirectly.

Question C

According to the City's General Plan and Zoning Code, there are no Timberland Production Zones in the City. As stated under Regulatory Context, timberland is defined as *"land, other than land owned by the federal government, which is available for, and capable of, growing a crop of trees of any commercial species used to produce lumber and other forest products, including Christmas trees."*

According to CAL FIRE, in Shasta County, commercial timber species include, but are not limited to, the following "Group A" species: sugar pine, coast redwood, ponderosa pine, Jeffrey pine, western white pine, lodgepole pine, white fir, California red fir, noble fir, Douglas fir, incense-cedar, and Port Orford cedar (CAL FIRE, 2019). In addition, the following "Group B" species may be considered commercial species if they are found on lands where the Group A species are growing naturally, or have grown naturally in the past: knobcone pine, gray pine, California black oak, Oregon white oak, tanoak, mountain hemlock, Brewer spruce, Englemann spruce, Sierra redwood, golden chinkapin, foxtail pine, white alder, Monterey pine, Pacific madrone, California laurel, and western juniper. As stated in Section 1.6, tree species in the project site include blue oak, gray pine, live oak, and black oak, which do not fall within the definition of timberland.

As stated under Regulatory Context above, "forest land" is defined in PRC §12220(g) as land that can support 10 percent native tree cover of any species, including hardwoods, under natural conditions, and that allows for management of one or more forest resources, including timber, aesthetics, fish and wildlife, biodiversity, water quality, recreation, and other public benefits. The project site supports 10 percent tree cover under natural conditions and provides wildlife habitat and biodiversity; thus, the project site meets the definition of forest land. The loss of native trees on the project site would be considered a significant impact, and mitigation is required.

As discussed in Section 4.4 (Biological Resources), **Mitigation Measures (MM) 4.4.4 and MM 4.4.5** are included to offset direct impacts to trees and minimize the potential for indirect impacts. With implementation of these measures, the project's impact on forest land, as defined by PRC §12220(g), is less than significant.

CUMULATIVE IMPACTS

As documented above, the proposed project would not result in impacts to agricultural resources or timberland; therefore, the proposed project would not contribute to adverse cumulative impacts to agricultural or timberland resources.

The proposed project and cumulative projects in the City are required to comply with the City's tree conservation requirements. All new development projects must include a tree removal and replacement plan to mitigate for the removal of protected trees. With implementation of **MM 4.4.4** and **MM 4.4.5** the project's cumulative impact on forest land is less than significant.

MITIGATION

Implementation of **MM 4.4.4 and 4.4.5.**

DOCUMENTATION

California Department of Conservation. Important Farmland Finder. https://maps.conservation.ca.gov/dlrp/ciff/. Accessed March 2020.

California Department of Forestry and Fire Protection. 2020. California Forest Practice Rules. https://bof.fire.ca.gov/media/9478/2020-forest-practice-rules-and-act_final_ada.pdf. Accessed March 2020.

4.3 AIR QUALITY

Would the project:

Issues and Supporting Evidence	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
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 in 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?	☐	☐	☒	☐

REGULATORY CONTEXT

FEDERAL

Federal Ambient Air Quality Standards

The U.S. Environmental Protection Agency (USEPA), under the federal Clean Air Act (CAA), establishes maximum ambient concentrations for criteria air pollutants (CAP), known as the National Ambient Air Quality Standards (NAAQSs). The NAAQSs are designed to protect the health and welfare of the populace with a reasonable margin of safety. **Table 4.3-1** identifies the seven CAPs as well as characteristics, health effects and typical sources for each CAP:

TABLE 4.3-1
Federal Criteria Air Pollutants

Pollutant	Characteristics	Primary Effects	Major Sources
Ozone (O_3)	Ozone is a colorless or bluish gas formed through chemical reactions between two major classes of air pollutants: reactive organic gases (ROG) and oxides of nitrogen (NO_X). These reactions are stimulated by sunlight and temperature; thus, ozone occurs in higher concentrations during warmer times of the year.	• Respiratory symptoms. • Worsening of lung disease leading to premature death. • Damage to lung tissue. • Crop, forest, and ecosystem damage. • Damage to a variety of materials, including rubber, plastics, fabrics, paints, and metals.	Motor vehicle exhaust, industrial emissions, gasoline storage and transport, solvents, paints, and landfills.
Carbon Monoxide (CO)	Carbon monoxide is an odorless, colorless gas produced by the incomplete combustion of carbon-containing fuels, such as gasoline and wood. Because CO is emitted directly from internal combustion engines, motor vehicles operating at slow speeds are the primary source of carbon monoxide.	• Chest pain in patients with heart disease. • Headache. • Light-headedness. • Reduced mental alertness.	Motor vehicle exhaust, combustion of fuels, combustion of wood in woodstoves and fireplaces.
Nitrogen Dioxide (NO_2)	Nitrogen dioxide is a reddish-brown gas formed when nitrogen (N_2) combines with oxygen (O_2). Nitrogen oxides are typically created during combustion processes and are major contributors to smog formation and acid deposition. Of the seven types of nitrogen oxide compounds, NO_2 is the most abundant in the atmosphere and is related to traffic density.	• Respiratory symptoms. • Damage to lung tissue. • Worsening of cardiovascular disease. • Precursor to ozone and acid rain. • Contributes to global warming and nutrient overloading which deteriorates water quality. • Causes brown discoloration of the atmosphere.	Automobile and diesel truck exhaust, petroleum-refining operations, industrial sources, aircraft, ships, railroads, and fossil-fueled power plants.

Pollutant	Characteristics	Primary Effects	Major Sources
Sulfur Dioxide (SO_2)	Sulfur dioxide is a colorless, nonflammable gas that results mainly from burning high-sulfur-content fuel oils and coal and from chemical processes occurring at chemical plants and refineries.	• Respiratory symptoms. • Worsening of cardiovascular disease. • Damage to a variety of materials, including marble, iron, and steel. • Damages crops and natural vegetation. • Impairs visibility. • Precursor to acid rain.	Petroleum refineries, cement manufacturing, metal processing facilities, locomotives, and large ships, and fuel combustion in diesel engines.
Particulate Matter ($PM_{2.5}$ and PM_{10})	Particulate matter is a major air pollutant consisting of tiny solid or liquid particles of soot, dust, smoke, fumes, and aerosols that are small enough to remain suspended in the air for a long period of time. Particulate matter with a diameter of 10 microns or less (PM_{10}) is inhalable into the lungs and can induce adverse health effects. Fine particulate matter is defined as particles that are 2.5 microns or less in diameter ($PM_{2.5}$). Therefore, $PM_{2.5}$ comprises a portion of PM_{10}.	• Premature death. • Hospitalization for worsening of cardiovascular disease. • Hospitalization for respiratory disease • Asthma-related emergency room visits. • Increased symptoms, increased inhaler usage	Dust- and fume-producing construction activities, power plants, steel mills, chemical plants, unpaved roads and parking lots, woodburning stoves and fireplaces, wildfires, motor vehicles, and other combustion sources. Also a result of photochemical processes.
Lead	A heavy metal that occurs both naturally in the environment and in manufactured products.	• Impaired mental functioning in children • Learning disabilities in children • Brain and kidney damage. • Reproductive disorders. • Osteoporosis.	Lead-based industrial production (e.g., battery production and smelters), recycling facilities, combustion of leaded aviation gasoline by piston-driven aircraft, and crustal weathering of soils followed by fugitive dust emissions.

STATE

State Ambient Air Quality Standards

The California Clean Air Act (CAA) establishes maximum concentrations for the seven federal CAPs, as well as the four additional air pollutants identified below. The four additional standards are intended to address regional air quality conditions, not project-specific emissions. These maximum concentrations are known as the California Ambient Air Quality Standards (CAAQSs). The California Air Resources Board (CARB) has jurisdiction over local air districts and has established its own standards and violation criteria for each CAP under the CAAQS. For areas within the State that have not attained air quality standards, the CARB works with local air districts to develop and implement attainment plans to obtain compliance with both federal and State air quality standards.

Visibility-Reducing Particles. Visibility-reducing particles come from a variety of natural and manmade sources. Major sources include wildfires, residential fireplaces and woodstoves, windblown dust, ocean sprays, biogenic emissions, dust and fume-producing construction,

industrial and agricultural operations, and fuel combustion. Primary effects include visibility impairment, respiratory symptoms, and worsening of cardiovascular disease.

Sulfate (SO_4). Sulfate is oxidized to sulfur dioxide (SO_2) during the combustion process and is subsequently converted to sulfate compounds in the atmosphere. Major sources include industrial processes and the combustion of petroleum-derived fuels (e.g., gasoline and diesel fuel) that contain sulfur. Primary effects include respiratory symptoms, worsening of cardiovascular disease, damage to a variety of materials, including marble, iron, and steel, damage to crops and natural vegetation, and visibility impairment.

Hydrogen Sulfide (H_2S). Hydrogen sulfide is a colorless gas with the odor of rotten eggs. Major sources include geothermal power plants, petroleum refineries, and wastewater treatment plants. Primary effects include eye irritation, headache, nausea, and nuisance odors.

Vinyl Chloride (chloroethene). Vinyl chloride, a chlorinated hydrocarbon, is a colorless gas with a mild, sweet odor. It is also listed as a toxic air contaminant. Most vinyl chloride is used to make PVC plastic and vinyl products. Vinyl chloride has been detected near landfills, sewage plants, and hazardous waste sites due to microbial breakdown of chlorinated solvents. Primary effects include dizziness, drowsiness, headaches, and liver damage.

Table 4.3-2 provides the federal and State ambient air quality standards:

TABLE 4.3-2
Federal and State Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards	National Standards
Ozone (O_3)	8 Hour	0.070 ppm (137µg/m^3)	0.070 ppm (137µg/m^3)
	1 Hour	0.09 ppm (180 µg/m^3)	–
Carbon Monoxide (CO)	8 Hour	9 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)
	1 Hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)
Nitrogen Dioxide (NO_2)	1 Hour	0.18 ppm (339 µg/m^3)	100 ppb (188 µg/m^3)
	Annual Arithmetic Mean	0.030 ppm (57 µg/m^3)	0.053 ppm (100 µg/m^3)
Sulfur Dioxide (SO_2)	24 Hour	0.04 ppm (105 µg/m^3)	0.14
	3 Hour	–	–
	1 Hour	0.25 ppm (665 µg/m^3)	75 ppb (196 µg/m^3)
	Annual Arithmetic Mean	–	0.030 ppm
Particulate Matter (PM_{10})	Annual Arithmetic Mean	20 µg/m^3	–
	24 Hour	50 µg/m^3	150 µg/m^3
Particulate Matter – Fine ($PM_{2.5}$)	Annual Arithmetic Mean	12 µg/m^3	12 µg/m^3
	24 Hour	–	35 µg/m^3
Sulfates	24 Hour	25 µg/m^3	–
Lead	Calendar Quarter	–	1.5 µg/m^3
	30 Day Average	1.5 µg/m^3	–
	Rolling 3-Month Average	None	0.15 µg/m^3
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)	–
Vinyl Chloride (chloroethene)	24 Hour	0.01 ppm (26 µg/m^3)	–
Visibility-Reducing Particles	8 Hour	–	–

Source: CARB 2016. Notes: mg/m^3=milligrams per cubic meter; ppm=parts per million; ppb=parts per billion; µg/m^3=micrograms per cubic meter

California Building Standards Code

Title 24 of the CCR, also known as the California Building Standards Code (CBSC), is based on the International Building Code (IBC) used widely throughout the country. The CBSC has been modified for California conditions to include more detailed and/or more stringent regulations. The CBSC consists of 13 parts, including the California Building Code, Energy Code, and Green Building Standards Code. The following regulations apply to residential development:

California Energy Code

The California Energy Code (Part 6 of the CBSC), also known as the State's Energy Efficiency Standards, was established in 1978 with a goal of reducing California's energy consumption for residential and nonresidential buildings. The Standards have the added benefit of reducing emissions of criteria pollutants.

The Initial Study/Negative Declaration prepared for the 2019 update to the Energy Efficiency Standards (effective January 1, 2020), estimates that implementation of the 2019 Standards will result in a net reduction in the emissions of nitrous oxide by roughly 100 metric tons per year, sulfur oxides by 0.27 metric tons per year, carbon monoxide by 28 metric tons per year, and particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$) by 3.36 metric tons per year.

California Green Building Standards Code

In 2007, the California Building Standards Commission (CBSC) developed green building standards in an effort to meet the goals established by the Global Warming Solutions Act of 2006. These standards are referred to as the CALGreen Code and are included as Part 11 of the CBSC. The CALGreen Code, requires new residential and commercial buildings to comply with mandatory measures related to planning and design, energy efficiency, water efficiency/ conservation, material conservation, resource efficiency, and environmental quality. The most recent update to the CALGreen Code went into effect on January 1, 2020.

CALGreen Division 4.5 (Environmental Quality), includes regulations pertaining to fireplaces, woodstoves, and pellet stoves, as well as additional measures pertaining to pollutant control. Section 4.503 states, *"Any installed gas fireplace shall be a direct-vent sealed-combustion type. Any installed woodstove or pellet stove shall comply with U.S. EPA New Source Performance Standards (NSPS) emission limits as applicable… Woodstoves, pellet stoves and fireplaces shall also comply with applicable local ordinance."* For purposes of the CALGreen Code, *"local ordinance"* includes rules and regulations of a local air district. *See Shasta County Air Quality Management District Rule 3:23 below).*

California Air Resources Control Board, Off-Road Vehicle and Equipment Regulations

All self-propelled off-road diesel vehicles 25 horsepower (HP) or greater used in California and most two-engine vehicles (except on-road two-engine sweepers) are subject to the Regulation for In-Use Off-Road Diesel-Fueled Fleets, including rented and leased vehicles. The overall purpose of the Off-Road Diesel Regulation is to reduce NO_X emissions and particulate matter from off-road diesel vehicles. The Off-Road Diesel Regulation:

- Requires all vehicles be reported to CARB (online reporting tool, DOORS) and labeled.
- Restricts adding older vehicles into fleets starting on January 1, 2014.
- Requires fleet owners to reduce their emissions by retiring, replacing, or repowering older engines, or installing Verified Diesel Emission Control Strategies (exhaust retrofits).
- Imposes limits on idling and requires a written idling policy.

In addition, the Portable Equipment Registration Program (PERP) requires all portable engines 50 HP or greater to be registered in PERP or permitted by a local air district.

LOCAL

Shasta County Air Quality Management District (SCAQMD):

The SCAQMD has the responsibility of enforcing federal and state air quality regulations in Shasta County. The SCAQMD adopts and enforces controls on stationary sources of air pollutants through its permit and inspection programs, and it regulates agricultural burning. All projects in Shasta County are subject to applicable SCAQMD rules and regulations in effect at the time of construction. Descriptions of specific rules applicable to the proposed project may include, but are not limited to:

- SCAQMD Rule 3:15, Cutback and Emulsified Asphalt, includes regulations to limit emissions of volatile organic compounds (VOCs)
- SCAQMD Rule 3:16, Fugitive, Indirect, or Non-Traditional Sources, controls the emission of fugitive dust during earth-moving, construction, demolition, bulk storage, and conditions resulting in wind erosion.
- SCAQMD Rule 3:31, Architectural Coatings, establishes VOC content limits for architectural coatings.
- SCAQMD Rule 3:32, Adhesives and Sealants, limits the emissions of VOCs from adhesives and sealants and associated primers, and from related surface preparation solvents, cleanup solvents, and strippers.
- SCAQMD Rule 3:23, Fireplace and Solid Fuel Heating Device Usage, establishes emissions limits for woodstoves, pellet stoves, and fireplaces.

Shasta County is currently designated a non-attainment area for State ozone standards; the County is designated as an attainment or unclassified area for all other federal and State ambient air quality standards. In the past, Shasta County has been designated non-attainment for State PM_{10} standards; however, as of September 24, 2018, the County is in attainment for State PM_{10} standards.

The SCAQMD, along with other air districts in the Northern Sacramento Valley Air Basin (NSVAB), jointly prepared an Air Quality Attainment Plan (AQAP) for the purpose of achieving and maintaining healthful air quality throughout the air basin. The Northern Sacramento Valley Planning Area (NSVPA) 2018 Triennial AQAP constitutes the region's State Implementation Plan (SIP). The NSVPA 2018 AQAP, adopted by the SCAQMD Board on May 7, 2019, includes updated control measures for the three-year period of 2019 through 2021. Shasta County has determined that the County's primary emphasis in implementing the 2018 Attainment Plan is to attempt to reduce emissions from mobile sources through public education and grant programs.

As shown in **Table 4.3-3**, Shasta County has adopted air quality thresholds for emissions of Reactive Organic Gases (ROG), Oxides of Nitrogen (NOx) and Particulate Matter, 10 microns in size (PM_{10}) to determine the level of significance for projects subject to CEQA review.

TABLE 4.3-3
Thresholds of Significance for Criteria Pollutants of Concern

Level	ROG	NOx	PM_{10}
Level A: Indirect Source	25 lbs/day	25 lbs/day	80 lbs/day
Level B: Indirect Source	137 lbs/day	137 lbs/day	137 lbs/day
Direct Sources	25 tons/year	25 tons/year	25 tons/year

Source: 2004 Shasta County General Plan, Chapter 6.5 (Air Quality).

All discretionary projects in Shasta County are required to implement Standard Mitigation Measures (SMMs) to minimize emissions and contribute to a reduction in cumulative impacts. SCAQMD recommends that projects that generate unmitigated emissions above Level A implement Best Available

Mitigation Measures (BAMMs) in addition to the SMMs. If a project is not able to reduce emissions below the Level B threshold, emissions offsets are required. If after applying the emissions offsets, a project's emissions still exceed the Level B threshold, an Environmental Impact Report is required.

City of Shasta Lake

The Shasta Lake General Plan includes the following objectives and policies that apply to the proposed project:

Air Quality Element		
Objectives:	AQ-1	Improve and maintain air quality to protect human health and preclude damage to plants and property.
	AQ-2	Meet applicable California air quality standards and avoid violating Federal air quality standards.
	AQ-3	Encourage integration of land use, transportation, and energy planning efforts which help to reduce air pollution.
	AQ-4	Improve the design of proposed development to reduce potential air pollution.
Policies:	AQ-b	Land use decisions shall be made with consideration given to the improvement of air quality. New development projects shall be conditioned to reduce air quality impacts. Standard Mitigation Measures and Best Available Mitigation Measures shall be incorporated into new projects when thresholds are exceeded. The City should consult with the Air Quality Management District regarding mitigation of air quality impacts.
	AQ-c	All parcels created by new land divisions and new multi-family residential, commercial and industrial development (or with expansion of such uses) shall be served by paved roads, driveways, and parking areas.
	AQ-d	Encourage a land use pattern that reduces reliance on the automobile and encourages alternative modes of transportation for travel to employment and shopping by encouraging: • infill development • mixed-use development near employment centers (day care, restaurant, and bank) • increased residential densities near employment and shopping, and along major traffic corridors • employment opportunities and shopping near to residential development
	AQ-e	Encourage a reduction in vehicle trips and vehicle miles traveled by encouraging: • public transportation • carpooling, ridesharing, and vanpooling • shortened and combined motor vehicle trips for work, shopping, and services • use of bicycles • pedestrian access and walking
	AQ-f	Encourage pedestrian-oriented and transit-oriented design in new development.

DISCUSSION OF IMPACTS

Questions A and B

As discussed under Regulatory Context, Shasta County is currently designated a non-attainment area for State ozone standards; for areas within the State that have not attained air quality standards, CARB works with local air districts to develop and implement attainment plans to obtain compliance with both federal and State air quality standards. The NSVAB 2018 AQAP serves as the air quality plan for the region.

An Air Quality and Greenhouse Gas Assessment was prepared for the proposed project by ECORP Consulting, Inc. in April 2019 (see **Appendix A**). The purpose of the assessment was to estimate project-generated criteria air pollutants and greenhouse gas (GHG) emissions associated with the proposed project. Project emissions were estimated using Version 2016.3.1 of the California Emissions Estimator Model (CalEEMod). CalEEMod reports both maximum daily emissions (pounds per day) and overall annual emissions (tons per year) for both construction and operational emissions.

Due to modifications to the proposed project, updated California Energy Code requirements for solar energy systems, and identification of feasible mitigation measures identified below, ENPLAN updated the CalEEMod project emissions reports in June 2020; the updated reports are included in **Appendix A**.

Emissions from construction are based on all construction-related activities, including but not limited to grading, site preparation, use of construction equipment, material hauling, trenching, and paving. Emissions from operation of the proposed project are based on all proposed operational activities, including vehicle traffic, electricity usage water use, wastewater treatment, solid waste disposal, use of architectural coatings, etc.

Construction Emissions

The project would result in the temporary generation of ROG, NOx, PM_{10}, and other regulated pollutants during construction. ROG and NOx emissions are associated with employee vehicle trips, delivery of materials, and construction equipment exhaust. PM_{10} is generated during site preparation, excavation, road paving, and from exhaust associated with construction equipment. As shown in **Table 4.3-3** above, Shasta County has adopted air quality thresholds of significance for projects subject to CEQA review; emissions are considered significant if they exceed these thresholds. **Table 4.3-4** shows the highest daily levels regardless of construction phase.

TABLE 4.3-4
Projected Construction Emissions

	Pollutants of Concern					
Construction Year	**ROG**	**NOx**	**PM_{10}**	**$PM_{2.5}$**	**CO**	**SO_2**
	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
1	4.58	**50.29**	10.56	6.55	33.07	0.06
2	8.45	**46.48**	6.15	3.51	31.89	0.06
3	8.23	18.05	1.40	0.98	19.96	0.04
4	8.06	16.54	1.28	0.87	19.68	0.04
5	7.94	15.49	1.18	0.78	19.48	0.04
Level A Threshold	25	25	80	-	-	-
Level B Threshold	137	137	137	-	-	-

As shown in **Table 4.3-4**, the proposed project would exceed the Level A numerical threshold for NOx in construction years 1 and 2 but would not exceed the Level B threshold.

As stated under Regulatory Context, all discretionary projects in Shasta County are required to implement SMMs to minimize emissions and contribute to a reduction in cumulative impacts. SCAQMD recommends that projects that generate unmitigated emissions above Level A implement BAMMs in addition to the SMMs. Impacts are considered significant if a project exceeds the Level B threshold.

MM 4.3.1 includes SMMs and BAMMs that are required to minimize emissions during construction. In addition, as stated under Regulatory Context, the project is subject to CARB regulations for in-use off-road vehicles and portable equipment rated over 50 horsepower. Because the project would not exceed the Level B threshold during construction, and **MM 4.3.1** and CARB regulations would be implemented, impacts during construction would be less than significant.

Operational Emissions

Operation of the project would generate criteria pollutants from area sources (e.g., consumer products such as cleaning supplies, maintenance activities such as painting, landscape equipment, fireplaces, woodstoves, etc.) and mobile sources (e.g., vehicle trips for residents, visitors, deliveries, etc.), as well as indirect emissions associated with energy use, solid waste disposal, water treatment and distribution, and wastewater treatment. **Table 4.3.5** shows estimated operational emissions associated with the proposed project. As shown in the table, operational emissions would exceed the County's Level A threshold for ROG emissions, primarily due to the use of wood-burning stoves, but would not exceed the Level B threshold.

As stated under Regulatory Context, the CALGreen Code requires that all installed woodstoves and pellet stoves must comply with U.S. EPA NSPS emission limits as well as local ordinances that are in place at the time a building permit is issued; this would include Shasta County AQMD Rule 3:23 (Fireplace and Solid Fuel Heating Device Usage), which also establishes emissions limits for woodstoves, pellet stoves, and fireplaces. The City's Building Official or his/her designee is responsible for reviewing all construction documents, including applications for woodstoves, pellet stoves, and fireplaces, to ensure compliance with CALGreen and Shasta County AQMD rules and regulations.

It should be noted that the CalEEMod program was last updated in 2017 and does not take into consideration the 2019 California Building Code Standards that went into effect on January 1, 2020; therefore, operational emissions are anticipated to be less than shown in **Table 4.3-5**.

TABLE 4.3-5
Projected Operational Emissions

Pollutants of Concern (Pounds per Day)						
Source	**ROG**	**NOx**	**PM_{10}**	**$PM_{2.5}$**	**CO**	**SO_2**
Area	126.95	2.47	21.23	21.23	157.73	0.27
Energy	0.06	0.53	0.04	0.04	0.22	Trace
Mobile	3.57	2.46	2.80	0.76	20.72	0.03
Total	**130.58**	**5.45**	**24.07**	**22.03**	**178.67**	**0.31**
Level A Threshold	25	25	80	-	-	-
Level B Threshold	137	137	137	-	-	-

For both construction and operational emissions, the proposed project would not result in significant impacts associated with ozone (O_3), lead (Pb), hydrogen sulfide (H_2S), vinyl chloride, or visibility reducing particles as discussed below.

Ozone. CalEEMod does not directly calculate ozone emissions. Instead, the emissions associated with ozone precursors (ROG and NO_X) are calculated. Because mitigation measures are included to minimize/avoid impacts during construction, and direct and indirect operational emissions are below the adopted thresholds, the potential for ozone production/emissions is less than significant.

Lead. Elevated levels of airborne lead at the local level are usually found near industrial operations that process materials containing lead, such as smelters and battery manufacturing/ recycling facilities. As these conditions are not applicable to the proposed project, there would be no potential for lead emissions.

Hydrogen Sulfide. Hydrogen sulfide is formed during the decomposition of organic material in anaerobic environments, including sewage treatment processes. It is also used as a digesting agent in the manufacture of pulp and paper. However, as discussed in Section 4.19, the proposed project would not result in a significant increase in the amount of wastewater treated at the WWTP and does not include the use of hydrogen sulfide; therefore, there is no potential for a significant increase in hydrogen sulfide emissions.

Vinyl Chloride. Vinyl chloride is used primarily to manufacture polyvinyl chloride (PVC) plastic. Because the proposed project would not include the use of vinyl chloride, and there are no PVC manufacturing facilities in the project area, there is no potential for vinyl chloride emissions.

Visibility-reducing pollutants. For the proposed project, visibility-reducing pollutants would be generated only during construction activities. Because only relatively low amounts of particulates would be generated, potential impacts with respect to visibility-reducing pollutants are less than significant.

As documented above, the project would not exceed the Level B thresholds during construction or operation of the project. All discretionary projects in Shasta County are required to implement SMMs to minimize emissions and contribute to a reduction in cumulative impacts (see **MM 4.3.1**). Further, the City's Building Official or his/her designee is responsible for verifying compliance with applicable CBSC requirements and rules and regulations of the Shasta County AQMD prior to issuance of a building permit.

Implementation of **MM 4.3.1** and compliance with State and local regulations, ensures that the project is in conformance with the applicable SIP and that cumulative impacts are less than significant.

Question C

See discussion under Questions A and B. Although construction emissions would not exceed the County's Level B thresholds, sensitive receptors adjacent to the construction area would be exposed to elevated dust levels and other pollutants. Sensitive receptors are individuals or groups of people that are more affected by air pollution than others, including young children, elderly people, and people weakened by disease or illness. Locations that may contain high concentrations of sensitive receptors include residential areas, schools, playgrounds, childcare centers, hospitals, convalescent homes, and retirement homes.

Construction activities would occur adjacent to single-family residences on Chaucer Way and Doyle Court, immediately south of the project's proposed southern street. Although these emissions would cease with completion of construction work, compliance with federal, state, and local regulations, and implementation of **MM 4.3.1** would reduce temporary impacts during construction to a less-than-significant level.

Question D

The project does not include any components that would result in the generation of long-term odors or similar emissions adversely affecting a substantial number of people. During construction, odors would be emitted from diesel equipment, paints, solvents, fugitive dust, asphalt, and adhesives. Odors from construction would be intermittent and temporary, and generally would not extend beyond the construction area. Due to the temporary and intermittent nature of construction odors, impacts during construction would be less than significant.

CUMULATIVE IMPACTS

Past, present, and future development projects contribute to a region's air quality conditions on a cumulative basis; therefore, by its very nature, air pollution is largely a cumulative impact. If a project's individual emissions contribute toward exceedance of the NAAQS or the CAAQS, then the project's cumulative impact on air quality would be considered significant. In developing attainment designations for criteria pollutants, the USEPA considers the region's past, present, and future emission levels. In addition, AQMDs determine suitable significance thresholds based on an area's designated nonattainment status, which also considers the region's past, present, and future emissions levels.

Implementation of the proposed project combined with future development within the project area could lead to cumulative impacts to air quality. However, as stated under Regulatory Context, all discretionary projects in Shasta County are required to implement SMMs to minimize emissions and contribute to a reduction in cumulative impacts. SCAQMD recommends that projects that generate unmitigated emissions above Level A implement BAMMs in addition to the SMMs. If a project is not able to reduce emissions below the Level B threshold, emissions offsets are required.

In addition, as discussed in detail above, operational emissions resulting from the proposed project would not exceed SCAQMD's thresholds, and implementation of SCAQMD and CARB regulations and **MM 4.3.1** would minimize temporary emissions during construction. Therefore, the proposed project would have a less-than-significant cumulative impact on local and regional air quality.

MITIGATION

MM 4.3.1 The following measures shall be implemented to avoid/minimize short-term air quality impacts during construction. These measures shall be included on all grading and improvement plans and/or permits.

a. During all construction activities, all architectural coatings applied shall contain a low content of volatile organic compounds (VOC) (i.e., 100 grams/liter) as required by the California Green Building Code or Shasta County AQMD, whichever is more restrictive.

b. All construction equipment shall be maintained and properly tuned in accordance with manufacturers' specifications.

c. All material excavated, stockpiled, or graded shall be sufficiently watered to prevent fugitive dust from leaving the property boundaries and causing a public nuisance or a violation of an ambient air standard. Watering shall occur at least twice daily with complete coverage of the construction area, preferably in the mid-morning and after work is completed each day.

d. All unpaved areas (including unpaved roads) with vehicle traffic shall be watered periodically or have dust palliatives applied for stabilization of dust emissions.

e. All on-site vehicles shall be limited to a speed of 15 miles per hour on unpaved roads.

f. All land clearing, grading, earth-moving, or excavation activities on the project site shall be suspended when sustained winds are expected to exceed 20 miles per hour.

g. All material transported off-site shall be either sufficiently watered or securely covered to prevent a public nuisance.

h. Prior to final occupancy, the applicant shall re-establish ground cover on the construction site through seeding and watering.

i. Off-road construction equipment shall not be left idling for periods longer than 5 minutes when not in use.

j. Trees and other vegetation cleared to accommodate the proposed project shall not be burned onsite and shall be disposed of in another lawful manner (e.g., chipping or mulching), as approved by the City.

DOCUMENTATION

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4.4 BIOLOGICAL RESOURCES

Would the project:

Issues and Supporting Evidence	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
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, including oak woodland, identified in local or regional plans, policies or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☒	☐	☐
c. Have a substantial adverse effect on state or federally protected wetlands, (including, but not limited to, marsh, vernal pool, coastal wetlands, 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?	☐	☐	☐	☒

REGULATORY CONTEXT

FEDERAL

Federal Clean Water Act

Section 404

Under Section 404 of the Clean Water Act (CWA), the U.S. Army Corps of Engineers (USACE) regulates the discharge of dredged or fill material into wetlands and waters of the U.S. The USACE requires that a permit be obtained prior to the placement of structures within, over, or under navigable waters and/or prior to discharging dredged or fill material into waters below the ordinary high-water mark (OHWM).

Section 401

Under Section 401 of the CWA, a project requiring a USACE Section 404 permit is also required to obtain a State Water Quality Certification (or waiver) to ensure that the project will not violate established State water quality standards. When a discharge is proposed to waters outside of federal jurisdiction, the discharge is regulated under the State Porter-Cologne Water Quality Control Act through the issuance of

Waste Discharge Requirements (WDRs). The State has a policy of no-net-loss of wetlands and requires mitigation for impacts to wetlands before it issues water quality certifications and WDRs.

Federal Endangered Species Act

The Federal Endangered Species Act (FESA) of 1973 requires that all federal agencies ensure that any action they authorize, fund, or carry out will not likely jeopardize the continued existence of federally listed species or result in the destruction or adverse modification of critical habitat. Projects that would result in "take" of any federally listed species are required to obtain authorization from National Marine Fisheries Service (NMFS) and/or U.S. Fish and Wildlife Service (USFWS) through either Section 7 (interagency consultation) or Section 10(a) (incidental take permit) of FESA, depending on whether the federal government is involved in permitting or funding the project.

Federal Migratory Bird Treaty Act

Under the Migratory Bird Treaty Act (MBTA) of 1918, as amended, migratory bird species listed in CFR Title 50, §10.13, including their nests and eggs, are protected from injury or death, and any project-related disturbances. The MBTA applies to over 1,000 bird species, including geese, ducks, shorebirds, raptors, and songbirds, some of which were near extinction before MBTA protections were put in place in 1918. The MBTA provides protections for nearly all native bird species in the U.S., including non-migratory birds.

Fish and Wildlife Conservation Act

Under the Fish and Wildlife Conservation Act of 1980, as amended, the USFWS maintains lists of migratory and non-migratory birds that, without additional conservation action, are likely to become candidates for listing under the FESA. These species are known as Birds of Conservation Concern and represent the highest conservation priorities.

Bald and Golden Eagle Protection Act

This Act provides for the protection of the bald eagle and the golden eagle by prohibiting, except under certain specified conditions, the taking, possession, and commerce of such birds and their occupied and unoccupied nests.

Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), also known as the Sustainable Fisheries Act, requires the identification of Essential Fish Habitat (EFH) for federally managed fishery species and implementation of appropriate measures to conserve and enhance EFH that could be affected by project implementation. All federal agencies must consult with NMFS on projects authorized, funded, or undertaken by that agency that may adversely affect EFH for species managed under the MSFCMA.

STATE

California Endangered Species Act

Under the California Endangered Species Act (CESA), the Fish and Game Commission is responsible for listing and delisting threatened and endangered species. CDFW maintains documentation and occurrence records on listed species, including candidate species for threatened or endangered status, fully protected species, and species of special concern (SSC). SSC are vulnerable to extinction but are not legally protected under CESA; however, impacts to SSC are generally considered significant under CEQA. CESA prohibits the take of State-listed threatened and endangered species, but CDFW has the authority to issue incidental take permits under special conditions when impacts are minimized and mitigated.

California Fish and Game Code §1600-1616 (Streambed Alteration)

California Fish and Game Code §1600 *et seq.*, requires that a project proponent enter into a Streambed Alteration Agreement (SAA) with CDFW prior to any work that would divert or obstruct the natural flow of any river, stream, or lake; change the bed, channel, or bank of any river, stream, or lake; use material from any river, stream, or lake; and/or deposit or dispose of material into any river, stream, or lake. The SAA includes conditions that minimize/avoid potentially significant adverse impacts to riparian habitat and waters of the state.

California Fish and Game Code §3503 and 3503.5 (Nesting Bird Protections)

These sections of the Code provide regulatory protection to resident and migratory birds and all birds of prey within the State and make it unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by the Code.

California Fish and Game Code §1900-1913 (Native Plant Protection Act)

The Native Plant Protection Act (NPPA) includes measures to preserve, protect, and enhance native plants that are listed as rare and endangered under the CESA. The CDFW categorizes the rarity of native plants in California. Rank 1B plants are rare, threatened, or endangered in California and elsewhere. Rank 2 plants are rare, threatened, or endangered in California, but are more common elsewhere. Rank 3 plants are those about which more information is needed (a review list). Rank 4 plants have limited distribution (a watch list).

LOCAL

City of Shasta Lake

The Shasta Lake General Plan includes the following objectives, policy, and implementation measures that apply to the proposed project:

Open Space Element		
Objectives:	FW-1	Conserve and manage significant fish, wildlife, and vegetation resources.
	FW-2	Recognize that wildlife habitat and development practices may on occasion conflict and shall need to be resolved according to policies specified in the General Plan.
Policy:	FW-b	Projects that may impact rare, threatened, or endangered plant or animal species, as officially designated by federal and state resource agencies, shall be designed or conditioned to avoid significant adverse impacts on those species.
Implementation Measures:	FW-(2)	Ensure that open space corridors along creeks include protective buffers (non-development setbacks), preserve existing riparian vegetation through the environmental review process and require minimum setbacks from the top-of-bank along creeks. Specific setbacks and widths will be determined on a case by case basis. Input from resource agencies, including the Department of Fish and Game will be considered in determining the setback distance.
	FW-(4)	Ensure that all new developments restrict the use of fencing in locations essential for wildlife movement and place structures so as to minimize interference with wildlife movement.
	FW-(10)	Coordinate with the Shasta County Mosquito Abatement District to ensure that acceptable disease vector control measures are coordinated with preservation of resources such as wetlands, recognizing the community's interest in meeting federal and state

wetlands protection policies.

FW-(11) Coordinate with the Department of Fish and Game to ensure the preservation and enhancement of species of resident and anadromous fish in creeks within the City.

Shasta Lake Tree Conservation Ordinance

SLMC Chapter 12.36 (Tree Conservation) recognizes that trees are important to the general well-being of the citizens of the City for their shade, cooling, noise and wind reduction, soil stabilization, protection of surface water quality, aesthetic value, air filtering and release of oxygen, benefits to wildlife and the area's ecology, and their economic enhancement to property. The intent of the tree conservation measures is to promote the conservation of a healthy tree population and to maintain and enhance tree canopy throughout the community. The Tree Conservation Ordinance includes tree planting requirements for all new development and tree replacement requirements for discretionary projects that result in the removal of protected trees.

Shasta Lake Storm Water Quality Management Program

SLMC Chapter 13.36 (Storm Water Quality Management) was adopted to protect and enhance the water quality of watercourses and water bodies and ensure compliance with the Federal CWA and Porter-Cologne Water Quality Control Act.

Shasta Lake Grading, Erosion Control, and Hillside Development Ordinance

SLMC Chapter 15.08 (Grading, Erosion Control, and Hillside Development), §15.08.210(A)(8) requires that all construction projects involving site grading shall include erosion control plans prepared by a qualified professional. Temporary and permanent erosion control devices, designed and constructed in accordance with the California Stormwater Quality Association (CASQA) BMPs, and the City's Construction Standards, shall be provided to control erosion.

DISCUSSION OF IMPACTS

Question A

A Biological Resource Assessment (BRA) was completed by Gallaway Enterprises in May 2018 to determine potential adverse effects that the proposed project could have on federal and State special-status plant and wildlife species and/or their habitats (see **Appendix B**).

The BRA consisted of a records search and field reconnaissance. The records search was conducted in May 2018 and included a review of California Natural Diversity Data Base (CNDDB) records for special-status plants, animals, and natural communities; California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants; USFWS records for federally listed, proposed, or candidate plant and animal species under jurisdiction of the USFWS; and USFWS critical habitat records. ENPLAN conducted an updated records search of USFWS, CNDDB, and CNPS records on June 3, 2020. No additional special-status species with a potential to occur in the project site were identified.

NMFS identifies Central Valley spring run Chinook salmon, evolutionary significant unit (ESU) (federally threatened), Sacramento River winter run (SRWR) Chinook salmon ESU (federally endangered), and California Central Valley (CCV) steelhead, distinct population segment (DPS) (federally threatened) in this quadrangle. Essential Fish Habitat (EFH) is identified in the Project City quadrangle for Chinook salmon, and critical habitat is identified in the Project City quadrangle for CCV steelhead. Additionally, the fall/late-fall run Chinook salmon ESU are known to occur in Churn Creek (Graham Matthews & Associates, 2008).

Field surveys were conducted by Gallaway on September 29, 2017, and May 7, 2018, to determine the presence of special-status species and their habitats within the project site. The May 7, 2018,

survey included a CDFW protocol-level rare plant survey. Although some of the special-status species potentially occurring in the study area would not have been evident at the time the fieldwork was conducted, determination of their potential presence could readily be made based on observed habitat characteristics.

Special-Status Plant Species

As documented in the BRA, Redding checkerbloom (Rare Plant Rank 3) was observed in the understory of blue oaks and occasionally under manzanita in multiple locations within the project site. The plant population encompasses ±5.5 acres. Redding checkerbloom is a perennial herb that is native to California and generally occurs in small populations in open oak woodlands. The blooming period is generally May through June but may occur as early as April and as late as August. Some Rank 3 plants meet the definitions of the CESA and are eligible for state listing. Impacts to these species or their habitat should be analyzed during preparation of CEQA documents pursuant to CEQA Guidelines §15380.

CEQA Guidelines §15380 states that even if a plant is not listed as endangered, rare, or threatened, a plant is considered endangered when its survival and reproduction in the wild are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, disease, or other factors. California Fish and Game Code §1901 also states that a species, subspecies, or variety is considered endangered when its prospects of survival and reproduction are in immediate jeopardy. A species, subspecies, or variety is considered rare when, although not presently threatened with extinction, it is in such small numbers throughout its range that it may become endangered if its present environment worsens.

Consultation with CDFW occurred in September 2019 and in early June 2020. On June 5, 2020, Amy Henderson, Senior Environmental Scientist with CDFW, provided written comments in an email stating that CDFW does not have any additional data to confirm that Redding checkerbloom is endangered, rare, or threatened pursuant to CEQA Guidelines §15380.

Ms. Henderson requested that a California Native Species Field Survey form be completed and submitted to CDFW for posting in the CNDDB. The form was completed by an ENPLAN biologist and submitted to CDFW on June 16, 2020.

Special-Status Wildlife Species

As documented in the BRA, mature trees in the project site provide potentially suitable habitat for two State Species of Special Concern: pallid bat and western red bat. **MM 4.4.1** ensures that potential effects on tree-roosting bats are avoided/minimized by implementation of a two-step process to permit bats the opportunity to abandon the roost prior to tree removal. No other special-status wildlife species were observed during the field surveys, nor are any expected to occur in the project site.

Potential indirect effects could occur if sediments or other pollutants enter surface waters and degrade habitat near the project site and downstream. However, as discussed in Regulatory Context and Section 1.8 (Regulatory Requirements), BMPs for sediment control and spill prevention would be implemented in accordance with SWRCB and City requirements to control erosion and sedimentation and prevent damage to streams, watercourses, and aquatic habitat. BMPs may include, but are not limited to, limiting construction to the dry season, and use of straw wattles, silt fences, and/or gravel berms to prevent sediment from discharging to surface waters.

Implementation of MM 4.4.1 and BMPs for sediment control and spill prevention will ensure that direct and indirect impacts on special-status species and their habitats are less than significant.

Questions B and C

Review of CNDDB natural community records shows that one natural community, Great Valley Cottonwood Riparian Forest, is identified about five miles south of the project area. CNDDB records do not identify any other sensitive natural communities within a five-mile radius of the project site. Neither the USFWS nor NMFS identify any designated critical habitats for federally listed species in the study area.

As documented in the BRA, the primary natural communities in and/or immediately adjacent to the project site include stream/riverine, wetland, and blue oak-foothill pine (gray pine) woodland. Stream/riverine and wetland habitats are considered sensitive natural communities as well as waters of the U.S., and fill of these features is regulated by the USACE. Potential impacts to natural communities are further discussed below.

Wetlands and Other Jurisdictional Waters

Gallaway Enterprises conducted a field investigation on September 29, 2017, to identify potential wetlands and other waters of the U.S./State. All jurisdictional waters identified during the field investigation are shown in **Figure 4.4-1** and are described below. **Figure 3.1-2** shows all jurisdictional waters in relation to proposed improvements.

Wetlands

Wetland features on the project site include three seasonal swales. Seasonal swales are generally described as depressional areas that primarily convey water during the winter and spring due to perched water and/or precipitation.

As shown in **Figure 4.4-1**, the swales are located in the northwestern and southwestern areas of the project site (WF01 and WF03), and also in the center of the project site (WF02). The seasonal swales total ±0.22 acres. All of the seasonal swales on the project site receive storm water from constructed drainage outfalls. In addition, installation of check dams in an ephemeral drainage slows water conveyance and provides storm water for WF02.

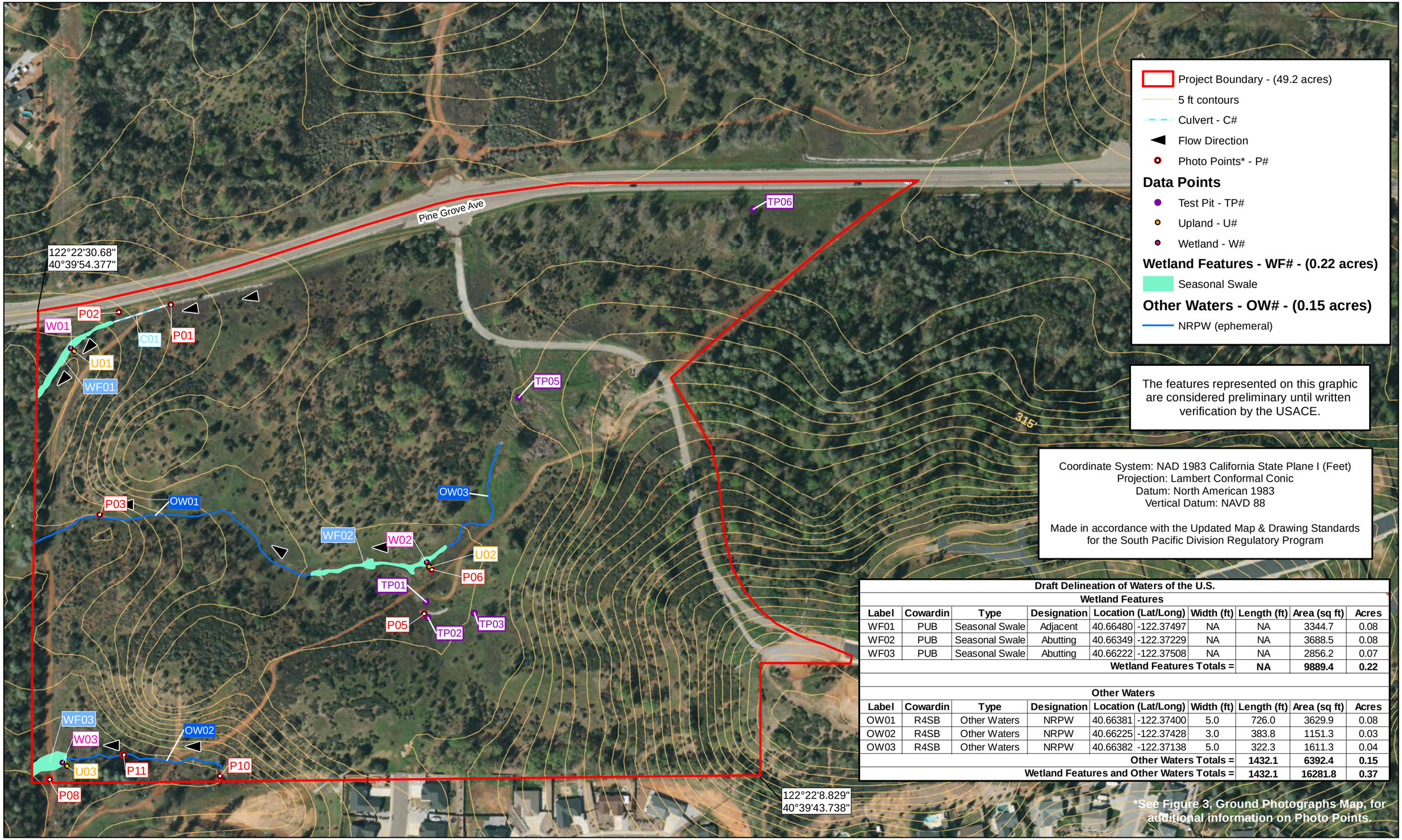
As indicated in **Figure 3.1-2**, seasonal swales in the northwestern and southwestern areas of the site would be completely avoided. The extension of Chaucer Way will span the swale in the central area of the project site (WF02), and utilities will be bored under this swale; thus, no direct impacts to wetlands would occur.

Other Waters

Other waters in and adjacent to the project site include three ephemeral streams in the western area of the project site (shown as OW01 through OW03 in **Figure 4.4-1**). The ephemeral streams total 0.37 acres. All of these streams are tributary to Churn Creek, which eventually reaches the Sacramento River.

Ephemeral streams are drainage channels that have flowing water only during, and for a short duration after, precipitation events. Runoff from rainfall is the primary source of water for stream flow. The source water for OW 02 is a large storm drain outlet. OW 01 and 03 are bisected by a series of check dams that slow storm water and filter sediments, which have created small seasonal wetlands. As shown in **Figure 3.1-2**, the project has been designed to avoid all ephemeral streams.

Although no direct impacts to wetlands or other jurisdictional waters would occur, indirect effects could potentially occur if sediments or other pollutants enter surface waters and degrade habitat in the study area and/or downstream. As stated under Regulatory Context, BMPs for sediment control and spill prevention would be implemented in accordance with SWRCB and City requirements to control erosion and sedimentation and prevent damage to streams, watercourses, and aquatic habitat.



Project Boundary - (49.2 acres)
5 ft contours
Culvert - C#
Flow Direction
Photo Points* - P#

Data Points

Test Pit - TP#
Upland - U#
Wetland - W#

Wetland Features - WF# - (0.22 acres)

Seasonal Swale

Other Waters - OW# - (0.15 acres)

NRPW (ephemeral)

The features represented on this graphic are considered preliminary until written verification by the USACE.

Coordinate System: NAD 1983 California State Plane I (Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Vertical Datum: NAVD 88

Made in accordance with the Updated Map & Drawing Standards for the South Pacific Division Regulatory Program

Draft Delineation of Waters of the U.S.

Wetland Features

Label	Cowardin	Type	Designation	Location (Lat/Long)	Width (ft)	Length (ft)	Area (sq ft)	Acres
WF01	PUB	Seasonal Swale	Adjacent	40.66480 -122.37497	NA	NA	3344.7	0.08
WF02	PUB	Seasonal Swale	Abutting	40.66349 -122.37229	NA	NA	3688.5	0.08
WF03	PUB	Seasonal Swale	Abutting	40.66222 -122.37508	NA	NA	2856.2	0.07
				Wetland Features Totals =		**NA**	**9889.4**	**0.22**

Other Waters

Label	Cowardin	Type	Designation	Location (Lat/Long)	Width (ft)	Length (ft)	Area (sq ft)	Acres
OW01	R4SB	Other Waters	NRPW	40.66381 -122.37400	5.0	726.0	3629.9	0.08
OW02	R4SB	Other Waters	NRPW	40.66225 -122.37428	3.0	383.8	1151.3	0.03
OW03	R4SB	Other Waters	NRPW	40.66382 -122.37138	5.0	322.3	1611.3	0.04
				Other Waters Totals =		**1432.1**	**6392.4**	**0.15**
				Wetland Features and Other Waters Totals =		**1432.1**	**16281.8**	**0.37**

***See Figure 3, Ground Photographs Map, for additional information on Photo Points.**

1:2,400
0 100 200 Feet
1 inch = 200 feet
NORTH
Data Sources: ESRI, USDA NAIP Imagery: 06/15/17, Shasta County

Mission Hills Subdivision
Draft Delineation of Waters of the U.S.
Exhibit A

Map By: R. Edwards
Delineation By: J. Gallaway
06/19/2017
GE# 17-109 Map Date: 10/09/17

gallaway ENTERPRISES

In addition, **MM 4.4.2** requires that all construction-related activities, including staging, stockpiling of soils, and storage of construction equipment and materials, shall maintain a minimum 50-foot buffer from the upland edge of all wetlands and other waters of the U.S./State that are adjacent to the grading footprint. The City may approve a reduced buffer, in consultation with CDFW. The buffer zones would be delineated by a qualified biologist prior to commencement of any earth disturbance.

Implementation of BMPs in accordance with SWRCB and City requirements, and **MM 4.4.2** ensures that impacts to wetlands and other jurisdictional waters would be less than significant.

Oak Woodland

As stated in the BRA, the dominant vegetation community in the project site is blue oak-foothill [gray] pine woodland; common species include blue oak, gray pine, live oak, and toyon, and occasional black oaks. Small patches of mixed chaparral habitat dominated by manzanita also occurs in the project site.

The site condition in portions of the project site is degraded due to past earth disturbance associated with installation of utilities, dirt/graveled roads, trails, drainage outfalls, check dams, etc. CDFW does not consider this oak woodland a sensitive natural community; however, the site retains significant ecological functions in that it provides nesting habitat for birds, and shelter and foraging habitat for various animals such as squirrels, skunks, rodents, snakes, and lizards.

In accordance with SLMC Chapter 12.36, Section 12.36.062(B), Sharrah Dunlap Sawyer (SDS) conducted a tree survey to identify protected trees (any living tree, except gray pine, having at least one trunk of ten inches or more diameter at breast height) in the project site (see **Appendix C**). The tree survey identified 141 protected trees; 107 of the trees would be removed to accommodate the proposed improvements.

In accordance with SLMC Chapter 12.36 (Tree Conservation), **MM 4.4.3** requires that prior to removal of any protected tree (any living tree, except gray pine, having at least one trunk of ten inches or more diameter at breast height), a final count of protected trees must be provided to the City in order to determine tree replacement requirements. Once a determination is made regarding the number of protected trees to be removed, a Tree Replacement Plan must be prepared by a certified arborist or landscape architect.

The City, in recognizing that it is not always feasible to accommodate replacement trees on a project site, allows for the Planning Commission to allow a different tree-planting requirement upon a finding that the alternative standard is consistent with the intent of the Tree Conservation Ordinance (SLMC §12.36.070.B).

In order to satisfy the intent of the City's Tree Conservation Ordinance, the Tree Replacement Plan shall identify one or a combination of the measures identified in **MM 4.4.3** (i.e., planting three fifteen (15) gallon trees for each protected tree removed; planting larger replacement trees to count as two replacement trees; planting replacement trees at an off-site location approved by the City; and/or paying an in-lieu fee to the City to purchase trees that would be planted on public property.

The Tree Replacement Plan must be approved by the City prior to issuance of a grading permit for the proposed project. Implementation of the Tree Replacement Plan would be verified by the City's Building Official in accordance with the Tree Replacement Plan (e.g., prior to issuance of a Certificate of Occupancy if replacement trees are to be planted on individual parcels).

In addition to direct removal, earthwork in the vicinity of trees has the potential to damage trees and their roots, resulting in eventual death. **MM 4.4.4** requires temporary construction fencing to be installed and maintained at least six feet outside of the dripline of all trees to be preserved. No vehicle parking or materials stockpiling would be allowed within the fenced area. If work must occur within the fenced area, the work must be completed under the supervision of a certified

arborist. Implementation of **MM 4.4.3 and MM 4.4.4** would ensure that the proposed project's impacts on protected trees are less than significant.

Potential Introduction and Spread of Noxious Weeds

The introduction and spread of noxious weeds during construction activities has the potential to adversely affect sensitive natural communities. Noxious weeds observed in the project site include Italian thistle, Klamath weed, medusa-head, and yellow star-thistle. These weeds are of widespread distribution in the County, and further spread of these weeds is not anticipated.

As required by **MM 4.4.5** the potential for introduction and spread of noxious weeds would be avoided/minimized by using only certified weed-free erosion control materials, mulch, and seed; limiting any import or export of fill material to material that is known to be weed free; and requiring the construction contractor to thoroughly wash all equipment at a commercial wash facility prior to entering the job site and upon leaving the job site.

Implementation of **MM 4.4.2** through **MM 4.4.5** ensures that the proposed project would not have a substantial adverse effect on a sensitive natural community, including wetlands and other jurisdictional waters; impacts would be less than significant.

Question D

Wildlife movement patterns can be disrupted by urban development and habitat conversion. The introduction of structures and fencing in an area may impede the movement of migratory fish, birds, deer, and other wildlife species. In addition, during construction, increased human activity may impede the movement of wildlife.

Neither the City's nor Shasta County's General Plans identify critical deer wintering ranges, fall holding areas, or deer fawning grounds in proximity to the proposed project.

Human activity in the project area may impede the movement of wildlife; however, it is anticipated that animals would alter their routes by moving around construction areas. In addition, because significant open space surrounding the project site would remain, the potential for long-term impacts on the movement of wildlife species is less than significant.

During construction, there is a slight possibility that wildlife could be trapped in open trenches and pipes. **MM 4.4.6** is included to prevent the inadvertent entrapment of wildlife species. In addition, as discussed under Question A, BMPs for sediment control and spill prevention would be implemented in accordance with SWRCB and City requirements to minimize/avoid the potential for indirect impacts on aquatic habitat.

The project area is located within the Pacific Flyway, and it is possible that migratory birds could nest in or adjacent to the project area. Nesting migratory birds, if present, could be directly or indirectly affected by construction activities. Direct effects could include mortality resulting from removal of a tree/shrub containing an active nest with eggs or chicks. Indirect effects could include nest abandonment by adults in response to loud noise levels or human encroachment, or a reduction in the amount of food available to young birds due to changes in feeding behavior by adults.

In the local area, most birds nest between February 1 and August 31. As required by **MM 4.4.7**, the potential for adversely affecting nesting birds can be greatly minimized by removing vegetation and conducting construction activities either before February 1 or after August 31. If this is not possible, a nesting survey would be conducted within one week prior to removal of vegetation and/or the start of construction.

If active nests are found in the project site, the City would implement measures to comply with the Migratory Bird Treaty Act and California Fish and Game Code. Compliance measures may include, but are not limited to, exclusion buffers, sound-attenuation measures, seasonal work closures based

on the known biology and life history of the species identified in the survey, as well as ongoing monitoring by biologists.

Therefore, the proposed project would have a less than significant impact on the movement of any migratory fish or wildlife species and would not significantly impact migratory wildlife corridors or impede the use of native wildlife nursery sites because significant open space would remain, BMPs for sediment and erosion control would be implemented to avoid indirect impacts to aquatic habitats, **MM 4.4.6** would prevent the inadvertent entrapment of wildlife, and **MM 4.4.7** would reduce the potential for adversely affecting nesting birds.

Question E

As noted under Regulatory Context above, the City's General Plan addresses the need to avoid impacts to special-status fish, wildlife, and plant species and their habitats. **MM 4.4.1** through **MM 4.4.7** are included to ensure consistency with General Plan policies and objectives. In addition, as discussed under Questions B and C above, the proposed project meets the intent of the City's Tree Conservation Ordinance with implementation of **MM 4.4.3** and **MM 4.4.4**. There are no other local policies or ordinances related to the protection of biological resources that would apply to the proposed project. Impacts would be less than significant.

Question F

A Habitat Conservation Plan (HCP) is a federal planning document that is prepared pursuant to Section 10 of the Federal Endangered Species Act (FESA). A Natural Community Conservation Plan (NCCP) is a state planning document administered by CDFW. There are no HCPs, NCCPs or other habitat conservation plans that apply to the proposed project. Therefore, there would be no impact.

CUMULATIVE IMPACTS

Cumulative projects in the vicinity of the project area, including growth resulting from build-out of the City of Shasta Lake, City of Redding, and Shasta County's General Plans, are anticipated to permanently remove plant and wildlife resources.

As development in the area continues, sensitive plant and wildlife species native to the region and their habitat, including those species listed under CESA and FESA and those identified by state and federal resources agencies as threatened, endangered, fully protected, sensitive, species of concern, or candidate species, will be lost through conversion of existing open space to urban development.

Although mobile species may have some ability to adapt to modifications to their environment by relocating, less mobile species may be locally extirpated. With continued conversion of natural habitat to human use, the availability and accessibility of remaining foraging and natural habitats in this ecosystem would dwindle and those remaining natural areas may not be able to support additional plant or animal populations. The conversion of plant and wildlife habitat on a regional level as a result of cumulative development would potentially result in a regionally significant cumulative impact on special-status species and their habitats.

Implementation of BMPs for erosion and sediment control, and implementation of **MM 4.4.1** through **4.4.7** avoid, reduce, or mitigate potential impacts to special-status species and their habitat. With these measures, the proposed project's contribution to cumulative regional impacts to biological resources would be less than significant.

MITIGATION

MM 4.4.1 In order to avoid impacts to tree-roosting bats, one of the following measures shall be implemented:

a. Prior to commencement of tree removal, a qualified bat biologist (i.e., an experienced bat biologist holding a California Department of Fish and Wildlife [CDFW] Scientific Collecting Permit) shall conduct a tree habitat assessment to identify trees with suitable bat roosting habitat (e.g., cavities, crevices, exfoliating bark, etc.).

   Trees determined to have suitable roosting habitat shall be removed only outside of the maternity season and winter season during the following times, or as otherwise approved/recommended by a qualified bat biologist.

   1. Between approximately March 1 (or after evening temperatures rise above 45ºF, and/or no more than ½ " of rainfall within 24 hours occurs), and April 15; or
   2. Between approximately September 1 and October 15 (or before evening temperatures fall below 45ºF, and/or more than ½ " of rainfall within 24 hours occurs).

   Trees shall be removed using the following two-step process to allow bats the opportunity to abandon the roost prior to tree removal. The two-step removal of bat habitat trees shall be conducted over two consecutive days.

   On day 1, non-habitat features (i.e., branches without cavities, crevices, or exfoliating bark) on bat habitat trees, shall be removed by hand (e.g., using chainsaws), and chippers shall be used wherever possible; this will cause a level of noise and vibration disturbance sufficient to cause bats to choose not to return to the tree for a few days after they emerge to forage.

   A qualified bat biologist experienced with two-step removal procedures shall instruct and provide initial supervision of tree cutting crews on day 1 so that they do not accidentally remove potential habitat features, which could result in direct mortality of bats.

   On the following day, the trees are removed. Any new tree cutting crew members added to the crew shall require instruction and initial supervision by a qualified bat biologist.

b. If trees are removed outside of the time periods described under **MM 4.4.1(a)** above (or a time period otherwise approved/recommended by a qualified bat biologist), the following steps shall be taken prior to tree removal:

   A night emergence survey shall be conducted by a qualified bat biologist during acceptable weather conditions (taking into consideration rain, high winds, and night temperatures) to identify the presence of bats. Alternatively, if conditions allow, the bat biologist shall physically inspect roosts for the presence or absence of bats. The results of the survey shall be submitted to CDFW upon completion.

   If no active roosts are found no further action is required. If a roost is determined to be occupied, a suitable non-disturbance buffer, determined by the bat biologist in consultation with CDFW, shall be established until the young are capable of flight, as determined through additional monitoring by a qualified bat biologist.
   The survey shall be conducted no more than one week prior to the initiation of tree removal. If tree removal is delayed or suspended for more than one week after the survey, a subsequent survey shall be conducted.

MM 4.4.2 All construction-related activities, including staging, stockpiling of soils, and storage of construction equipment and materials, shall maintain a minimum 50-foot buffer from the upland edge of all wetlands and other waters of the U.S. and State that are outside the project footprint.

The City, in consultation with the California Department of Fish and Wildlife, may approve a smaller buffer. Prior to commencement of any earth disturbance (e.g., clearing, grading, trenching, etc.), a qualified biologist, in consultation with the project engineer, shall delineate

the buffer zones with temporary fencing that shall remain in place until construction is complete. The buffer areas shall be periodically inspected by a qualified biologist throughout project construction to ensure the fencing is properly maintained.

MM 4.4.3 The following measures shall be implemented to ensure adequate replacement of protected trees (any living tree, except gray pine, having at least one trunk of ten inches or more diameter at breast height):

a. Prior to issuance of a grading permit, a map exhibit depicting the species and size of protected trees proposed for removal shall be provided to the Development Services Director or his/her designee in order to determine tree replacement requirements.

b. Once a determination is made regarding the number of protected trees to be removed, a Tree Replacement Plan shall be prepared by a certified arborist or landscape architect. In order to satisfy the intent of the City's Tree Conservation Ordinance, the Tree Replacement Plan shall prescribe one or a combination of the following measures:

1. Three fifteen-gallon trees shall be planted on-site for each protected tree removed. This could include tree planting in on-site open space areas, street trees along Pine Grove Avenue, or additional trees planted on individual parcels. The size of a fifteen-gallon replacement tree may be increased to a 24-inch box and count as two replacement trees.

   The Tree Replacement Plan shall identify the species, size, and location of all replacement trees. The replacement trees shall be native trees; and/or

2. An alternative site(s) within the City limits shall be identified for additional tree planting that is required to satisfy the tree replacement ratio. Alternative sites may include, but are not limited to, local parks, schools, and public rights-of-way; and/or

3. An in-lieu fee shall be paid to the City to purchase trees that will be planted on public property, such as parks, schools, public rights-of-way, or at other public facilities. The in-lieu fee shall be based on the fair market value of the number of trees required as replacement trees that cannot be accommodated elsewhere; and/or

4. Deed restrictions shall be recorded to prohibit future development in an area of the property that contains protected trees in proportion to the number of trees proposed for removal, with credit given for implementation of one or more of the above measures.

Prior to issuance of a grading permit, the Tree Replacement Plan shall be submitted to the Development Services Director or his/her designee for approval. Implementation of the Tree Replacement Plan shall be verified by the City's Building Official in accordance with the Plan (e.g., prior to issuance of a Certificate of Occupancy for a dwelling unit).

MM 4.4.4 Temporary construction fencing shall be installed and maintained at least six feet outside of the dripline of all oak trees to be preserved. The fencing around this "root protection zone" shall be maintained throughout construction.

a. No vehicle parking or materials stockpiling shall occur within the root protection zone.

b. To the extent feasible, no construction activities (including grading, cutting, and trenching), shall occur within the root protection zone. If trenching or other work must occur within the root protection zone, the work shall be completed under the supervision of a certified arborist.

MM 4.4.5 The potential for introduction and spread of noxious weeds shall be avoided/minimized by:

a. Using only certified weed-free erosion control materials, mulch, and seed.

b. Limiting any import or export of fill material to material that is known to be weed free.

c. Requiring the construction contractor to thoroughly wash all equipment at a commercial wash facility prior to entering the job site and upon leaving the job site.

MM 4.4.6 To prevent the inadvertent entrapment of wildlife, the construction contractor shall ensure that at the end of each workday trenches and other excavations that are over one-foot deep have been backfilled or covered with plywood or other hard material. If backfilling or covering is not feasible, one or more wildlife escape ramps constructed of earth fill or wooden planks shall be installed in the open trench.

Pipes shall be inspected for wildlife prior to capping, moving, or placing backfill over the pipes to ensure that animals have not been trapped. If animals have been trapped, they shall be allowed to leave the area unharmed.

MM 4.4.7 In order to avoid impacts to nesting migratory birds and/or raptors protected under the federal Migratory Bird Treaty Act and California Fish and Game Code §3503 and §3503.5, including their nests and eggs, one of the following shall be implemented:

a. Vegetation removal and other ground-disturbance activities associated with construction shall occur between September 1 and January 31 when birds are not nesting; or

b. If vegetation removal or ground disturbance activities occur during the nesting season, a pre-construction nesting survey shall be conducted by a qualified biologist to identify active nests in and adjacent to the work area. The survey shall take into account acoustic impacts and line-of-sight disturbances occurring as a result of the project in order to determine a sufficient survey radius to avoid nesting birds. The results of the survey shall be submitted to the California Department of Fish and Wildlife upon completion. The survey shall be conducted no more than one week prior to the initiation of construction. If construction activities are delayed or suspended for more than one week after the pre-construction survey, the site shall be resurveyed.

If active nests are found, the City of Shasta Lake shall consult with the California Department of Fish and Wildlife and the U.S. Fish and Wildlife Service regarding appropriate action to comply with the Migratory Bird Treaty Act and California Fish and Game Code §3503. Compliance measures may include, but are not limited to, exclusion buffers, sound-attenuation measures, seasonal work closures based on the known biology and life history of the species identified in the survey, as well as ongoing monitoring by biologists.

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4.5 CULTURAL RESOURCES

Would the project:

Issues and Supporting Evidence	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Cause a substantial adverse change in the significance of a historical resource pursuant to Section 15064.5?	☐	☒	☐	☐
b. Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?	☐	☒	☐	☐
c. Disturb any human remains, including those interred outside of dedicated cemeteries?	☐	☒	☐	☐

REGULATORY CONTEXT

FEDERAL

Section 106 of the National Historic Preservation Act (NHPA)

Section 106 of the NHPA and its implementing regulations require federal agencies to take into account the effects of their activities and programs on historic properties. A historic property is any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in the National Register of Historic Places. Section 106 applies to projects undertaken or funded by federal agencies, and projects that require a federal-agency permit.

STATE

California Environmental Quality Act (CEQA)

CEQA Guidelines §15064.5 *et seq.* requires that projects financed by or requiring the discretionary approval of public agencies in California be evaluated to determine potential adverse effects on historical and archaeological resources. Historical resources are defined as buildings, sites, structures, or objects, each of which may have historical, architectural, archaeological, cultural, or scientific importance. §15064.5 also includes provisions for the accidental discovery of cultural resources and human remains.

Assembly Bill (AB) 52 (2014)

Public Resources Code (PRC) §21084.2 (AB 52, 2014) 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."* Pursuant to PRC §21080.3.1, in order to determine whether a project may have such an effect, a lead agency is required to consult with a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project if the tribe requested to the lead agency to be informed through formal notification of proposed projects in the area and the tribe responds, in writing, within 30 days of receipt of the formal notification and requests the consultation.

Senate Bill (SB) 18 (2004) Traditional Tribal Cultural Places

California Government Code (CGC) §65352.3 (SB 18, 2004) requires local governments to contact tribal organizations identified by the Native American Heritage Commission (NAHC) prior to adopting or amending a general plan or specific plan, and prior to designating open space. The intent of SB 18 is to provide Native American tribes an opportunity to participate in land use decisions for the purpose of protecting or mitigating impacts to Native American cultural resources and sacred sites.

LOCAL

City of Shasta Lake

The Shasta Lake General Plan includes the following objective, policy, and implementation measures that apply to the proposed project:

Open Space Element		
Objective:	HER-1	Conserve and manage significant prehistoric and historic cultural resources.
Policy:	HER-a	Development projects in areas containing known significant cultural resources shall be designed to minimize degradation of these resources. Where conflicts are unavoidable, mitigation measures, which reduce such impacts, shall be implemented. Possible mitigation measures may include clustering, buffer zones, and building siting requirements.
Implementation Measures:	HER-(a)	Require a records search for any development project proposed in areas of high archaeology sensitivity to determine whether the site contains known prehistoric or historic cultural resources and/or to determine the potential for discovery of additional cultural resources.
	HER-(b)	Require that sponsors of projects on sites where probable cause for discovery of archaeological resources (as indicated by records search and where resources have been discovered in the vicinity of the project) retain a consulting archaeologist to survey the project site. If unique resources, as defined by state law, are found, require preparation of an archaeological resource mitigation plan; monitor the project to ensure that mitigation measures are implemented.

DISCUSSION OF IMPACTS

Questions A and B

In January 2020, ENPLAN prepared a Cultural Resources Evaluation (CRE) Report for the proposed project that details the results of prior records searches that covered all or portions of the Windsor 3 Area of Potential Effects (APE). The CRE also documents the results of a field evaluation conducted on December 30, 2019, and provides a determination of potential effects on cultural resources and recommended mitigation measures. **Table 4.5-1** identifies previously conducted surveys that covered all or a portion of the project's APE.

Table 4.5-1
Previously Conducted Cultural Resource Surveys

Report #	Author	Year	Project	Field Survey Coverage Area	Cultural Resources Identified	Resource in the APE?
47	James Dotta	1977	Bard Enterprises Subdivision	Entire APE (total of 253 acres surveyed)	CA-SHA-781 CA-SHA-782	No (±0.5 miles east of APE)

8096	Jensen & Associates	1993	City of Shasta Lake Force Main Routes for Reclamation and Sewage Lines	Northwestern area of the APE	None	N/A
8097	Jensen & Associates	1993	Shasta Dam Public Utilities District's Proposed Water System Force Main	Northwestern area of the APE	CA-SHA-781 CA-SHA-782	No (±0.5 miles east of APE)
1445	Jensen & Associates	1997	Pine Grove Avenue Road Extension Project	Northwestern area of the APE and property frontage along Pine Grove Avenue	CA-SHA-781 CA-SHA-782	No (±0.5 miles east of APE)
-	ENPLAN	2019	Force Main Replacement Project	Road corridor (extension of Chaucer Way)	None	N/A

As indicated in **Table 4.5-1**, the survey completed by James Dotta in 1977 covered the entirety of the Windsor 3 APE, as well as areas to the north, south, and east. As a result of the survey, CA-SHA-781 (lithic scatter) and CA-SHA-782 (habitation site) were identified ±0.5 miles east of the Windsor 3 APE. Cultural resources surveys conducted by Jensen & Associates in 1993 covered the northwestern area of the Windsor 3 APE; the 1997 report covered the northwestern area of the Windsor 3 APE and the property's frontage along Pine Grove Avenue.

Archaeological excavation and data recovery work by Jensen & Associates was conducted for site CA-SHA-781 in 2003 and for site CA-SHA-782 in 1984, and archaeological monitoring occurred during grading activities; no additional cultural resources were identified. Other than CA-SHA-781 and CA-SHA-782, no cultural resources were identified during the past surveys noted above.

A records search conducted by ENPLAN on July 9, 2018, for the City's Force Main Replacement project covered the Windsor 3 APE and a ±0.5-mile radius around the Windsor 3 APE. The records search confirmed that no cultural resources have been recorded in the APE. Additional research related to the environmental background of the APE was also conducted. According to the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS 2019), soils in the APE are mapped as Auburn loam, 8 to 30 percent slopes; Boomer gravelly loam, 0 to 15 percent slopes; and Boomer gravelly loam, 15 to 30 percent slopes. [Meyer's (2013) soil reference indicates that Auburn and Boomer series soils date to the Pre-Quaternary (>1.9 my). Pre-Quaternary-age soils are generally too old and erosional to harbor buried cultural resources].

Field Survey

A pedestrian survey was conducted by Jacques Kerkhove-Peltier, ENPLAN archaeologist, on December 30, 2019. The purpose of the survey was to identify cultural resources that may be affected by the proposed project. Since the entire APE was previously surveyed for cultural resources, the 2019 survey consisted of transects spaced 25 to 30 meters apart. Areas with exposed subsurface soil, including dirt road berms and rodent burrows, were thoroughly inspected for evidence of any possible buried cultural deposits and/or soil differentiation. Ground visibility was poor throughout the APE due to the presence of a heavy duff layer, low-lying vegetation, poison oak, and manzanita.

The APE appeared to be subject to periodic dumping. Contemporary debris included fragments of porcelain (likely from a toilet or other bathroom fixture), fragments of amber and colorless bottle glass, plastic containers, golf balls, and miscellaneous fragments of metal. Also present in the APE were several check dams constructed out of rock. These dams were likely constructed when the nearby subdivisions were constructed. Although there was a significant amount of contemporary garbage found in the APE, no cultural resources were identified.

Native American Consultation

A Request for a Sacred Lands Search was e-mailed to the Native American Heritage Commission (NAHC) on June 20, 2019. The NAHC responded by e-mail on June 24, 2019, indicating that their files did not identify the presence of Native American sacred sites or cultural resources in the immediate project area.

The NAHC provided contact information for several Native American representatives and organizations. California Government Code §65352.3 (SB 18, 2004) requires local governments to contact Native American tribes identified by the NAHC prior to amending a general plan.

To satisfy SB 18 requirements, on October 30, 2019, Peter Bird, Associate Planner with the City, sent comment solicitation letters to the following Native American representatives and organizations that were identified by the NAHC: Wade McMaster, Chairperson of the Wintu Tribe of Northern California; Kelli Hayward, Cultural Resources Director of the Wintu Tribe of Northern California & Toyon-Wintu Center; Caleen Sisk, Chief of the Winnemem Wintu Tribe; Roy Hall, Chairperson of the Shasta Nation; Janice Crowe, Chairperson of the Shasta Indian Nation; Jack Potter, Chairperson of the Redding Rancheria; Frieda Bennett, Chairperson of the Quartz Valley Indian Community; Agnes Gonzalez, Chairperson of the Pit River Tribe of California; John Hayward, Chairperson of the Nor-Rel-Muk Nation; and Kyle Self, Chairperson of the Greenville Rancheria of Maidu Indians.

On November 15, 2019, John Hayward of the Nor-Rel-Muk Wintu Nation responded to the SB 18 comment solicitation letter from Mr. Bird. Mr. Hayward stated the Nor-Rel-Muk Wintu have concerns regarding this project due to past prehistoric activity in the vicinity of the APE. Mr. Hayward requested a monitor for the project. The City spoke with Mr. Hayward in February 2020 and explained that the Wintu Tribe of Northern California expressed similar concerns. Mr. Hayward stated that he was not opposed to the Wintu Tribe providing the Native American monitor.

In addition, in accordance with Public Resources Code §21084.2 (AB 52, 2014), on June 21, 2019, the City sent a letter to the Wintu Tribe of Northern California & Toyon-Wintu Center providing detailed information on the proposed project and describing the AB 52 consultation process. A written response was received from Kelli Hayward on June 26, 2019, requesting to engage in formal consultation regarding the proposed project. The City met with Ms. Hayward on the project site on February 20, 2020. On March 2, 2020, Ms. Hayward provided written comments to the City and stated that there are recorded Native American villages and sites in the general project area. Due to the presence of waterways in the area, including Churn Creek west of the project site, the likelihood that the Wintu gathered and hunted in the area is high.
Ms. Hayward stated that the Tribe feels that a Wintu monitor should be present during earth-disturbing activities. In addition, she recommends that training in identifying cultural resources and treating tribal cultural resources with dignity and respect to the Wintu and their history be provided to all construction workers, project supervisors, developers, and inspectors.

Conclusions and Recommendations

No cultural resources were identified within the project site as a result of the CRE. However, based on the geomorphological and topographic characteristics of the project site, the results of the records and literature search, the age of soils mapped in the area, and the level of contemporary disturbance, the project site is considered to have a low to moderate potential for both buried historic and prehistoric resources. **MM 4.5.1** addresses the inadvertent discovery of cultural resources.

To address Native American concerns, **MM 4.5.2** is included to require that construction personnel and their supervisors receive training from a qualified archaeologist and/or Native American representative regarding cultural and tribal cultural resources that may be present in the project site.

Representatives from the Wintu Tribe of Northern California & Toyon-Wintu Center shall be given the opportunity to review the training materials and participate in the initial training.

MM 4.5.3 requires that a minimum of one week in advance of any ground-disturbing activities, the Wintu Tribe of Northern California & Toyon-Wintu Center shall be notified and offered the opportunity for a Native American representative to voluntarily monitor ground-disturbing activities. In accordance with **MM 4.5.4**, in the event that cultural resources or human remains of Native American descent are identified during earth disturbance, the Wintu Tribe of Northern California & Toyon Wintu Center shall be requested to provide a Native American monitor to observe subsequent earth-disturbing construction activities on potentially sensitive lands. Costs associated with such Native American monitoring shall be the responsibility of the Developer. Implementation of **MM 4.5.1** through **MM 4.5.4** ensures that the project's impacts would be less than significant.

Question C

The project area does not include any known cemeteries, burial sites, or human remains. However, it is possible human remains may be unearthed during construction activities. **MM 4.5.5** states if human remains are discovered, there shall be no further excavation or disturbance of the site until the County coroner has been contacted and has made the necessary findings as to origin and disposition in accordance with §15064.5(e) of the CEQA Guidelines. Therefore, with implementation of **MM 4.5.4** and **MM 4.5.5**, impacts would be less than significant.

CUMULATIVE IMPACTS

Cumulative projects in the vicinity of the project area have the potential to impact cultural resources. Archaeological and historic resources are afforded special legal protections designed to reduce the cumulative effects of development. Cumulative projects and the proposed project are subject to the protection of cultural resources afforded by the CEQA *Guidelines* §15064.5 and related provisions of the PRC. In addition, projects with federal involvement would be subject to Section 106 of the NHPA.

Given the non-renewable nature of cultural resources, any impact to protected sites could be considered cumulatively considerable. **MM 4.5.1** addresses the inadvertent discovery of cultural resources and human remains. **MM 4.5.2** requires all construction personnel that conduct earth-disturbing activities and their supervisors receive training regarding cultural and tribal cultural resources that may be present in the project site.

MM 4.5.3 and **MM 4.5.4** provide an opportunity for the Wintu Tribe of Northern California & Toyon Wintu Center to monitor ground-disturbing activities, and **MM 4.5.5** addresses the inadvertent discovery of human remains. Implementation of **MM 4.5.1** through **MM 4.5.5** ensures that the proposed project's cumulative impacts to cultural resources are less than significant.

MITIGATION

MM 4.5.1 In the event of any inadvertent discovery of cultural resources (i.e., burnt animal bone, midden soils, projectile points or other humanly-modified lithics, historic artifacts, etc.), all work within 50 feet of the find shall be halted until a professional archaeologist can evaluate the significance of the find in accordance with PRC §21083.2(g) and §21084.1, and CEQA Guidelines §15064.5(a). If any find is determined to be significant by the archaeologist, the City shall meet with the archaeologist to determine the appropriate course of action. If necessary, a Treatment Plan prepared by an archeologist outlining recovery of the resource, analysis, and reporting of the find shall be prepared. The Treatment Plan shall be reviewed and approved by the City prior to resuming construction.

MM 4.5.2 Prior to commencement of any earth disturbance (e.g., clearing, grading, trenching, etc.), all construction personnel participating in the earth-disturbing activities and their supervisors shall receive training from a qualified archaeologist and/or Native American representative

regarding cultural and tribal cultural resources that may be present in the project site. Representatives from the Wintu Tribe of Northern California & Toyon-Wintu Center shall be given the opportunity to review the training materials and participate in the initial training.

At a minimum, the training shall include a discussion of pertinent laws protecting cultural and tribal cultural resources, examples of resources that could be encountered in the project site, and procedures to be followed if resources are found.

If new personnel are added to the project, the City shall ensure that they receive the mandatory training before starting work. The initial training session may be videotaped and presented to new personnel to satisfy the sensitivity training requirement.

MM 4.5.3 A minimum of one week in advance of any ground-disturbing activities (e.g., tree removal, clearing, grading, trenching, etc.), the Wintu Tribe of Northern California & Toyon-Wintu Center shall be notified and offered the opportunity for a Native American representative to voluntarily monitor ground-disturbing activities.

MM 4.5.4 In the event that cultural resources or human remains of Native American descent are identified during earth disturbance, the Wintu Tribe of Northern California & Toyon Wintu Center shall be requested to provide a Native American monitor to observe subsequent earth-disturbing construction activities on potentially sensitive lands. Costs associated with such Native American monitoring shall be the responsibility of the Developer.

MM 4.5.5 In the event that human remains are encountered during construction activities, the City shall comply with §15064.5 (e) (1) of the CEQA Guidelines and PRC §7050.5. All project-related ground disturbance within 100 feet of the find shall be halted until the County coroner has been notified. If the coroner determines that the remains are Native American, the coroner will notify the NAHC to identify the most likely descendants of the deceased Native Americans. Project-related ground disturbance in the vicinity of the find shall not resume until the process detailed in §15064.5 (e) has been completed.

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4.6 ENERGY

Would the project:

Issues and Supporting Evidence	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources during project construction or operation?	☐	☐	☐	☒
b. Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	☐	☒

REGULATORY CONTEXT

FEDERAL

There are no federal regulations pertaining to energy that apply to the proposed project.

STATE

Renewables Portfolio Standard

In 2002, SB 1078 was passed to establish the State's Renewables Portfolio Standard (RPS) Program, with the goal of increasing the amount of electricity generated and sold to retail customers from eligible renewable energy resources. The initial goal was to increase the percentage of renewable energy in the state's electricity mix to 20 percent of retail sales by 2017. The Renewables Portfolio Standard has been subsequently amended by the following actions:

Date	Legislation/Plan	Action
May 3, 2003	Energy Action Plan I	Accelerated the 20 percent renewable energy target to 2010.
September 21, 2005	Energy Action Plan II	Recommended a goal of 33 percent renewable energy by 2020.
September 26, 2006	SB 107	Codified the 20 percent renewable energy by 2010 target set forth in the Energy Action Plan I.
November 17, 2008	EO S-14-08 (Schwarzenegger)	Required 33 percent renewable energy by 2020 as recommended in the Energy Action Plan II.
September 15, 2009	EO S-21-09 (Schwarzenegger)	Directed the CARB to adopt regulations by July 31, 2010, consistent with the 33 percent renewable energy by 2020 target set forth in EO S-14-08.
April 12, 2011	Senate Bill X1-2	Codified the 33 percent renewable energy by 2020 target set forth in EO S-14-08; this new target applied to all electricity retailers in the state, including publicly owned utilities, investor-owned utilities, electricity service providers, and community choice aggregators.
October 7, 2015	SB 350	Codified a target of 50 percent renewable energy by 2030. Also requires California utilities to develop integrated resource plans

Date	Legislation/Plan	Action
		that incorporate a GHG emission reduction planning component beginning January 1, 2019.
September 10, 2018	SB 100	Codified targets of 60 percent renewable energy by 2030 and 100 percent renewable energy by 2045.

California Building Standards Code

Title 24 of the CCR, also known as the California Building Standards Code (CBSC), includes the following regulations that apply to the proposed project:

California Energy Code

The California Energy Code (Part 6 of the CBSC), also known as the State's Energy Efficiency Standards, was established in 1978 with a goal of reducing California's energy consumption for residential and nonresidential buildings. The Standards include mandatory measures related to building envelopes, mechanical systems, indoor and outdoor lighting, and electrical power distribution.

The 2019 update to the Energy Efficiency Standards went into effect on January 1, 2020. One of the most significant changes is the requirement that beginning in 2020, solar photovoltaic (PV) systems must be installed on all new single-family and multi-family residences of three stories or fewer to offset the estimated electrical usage of the home. In addition, the new standards require thicker attic and wall insulation and improved ventilation systems to prevent heat transfer and improve air quality, respectively.

The Initial Study/Negative Declaration prepared for the update estimates that implementation of the 2019 Standards will reduce the energy use of typical new residential buildings by about 7 percent and nonresidential buildings by about 31 percent compared to buildings constructed under the previous standards. The inclusion of solar PV systems is anticipated to reduce each building's demand for grid electricity by about 53 percent. The 2019 Standards are also projected to decrease statewide water consumption by approximately 246 million gallons per year, reduce statewide annual electricity consumption by about 650 gigawatt-hours per year, and reduce statewide natural gas consumption by 9.8 million therms per year.

In addition, it is estimated that there will be a net reduction in the emissions of nitrous oxide by roughly 100 metric tons per year, sulfur oxides by 0.27 metric tons per year, carbon monoxide by 28 metric tons per year, and particulate matter less than 2.5 micrometers in diameter (PM 2.5) by 3.36 metric tons per year. The Standards are also anticipated to reduce growth in statewide GHG emissions by 230,000 metric tons of carbon dioxide (CO_2e) per year.

California Green Building Standards Code

In 2007, the California Building Standards Commission (CBSC) developed green building standards in an effort to meet the goals established by the Global Warming Solutions Act of 2006. These standards are referred to as the CALGreen Code and are included as Part 11 of the CBSC.

The CALGreen Code, requires new residential and commercial buildings to comply with mandatory measures related to planning and design, energy efficiency, water efficiency/ conservation, material conservation, resource efficiency, and environmental quality. The most recent update to the CALGreen Code went into effect on January 1, 2020. Although it was adopted as part of the State's efforts to reduce GHG emissions, the CALGreen Code has the added benefit of reducing energy consumption from residential and nonresidential buildings that are subject to the Code.

California Environmental Quality Act (CEQA)

Section 15126.2(b) of the CEQA Guidelines states that if analysis of a project's energy use reveals that the project may result in significant environmental effects due to wasteful, inefficient, or unnecessary use of energy, or wasteful use of energy resources, the effects must be mitigated. The Guidelines provide suggestions of topics that may be included in the energy analysis, including identification of energy supplies that would serve the project and energy use for all project phases and components. In addition to building code compliance, other relevant considerations may include the project's size, location, orientation, equipment use and any renewable energy features that could be incorporated into the project. The energy use analysis may be included in related analyses of air quality, GHG emissions, transportation, or utilities at the discretion of the lead agency.

LOCAL

City of Shasta Lake

The Shasta Lake General Plan includes the following objectives, policies, and implementation measures that apply to the proposed project:

Conservation Element		
Objectives:	E-1	Utilize the City's renewable resource base to the extent feasible, including passive and active solar, wind, co-generation, and biomass.
	E-2	Conserve nonrenewable energy resources, specifically raw materials, transportation fuels, and land area, through the recovery and recycling of solid waste materials in a cost-effective manner.
Policies:	E-b	City government shall review its energy consumption performance and implement programs designed to increase energy efficiency.
	E-c	City ordinances and regulations shall be reviewed to eliminate barriers to the use of renewable energy resources.
Implementation Measures:	E-(1)	Coordinate with the City Electric Department to educate the public about the need to conserve scarce energy resources, insulate buildings to reduce energy required for heating and cooling, and use energy-efficient appliances.
	E-(2)	Require consideration of passive solar energy techniques in subdivision design; including house orientation, street and lot layout, vegetation and protection of solar access.
	E-(3)	Continue to require new buildings to meet state energy efficiency standards and develop a design manual showing examples of energy conservation in subdivision planning, site layout, and building design.

DISCUSSION OF IMPACTS

Question A

Also see discussion in Section 4.8 (Greenhouse Gas Emissions).

Construction-Related Energy Use

Energy consumption during construction would occur from diesel and gasoline used for construction equipment, haul trucks, and construction workers travelling to and from the work site. In addition, electrical power would be used during certain phases of development. The use of electricity during construction would be minimal and would not be considered wasteful, inefficient, or unnecessary.

Construction equipment would comply with regulations that restrict idling when not in use (see **4.13.3**). Construction equipment must also comply with State regulations that require the use of fuel-efficient equipment. Compliance with existing State regulations that require the use of fuel-efficient equipment ensures that impacts during construction would be less than significant. Implementation of **MM 4.13.3** will even further reduce impacts during construction.

Operational Energy Use

Operational energy use would include electricity and natural gas for building heating and cooling, lighting, appliances, electronic equipment, and other similar uses.

As stated in Section 4.3 under Questions A and B, project emissions were estimated using CalEEMod. CalEEMod reports a project's operational emissions based on all operational activities, including vehicle traffic, electricity usage in the buildings, water use, wastewater treatment, solid waste disposal, use of architectural coatings, etc. CalEEMod estimates electricity use for the proposed project at 319,725 kilowatt hours per year (kWh/yr), which equates to 3,996 kWh/yr per dwelling unit. [CalEEMod does not take into consideration all Building Codes that have been adopted since the current CalEEMod version was released in 2017].

As stated under Regulatory Context, the 2019 Energy Efficiency Standards require that solar PV systems must be installed on all new single-family residences to offset the estimated electrical usage of the home. The new standards also require thicker attic and wall insulation to prevent heat transfer. Implementation of the 2019 Standards will reduce the energy use of typical new residential buildings by about 7 percent. The inclusion of solar PV systems will reduce each building's demand for grid electricity by about 53 percent.

In addition, the proposed project must comply with the CALGreen Code that was established to reduce the State's energy consumption and provide energy efficiency for residential and nonresidential buildings. The Code includes mandatory measures for planning and design, energy efficiency, water efficiency/conservation, material conservation, resource efficiency, and environmental quality. Because the City's Building Official will ensure compliance with State energy-efficiency regulations through the plan review and inspection process, the project would not result in the wasteful, inefficient, or unnecessary consumption of energy resources; there would be no impact.

Question B

As stated under Regulatory Context above, the City's General Plan includes goals, policies, and implementation measures that conserve energy resources and encourage the development of sustainable energy sources. In addition, the State's Energy Efficiency Standards include renewable energy requirements for new single-family residential projects. The City's Building Official is responsible for reviewing all construction documents to ensure that the proposed project implements the State's mandatory energy efficiency measures. Compliance with these measures will ensure that the proposed project does not conflict with or obstruct a State or local plan for renewable energy or energy efficiency; there would be no impact.

CUMULATIVE IMPACTS

Completion of the proposed project and other potential cumulative projects, including growth resulting from build-out of the City's General Plan, could result in potentially significant impacts due to the wasteful, inefficient, or unnecessary consumption of energy resources. However, as stated under Regulatory Context, new development projects in the State are required to comply with the State's Energy Efficiency Standards. These regulations are intended to reduce the potential for cumulative impacts related to energy use and GHG emissions. Because all new single-family residences must comply with the State's requirements for energy efficiency and renewable energy, the proposed project's cumulative impacts on energy resources would be less than significant.

MITIGATION

None necessary.

DOCUMENTATION

California Energy Commission. 2018. Initial Study/Proposed Negative Declaration for the 2019 Building Energy Efficiency Standards for Residential and Nonresidential Buildings. https://ww2.energy.ca.gov/title24/2019standards/rulemaking/documents/. Accessed May 2020.

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4.7 GEOLOGY AND SOILS

Would the project:

Issues and Supporting Evidence	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death, involving: i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☒	☐
ii) Strong seismic ground shaking?	☐	☐	☒	☐
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☒	☐
iv) Landslides?	☐	☐	☒	☐
b. Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐
c. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☒	☐
d. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	☐	☐	☒	☐
e. Have soils incapable of adequately supporting the use of septic tanks or alternative 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?	☐	☒	☐	☐

REGULATORY CONTEXT

FEDERAL

National Earthquake Hazards Reduction Act

The National Earthquake Hazards Reduction (NEHR) Act was passed in 1977 to reduce the risks to life and property from future earthquakes in the United States. The Act established the National Earthquake Hazards Reduction Program, which was most recently amended in 2004. The Federal Emergency Management Agency (FEMA) is designated as the lead agency of the program.

STATE

California Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act (PRC §2621 *et seq.*) was passed in 1972 to reduce the risk to life and property from surface faulting in California. The Act prohibits the siting of most structures intended for human occupancy on the surface trace of active faults. For projects proposed in an Alquist-Priolo Fault Study Zone, a geologic investigation must be prepared to demonstrate that proposed buildings would not be constructed across active faults.

California Seismic Hazards Mapping Act

The California Seismic Hazards Mapping Act (SHMA) of 1990 (PRC §2690–2699.6) addresses non-surface fault rupture earthquake hazards, including strong ground shaking, liquefaction, and seismically induced landslides. The SHMA also addresses expansive soils, settlement, and slope stability. Under the SHMA, cities and counties may withhold development permits for sites within seismic hazard areas until geologic/geotechnical investigations have been completed and measures to reduce potential damage have been incorporated into development plans.

California Building Standards Code

As discussed in Section 4.6, the CBSC consists of 13 parts, including the California Building Code, Energy Code, Fire Code, and Green Building Standards Code. Part 2 of the CBSC is the California Building Code (CBC) that includes standards for structural design, excavation, grading, seismic design, drainage, and erosion control. CBC Chapter 18 (Soils and Foundations) and Appendix J (Grading) include requirements for geotechnical investigations and soil reports.

Protection of Paleontological Resources

Under CEQA, a project is considered to have a significant impact on paleontological resources if it would disturb or destroy a unique paleontological resource or site or unique geologic feature. In addition, Public Resources Code (PRC) Section 5097.5 provides for the protection of paleontological resources. Local agencies are required to comply with PRC 5097.5 when the agency has discretionary authority over a project undertaken by others (e.g., issuance of use permits, grading permits, etc.).

LOCAL

City of Shasta Lake

The Shasta Lake General Plan includes the following objectives, policies, and implementation measure that apply to the proposed project:

Safety Element		
Objectives:	SG-1	Protect development from seismic hazards; and protection of essential or critical structures, such as schools, public meeting facilities, emergency services, high-rise and high-density structures,

		by developing standards appropriate for such protection.
	SG-2	Avoid development on unstable slopes by developing standards for the location of development relative to these hazards.
	SG-3	Protect development from other geologic hazards, such as landslides, erosion and expansive soils.
Policies:	SG-a	Comply with state seismic and building standards in the design and siting of critical facilities, including hospital facilities, police and fire stations, school facilities, hazardous material manufacture and storage facilities, bridges, and large public assembly halls. Require all new buildings in the City be built under the seismic requirements of the currently adopted codes.
	SG-c	Sedimentation and erosion from development shall be minimized through ordinances and implementation mechanisms as adopted by the City.
	SG-d	When soil tests reveal the presence of expansive soils, require engineering design measures to eliminate or mitigate their impacts.
Implementation Measure:	SG-(1)	Require all new buildings in the City to be built under the seismic requirements of the Uniform Building Code.

Grading, Erosion Control, and Hillside Development Ordinance

SLMC Chapter 15.08 (Grading, Erosion Control, and Hillside Development), §15.08.210(A)(8) requires that all construction projects involving site grading shall include erosion control plans prepared by a registered civil engineer, qualified SWPPP developer (QSD), or other licensed or certified stormwater professional. Temporary and permanent erosion control devices, designed and constructed in accordance with the California Stormwater Quality Association (CASQA) BMPs, and the City's Construction Standards, shall be provided to control erosion. The Developer must provide sufficient equipment and qualified personnel to conduct emergency erosion control as identified in the SWPPP and/or erosion control plan.

DISCUSSION OF IMPACTS

Question A

i and ii)

According to the Alquist-Priolo Earthquake Fault Zoning Maps, the closest Special Study Zone is the Rocky Ledge Fault Zone, approximately 43 miles to the northeast near Burney. Review of the USGS earthquake fault map shows that the nearest potentially active fault is the Battle Creek fault, approximately 20 miles south of the project site along Cottonwood Creek. Although this fault line could produce low to moderate ground shaking, which is the principal cause of damage in a seismic event, to date, there have been no reported surface ruptures in the immediate project area and Shasta County has never proclaimed a state of emergency due to earthquake events.

As stated under Regulatory Context above, the CBC provides minimum standards for building design and construction, including seismic design. It is the responsibility of the City's Building Official to ensure that buildings are designed in accordance with State regulations for seismic safety. Compliance with existing building code standards ensures that impacts are less than significant.

iii)

Liquefaction results from an applied stress on the soil, such as earthquake shaking or other sudden change in stress condition. During liquefaction, soils lose strength and ground failure

may occur. This is most likely to occur in saturated silt, sand, and fine-grained gravel deposits of Holocene to late Pleistocene age in areas where the groundwater table is high.

A Geotechnical Investigation Report was prepared by Brown & Mills, Inc., in 2003 for a previously proposed subdivision that included a majority of the project site; the report was reviewed by CGI Technical Services, Inc., in 2020 (see **Appendix D**). As stated in the Report, geotechnical field investigations were conducted to evaluate subsurface soil conditions. The study included subsurface exploration through excavation of 16 test pits, six of which were on the project site (TP-2, 3, 4, 15, 16, and 17). Near-surface soils in these test pits consisted predominantly of loose-to-medium-dense silty sand/clayey sand. Below the near-surface soils, slightly- to highly-weathered, weak-to-very-strong metavolcanic rock was encountered at depths ranging from 1 to 4 feet. Backhoe refusal on rock was encountered in TP-2 at a depth of 5 feet, and in TP-3 and TP-16 at a depth of 4.5 feet. Because soils are relatively dense overall and overlay metavolcanic rock, there is a low potential for liquefaction; impacts would be less than significant.

iv)

The project site is identified in the *Shasta Lake Local Hazard Mitigation Plan* (LHMP) as having low susceptibility for landslide hazards. In addition, there are no unique geologic conditions in the project area that make the area susceptible to landslides. Therefore, potential impacts associated with landslides would be less than significant.

Question B

Construction of the proposed project would involve excavation, grading activities, and installation of project components, which would result in the temporary disturbance of soil and would expose disturbed areas to potential storm events. This could generate accelerated runoff, localized erosion, and sedimentation. In addition, construction activities could expose soil to wind erosion that could adversely affect on-site soils and the re-vegetation potential of the area.

As noted in Section 1.8 (Regulatory Requirements), the Developer is required to obtain coverage under the NPDES permit for *Discharges of Storm Water Runoff Associated with Construction Activity* by submitting a Notice of Intent to the SWRCB. The permitting process requires the development and implementation of an effective SWPPP that includes BMPs to reduce pollutants and any additional controls necessary to meet water quality standards. Measures that may be implemented to minimize erosion include, but are not limited to: limiting construction to the dry season; use of straw wattles, silt fences, and/or gravel berms to prevent sediment from discharging off-site; and revegetating temporarily disturbed sites upon completion of construction.

In addition, as required by the City's Phase II MS4 permit, the project must incorporate measures to reduce stormwater runoff both during construction and post-construction to minimize the potential for long-term impacts. Post construction measures include site design measures (e.g. stream setbacks and vegetated buffer strips, vegetated swales to provide filtration and bio-uptake of pollutants, tree planting and preservation, use of porous pavement); and storm water treatment measures (e.g., retention and detention basins, bioretention/rain gardens).

As stated under Regulatory Context, SLMC §15.08.210(A)(8) requires that temporary and permanent erosion control devices, designed and constructed in accordance with CASQA BMPs, must be provided to control erosion. The Developer must provide sufficient equipment and qualified personnel to conduct emergency erosion control as identified in the SWPPP and/or erosion control plan. Because BMPs for erosion and sediment control would be implemented in accordance with existing requirements, the potential for soil erosion and loss of top soil would be less than significant.

Question C

See discussion under Question A(iii) and (iv) above. As stated under Question A(iii), a geotechnical report was prepared in 2003 by Brown & Mills for a previously proposed subdivision that included a majority of the project site. In January 2020, CGI Technical Services, Inc., reviewed the 2003 Brown

& Mills report and concluded that the information and recommendations in the previous report remain generally applicable to the design and construction of the proposed project (see **Appendix D**).

However, CGI recommends that once the subdivision design is finalized, that additional geotechnical testing be conducted to ensure that cement type is selected based on soil chemistry, building foundations are designed based on plasticity index, and roads are designed based on site-specific R-values.

CGI recommends that they conduct a general review of final improvement plans and specifications to ensure geotechnical recommendations have been properly interpreted and implemented into the project design. Further, as recommended in the original geotechnical report, site earthwork activities (including site preparation, placement of engineered fill and trench backfill, construction of slab and pavement subgrades, and foundation excavations), should be monitored by the individual who prepared the geotechnical report.

MM 4.7.1 requires that prior to recordation of the final map or issuance of a grading permit, additional geotechnical testing be conducted based on final design of the subdivision to identify recommended measures that need to be incorporated into the project design.

MM 4.7.2 requires that grading and improvement plans be reviewed by a qualified professional to ensure all recommendations included in the geotechnical report are implemented. In addition, **MM 4.7.3** requires that a qualified professional monitor and inspect work activities as recommended in the geotechnical report.

As stated in the preliminary Brown & Mills Geotechnical Report (**Appendix D**), rock was encountered in some of the test pits on the project site. It is anticipated that excavations within some areas of the site will be difficult (if not impossible) with a conventional backhoe. A large track-mounted excavator, equipped with a single ripper tooth and/or a hydraulic percussion hammer, may be required to advance some on-site excavations. There is a possibility that blasting may be required if less-weathered zones of rock are encountered during excavation. Use of large track-mounted excavators and blasting could result in unstable conditions both on- and off-site.

Blasting activities typically include pre-drilling holes in areas with hard rock, placing charges in the drilled holes, and detonating the charges. Blasts typically occur for only a few seconds. Blasting activities would be conducted in accordance with applicable Department of Industrial Relations (DIR) regulations (CCR Title 8, §5236 *et seq.*) and Section 5607 of the California Fire Code (CFC). In accordance with DIR regulations, blasting operations must be conducted by or be under the direct supervision of a blaster holding a valid California Blaster's License. The CFC also requires that blasters be familiar with potential hazards and required safety precautions identified in the California Fire Code and the National Fire Protection Association (NFPA) Explosive Materials Code. Compliance with existing regulations pertaining to blasting would ensure that the potential for geologic hazards associated with blasting would be less than significant.

Potential impacts from blasting associated with hazards, hazardous materials, noise, and vibration are addressed in Sections 4.9 (Hazards and Hazardous Materials) and 4.13 (Noise).

As required by **MM 4.9.1**, if the grading/excavation contractor determines that blasting is required, a Blasting Plan, prepared by a qualified blasting specialist, must be completed prior to any blasting activities. The Blasting Plan would include, but not be limited to, identification of blasting locations, a description of types of blasting agents to be used, planned blasting methods, provisions for transportation, handling, and use of explosive materials, identification of sensitive receptors and structures potentially affected by blasting operations, and the location of overhead and underground utility lines in proximity to blasting activities. The plan must include appropriate measures to ensure compliance with CFC and NFPA requirements.

Implementation of **MM 4.9.1 and MM 4.7.1 through MM 4.7.3** ensures that geologic and soils hazards associated with the proposed project would be less than significant.

Question D

Some soils have a potential to swell when they absorb water and shrink when they dry out. These expansive soils generally contain clays that expand when moisture is absorbed into the crystal structure. Potentially expansive soils are generally those with a liquid limit over 50 percent and a plasticity index over 30 percent.

The preliminary Brown & Mills geotechnical report does not identify the presence of any expansive soils. If additional geotechnical testing identifies expansive soils on the project site, the geotechnical engineer will identify appropriate design and construction measures to ensure that potential impacts associated with expansive soils are less than significant.

Question E

The proposed project does not include the installation or use of alternative wastewater disposal systems. Therefore, there would be no impact.

Question F

Paleontology refers to the study of prehistoric life forms, other than humans. Paleontological resources include fossils and the deposits that contain fossils. Fossils are evidence of ancient life preserved in sediments and rock, such as the remains of animals, animal tracks, plants, and other organisms; as such, they are a non-renewable resource.

Paleontological resources and fossils are found primarily in sedimentary rock deposits. According to the California Geological Survey (CGS), rock formations on the project site are Paleozoic-age metavolcanic rocks (mostly flows, breccia, and tuff, including greenstone, diabase, and pillow lavas). Because metavolcanic rocks were generated from volcanic eruptions and were formed under high temperature and pressure conditions, the project site has an extremely low potential to harbor fossils. In addition, the project area has no unique geological features, and, according to the U.C. Berkeley Museum of Paleontology, no fossils have been reported in the project area. Although no unique geologic features or paleontological sites are known to exist in the study area, **MM 4.7.4** addresses the inadvertent discovery of paleontological resources and ensures that impacts are less than significant.

CUMULATIVE IMPACTS

Completion of the proposed project and other potential cumulative projects in the region, including growth resulting from build-out of the City's General Plan, could result in increased erosion and soil hazards and could expose additional structures and people to seismic hazards. In addition, ground disturbance has the potential to destroy paleontological resources and unique geological features. However, all projects are required to implement BMPs for erosion and sediment control and comply with CBC seismic design criteria and engineering design measures. Implementation of **MM 4.9.1** and **MM 4.7.1** through **MM 4.7.4** ensures that the project's impacts are not cumulatively considerable.

MITIGATION

Implementation of **MM 4.9.1.**

MM 4.7.1 Prior to issuance of a grading permit, additional geotechnical testing shall be conducted as recommended in the January 17, 2020, CGI Technical Services, Inc., *Update to Geotechnical Report, Windsor Estates III, Shasta Lake, California.* Testing shall be conducted by a California registered geotechnical engineer, certified engineering geologist, or other qualified professional approved by the City Engineer or his/her designee.

MM 4.7.2 Prior to issuance of a grading permit, grading/improvement plans and other applicable plans shall be reviewed by a California registered geotechnical engineer, certified engineering geologist, or other qualified professional approved by the City Engineer or his/her designee to ensure that all recommendations included in the January 7, 2003, Brown & Mills, Inc., *Geotechnical Investigation Report, Proposed Residential Subdivision, Deer Creek Manor, Pine Grove Avenue, Shasta Lake, CA* are implemented. Applicable notes shall be placed on the attachment sheet to the improvement plans and in applicable project plans and specifications.

MM 4.7.3 Site earthwork activities shall be monitored by a qualified professional approved by the City Engineer or his/her designee as recommended in the January 7, 2003, Brown & Mills, Inc., *Geotechnical Investigation Report, Proposed Residential Subdivision, Deer Creek Manor, Pine Grove Avenue, Shasta Lake, CA*.

MM 4.7.4 If paleontological resources (fossils) are discovered during construction, all work within a 60-foot radius of the find shall be halted until a professional paleontologist can evaluate the significance of the find. If any find is determined to be significant by the paleontologist, the City shall meet with the paleontologist to determine the appropriate course of action. If necessary, a Treatment Plan prepared by a paleontologist outlining recovery of the resource, analysis, and reporting of the find shall be prepared. The Treatment Plan shall be reviewed and approved by the City prior to resuming construction.

DOCUMENTATION

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4.8 GREENHOUSE GAS EMISSIONS

Would the project:

Issues and Supporting Evidence	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
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?	☐	☐	☒	☐

REGULATORY CONTEXT

Also see Regulatory Context in Section 4.6 (Energy)

FEDERAL

U.S. Environmental Protection Agency

In *Massachusetts v. EPA,* 549 U.S. 497 (2007), the Supreme Court found that greenhouse gas emissions (GHGs) are air pollutants covered by the federal Clean Air Act (CAA). The Court also acknowledged that climate change is caused, in part, by human activities. The Supreme Court's ruling paved the way for the regulation of GHG emissions by the USEPA under the CAA. The USEPA has enacted regulations that address GHG emissions, including, but not limited to, mandatory GHG reporting requirements, carbon pollution standards for power plants, and air pollution standards for oil and natural gas.

STATE

Assembly Bill 32 (Global Warming Solutions Act of 2006)

As required by AB 32 (2006), CARB adopted the initial Climate Change Scoping Plan in 2008 that identified the State's strategy to achieve the 2020 GHG emissions limit via regulations, market-based mechanisms, and other actions. AB 32 requires that the Scoping Plan be updated every five years. CARB's first update to the Climate Change Scoping Plan (2014) addressed post-2020 goals and identified the need for a 2030 mid-term target to establish a continuum of actions to maintain and continue reductions. In December 2017, CARB adopted the second update to the Scoping Plan that includes strategies to achieve the 2030 mid-term target.

California Building Standards Code

The CBSC consists of 13 parts, including the California Building Code, Energy Code, and Green Building Standards Code.

California Energy Code

As stated in Section 4.6 under Regulatory Context, the California Energy Code (Part 6 of the CBSC), also known as the State's Energy Efficiency Standards, was established in 1978 with a goal of reducing California's energy consumption for residential and nonresidential buildings.

The 2019 Energy Efficiency Standards require that beginning in 2020, solar PV systems must be installed on all new single-family and multi-family residences of three stories or fewer to offset the estimated electrical usage of the home. In addition, the new standards require thicker attic and wall insulation and improved ventilation systems to prevent heat transfer and improve air quality, respectively. The 2019 Standards are expected to reduce the energy use of typical new residential buildings by about 7 percent compared to buildings constructed under the previous standards. The inclusion of solar PV systems is anticipated to reduce each building's demand for grid electricity by about 53 percent. The 2019 Standards are also projected to decrease statewide water consumption, reduce statewide annual electricity consumption, and reduce statewide annual natural gas consumption.

In addition, it is estimated that there will be a net reduction in the emissions of nitrous oxide by roughly 100 metric tons per year, sulfur oxides by 0.27 metric tons per year, carbon monoxide by 28 metric tons per year, and particulate matter less than 2.5 micrometers in diameter (PM 2.5) by 3.36 metric tons per year. The Standards are also anticipated to reduce growth in statewide GHG emissions by 230,000 metric tons of carbon dioxide (CO_2e) per year.

California Green Building Standards Code

In 2007, the California Building Standards Commission (CBSC) developed green building standards in an effort to meet the goals established by the Global Warming Solutions Act of 2006. These standards are referred to as the CALGreen Code and are included as Part 11 of the CBSC. The CALGreen Code, requires new residential and commercial buildings to comply with mandatory measures related to planning and design, energy efficiency, water efficiency/ conservation, material conservation, resource efficiency, and environmental quality. The most recent update to the CALGreen Code went into effect on January 1, 2020.

Senate Bill 375 (Sustainable Communities and Climate Protection Act of 2008)

Under SB 375, the CARB sets regional targets for the reduction of GHG emissions from passenger vehicles and light duty trucks through an integrated approach to regional transportation and land use planning. SB 375 requires a Sustainable Communities Strategy (SCS) to be included in the applicable Regional Transportation Plan (RTP) that demonstrates how the region will meet the GHG emissions reduction targets. The purpose of the SCS is to coordinate transportation and land use planning in order to reduce vehicle miles traveled (VMT) and associated GHG emissions from vehicles and light trucks.

In Shasta County, the Shasta Regional Transportation Agency (SRTA) is responsible for developing the SCS. The SCS identifies the following strategies that are believed to offer the highest GHG reduction benefit per dollar investment: expanded plug-in vehicle charging infrastructure; expansion of interregional public transportation options; consolidated goods and freight hubs; expanded bicycle and pedestrian infrastructure; incentives for infill and redevelopment projects; and technology-based strategies (e.g., intelligent transportation systems applications that provide real-time travel information).

Senate Bill 391

SB 391, enacted in 2009, requires the California Transportation Plan to support an 80 percent reduction in GHG emissions below 1990 levels by 2050.

Senate Bill 32/Assembly Bill 197

These two bills were signed into legislation on September 8, 2016. SB 32 requires CARB to reduce GHG emissions to 40 percent below the 1990 levels by 2030. AB 197 requires CARB to prioritize direct GHG emission reductions in a manner that benefits the state's most disadvantaged communities and to consider social costs when adopting regulations to reduce GHG emissions. AB 197 also provides more legislative oversight of CARB.

Mobile Source Strategy

CARB's Mobile Source Strategy, adopted in 2016, describes the State's strategy for containing air pollutant emissions from vehicles, and demonstrates how the State can simultaneously meet air quality standards, achieve GHG emission reduction targets, decrease health risks from transportation emissions, and reduce petroleum consumption over the next fifteen years.

Senate Bill 210 (2019), Heavy-Duty Vehicle Inspection and Maintenance Program

Under SB 210, heavy-duty diesel trucks will have to pass a smog check to ensure vehicle emission controls are maintained in order to register or operate in California. Upon implementation of the Program, CARB must provide mechanisms for out-of-state owners of heavy-duty vehicles to establish and verify compliance with State regulations for heavy-duty diesel trucks prior to entering the State.

Senate Bill 44 (2019), Medium- and Heavy-Duty Vehicles: Comprehensive Strategy

SB 44 requires CARB to update the State's Mobile Source Strategy no later than January 1, 2021, to include a comprehensive strategy to reduce emissions from medium- and heavy-duty vehicles in order to meet federal ambient air quality standards and reduce GHG emissions from this sector. The Bill also requires CARB to establish emission reduction goals for 2030 and 2050 for medium- and heavy-duty vehicles.

Short-Lived Climate Pollutant Reduction Strategy

As required by SB 605 (2014), CARB prepared a Short-Lived Climate Pollutant (SLCP) Reduction Strategy in 2017. SLCPs are powerful climate forcers that have relatively short atmospheric lifetimes and include methane, hydrofluorocarbons, and anthropogenic black carbon. The goal of the Strategy is to achieve a reduction in methane by 40 percent, hydrofluorocarbon gases by 40 percent, and anthropogenic black carbon by 50 percent below 2013 levels by 2030. The bill also established targets for reducing organic waste in landfills.

California Executive Order B-48-18

EO B-48-18 was issued by the Governor in January 2018, and set targets of 200 hydrogen fueling stations and 250,000 electric vehicle chargers to support 1.5 million zero-emission vehicles (ZEVs) on California roads by 2025, and 5 million ZEVs by 2030. The State's ZEV Action Plan outlines specific actions that state agencies will take to continue advancing the ZEV market in California.

Renewables Portfolio Standard

As discussed in Section 4.6 (Energy), the State's RPS Program was enacted to increase the amount of electricity generated and sold to retail customers from eligible renewable energy resources. The RPS was most recently amended in September 2018 by SB 100 to establish a target of 60 percent renewable energy by 2030 and 100 percent renewable energy by 2045.

California Executive Order B-55-18

EO B-55-18 was issued by the Governor on September 10, 2018. It sets a statewide goal to achieve carbon neutrality as soon as possible, and no later than 2045, and to achieve and maintain net negative emissions thereafter. This goal is in addition to the existing statewide GHG reduction targets.

CEQA Guidelines

§15064.4 of the CEQA Guidelines states that the lead agency should focus its GHG emissions analysis on the reasonably foreseeable incremental contribution of the project's emissions to the effects of climate change. A lead agency has the discretion to determine whether to use a model or methodology to quantify GHG emissions or to rely on a qualitative or performance-based standard.

The GHG analysis should consider 1) the extent to which the project may increase or reduce GHG emissions as compared to the existing environmental setting; 2) whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project and 3) the extent to which the project complies with any regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of GHG emissions. If there is substantial evidence that the possible effects of a particular project are still cumulatively considerable notwithstanding compliance with the adopted regulations or requirements, an EIR must be prepared for the project.

Greenhouse Gases Defined

Table 4.8-1 provides descriptions of the GHGs identified in California Health and Safety Code §38505(g).

TABLE 4.8-1
Greenhouse Gases

Greenhouse Gas	Description
Carbon dioxide (CO_2)	CO_2 is the primary greenhouse gas emitted through human activities. In 2014, CO_2 accounted for about 80.9 percent of all U.S. greenhouse gas emissions from human activities. The main human activity that emits CO_2 is the combustion of fossil fuels (coal, natural gas, and oil) for energy and transportation, although certain industrial processes and land-use changes also emit CO_2.
Methane (CH_4)	CH_4 is the second most prevalent greenhouse gas emitted in the United States from human activities. Methane is emitted by natural sources such as wetlands, as well as human activities such as the raising of livestock; the production, refinement, transportation and storage of natural gas; methane in landfills as waste decomposes; and in the treatment of wastewater.
Nitrous oxide (N_2O)	In 2014, N_2O accounted for about 6 percent of all U.S. greenhouse gas emissions from human activities. Nitrous oxide is naturally present in the atmosphere as part of the Earth's nitrogen cycle. Human activities such as agricultural soil management (adding nitrogen to soil through use of synthetic fertilizers), fossil fuel combustion, wastewater management, and industrial processes are also increasing the amount of N_2O in the atmosphere.
Hydrofluorocarbons (HFCs)	HFCs are man-made chemicals, many of which have been developed as alternatives to ozone-depleting substances for industrial, commercial, and consumer products such as refrigerants, aerosol propellants, solvents, and fire retardants. They are released into the atmosphere through leaks, servicing, and disposal of equipment in which they are used.
Perfluorocarbons (PFCs)	PFCs are colorless, highly dense, chemically inert, and nontoxic. There are seven PFC gases: perfluoromethane (CF_4), perfluoroethane (C_2F_6), perfluoropropane (C_3F_8), perfluorobutane (C_4F_{10}), perfluorocyclobutane (C_4F_8), perfluoropentane (C_5F_{12}), and perfluorohexane (C_6F_4). Perfluorocarbons are produced as a byproduct of various industrial processes associated with aluminum production and the manufacturing of semiconductors.

Greenhouse Gas	Description
Sulfur hexafluoride (SF_6)	SF_6 is an inorganic compound that is colorless, odorless, nontoxic, and generally nonflammable. SF_6 is primarily used in magnesium processing and as an electrical insulator in high voltage equipment. The electric power industry uses roughly 80 percent of all SF_6 produced worldwide.
Nitrogen trifluoride (NF_3)	NF_3 is a colorless, odorless, nonflammable gas that is highly toxic by inhalation. It is one of several gases used in the manufacture of liquid crystal flat-panel displays, thin-film photovoltaic cells and microcircuits.

LOCAL

Shasta County Regional Climate Action Plan

Shasta County developed a draft Shasta Regional Climate Action Plan in August 2012 (RCAP). The RCAP includes GHG inventories and projections for each jurisdiction in Shasta County for 2008, 2020, 2035, and 2050. The plan shows that the County would achieve a reduction in GHG emissions in the year 2020 below 2008 business as usual (BAU) emissions with the implementation of State and federal reduction measures. According to SCAQMD staff, the District's greenhouse gas policy is to quantify, minimize, and mitigate greenhouse gas emissions, as feasible. Chapter 4 of the RCAP is specific to the City of Shasta Lake; however, the City has not formally adopted the RCAP or adopted thresholds of significance for GHGs.

City of Shasta Lake Renewable Energy Portfolio Standard

As discussed under Section 4.6 (Energy), the City adopted a RPS Enforcement Program and Renewable Energy Resources Procurement Plan in 2013. In February 2019, the California Energy Commission (CEC) conducted a verification review covering the City's second compliance period (2014-2016). The CEC found that for Compliance Period 2, the City met its renewable energy portfolio balance requirements.

DISCUSSION OF IMPACTS

Question A

Gases that trap heat in the atmosphere create a greenhouse effect that results in global warming and climate change. These gases are referred to as greenhouse gases (GHGs). As described in **Table 4.8-1**, some GHGs occur both naturally and as a result of human activities, and some GHGs are exclusively the result of human activities. The atmospheric lifetime of each GHG indicates how long the gas stays in the atmosphere before natural processes (e.g., chemical reactions) remove it. A gas with a long lifetime can exert more warming influence than a gas with a short lifetime. In addition, different GHGs have different effects on the atmosphere. For this reason, each GHG is assigned a global warming potential (GWP), which is a measure of the heat-trapping potential of each gas over a specified period of time.

Gases with a higher GWP absorb more heat than gases with a lower GWP, and thus have a greater effect on global warming and climate change. The GWP metric is used to convert all GHGs into CO_2 equivalent (CO_2e) units, which allows policy makers to compare impacts of GHG emissions on an equal basis. The GWPs and atmospheric lifetimes for each GHG are shown in **Table 4.8-2**.

Neither Shasta County nor the City have adopted thresholds of significance for GHG emissions. Because there are no local quantitative thresholds, predicted project-related GHG emissions were compared to the threshold suggested by the California Air Pollution Control Officers Association (900 metric tons per year CO_2e).

TABLE 4.8-2
Greenhouse Gases: Global Warming Potential and Atmospheric Lifetime

GHG	GWP (100-year time horizon)	Atmospheric Lifetime (years)
CO_2	1	50 -200
CH_4	25	12
N_2O	298	114
HFCs	Up to 14,800	Up to 270
PFCs:	7,390-12,200	2,600 – 50,000
SF_6	22,800	3,200
NF_3	17,200	740

Source: *U.S. Environmental Protection Agency, 2020.*

Project GHG Emissions

As stated in Section 4.3, an Air Quality and Greenhouse Gas Assessment was prepared for the proposed project by ECORP Consulting, Inc. in April 2019 (**See Appendix A**). The purpose of the assessment was to estimate project-generated criteria air pollutants and GHG emissions associated with the proposed project. Due to modifications to the proposed project, updated California Energy Code requirements for solar energy systems, and identification of feasible mitigation measures identified below, ENPLAN updated the CalEEMod project emissions report in June 2020; the updated reports are included in **Appendix A.**

CalEEMod quantifies direct GHG emissions from construction and operation (including vehicle use), as well as indirect GHG emissions, such as GHG emissions from energy use, solid waste disposal, vegetation planting and/or removal, and water use. CalEEMod also includes the intensity factors for CO_2, CH_4, and N_2O for the utility company that will serve the proposed project. CalEEMod does not identify intensity factors for the Shasta Lake Electric Utility; therefore, this information was obtained from the U.S. EPA Power Profiler.

Construction Emissions

Emissions from construction are based on all construction-related activities associated with proposed and future uses, including but not limited to site preparation, grading, trenching, use of construction equipment, and material hauling. Construction of the proposed project would emit GHG emissions as shown in **Table 4.8-3**, primarily from the combustion of diesel fuel in heavy equipment.

TABLE 4.8-3
Construction-Related Greenhouse Gas Emissions

Total Construction Emissions (Metric Tons)				
Year	**Carbon Dioxide (CO_2)**	**Methane (CH_4)**	**Nitrous Oxide (N_2O)**	**Carbon Dioxide Equivalent (CO_2e)**
2020	135.39	0.04	0	136.44
2021	432.66	0.11	0	435.32
2022	410.95	0.08	0	412.90
2023	408.77	0.08	0	410.69
2024	104.83	0.02	0	105.29
Total	1,492.60	0.33	0	1,500.64

Source: *CalEEMod, 2020.*

Operational Emissions

Emissions from operation of the proposed project are based on all proposed and future operational activities, including vehicle traffic, electricity usage, water use, wastewater treatment, solid waste disposal, use of architectural coatings, etc. Construction emissions and emissions associated with the loss in sequestration potential from removal of vegetation are amortized over the life of the project, defined as 30 years, and added to the operational emissions.

The proposed project would result in the generation of operational GHG emissions as shown in **Table 4.8-4.** The majority of operational emissions are indirect emissions attributed to the generation of electricity for the proposed project through the combustion of fossil fuels, followed by mobile sources (e.g., vehicle trips).

TABLE 4.8-4
Operational Greenhouse Gas Emissions

Total Annual Operational Emissions (Metric Tons)				
Source	**Carbon Dioxide (CO_2)**	**Methane (CH_4)**	**Nitrous Oxide (N_2O)**	**Carbon Dioxide Equivalent (CO_2e)**
Area	118.26	0.08	Trace	122.13
Energy	183.62	Trace	Trace	184.58
Mobile	421.69	0.05	0	422.97
Solid Waste	10.40	0.61	0	25.77
Water	8.84	0.14	Trace	13.22
Amortized Loss in Sequestration Potential from Vegetation Removal	7.8	0	0	7.8
Amortized Construction Emissions	49.75	0.01	0	50
Total	**800.36**	**0.89**	**0.01**	**826.47**

Source: CalEEMod, 2020.

As documented in **Table 4.8-4**, the proposed project would not exceed the numerical threshold of 900 metric tons/year of CO_2e. Therefore, impacts are less than significant and no mitigation is required.

Question B

See discussion under Regulatory Context above. The City's Building Official is responsible for reviewing construction documents to ensure mandatory measures included in the CALGreen Code are implemented into the project design. The Building Official verifies implementation of the mandatory measures during final inspection of the building. The plan review and inspection process ensures that the proposed project does not conflict with any local or State regulations or plans adopted for the purpose of reducing GHG emissions; there would be no impact.

CUMULATIVE IMPACTS

GHG emissions and global climate change are, by nature, cumulative impacts. Unlike criteria pollutants, which are pollutants of regional and local concern, GHGs are global pollutants and are not limited to the area in which they are generated.

As discussed above, the State legislature has adopted numerous programs and regulations to reduce statewide GHG emissions, including indirect emissions that are produced when electricity is generated from fossil fuels. As the use of renewable energy sources for electricity generation increases in accordance with existing State regulations, GHG emissions associated with the use of electricity will continue to decrease. Further, GHG emissions in the transportation sector will continue to decrease with implementation of State regulations. In addition, all new residential and nonresidential developments in the State are required to implement applicable State Energy Code and CALGreen Code mandatory measures that were enacted to reduce statewide GHG emissions. Because the project will comply with State codes adopted to reduce GHG emissions throughout the State, the project's contribution to cumulative GHG emissions would be less than significant.

MITIGATION

None necessary.

DOCUMENTATION

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4.9 HAZARDS AND HAZARDOUS MATERIALS

Would the project:

Issues and Supporting Evidence	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Create a significant hazard to the public or the environment through the routine transport, use or disposal of hazardous materials?	☐	☒	☐	☐
b. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☒	☐
c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code §65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒
e. For a project located within an airport land use plan area or, where such a plan has not been adopted, within two miles of a public airport or a 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?	☐	☒	☐	☐

REGULATORY CONTEXT

FEDERAL

Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA) is the primary federal law for the regulation of solid waste and hazardous waste in the United States and provides for the “cradle-to-grave” regulation that requires businesses, institutions, and other entities that generate hazardous waste to track such waste from the point of generation until it is recycled, reused, or properly disposed of. The USEPA has primary responsibility for implementing the RCRA.

STATE

Definition of Hazardous Waste/Hazardous Material

A material is considered hazardous if it appears on a list of hazardous materials prepared by a federal, state, or local agency, or if it has characteristics defined as hazardous by such an agency. Hazardous wastes are a subset of hazardous materials and are defined in §25117 of the Health and Safety Code as wastes, that because of their quantity, concentration, or physical, chemical, or infectious characteristics

may cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or pose a substantial present or potential hazard to human health or the environment.

Department of Toxic Substances Control

The California Department of Toxic Substances Control (DTSC) regulates the generation, transportation, treatment, storage, and disposal of hazardous waste under the RCRA and the State Hazardous Waste Control Law. Both laws impose "cradle-to-grave" regulatory systems for handling hazardous waste in a manner that protects human health and the environment.

California Occupational Safety and Health Administration (Cal/OSHA)

The California Occupational Safety and Health Administration (Cal/OSHA) has primary responsibility for developing and enforcing state workplace safety regulations, including requirements for safety training, availability of safety equipment, accident and illness prevention programs, hazardous substance exposure warnings, and emergency action and fire prevention plan preparation.

Regional Water Quality Control Board

The SWRCB and RWQCBs regulate hazardous substances, materials, and wastes that may affect surface water or groundwater through a variety of state statutes, including the Porter-Cologne Water Quality Control Act and underground storage tank cleanup laws. Any person proposing to discharge waste within the State must file a Report of Waste Discharge with the appropriate regional board. The proposed project is located within the jurisdiction of the CVRWQCB.

California Department of Forestry and Fire Protection (CAL FIRE)

The Bates Bill (AB 337), enacted in 1992, required CAL FIRE to work with local governments to identify high fire hazard severity zones throughout each county in the State. CAL FIRE adopted Fire Hazard Severity Zone (FHSZ) Maps for State Responsibility Areas (SRAs) in November 2007. Pursuant to California Government Code §51175-51189, CAL FIRE also recommended FHSZs for Local Responsibility Areas (LRAs).

California Fire Code

Chapter 33 of the CFC includes minimum safeguards that must be implemented during construction, alteration, and demolition activities to protect life and property from fire. Requirements are provided for cutting and welding activities, storage of flammable and combustible materials, blasting operations, and other construction-related activities. Vehicle access to the construction site for fire department personnel must be provided by either temporary or permanent roads capable of supporting vehicle loading under all weather conditions.

California Building Code

California Building Code Chapter 7A (Materials and Construction Methods for Exterior Wildfire Exposure) includes standards for new construction in Wildland-Urban Interface (WUI) Fire Areas (fire hazard severity zones. The purpose of Chapter 7A is to prevent a building from being ignited by flying embers that can travel as much as a mile away from a wildfire, and to contribute to a systematic reduction in fire-related losses through the use of performance and prescriptive requirements.

California Residential Code

California Residential Code (CRC) Section R337 requires incorporation of fire-resistant building materials in new residential dwellings to increasing the ability of a building located in any WUI Fire Area to resist the intrusion of flame or burning embers projected by a vegetation fire. In addition, as of 2011, the CRC requires that automatic fire sprinkler systems be installed in all new single-family residences to protect all areas of a dwelling unit in the event of a fire.

LOCAL

City of Shasta Lake

The Shasta Lake General Plan includes the following objectives and policies that apply to the proposed project:

Safety Element		
Objectives:	FS-1	Protect development from wildland and non-wildland fires by requiring development to incorporate design measures responsive to the risk from this hazard.
	FS-2	Protect life and property from crime by encouraging the incorporation of defensible space design techniques in the physical design of new development.
	HM-1	Protection of life and property from contact with hazardous materials through site design and land use regulations and storage and transportation standards.
	HM-2	Protection of life and property in the event of the accidental release of hazardous materials through emergency preparedness planning.
Policies:	FS-b	All land divisions and development shall be required to conform to Shasta Lake Fire Protection District Fire Safety Standards.
	FS-c	Known fire hazard information should be reported as part of every general plan amendment, zone change, use permit, variance, building site approval, and all other land development applications subject to environmental assessment.
	FS-e	Development in areas requiring additional levels of police and fire services shall participate in offsetting costs for the additional services.

Shasta Lake Municipal Code

Shasta Lake Municipal Code (SLMC), Title 15, Chapter 15.10 (Water Efficient Landscaping); §15.10.050(D)(1)(e) states that a landscape design plan for projects in fire-prone areas shall address fire safety and prevention. A defensible space or zone around a building or structure is required per PRC §4291(a) and (b). Fire-prone plant materials and highly flammable mulches must be avoided.

City of Shasta Lake Local Hazard Mitigation Plan (LHMP)

The City's LHMP includes a wildfire risk analysis and fire fuel rank map based on CAL FIRE's fuel model for the City. The map identifies moderate, high, and very-high fuel ranks based on inputs such as fuel, slope, brush density, and tree density.

Shasta County Hazardous Materials Area Plan, 2018

The Shasta County Hazardous Materials Area Plan establishes policies, responsibilities, and procedures required to protect the health and safety of Shasta County's citizens, the environment, and public and private property from the effects of hazardous materials emergency incidents.

The Area Plan establishes the emergency response organization for hazardous materials incidents occurring within Shasta County, including the cities of Redding, Anderson, and Shasta Lake. This Plan documents the operational and general response procedures for the Shasta-Cascade Hazardous Materials Response Team (SCHMRT), which is the primary hazardous materials response group for Shasta County.

DISCUSSION OF IMPACTS

Questions A and B

Hazardous materials that would be used for maintenance purposes at the residences include cleaning supplies, gasoline for landscaping equipment, fertilizers, pesticides, etc. However, it is not anticipated that the quantity of these substances would be sufficient to result in adverse impacts related to hazardous materials.

During construction activities, it is anticipated that limited quantities of hazardous substances, such as gasoline, diesel fuel, hydraulic fluid, solvents, oils, paints, etc. would temporarily be brought into areas where improvements are proposed. There is a possibility of accidental release of hazardous substances into the environment, such as spilling petroleum-based fuels used for construction equipment. However, construction contractors would be required to comply with applicable federal and State environmental and workplace safety laws and implement BMPs for the storage, use, and transportation of hazardous materials.

In addition, as stated in Section 4.7 under Question C, rock was encountered in some of the test pits on the project site, and there is a possibility that blasting may be required if less-weathered zones of rock are encountered during excavation. Potential impacts from blasting include flyrock, airblast, and vibration. Potential impacts from airblast and vibration are discussed in Section 4.13 (Noise).

Flyrock is rock that is ejected beyond the blast site following a blast. Because the amount of required blasting is anticipated to be minimal, the potential for flyrock is low; however, flyrock has the potential to result in structural damage and injury to people living and working in the area. In addition, the transport and use of explosives has the potential to create a hazard to the public and the environment.

As required by **MM 4.9.1**, if the grading/excavation contractor determines that blasting is required, a Blasting Plan, prepared by a qualified blasting specialist, must be completed prior to any blasting activities. Blasting activities would be conducted in accordance with applicable DIR and CFC regulations. In accordance with DIR regulations, blasting operations must be conducted by or be under the direct supervision of a blaster holding a valid California Blaster's License. The California Fire Code also requires that blasters be familiar with potential hazards and required safety precautions identified in the CFC and the National Fire Protection Association (NFPA) Explosive Materials Code.

The transport, use, and disposal of blasting agents must comply with the applicable provisions of Cal/OSHA's Construction Safety Orders and with Title 27, CFR 181, Part 55, Subpart K, Commerce in Explosives. Transportation of explosives to the project site must be in accordance with Federal Department of Transportation and California Highway Patrol regulations. Blasting materials would be transported to the site for each blasting sequence, and no explosives would be stored at the site. Implementation of **MM 4.9.1** and compliance with existing regulations pertaining to the handling and use of explosives (if required), ensures that impacts during construction would be less than significant.

Question C

The nearest schools to the project site are Shasta Lake School (K-8) on Vallecito Street, approximately 0.5 miles northeast of the project site, and Central Valley High School (9-12) on La Mesa Avenue, approximately 0.6 miles north of the project site. In addition, there are no proposed schools within one-quarter mile of the project site; therefore, the project would not emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school; there would be no impact.

Question D

The Cortese list is prepared in accordance with California Government Code §65962.5. The following databases were reviewed to locate "Cortese List" sites.

- List of Hazardous Waste and Substances sites from the Department of Toxic Substances Control (DTSC) EnviroStor database.
- SWRCB GeoTracker Database
- List of solid waste disposal sites identified by SWRCB with waste constituents above hazardous waste levels outside the waste management unit.
- List of active Cease and Desist Orders and Clean-Up and Abatement Orders from the SWRCB.

The EnviroStor database indicates the nearest active clean-up site is Valley Plating on El Cajon Avenue, approximately 0.75 miles northwest of the project site. The Geotracker database indicates the nearest clean-up is Flying J on Shasta Dam Boulevard, approximately 1.2 miles northeast of the project site. Due to the distance between the project site and the active clean-up sites, there would be no impact.

Questions E

According to the Shasta Lake General Plan, the project area is not within an airport land use plan area. According to the Federal Aviation Administration (FAA), the nearest public airport is Benton Airpark, approximately 7 miles southwest of the project site. Due to the distance between the airports and the project site, there would be no impact.

Question F

Construction

Although a temporary increase in traffic could occur during construction, construction-related traffic would be minor due to the overall scale of the construction activities. Further, construction-related traffic would be spread over the duration of the construction schedule and would be minimal on a daily basis. If work is required in the public road ROW, the Developer would be required to obtain an encroachment permit from the City. The City's standard conditions require temporary traffic control to be provided during completion of activities in the ROW. At the discretion of the City Engineer, the Developer may be required to submit a temporary traffic control plan for review and approval prior to issuance of an encroachment permit. The plan must illustrate the location of the work, affected roads, and types and locations of temporary traffic control measures (i.e., signs, cones, flaggers, etc.) that will be implemented during the work. These requirements ensure that there are no impacts during construction.

Operations

Below is a discussion of applicable adopted emergency response plans, emergency evacuation plans, and requirements for emergency access that apply to the proposed project:

Shasta County Hazardous Materials Area Plan

As stated under Regulatory Context, the Shasta County Hazardous Materials Area Plan (2018) serves as the local emergency response plan for hazardous materials. The Plan establishes the policies, responsibilities, and procedures required to protect the health and safety of Shasta County's citizens, the environment, and public and private property from the effects of hazardous materials emergency incidents occurring in Shasta County, including the cities of Anderson, Redding, and Shasta Lake. The Plan describes the hazardous materials incident response program, training, communications, and post-incident recovery procedures. The proposed project does not include any components that would impair implementation of the County Hazardous Materials Area Plan.

City of Shasta Lake Wildland Fire Evacuation Plan

A Wildland Fire Evacuation Plan for the City of Shasta Lake was prepared by the SLFPD (undated). The Plan identifies primary emergency travel routes in the City (Shasta Dam Boulevard, Cascade Boulevard, Pine Grove Avenue, Ashby Road, and Lake Boulevard), as well as disaster coordination/evacuee collection points in the City (Central Valley High School on La Mesa Avenue and Grand Oak Elementary School on Grand Avenue). The proposed project would not interfere with any of the emergency travel routes or evacuee collection points identified in the SLFPD Wildland Fire Evacuation Plan.

In addition, the project includes extending Chaucer Way from its current northern terminus to Pine Grove Avenue, thereby providing a second ingress/egress route. Because access roads to the project site would comply with City and Fire District standards, there would be no long-term impact or interference with an emergency response plan or emergency evacuation plan.

Question G

As stated under Regulatory Context, CAL FIRE adopted FHSZ Maps for SRAs in November 2007 and recommended FHSZs for LRAs. According to CAL FIRE, the project site and surrounding undeveloped properties are within a LRA Very High FHSZ.

Wildfires can be classified as either a wildland fire or a wildland-urban interface (WUI) fire. A wildland fire occurs in an area that is relatively undeveloped except for the possible existence of basic infrastructure such as roads and power lines. According to the 2010 Strategic Fire Plan for California (updated April 2016), prepared by CALFIRE, WUI is defined as *"the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels."*

As stated in Section 5.3 (Wildfire Hazard Profile) of the City's LHMP and CAL FIRE's fire hazard model, there are generally three major factors that sustain wildfires and predict a given area's potential to burn. These factors include wildland fuels (natural vegetation that burns during the wildfire); topography (fires burn faster as they burn up-slope); weather (fire burns faster and with more intensity when air temperature is high, relative humidity is low, and winds are strong); and ember production and movement (how far embers move and how receptive the landing site is to new fires). Fuel is the only factor that is under human control. Fuel is classified by type and volume. Fuel sources include dead trees, tree leaves, twigs, branches, live trees, brush, and grasses. Manmade structures are also considered a fuel source. The type of prevalent fuel in the area directly influences the behavior of wildfire.

An area's terrain and slope also influence its susceptibility to the spread of wildfire. Both fire intensity and rate of spread increase as slope increases due to the tendency of heat from a fire to rise via convection. The arrangement of vegetation throughout a hillside can also contribute to increased fire activity on slopes. Weather components such as temperature, humidity, wind, and lightning also affect the potential for wildfire. During periods of drought, the threat of wildfire increases. Wind is the most treacherous weather factor. Changes in wind direction and speed can occur suddenly due to temperature changes or the interaction of wind with topographical features such as slopes or steep hillsides.

The LHMP identifies the project site and surrounding undeveloped areas as having high to very-high fuel rankings.

Construction

Equipment used during construction activities may create sparks that could ignite dry grass. Also, the use of power tools and/or acetylene torches may increase the risk of wildland fire hazard. **MM 4.9.2** ensures that impacts during construction are less than significant.

Operational

The project would bring people into the area and thus would increase exposure of people and structures to the risk of wildfires originating off-site and spreading to the project site. The project site is bound by expanses of heavily vegetated undeveloped land to the east, west, and southwest, which intensifies this risk. Undeveloped property to the northeast is also heavily vegetated; Pine Grove Avenue provides a fire break between this property and the project site, however, flying embers can travel as much as a mile away from a wildfire.

Because the project site is located in a LRA Very High FHSZ, the project is subject to the provisions of Chapter 7A of the CBC and Section R337 (Materials and Construction Methods for Exterior Wildfire Exposure) of the California Residential Code (CRC).

The purpose of CBC Chapter 7A is to protect life and property by increasing the ability of a building to resist the intrusion of flames or burning embers projected by a vegetation fire. Chapter 7A also includes provisions for vegetation management compliance. Prior to building permit final approval, the property must be in compliance with defensible space requirements prescribed in California Fire Code §4906, including California Public Resources Code §4291 or California Government Code §51182. These provisions require that a minimum of 100 feet of defensible space be maintained around each side of an occupied structure, but not beyond the property line unless required by State law or local regulations if necessary to reduce the risk of transmission of flame or heat.

The CRC also requires that buildings and structures in Very High FHSZs maintain defensible space from each side of the structure so a wildfire burning under average weather conditions would be unlikely to ignite the structure. CRC Section R337 requires incorporation of fire-resistant building materials in new residential dwellings to increase the ability of a building located in any WUI Fire Area to resist the intrusion of flame or burning embers projected by a vegetation fire. In addition, as of 2011, the CRC requires that automatic fire sprinkler systems be installed in all new single-family residences to protect all areas of a dwelling unit in the event of a fire. The project must also comply with SLMC Chapter 15.10 (Water Efficient Landscaping); §15.10.050(D)(1)(e) requires that projects in fire-prone areas must address fire safety and prevention by avoiding fire-prone plant materials and highly flammable mulches.

The City's Building Official and SLFPD's Fire Marshal review all improvement and construction plans in the City prior to issuance of a grading permit or building permit to ensure compliance with applicable State building and fire code requirements. In addition, the City's Building Official and SLFPD's Fire Marshal conduct a final inspection prior to issuance of a Certificate of Occupancy to ensure that the structure(s) complies with applicable fire codes and standards. Compliance with the State and local regulations noted above ensures that the potential for direct and indirect risks to people and structures associated with wildland fires is less than significant.

CUMULATIVE IMPACTS

Potential cumulative projects in the area include growth according to the build-out projections in the City's General Plan. Hazard-related impacts from the proposed project include temporary impacts related to wildfire risks during construction, and potential exposure of people and structures to risks associated with wildland fires.

As documented above, all projects must comply with State building and fire codes related to fire-resistant materials and construction methods for exterior wildfire exposure, vegetation management/defensible space, and fire protection systems. In addition, City codes require that projects in fire-prone areas must address fire safety and prevention by avoiding fire-prone plant materials and highly flammable mulches.

Compliance with these regulations, combined with **MM 4.9.1 and MM 4.9.2**, ensure that impacts associated with hazards and hazardous materials are less than significant and that the project does not result in impacts that would be cumulatively considerable.

MITIGATION

MM 4.9.1 If blasting is required, prior to commencement of blasting activities, a Blasting Plan shall be prepared and submitted to the City's Building Official for review and approval to ensure that potential impacts with respect to noise, vibration, safety, and security are adequately addressed. All work shall be conducted under the direct supervision of a blaster holding a current license issued by Cal/OSHA.

The Blasting Plan shall include, at a minimum, the following:

a. Identification of licensed blaster(s) who will be conducting/supervising the work.

b. Plans, drawn to scale, showing blasting locations and distances from neighboring dwelling units and other structures.

c. Identification of type and quantity of explosives, description of detonation devices, and description of the extent and duration of the blasting.

d. Identification of Best Management Practices (e.g., matting or covering the blast area, etc.) that will be implemented to minimize noise and vibration from blasting and prevent structural damage and potential impacts to human health, safety, and the environment from the use of explosives.

e. Procedures for pre-blast and post-blast structural inspections for structures within 300 feet of the blast site.

f. Blasting notification procedures and a list of agencies/entities and potentially affected sensitive receptors to be notified. At a minimum, sensitive receptors within 300 feet of the blast site must be notified a minimum of 24 hours prior to blasting activities.

MM 4.9.2 During construction, all areas in which work will be completed using spark-producing equipment shall be cleared of dried vegetation or other materials that could serve as fire fuel. To the extent feasible, the contractor shall keep these areas clear of combustible materials in order to maintain a fire break.

DOCUMENTATION

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4.10 HYDROLOGY AND WATER QUALITY

Would the project:

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

REGULATORY CONTEXT

FEDERAL

Clean Water Act (CWA)

The CWA (33 USC §1251-1376), as amended by the Water Quality Act of 1987, is the major federal legislation governing water quality and was established to *"restore and maintain the chemical, physical, and biological integrity of the Nation's waters."* Pertinent sections of the Act are as follows:

1. Sections 303 and 304 provide for water quality standards, criteria, and guidelines.

2. Section 401 (Water Quality Certification) requires an applicant for any federal permit that would authorize a discharge to waters of the United States to obtain certification from the state that the discharge will comply with other provisions of the Act.
3. Section 402 establishes the NPDES, a permitting system for the discharge of any pollutant (except for dredged or fill material) into waters of the United States. This permit program is administered by the SWRCB and is discussed in detail below.
4. Section 404, jointly administered by the USACE and USEPA, establishes a permit program for the discharge of dredged or fill material into waters of the United States.

Safe Drinking Water Act

Under the 1974 Safe Drinking Water Act, most recently amended in 1996, USEPA regulates contaminants of concern to domestic water supply, which are those that pose a public health threat or that alter the aesthetic acceptability of the water. These types of contaminants are classified as either primary or secondary Maximum Contaminant Levels (MCLs).

Federal Emergency Management Agency (FEMA)

FEMA is responsible for mapping flood-prone areas under the National Flood Insurance Program (NFIP). Communities that participate in the NFIP are required to adopt and enforce a floodplain management ordinance to reduce future flood risks related to new construction in a flood hazard area. In return, property owners have access to affordable federally-funded flood insurance policies.

National Pollution Discharge Elimination System (NPDES)

Under Section 402(p) of the CWA, the USEPA established the NPDES to enforce discharge standards for both point-source and non-point-source pollution. Dischargers can apply for individual discharge permits, or apply for coverage under the General Permits that cover certain qualified dischargers. Point-source discharges include municipal and industrial wastewater, stormwater runoff, sanitary sewer overflows, and municipal separate storm sewer systems. NPDES permits impose limits on discharges based on performance standards or the quality of the receiving water, whichever is more stringent.

STATE

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (California Water Code §13000 *et seq.*) is the principal law governing water quality regulation in California. It establishes a comprehensive program to protect water quality and the beneficial uses of waters of the State. The Porter-Cologne Act applies to surface waters, wetlands, and groundwater, and to both point and non-point sources of pollution. The Act requires a Report of Waste Discharge for any discharge of waste (liquid, solid, or otherwise) to land or surface waters that may impair a beneficial use of surface or groundwater of the state.

State Water Resources Control Board (SWRCB)

National Pollution Discharge Elimination System

Pursuant to the federal CWA, the responsibility for issuing NPDES permits and enforcing the NPDES program was delegated to the State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards (RWQCB). NPDES permits are also referred to as waste discharge requirements (WDRs) that regulate discharges to waters of the United States. Below is a description of relevant NPDES general permits.

Construction Activity

Discharges from construction sites that disturb one acre or more of total land area are subject to the NPDES permit for *Discharges of Storm Water Runoff Associated with Construction Activity* (currently Order No. 2009-009-DWQ), also known as the Construction General Permit. The permitting process requires the development and implementation of an effective Storm Water Pollution Prevention Plan

(SWPPP). Coverage under the Construction General Permit is obtained by submitting a Notice of Intent (NOI) to the SWRCB and preparing the SWPPP prior to the beginning of construction. The SWPPP must include BMPs to reduce pollutants and any more stringent controls necessary to meet water quality standards. Dischargers must also comply with water quality objectives as defined in the applicable Basin Plan. If Basin Plan objectives are exceeded, corrective measures are required.

Dewatering Activities (Discharges to Surface Waters and Storm Drains)

Construction dewatering activities that involve the direct discharge of relatively pollutant-free wastewater that poses little or no threat to the water quality of waters of the U.S. are subject to the provisions of CVRWQCB Order R5-2016-0076-01 (NPDES No. CAG995002), *Waste Discharge Requirements, Limited Threat Discharges to Surface Water*, as amended. WDRs for this order include discharge prohibitions, receiving water limitations, monitoring, and reporting, etc. Coverage is obtained by submitting a NOI to the RWQCB.

Dewatering Activities (Discharges to Land)

Construction dewatering activities that are contained on land and do not enter waters of the U.S. are authorized under SWRCB Water Quality Order No. 2003-003-DWQ, provided that the dewatering discharge is of a quality as good as or better than the underlying groundwater, and there is a low risk of nuisance.

Storm Water Discharges from Small Municipal Separate Storm Sewer Systems (Phase II MS4)

On February 5, 2013, the SWRCB adopted *Waste Discharge Requirements for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems (Phase II MS4s)* (currently Water Quality Order No. 2013-0001-DWQ). The City of Shasta Lake is a Regulated Small MS4 and must comply with provisions of the Phase II MS4 General Order. Under the Phase II MS4 permit, the City must ensure that development projects incorporate measures to reduce storm water runoff both during construction and post-construction to minimize the potential for long-term impacts.

Water Quality Control Plans (Basin Plans)

Each of the State's RWQCBs is responsible for developing and adopting a basin plan for all areas within its region. The Plans identify beneficial uses to be protected for both surface water and groundwater. Water quality objectives for all waters addressed through the plans are included, along with implementation programs and policies to achieve those objectives. Waste discharge requirements (WDRs) were adopted in order to attain the beneficial uses listed for the Basin Plan areas.

Sustainable Groundwater Management Act

The Sustainable Groundwater Management Act (SGMA), enacted in September 2014, established a framework for groundwater resources to be managed by local agencies in areas designated by the Department of Water Resources as "medium" or "high" priority basins. Basins were prioritized based, in part, on groundwater elevation monitoring conducted under the California Statewide Groundwater Elevation Monitoring (CASGEM) program. The SGMA requires local agencies in overdrafted, medium- and high-priority basins to form Groundwater Sustainability Agencies and be managed in accordance with locally-developed Groundwater Sustainability Plans (GSPs).

LOCAL

City of Shasta Lake

The Shasta Lake General Plan includes the following objective, policies, and implementation measures that apply to the proposed project:

Conservation and Land Use Elements		
Objective:	W-1	Conserve and manage all surface and groundwater resources so that all City residents, both now and in the future, have reasonable assurances that an adequate quantity and quality of water exists.
Policies:	W-a	The City shall maintain standards for erosion and sediment control plans for development.
	W-b	Septic systems, waste disposal sites, and other sources of hazardous or polluting materials shall be designed to prevent contamination to rivers, creeks, streams, reservoirs, or the groundwater basin in accordance with standards accepted by or imposed by the City, Shasta County Environmental Health Division and the State Regional Water Quality Control Board.
Implementation Measures:	PF-(5)	Require the use of Best Management Practices to control runoff from all new development, including the issuance of building permits.
	PF-(6)	Continue requiring project proponents to provide plans for erosion and sedimentation control from their sites during construction.

Shasta Lake Storm Water Quality Management Program

SLMC Chapter 13.36 (Storm Water Quality Management) was adopted to protect and enhance the water quality of watercourses and water bodies and ensure compliance with the Federal CWA and Porter-Cologne Water Quality Control Act. SLMC Chapter 13.36 provides the City with the legal authority to fully implement and enforce provisions set under NPDES General Permit CAS000004, *Waste Discharge Requirements for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems (MS4)* (Water Quality Order 2013-0001-DWQ, as amended).

SLMC Chapter 15.08 (Grading, Erosion Control, and Hillside Development), §15.08.210(A)(8) requires that all construction projects involving site grading shall include erosion control plans prepared by a registered civil engineer, qualified SWPPP developer (QSD), or other licensed or certified stormwater professional. Temporary and permanent erosion control devices, designed and constructed in accordance with the California Stormwater Quality Association (CASQA) BMPs, and the City's Construction Standards, shall be provided to control erosion. The Developer must provide sufficient equipment and qualified personnel to conduct emergency erosion control as identified in the SWPPP and/or erosion control plan.

DISCUSSION OF IMPACTS

Questions A and E

As stated under Regulatory Context, the project is subject to the SWRCB's NPDES permit for *Discharges of Storm Water Runoff Associated with Construction Activity*, which requires implementation of BMPs to control erosion and prevent degradation of surface and groundwater quality.

In addition, as required by the Phase II MS4 permit, the project must incorporate measures to reduce storm water runoff both during construction and post-construction to minimize the potential for long-term impacts. Post-construction measures include site design measures (e.g., stream setbacks and vegetated buffer strips, vegetated swales to provide filtration and bio-uptake of pollutants, tree planting and preservation, use of porous pavement); and storm water treatment measures (e.g., retention and detention basins, bioretention/rain gardens).

The Developer is required to prepare an Operations and Maintenance Plan describing how post-construction measures will be maintained. Proposed post-construction measures are verified by the City Engineer and City Building Official prior to issuance of grading permits and/or building permits.

Implementation of the post-construction measures is verified prior to issuance of a Certificate of Occupancy for the building(s). In addition, as required by the Phase II MS4 permit, work must be inspected by a QSD or a certified Qualified SWPPP Practitioner (QSP) to ensure that post-construction measures have been properly implemented.

MM 4.10.1 is included to ensure compliance with the City's storm water quality management regulations (SLMC Chapter 13.36), including provisions of the Phase II MS4 permit.

Because BMPs would be implemented in accordance with SWRCB and City regulations to control erosion/sedimentation during construction, and post-construction measures would be implemented in accordance with **MM 4.10.1**, the project would not violate any water quality standards or waste discharge requirements, or otherwise degrade water quality. Impacts would be less than significant.

Question B

Sustainable groundwater management focuses on avoiding conditions that adversely affect groundwater availability and quality, and on enabling reasonable use of groundwater resources in a groundwater basin. As discussed under Regulatory Context above, the SGMA established a framework for groundwater resources to be managed by local agencies in areas designated by the Department of Water Resources as medium- and high-priority basins. According to the California Department of Water Resources, the project site is not located in a medium- or high-priority basin, and there is not a sustainable groundwater management plan that applies to the project area

According to the City's Urban Water Management Plan (UWMP, 2015), the City does not operate groundwater wells within the City limits for water supply, and it is not feasible to obtain any significant water supply from groundwater wells in the City due to the underlying geology.

The addition of impervious surfaces would decrease the area available for water penetration, thereby reducing local groundwater recharge potential. However, the increase in impervious surfaces represents a very small percentage of the entire surface area of the hydrologic region. In addition, as discussed under Question C below, runoff from impervious surfaces would be directed to on-site detention facilities. Because runoff would eventually be directed to areas with pervious surfaces, and the open space areas surrounding the development site would continue to provide for groundwater recharge, the proposed project would not substantially interfere with groundwater recharge. Therefore, the project would not impede sustainable groundwater management of the basin and there would be no impact.

Question C

The proposed project does not include any components that would alter the course of a stream or river. The project would increase the impervious surface area of the project site by constructing paved roads, driveways, and rooftops. An increase in impervious surface area could alter the existing drainage pattern of the site and result in potential risks related to erosion/siltation, increased stormwater runoff, and/or flooding.

Included as **Appendix E** is an Entitlement Level Storm Drainage Analysis prepared by Sharrah Dunlap Sawyer (SDS) in April 2020. The purpose of the analysis was to ensure that post-construction runoff from the project would not increase the pre-development peak flows for the 10-, 25-, and 100-year design storm events.

As stated in the Storm Drain Analysis, the project site drains into two creek systems (Churn Creek and Salt Creek). Runoff would be controlled with two on-site aboveground detention facilities. A network of drainage inlets and pipes would direct site runoff into the respective detention basins before leaving the site. Unlike retention basins that have a permanent pool of water, the detention basins would hold water for only a short period of time following a storm event (typically less than 24 hours) and would slowly release the water in order to reduce peak stormwater runoff.

Pursuant to SLMC Section 15.08.090(D), the grading plan must include detailed plans of all surface and subsurface drainage devices, including brow ditches, retaining walls, cribbing, dams, protective fencing, and other protective devices to be constructed with, or as a part of, the proposed work, together with a map showing the drainage area and the estimated runoff of the area served by any drains.

SLMC Section 15.08.160 requires plans to be submitted to the City upon completion of rough grading work prior to any precise/fine grading, and at the final completion of the work. Final plans must include a record grading plan prepared by the project civil engineer or other authorized licensed professional, including original ground surface elevations, as-graded ground surface elevations, lot drainage patterns and locations and elevations of all surface and subsurface drainage facilities.

Prior to issuance of a Certificate of Occupancy, the project civil engineer or other authorized licensed professional shall certify in writing that the work was done in accordance with the final approved grading plan.

As required by **MM 4.10.2**, the drainage plan must address the subdivision as a whole and must also address phasing of the subdivision to ensure that adequate detention is provided for each phase of development. Compliance with the City's requirements for drainage facilities and implementation of **MM 4.10.2** ensures that the proposed project would not alter the existing drainage pattern of the site in a manner that would result in flooding, erosion, siltation, or substantial additional sources of polluted runoff on- or off-site. Impacts would be less than significant.

Question D

A seiche is a large wave generated in an enclosed body of water in response to ground shaking. Seiches could potentially be generated in Lake Shasta due to very strong ground-shaking. However, as discussed in Section 4.7 under Question A, the closest potentially active faults are in the Battle Creek fault zone, approximately 20 miles south of the project site. Although these fault lines could produce low to moderate ground shaking, it is not likely that such ground shaking would cause a seiche large enough to overtop Shasta Dam. A tsunami is a wave generated in a large body of water (typically the ocean) by fault displacement or major ground movement. The project area is located approximately 100 miles east of the Pacific Ocean, and there is no risk of tsunami. According to FEMA Flood Insurance Rate Maps (Panel 06089C-1236G, effective March 16, 2011), the project site is not located within a special flood hazard zone. Therefore, there is no potential for release of pollutants due to inundation by seiche, tsunami, or flood.

CUMULATIVE IMPACTS

Potential cumulative projects in the area include growth according to the build-out projections in the City's General Plan. All development projects in the City are subject to regulations related to floodplain development, stormwater runoff, and erosion and sediment control. These regulations are intended to reduce the potential for cumulative impacts related to hydrology and water quality.

In addition, all projects over one-acre in size are required to comply with the SWRCB General Construction NPDES permit that requires implementing a SWPPP that includes BMPs to reduce pollutants and any additional controls necessary to meet water quality standards.

All projects in the City must comply with the City's Storm Water Quality Management regulations that were adopted to assist in the protection and enhancement of water quality pursuant to the Federal CWA and Porter-Cologne Water Quality Control Act. With implementation of BMPs in accordance with SWRCB and City regulations, **MM 4.10.1** and **MM 4.10.2**, the project's impacts would not be cumulatively considerable.

MITIGATION

MM 4.10.1 Grading/improvement plans and specifications shall be prepared and signed by a civil engineer or other licensed professional as authorized by the California Business and Professions Code and shall incorporate best management practices (BMPs) to ensure compliance with the *NPDES General Permit for Waste Discharges from Small Municipal Separate Storm Sewer Systems (MS4s)* and Chapter 13.36 (Storm Water Quality Management) of the Shasta Lake Municipal Code.

Temporary and permanent BMPs shall be designed and constructed in accordance with the California Stormwater Quality Association (CASQA) BMP Handbook or equivalent handbook approved by the City. Plans shall be accompanied by an Operations and Maintenance Plan for the ongoing maintenance of post-construction measures in accordance with the Phase II MS4 permit.

Prior to issuance of a grading permit or building permit, the plans and specifications shall be reviewed to ensure compliance with the applicable storm water regulations. In accordance with the Phase II MS4 permit, plan reviewers must be certified as a Qualified Storm Water Pollution Prevention Plan (SWPPP) Developer (QSD), pursuant to a State Water Board-sponsored program.

Prior to issuance of a Certificate of Occupancy, BMPs shall be inspected by a QSD or a certified Qualified SWPPP Practitioner (QSP) as required by the Phase II MS4 permit to ensure that post-construction measures have been implemented.

MM 4.10.2 The final drainage plan shall address the subdivision as a whole and shall address phasing of the subdivision to ensure that adequate detention is provided for each phase of development. The drainage plan shall be prepared by a licensed professional engineer and shall include the following:

a. Pre- and post-construction volume calculations for the 10-, 25-, and 100-year design storm events for each drainage basin; runoff detention requirements shall be met for the three basins flowing to Churn Creek and the one basin flowing to Salt Creek.

b. Verification that the existing detention basin in Phase 2, Unit 5, of the Windsor Estates subdivision has adequate capacity to accommodate flows from the proposed project.

c. Detailed improvement plans for the drainage system, including detention basins, inlets, outlets, storm drain pipes, etc., in accordance with the City's construction standards.

d. Additional information deemed necessary by the City Engineer to ensure that the project does not increase pre-development peak flows for the 10-, 25-, and 100-year design storm events.

DOCUMENTATION

California Department of Water Resources. 2020. Sustainable Groundwater Management Act, Basin Prioritization. https://water.ca.gov/Programs/Groundwater-Management/Basin-Prioritization. Accessed May 2020.

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_____. 1999. City of Shasta Lake General Plan. http://www.cityofshastalake.org/documentcenter/view/115. Accessed May 2019.

Federal Emergency Management Agency. National Flood Hazard Map (Panel 06089C1236G, effective March 16, 2011). https://msc.fema.gov/portal/search?AddressQuery=Shasta%20Lake%2C%20CA#searchresultsanchor. Accessed October 2019.

4.11 LAND USE AND PLANNING

Would the project:

Issues and Supporting Evidence	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Physically divide an established community?	☐	☐	☐	☒
b. Cause a significant environmental impact due to a conflict with any applicable land use plan, policy or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☒	☐	☐

REGULATORY CONTEXT

Shasta Lake General Plan

The Shasta Lake General Plan includes objectives and policies designed for the purpose of avoiding or minimizing environmental impacts to the natural environment. The General Plan recognizes major factors of the natural environment are landforms, water, climate, minerals, soils, vegetation, and wildlife.

Shasta Lake Municipal Code

The SLMC implements the City's General Plan. The purpose of the land use and planning provisions of the Code (Title 17, Zoning) is to provide for the orderly and efficient application of regulations and to implement and supplement related laws of the State of California, including but not limited to the California Environmental Quality Act (CEQA).

DISCUSSION OF IMPACTS

Question A

Land use impacts are considered significant if a project would physically divide an existing community (a physical change that interrupts the cohesiveness of the neighborhood). The proposed project includes extending Chaucer Way from its northern terminus in the Windsor Estates Subdivision to Pine Grove Avenue; thereby providing a secondary connection in accordance with the City's General Plan Circulation Element. Therefore, the project would not physically divide an established community; there would be no impact

Question B

As discussed in each resource section of this Initial Study, the proposed project is consistent with applicable Policies, Objectives, and Implementation Measures of the City's General Plan and Zoning Code (as amended) and regulations of the regulatory agencies identified in Section 1.8 of this Initial Study. Where necessary, mitigation measures are included to reduce impacts to less than significant levels. Therefore, the proposed project would not conflict with any plans, policies, or regulations adopted for the purpose of avoiding or mitigating an environmental effect.

CUMULATIVE IMPACTS

Cumulative projects in the vicinity of the project area, including build-out of the Shasta County, City of Redding, and City of Shasta Lake General Plans, would be developed in accordance with local and regional planning documents. Thus, cumulative impacts associated with land use compatibility are expected to be less than significant. In addition, with approval of the proposed General Plan amendment and Rezone, as well as implementation of the recommended mitigation measures, the proposed project is consistent with the General Plan and Municipal Code, and would not contribute to the potential for adverse cumulative land use effects.

MITIGATION

No additional mitigation necessary.

DOCUMENTATION

City of Shasta Lake. 1999. City of Shasta Lake General Plan. http://www.cityofshastalake.org/documentcenter/view/115. Accessed January 2020.

_____. 2020. Shasta Lake Municipal Code. https://library.municode.com/ca/shasta_lake/codes/code_of_ordinances. Accessed January 2020.

4.12 MINERAL RESOURCES

Would the project:

Issues and Supporting Evidence	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
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?	☐	☐	☐	☒

REGULATORY CONTEXT

There are no federal or local regulations pertaining to mineral resources that apply to the proposed project.

STATE

Surface Mining and Reclamation Act of 1975

The Surface Mining and Reclamation Act (PRC Chapter 9, Division 2) provides a comprehensive surface mining and reclamation policy to ensure that adverse environmental impacts are minimized and mined lands are reclaimed to a usable condition. Mineral Resource Zones (MRZs) are applied to sites determined by the CGS as being a resource of regional significance, and are intended to help maintain mining operations and protect them from encroachment of incompatible uses.

DISCUSSION OF IMPACTS

Questions A and B

According to the CGS, the closest Mineral Resource Zones to the project area are approximately 4.5 miles to the northeast. Due to the distance from the project area, the project would not interfere with existing mining operations. In addition, the project area is not zoned for mineral resource extraction, and there are no known mineral resources of value in the project area. Therefore, the proposed project would have no impact on mineral resources.

CUMULATIVE IMPACTS

As documented herein, the proposed project would not result in impacts to mineral resources; therefore, the proposed project would not contribute to adverse cumulative impacts to mineral resources.

MITIGATION

None necessary.

DOCUMENTATION

California Department of Conservation, Division of Mines and Geology. 1997. Mineral Land Classification of Alluvial Sand and Gravel, Crushed Stone, Volcanic Cinders, Limestone, and Diatomite within Shasta County, California. ftp://ftp.consrv.ca.gov/pub/dmg/pubs/ofr/OFR_97-03/OFR_97-03_Text.pdf. Accessed May 2020.

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4.13 NOISE

Would the project result in:

Issues and Supporting Evidence	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
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 of 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 area or, where such a plan has not been adopted, within two miles of a public airport or a public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

NOISE FUNDAMENTALS

Commonly used technical acoustical terms are defined as follows:

Acoustics The science of sound.

Ambient Noise The distinctive pre-project acoustical characteristics of a given area consisting of all noise sources audible at that location.

A-Weighting The sound level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the response of the human ear and gives good correlation with subjective reactions to noise.

Decibel, or dB The fundamental unit of measurement that indicates the intensity of a sound, defined as ten times the logarithm of the ratio of the sound pressure squared over the reference pressure squared.

CNEL Community Noise Equivalent Level. The average sound level over a 24-hour period, with a penalty of 5 dB added during evening hours (between 7:00 PM and 10:00 PM) and a penalty of 10 dB added during nighttime hours (between 10:00 PM and 7:00 AM).

Frequency The measure of the rapidity of alterations of a periodic acoustic signal, expressed in cycles per second or Hertz.

L_{dn} Day-Night Average Sound Level. The average equivalent A-weighted sound level during a 24-hour day, obtained after the addition of 10 decibels to sound levels in the night after 10 p.m. and before 7 a.m. (Note: CNEL and Ldn represent daily levels of noise exposure averaged on an annual or daily basis).

L_{eq} The sound level in decibels, equivalent to the total sound energy measured over a stated period of time. L_{eq} includes both steady background sounds and transient short-term sounds.

A change of 1 dBA generally cannot be perceived by humans; a 3 dBA change is considered to be a barely noticeable difference; a 5 dBA change is typically noticeable; and a 10 dBA increase is considered to be a doubling in loudness. Depending on the type of construction, interior noise levels are about 10-15 dBA lower than exterior levels with the windows partially open, and approximately 20-25 dBA lower than exterior noise levels with the windows closed.

REGULATORY CONTEXT

FEDERAL

There are no federal regulations pertaining to noise that apply to the proposed project.

STATE

California Government Code §65302(f)

California Government Code §65302(f) requires a Noise Element to be included in all city and county General Plans. The Noise Element must identify and appraise major noise sources in the community (e.g., highways and freeways, airports, railroad operations, local industrial plants, etc.). A noise contour diagram depicting major noise sources must be prepared and used as a guide for establishing land use patterns to minimize the exposure of residents to excessive noise. The Noise Element must include implementation measures and possible solutions that address existing and foreseeable noise levels.

California Building Code

The CBC (CCR Title 24, Part 2) includes noise insulation standards that apply to all new construction. The CBC requires that interior noise levels attributable to exterior sources not exceed 45 dB in any habitable room. The noise metric (i.e., day-night average sound level [Ldn] or the community noise equivalent level [CNEL]) must be consistent with the Noise Element of the jurisdiction's General Plan. Compliance with the noise insulation standards is verified through the building permit process.

LOCAL

City of Shasta Lake

The Shasta Lake General Plan includes the following objective, policies, and implementation measures that apply to the proposed project:

Noise Element		
Objective:	N-1	Protect noise sensitive areas of the City by regulation of new noise-generating development.
Policies:	N-a	New development shall use appropriate site planning and building design to reduce undesirable noise impacts. The noise sensitivity of land uses as established in Table N-1 shall be used in the location of new development, preparation of general plan amendments and specific plans. The noise exposure level shall be established by reference to the Noise Contour Map (on file with the City) or project-specific measurements or calculations. The interpretive guidelines in Figure N-1 shall not be applied mechanically, but with the degree of flexibility required in each case to achieve a sound and feasible land use decision. However, in no case shall a residential land use be located where the existing noise environment, combined with the measured or calculated noise reduction of the type of structure under consideration, makes it impossible to maintain an interior noise environment at or below 45 dBA CNEL.
	N-b	The planning and design of improvements in the circulation system shall consider their noise impacts on adjacent land uses and shall include measure to mitigate significant noise impacts.
Implementation Measures:	N-(2)	Where noise mitigation measures are anticipated to be needed based on a review of a project, require that project applicants secure the services of a qualified acoustical engineer to perform a detailed technical study and to design mitigation measures.
	N-(5)	Control noise at the source through use of insulation, berms, building design and orientation, buffer yards, staggered operating hours, and other techniques; where necessary, use noise barriers to attenuate

noise to acceptable levels; require that barriers are landscaped to reduce negative visual impacts on the community.

N-(6) Encourage noise attenuation programs that avoid visible sound walls, where practical. Open space, parking, accessory buildings, frontage roads, and landscaping can be used to buffer development from noise.

Table 4.13-1 is based on General Plan Table N-1 and identifies noise sensitivity standards that apply to the proposed project based on surrounding land uses.

Table 4.13-1
City of Shasta Lake Noise Sensitivity Standards

New Land Use	Outdoor Activity Area [1] - Ldn	Interior Activity Area [2] – Ldn/Peak Hour Leq
All Residential	60-65 [3]	45

1. Outdoor activity areas for single-family residential uses are designated as back yards. For large parcels or residences with no clearly designated outdoor activity area, the standards shall be applicable within a 100-foot radius of the residence.
2. For traffic noise within the City, Ldn and peak-hour Leq values are estimated to be approximately similar. Interior noise level standards are applied with windows and doors in the closed positions.
3. Where it is not possible to reduce noise in outdoor activity area to 60 dB Ldn or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 65 dB Ldn may be allowed provided that available exterior noise level reduction measures have been implemented and interior noise levels are in compliance with this table.

DISCUSSION OF IMPACTS

Question A

Some individuals and groups of people are considered more sensitive to noise than others and are more likely to be affected by the existence of noise. A sensitive receptor is defined as any living entity or aggregate of entities whose comfort, health, or well-being could be impaired or endangered by the existence of noise. Locations that may contain high concentrations of noise-sensitive receptors include residential areas, schools, parks, churches, hospitals, and long-term care facilities. Existing sensitive receptors in the project area include single-family residences immediately south of the project site in the Windsor Estate Subdivision, single-family residences ±200 feet west of the project site on Siner Ranch Road, and ±600 feet east of the project site in the Deer Creek Manor Subdivision.

The primary noise source in the project area is traffic on Pine Grove Avenue, north of the project site. The City's Wastewater Treatment Plant (WWTP), located ±0.25 miles west of the project site, is also a noise source. Industrial uses in and adjacent to Shasta Gateway Industrial Park (SGIP) are located over 0.5 miles from the project site and do not substantially affect the ambient noise environment in the project site.

An Environmental Noise Assessment was completed in 2006 by Bollard Acoustical Consultants, Inc. (BAC), for a previously proposed subdivision on the project site (see **Appendix F**). The purpose of the Assessment was to identify potential noise impacts and necessary mitigation measures to ensure compliance with applicable noise standards. On June 8, 2020, Paul Bollard reviewed the 2006 report and provided the following comments:

1. The subdivision layout is different than shown in the 2006 report, and some of the lots are farther away from Pine Grove Avenue. Some of the lots will still need a sound barrier, but the barrier may not need to be as tall for some of the lots due to the additional setback.

2. The speed limit on Pine Grove Avenue along the property frontage is 5 miles per hour higher that referenced in the 2006 study. This translates to a traffic noise level increase of about 1 dB.

3. The 2006 traffic study assumed a future-plus-project traffic volume of 4,530 west of the site access road and 7,560 east of the site access road. Based on traffic counts collected in December 2018, the roadway has a current ADT of ±5,200. Based on the current ADT, noise levels would increase by 0.6 dB to the west and decrease by 1.6 dB to the east.

Construction Noise

Construction of the proposed project would generate noise and temporarily increase noise levels at nearby sensitive land uses. Clearing and grading activities would occur ±25 feet north of residences in the Windsor Estates Subdivision, ±200 feet east of residences on Pine Grove Avenue (Siner Ranch Road), and ±600 feet east of residences in the Deer Creek Manor Subdivision. Construction of dwelling units also has the potential to affect residents in and adjacent to the proposed subdivision.

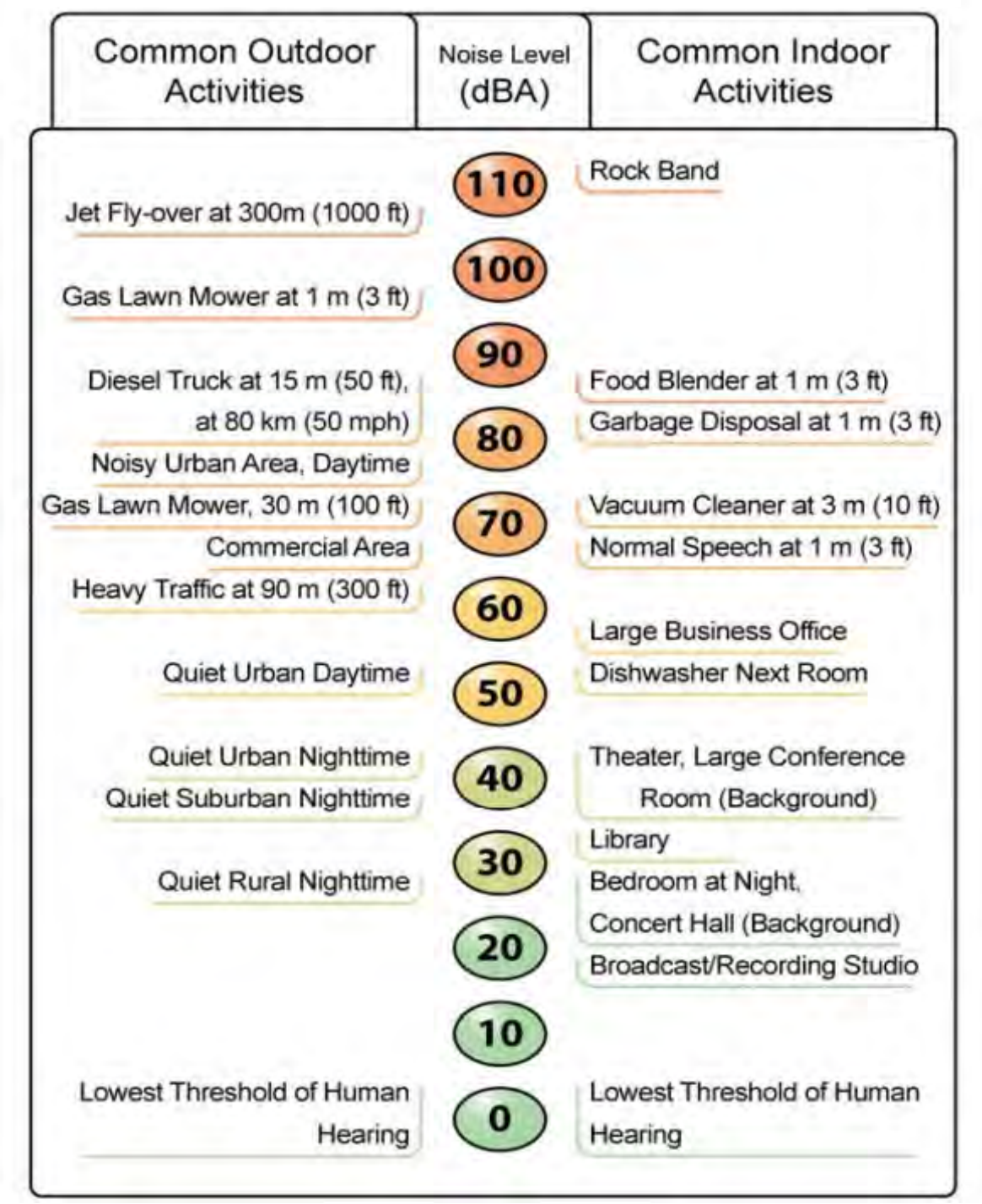
Temporary noise impacts would occur due to an increase in traffic from construction workers commuting to the site; however, it is not anticipated that worker commutes would significantly increase daily traffic volumes. Noise impacts resulting from construction would depend on: 1) the noise generated by various pieces of construction equipment; 2) the timing and duration of noise-generating activities; 3) the distance between construction noise sources and noise sensitive receptors; and 4) existing ambient noise levels. **Figure 4.13-1** shows noise levels of common activities to enable the reader to compare construction-noise with common activities. **Table 4.13-2** shows the approximate noise levels of common construction equipment that may be used during construction.

TABLE 4.13-2
Examples of Construction Equipment
Noise Emission Levels

Equipment	Typical Noise Level (dBA) 50 feet from Source
Air Compressor	81
Backhoe	80
Blasting	94
Chainsaw	85
Compactor	82
Concrete Mixer	85
Concrete Pump	82
Concrete Vibrator	76
Crane, Mobile	83
Dozer	85
Generator	81
Grader	85
Loader	85
Mounted Impact Hammer (hoe ram)	90
Paver	89
Pump	76
Reverse Signal Alarm	97 - 112
Rock Drill/Crusher	85
Saw	76
Scraper	89
Truck	88

Source: Federal Transit Administration, 2006.

Figure 4.13-1
Noise Levels of Common Activities



Source: Caltrans, 2016

In addition to conventional construction equipment, as stated in Section 4.7 under Questions A and C, the Brown & Mills Geotechnical Investigation Report states that rock was encountered in some of the test pits on the project site and a large track-mounted excavator, equipped with a single ripper tooth and/or a hydraulic percussion hammer, may be required to advance some on-site excavations. There is also a possibility that blasting may be required if less-weathered zones of rock are encountered during excavation.

Blasting activities typically include pre-drilling a series of holes in areas with hard rock, placing explosives in the drilled holes, and detonating the explosives. The explosives are timed to detonate in each hole in sequence, which minimizes noise and ground vibration associated with the blast. Following blasting, the rock is typically broken up into smaller sizes using a rock crusher and moved with conventional earthmoving equipment. Blasting, if required, could result in noise levels of ±94 dBA. However, each blast is brief in duration (milliseconds), and the noise rapidly dissipates.

Noise Attenuation

Noise from construction activities generally attenuates at a rate of 6 dBA (on hard and flat surfaces) to 7.5 dBA (on soft surfaces, such as uneven and/or vegetated terrain) per doubling of distance. If the receptor is far from the noise source, other factors come into play. For example, barriers such as fences or buildings that break the line of sight between the source and the receiver typically reduce sound levels by at least 5 dBA. Likewise, wind can reduce noise levels by 20 to 30 dBA over long distances. Because the project area consists of uneven and vegetated terrain, noise attenuation between the project site and nearest residences is anticipated to be at least ±7.5 dBA per doubling of distance. Because all adjacent residential properties are fenced, an additional ±5 dBA can be expected.

Cumulative Noise-Identical Sources

Because it is a logarithmic unit of measurement, a decibel cannot be added or subtracted arithmetically. The combination of two or more identical sound pressure levels at a single location involves the addition of logarithmic quantities as shown in **Table 4.13-3.** A doubling of identical sound sources results in a sound level increase of approximately 3 dB. Three identical sound sources would result in a sound level increase of approximately 4.8 dB. For example, if the sound from one scraper resulted in a sound pressure level of 89 dBA, the sound level from two scrapers would be 92 dBA, and the sound level from three scrapers would be ±93.8 dBA.

TABLE 4.13-3
Cumulative Noise: Identical Sources

Number of Sources	Increase in Sound Pressure Level (dB)
2	3
3	4.8
4	6
5	7
10	10
15	11.8
20	13
50	17

Sources: U.S. Department of Transportation, Federal Transit Administration, 2018. The Engineering Toolbox, 2019.

Cumulative Noise-Different Sources

As shown in **Table 4.13-4**, the sum of two sounds of a different level is only slightly higher than the louder level. For example, if the sound level from one source is 80 dBA, and the sound level from the second source is 89 dBA, the level from both sources together would be 89.5 dBA.

TABLE 4.13-4
Cumulative Noise: Different Sources

Sound Level Difference between two sources (dB)	Decibels to Add to the Highest Sound Pressure Level
0	3
1	2.5
2	2
3	2
4	1.5
5	1
6	1
7	1
8	0.5
9	0.5
10	0.5
Over 10	0

Sources: U.S. Department of Transportation, Federal Transit Administration, 2018. The Engineering Toolbox, 2003.

Potential Construction Noise

Three pieces of equipment with a dBA of 89 operating simultaneously would generate a combined noise level of 93.8 dBA; based on a standard noise attenuation rate of 7.5 dBA per doubling of distance, and additional attenuation of 5 dBA due to fencing between the project site and sensitive receptors, exterior noise levels could reach ±73.7 dBA at the nearest residence to the west, ±61.8 dBA at the nearest residence to the east, and ±96.3 dBA to the south.

If blasting is required, noise levels could reach ±78 dBA at the nearest residence to the west, ±66 dBA at the nearest residence to the east, and ±100 dBA to the south; however, noise and vibration levels associated with blasting can be highly variable depending on the methodology selected by the licensed blasting professional.

Interior noise levels would be ±20-25 dBA less than exterior noise levels, provided that the windows are closed.

In addition to noise from construction equipment, OSHA regulations (Title 29 CFR, §1926.601(b)(4)(i) and (ii) and §1926.602(a)(9)(ii)) state that no employer shall use any motor vehicle, earthmoving, or compacting equipment that has an obstructed view to the rear unless the vehicle has a reverse signal alarm audible above the surrounding noise level or the vehicle is backed up only when an observer signals that it is safe to do so. Although these regulations require an alarm to be only at a level that is distinguishable from the surrounding noise level (±5 dB), some construction vehicles are pre-equipped with non-adjustable alarms that range from 97 to 112 dBA. Exterior noise levels from a reverse signal alarm could periodically reach ±92 dBA at the nearest residence to the west, ±80 dBA at the nearest residence to the east, and ±114 to the south; interior noise levels are expected to be at least 20 dBA less, provided that the windows are closed.

The exposure to loud noises (above 85 dBA) over a long period of time may lead to hearing loss. The longer the exposure, the greater the risk for hearing loss, especially when there is not enough time for the ears to rest between exposures. Hearing loss can also result from a single extremely loud sound at very close range, such as sirens and firecrackers (Centers for Disease Control, 2019). Even when noise is not at a level that could result in hearing loss, excessive noise can affect quality of life, especially during nighttime hours.

The City does not have a noise ordinance or General Plan policy for noise impacts specifically associated with construction activities. The California Division of Safety and Health and OSHA have established thresholds for exposure to noise in order to prevent hearing damage. The maximum allowable daily noise exposure is 90 dBA for 8 hours, 92 dBA for 6 hours, 95 dBA for 4 hours, 100 dBA for 2 hours, 105 dBA for 1 hour, 110 dBA for 30 minutes, and 115 dBA for 15 minutes (Caltrans, 2013).

As documented above, interior noise levels at the nearest sensitive receptors would range between 41.8 dBA and 76.3 dBA during construction activities, and would be intermittently louder if reverse signal alarms are used. However, construction equipment does not operate continuously throughout the entire work day. While construction noise may reach considerable levels for short instances, noise levels at the nearby residences would not exceed OSHA noise exposure thresholds for hearing damage.

As discussed in Section 4.9 (Hazards and Hazardous Materials), **MM 4.9.1** is included to minimize potential impacts associated with blasting (if required). If blasting is required, a Blasting Plan, prepared by a qualified blasting specialist, must be completed and approved by the City prior to any blasting activities. The Blasting Plan would include, but not be limited to, identification of blasting locations, a description of types of blasting agents to be used, planned blasting methods, provisions for transportation, handling, and use of explosive materials, identification of sensitive receptors and structures potentially affected by blasting operations, a process to notify neighboring residents of blasting activities, and additional measures necessary to ensure compliance with California Fire Code, NFPA, and City requirements. The Plan must be approved by the City prior to any blasting activities to ensure that potential concerns with respect to noise are adequately addressed.

To minimize potential effects of noise during construction, **MM 4.13.1** limits construction activities to between the hours of 7:00 AM and 7:00 PM, Monday through Friday, and from 8:00 AM to 5:00 PM on Saturdays, with no construction allowed on Sundays or holidays. Construction outside of this timeframe may occur only if the City's Building Official or City Engineer issues an exemption for activities that require interruption of utility services to allow work during low demand periods, or to alleviate traffic congestion and safety hazards.

MM 4.13.2 requires that construction equipment be properly maintained and equipped with noise-reduction intake and exhaust mufflers and engine shrouds.

MM 4.13.3 requires that fixed construction equipment (e.g., compressors and generators) be located at the furthest practical distance from nearby noise-sensitive land uses.

In addition, **MM 4.3.1** requires that off-road construction equipment and other diesel-fueled construction vehicles (e.g., dump trucks) shall not be left idling for periods longer than five minutes when not in use, which would also minimize noise levels during construction.

Operational Noise

Increased Traffic Noise

The proposed project would increase traffic on area streets and result in an increase in ambient noise levels due to traffic noise. According to the Traffic Impact Study (TIS) prepared for the proposed project by W-Trans (see discussion in Section 4.17, Transportation), the project is expected to generate ±699 average daily trips (ADTs), with 55 trips during the A.M. peak hour and 73 trips during the P.M. peak hour.

According to the 2013 Caltrans Technical Noise Supplement to the Traffic Noise Analysis Protocol, doubling of traffic on a roadway would result in an increase of 3 dB, a barely perceptible increase. The W-Trans TIS states that current ADTs on Pine Grove Avenue are 5,188; project-generated traffic would result in substantially less than a doubling of traffic on Pine Grove

Avenue. Likewise, other local streets in the area, including Cascade Boulevard, Ashby Road, and Lake Boulevard would not experience a doubling of traffic as a result of the proposed project.

The project includes the extension of Chaucer Way to Pine Grove Avenue, and it is anticipated that some current residents in the northwesternmost areas of the Windsor Estates Subdivision would use this route to reach Pine Grove Avenue (see discussion in Section 4.17 under Questions A and B. This would result in an increase in traffic and traffic noise on Avington Way north of Trinity Street, and Chaucer Way north of Avington Way.

Although the roadway extension would likely result in a doubling of traffic in some areas of previous phases of the Windsor Estates Subdivision, an exceedance of the City's noise standards would not occur, and no mitigation for traffic noise resulting from the proposed project is required.

Operational Activities

Long-term impacts would include noise from mechanical equipment (e.g., heating, ventilation, and air conditioning systems), landscape maintenance activities, and general outdoor social and recreational activities typical for a residential subdivision.

Noise from mechanical equipment must comply with CBC requirements for noise attenuation and must be consistent with the City's General Plan. This is verified by the City's Building Official during the plan review and inspection process.

Landscape maintenance may include the use of lawnmowers, leaf blowers, and other noise-generating equipment; however, these activities would occur throughout the proposed subdivision and at different times; thus, landscape maintenance activities would not constitute a significant increase in ambient noise levels at off-site locations. The proposed project does not include a neighborhood park or other components that would generate excessive noise.

Exposure of Future Residents to Pine Grove Avenue Traffic Noise

Future residents of dwelling units along Pine Grove Avenue would be exposed to traffic noise. The Environmental Noise Assessment provides an estimate of future traffic noise based on the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model, which is based on the CALVENO noise emission factors for automobiles, medium trucks, and heavy truck, with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and the acoustical characteristics of the site.

BAC predicted traffic noise levels using the FHWA Model based on traffic projections included in a traffic impact analysis completed by Whitlock & Weinberger Transportation in 2003 (i.e., 7,560 ADTs east of the project driveway and 4,530 ADTs west of the project driveway).

As noted above, the W-Trans TIS states that current ADTs on Pine Grove Avenue are 5,188; therefore, future traffic noise, particularly west of the project driveway, would be higher than reflected in the 2006 study. As noted above, Mr. Bollard estimates that traffic noise levels would be 0.6 dB higher than previously projected west of the project driveway (±61.6 to 63.6 dB) and 1.6 dB lower than previously projected east of the driveway (±62.4 dB).

Exterior Noise Levels

Based on the above information, the outdoor activity areas for some of the proposed parcels would be exposed to traffic noise levels from Pine Grove Avenue in excess of the City's 60 dB Ldn noise standard.

As stated in the Bollard Noise Assessment, solid noise barriers could be used to effectively reduce predicted future noise levels at the proposed backyard areas. The effectiveness of a barrier is dependent upon blocking line-of-sight between the source and receiver, and is improved with increasing the distance the sound must travel to pass over the barrier as compared to a straight line from source to receiver.

The Bollard Noise Assessment states, in general, if the line of sight from a noise source to a noise receiver is intercepted, noise levels at the receiver will be reduced by approximately 5 dB; therefore, if noise barriers are constructed to intercept line of sight from roadway traffic to the outdoor activity areas of the residences adjacent to Pine Grove Avenue, compliance with the City's exterior noise level standard of 60 dB Ldn will be achieved. Suitable materials for these barriers include masonry block, precast concrete panels, or other massive materials (surface density of 4 pounds per square foot).

MM 4.13.4 requires that prior to issuance of a grading permit for Phase 1 or Phase 2 of the subdivision, a qualified acoustical consultant must review the final traffic study and grading plans to identify locations where a sound wall would be required to ensure compliance with the City's exterior noise level standards. Final improvement plans for the project shall identify the location and height of proposed sound walls. The City's Building Official shall verify that the proposed sound walls are installed in accordance with the final improvement plans.

Interior Noise Levels

As noted above, interior noise levels are approximately 20-25 dBA lower than exterior noise levels with the windows closed. Therefore, with installation of a sound wall, interior noise levels for single-story residences adjacent to Pine Grove Avenue would not exceed the City's interior noise standard of 45 dB Ldn/peak hour Leq. As stated in the Bollard Noise Assessment, if two-story residences are constructed adjacent to Pine Grove Avenue, noise levels are expected to be approximately 2 dB higher on the top floor. The Bollard Assessment, prepared in 2006, states that a noise reduction of 21 dB would be required at the unshielded second floor facades adjacent to Pine Grove Avenue.

MM 4.13.5 requires that prior to issuance of a building permit for any two-story structure adjacent to Pine Grove Avenue, a qualified acoustical consultant shall review the construction plans and identify whether any measures over and above California Building Code and Energy Code requirements are needed (e.g., sound-rated windows, exterior wall assemblies, etc.) to ensure compliance with the City's interior noise standards.

Implementation of **MM 4.3.1, MM 4.6.1,** and **MM 4.13.1** through **MM 4.13.5** would ensure that the project would not result in a substantial temporary or permanent increase in ambient noise levels or exceed noise level standards established in the City's General Plan. Impacts would be less than significant.

Question B

Typical sources of ground-borne vibration include construction equipment, steel-wheeled trains, and vehicles on rough roads. Long-term operational activities associated with the proposed project would not involve the use of any equipment or processes that would result in perceptible levels of ground-borne vibration outside of the project footprint.

Vibration during construction would occur only when high vibration equipment (e.g., compactors, large dozers, etc.) are operated. The proposed project may require limited use of equipment with high vibration levels during construction. As noted above, there is also a possibility that blasting may be required in certain areas of the project site. Potential effects of ground-borne vibration include perceptible movement of building floors, rattling windows, shaking of items on shelves or hangings on walls, and rumbling sounds. In extreme cases, vibration can cause damage to buildings. Both human and structural response to ground-borne vibration are influenced by various factors, including ground surface, distance between the source and the receptor, and duration.

The most common measure used to quantify vibration amplitude is the peak particle velocity (PPV). PPV is a measurement of ground vibration defined as the maximum speed (measured in inches per second) at which a particle in the ground is moving relative to its inactive state. Although there are no federal, state, or local regulations for ground-borne vibration, Caltrans has developed criteria for evaluating vibration impacts, both for potential structural damage and for human annoyance. The Caltrans Transportation and Construction Vibration Guidance Manual (2013), was referenced in the

analysis of construction-related vibration impacts. **Table 4.13-5** identifies the potential for damage to various building types as a result of ground-borne vibration. Transient sources include activities that create a single isolated vibration event, such as blasting. Continuous, frequent, or intermittent sources include impact pile drivers, vibratory pile drivers, and vibratory compaction equipment.

TABLE 4.13-5
Structural Damage Thresholds from Ground-borne Vibration

Structure Type	Vibration Level (Inches per Second) PPV	
	Transient Sources	Continuous/ Frequent/ Intermittent Sources
Older residential structures	0.5	0.3
Newer residential structures	1.0	0.5
Historic and some old buildings	0.5	0.25
Newer industrial/commercial buildings	2.0	0.5

Source: Caltrans, 2013

Table 4.13-6 indicates the potential for annoyance to humans as a result of ground-borne vibration.

TABLE 4.13-6
Human Response to Ground-Borne Vibration

Human Response	Vibration Level (Inches per Second PPV	
	Transient Sources	Continuous/ Frequent/ Intermittent Sources
Barely Perceptible	0.04	0.01
Distinctly Perceptible	0.25	0.04
Strongly Perceptible	0.9	0.10
Disturbing	2.0	0.4

Source: Caltrans, 2013

Table 4.13-7 indicates vibration levels for various types of construction equipment that may be used for the proposed project.

TABLE 4.13-7
Examples of Construction Equipment Ground-borne Vibration

Equipment Type	PPV at 25 feet (inches per second)
Bulldozer (small)	0.003
Bulldozer (large)	0.089
Mounted Impact Hammer (Hoe Ram)	0.089
Jackhammer	0.035
Loaded trucks	0.076
Vibratory roller	0.210

Sources: Caltrans Vibration Prediction and Screening Assessment for Construction Equipment, 2013; National Cooperative Highway Research Program, 1999.

Vibration levels from construction equipment at varying distances from the source can be calculated using the following formula:

$$PPV_{Equipment} = PPV_{Ref} \times (25/D)^n$$

Where:

$PPV_{Equipment}$ is the peak particle velocity in inches/second of the equipment, adjusted for distance

PPV_{Ref} is the reference vibration level in inches per second at 25 feet.

D is the distance from the equipment to the receptor.

n is the value related to the attenuation rate through ground, based on soil class (1.5 for competent soils including most sands, sandy clays, silty clays, gravel, silts, weathered rock; 1.1 for hard soils, including dense compacted sand, dry consolidated clay, consolidated glacial till, and some exposed rock).

As stated in the Geotechnical Report (CGI, 2019), subsurface soils range in consistency from stiff clay to friable rock with a strong to very strong rock at depth. Therefore, an attenuation coefficient of 1.1 was used for this analysis.

In the worst-case scenario, a vibratory roller would generate a PPV of up to 0.006 inches per second at the nearest residences to the east, 0.02 inches per second at the nearest residences to the west, and 0.21 inches per second at the nearest residences to the south. These vibration levels would not cause structural damage (refer to **Table 4.13-5**) to any of the adjacent residences. Vibration levels would not be perceptible at residences to the east (refer to **Table 4.13-6**). At residences to the west, vibration levels would be perceptible. At residences to the south, vibration levels would be strongly perceptible but would not be considered disturbing.

As stated above, the use of controlled blasting may be required for the proposed project. Blasting is considered a transient event and would be of short duration over a specified period of time. When a blast is detonated, only a portion of the energy is consumed in breaking up and moving the rock. The remaining energy is released in the form of vibration waves. Although an experienced blaster can easily design blasts to stay well below any vibration or air overpressure levels that could cause damage, it is virtually impossible to design blasts that are not perceptible by people in the vicinity (Caltrans, 2013).

The need for blasting would be identified during site excavation; therefore, it is not possible to accurately identify potential vibration impacts resulting from blasting. As required by **MM 4.9.1**, a Blasting Plan prepared by a qualified blasting specialist must be completed and approved by the City prior to any blasting activities.

The Blasting Plan would include, but not be limited to, identification of blasting locations, a description of types of blasting agents to be used, planned blasting methods, provisions for transportation, handling, and use of explosive materials, identification of sensitive receptors and structures potentially affected by blasting operations, a process to notify neighboring residents of blasting activities, and additional measures as necessary. An experienced blaster would design blasts to ensure that damage to neighboring structures does not occur. The Plan must be approved by the City prior to any blasting activities to ensure that potential concerns with respect to vibration are adequately addressed.

Therefore, impacts from ground-borne vibration during construction would be less than significant with implementation of **MM 4.9.1**

Question C

The project site is not within an airport land use plan area, within the vicinity of a private airstrip, or within two miles of a public airport. According to the Federal Aviation Administration (FAA), the nearest public airport is Benton Airpark, approximately 7 miles southwest of the project site. The nearest private airstrip is Tews Field on Moody Creek Drive, approximately 1.5 miles northeast of the project site. Due to the distance between the airports and the project site, there would be no impact.

CUMULATIVE IMPACTS

The proposed project would result in a temporary increase in daytime noise levels during construction activities. Other projects within the study area would also contribute to increases in noise levels during construction, and in some cases construction periods may overlap. However, all construction would take place in compliance with standard mitigation measures governing noise levels. Operational noise would be typical of a residential neighborhood. **MM 4.9.1 and MM 4.13.1** through **MM 4.13.5** are included to minimize temporary noise and vibration during construction and to ensure compliance with applicable policies. Therefore, cumulative noise impacts are considered less than significant.

MITIGATION

Implementation of **MM 4.3.1 and MM 4.9.1**

MM 4.13.1 Construction activities shall be limited to between the daytime hours of 7:00 A.M. and 7:00 P.M., Monday through Friday; and 8:00 AM to 5:00 PM on Saturdays. Construction activities shall be prohibited on Sundays and federal/state recognized holidays.

Exceptions to these limitations may be approved by the City Engineer or City Building Official, or their designees, for activities that require interruption of utility services to allow work during low demand periods, or to alleviate traffic congestion and safety hazards.

MM 4.13.2 Construction equipment shall be properly maintained and equipped with noise-reduction intake and exhaust mufflers and engine shrouds, in accordance with manufacturers' recommendations. Equipment engine shrouds shall be closed during equipment operation.

MM 4.13.3 Fixed construction equipment (e.g., compressors and generators) shall be located at the farthest practical distance from nearby residences.

MM 4.13.4 Prior to issuance of a grading permit for Phase 1 or Phase 2 of the subdivision, a qualified acoustical consultant shall review the final traffic study and grading plans to identify locations where a sound wall would be required to ensure compliance with the City's exterior noise level standards. Final improvement plans for the project shall identify the location and height of proposed sound walls. The City's Building Official shall verify that the proposed sound walls are installed in accordance with the final improvement plans.

MM 4.13.5 Prior to issuance of a building permit for any two-story structure adjacent to Pine Grove Avenue, a qualified acoustical consultant shall review the construction plans and identify whether any measures over and above California Building Code and Energy Code requirements are needed to ensure compliance with the City's interior noise standards.

DOCUMENTATION

Bollard Acoustical Consultants, Inc. 2006. Environmental Noise Assessment, Deer Creek Manor Residential Development, Shasta Lake, California.

California Department of Transportation. 2013. Technical Noise Supplement to the Traffic Noise Analysis Protocol. https://www.dtsc-ssfl.com/files/lib_ceqa/ref_draft_peir/Chap4_10-Noise/Caltrans_2013a_Tech_Noise_Supplement.pdf. Accessed March 2020.

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Federal Aviation Administration. 2018. Airport Facilities Data. https://www.faa.gov/airports/. Accessed December 2019.

4.14 POPULATION AND HOUSING

Would the project:

Issues and Supporting Evidence	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
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?	☐	☐	☐	☒

REGULATORY CONTEXT

FEDERAL

There are no federal regulations pertaining to population or housing that apply to the proposed project.

STATE

California Government Code §65581

California Government Code §65581 *et seq.* requires a Housing Element to be included in all city and county General Plans. State Housing Element law mandates that jurisdictions provide sufficient land to accommodate a variety of housing opportunities for all economic segments of the community. Compliance with this requirement is measured by the jurisdiction's ability to provide adequate land to accommodate a share of the region's projected housing needs for the applicable planning period. This share is known as the Regional Housing Needs Allocation (RHNA).

LOCAL

City of Shasta Lake

The City's Housing Element (2020) states that the City's RHNA for the 2018-2028 RHNA projection period is 238 housing units, including 28 extremely low, 28 very-low, 39 low, 42 moderate, and 101 above-moderate income units. The Housing Element includes a vacant site inventory that identifies where these units can be accommodated.

DISCUSSION OF IMPACTS

Question A

A project would induce unplanned population growth if it conflicted with a local land use plan (e.g., a General Plan) and induced growth in areas that aren't addressed in a General Plan or other land use plan. As discussed in Section 3.1 (Project Components/Physical Improvements) and shown in **Table 3.1-1**, the project includes a General Plan amendment of ±6.86 acres of developable land that is currently designated Light Industrial (IL). As proposed, the project includes development of 20 dwelling units in the area that is presently designated IL.

According to the California Department of Finance, as of January 1, 2020, the City had a population of about 10,657. There were 3,420 single-family dwelling units in the City, with an average of 2.56 persons per household. The construction of 20 dwelling units would result in an additional population of ±51, which is ±0.48 percent of the City's current population and would not be considered substantial unplanned population growth.

Although the project includes the extension of public utilities from Pine Grove Avenue to the project site, this would not benefit adjacent undeveloped parcels and would not indirectly induce population growth. Therefore, impacts associated with population growth would be less than significant.

Question B

No structures would be demolished to accommodate the proposed improvements; therefore, the project would not displace people or housing. There would be no impact.

CUMULATIVE IMPACTS

The proposed project would result in the construction of 20 dwelling units in an area that is presently designated Light Industrial in the City's General Plan, the Light Industrial designation provides for research and development, warehousing, wholesale distribution, manufacturing, assembling, and ancillary office and support uses. The construction of 20 dwelling units would result in a population of ±51, which is ±0.48 percent of the City's current population and would not be considered substantial unplanned population growth.

Although the project includes the extension of public utilities from Pine Grove Avenue to the project site, the proposed project is not anticipated to influence development on other properties in the area because there are many other factors that influence the density and timing of development (e.g., cost of installing sewer, electric, and gas infrastructure; cost of completing roadway improvements, regulatory controls, economic conditions, property owner decisions, and other market forces). Therefore, the project's cumulative impact on housing and population would be less than significant.

MITIGATION

None necessary

DOCUMENTATION

California Department of Finance. 2020. E-5: City/County Population and Housing Estimates, January 1, 2020. http://www.dof.ca.gov/Forecasting/Demographics/Estimates/E-5/. Accessed May 2020.

California Department of Housing and Community Development. 2018. Final Regional Housing Need Determination. http://www.hcd.ca.gov/community-development/housing-element/docs/Shasta-County-RHNA-Final.pdf. Accessed October 2019.

City of Shasta Lake. 1999. City of Shasta Lake General Plan. http://www.cityofshastalake.org/documentcenter/view/115. Accessed October 2019.

4.15 PUBLIC SERVICES

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

Issues and Supporting Evidence	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Fire protection?	☐	☐	☐	☒
b. Police protection?	☐	☐	☐	☒
c. Schools?	☐	☐	☐	☒
d. Parks?	☐	☐	☒	☐
e. Other public facilities?	☐	☐	☐	☒

REGULATORY CONTEXT

There are no federal or State regulations pertaining to public services that apply to the proposed project.

LOCAL

The Shasta Lake General Plan includes the following objectives, policies, and implementation measures that apply to the proposed project:

Land Use and Open Space Elements		
Objectives:	PF-1	Provide for a full range of public services and public facilities throughout the City.
	OSR-2	Provide public access to open-space and recreation resources consistent with the need to protect these resources and consider the rights of private property owners.
	OSR-5	Provide sufficient park facilities to serve the City's population.
Policies:	PF-e	The City will cooperate and coordinate its planning with the Gateway Unified School District and develop plans that respond to the growth

		of the City.
	OSR-d	The City may require the dedication of land and/or improvement of open space, parks, or the payment of in lieu-fees in accordance with City development standards as part of the entitlement and/or building permit process.
	OSR-e	Provide for neighborhood parks
	OSR-f	Provide off-road pedestrian and non-motorized bike facilities, where feasible and practicable.
Implementation Measures:	PF-(7)	Evaluate, and if feasible, implement a requirement that new development pay its fair share of costs associated with the provision and maintenance of streets, parks, water supply and treatment, wastewater treatment and disposal, drainage, and facilities for police and fire protection.
	OSR-(1)	Provide 5 acres of neighborhood, community, and creekside parks per 1,000 new residents. Strive to maintain a neighborhood park standard of at least 0.9 acres per 1,000 new residents

Shasta Lake Municipal Code

The SLMC includes the following requirements that apply to the proposed project:

SLMC §13.08.050 requires park and recreation facilities impact fees to be paid prior to issuance of a building permit for new residential development. The purpose of the fee is to provide for the planning, acquisition, improvement, expansion, and financing of public parks, playground, and recreational facilities. The fee for permits issued in 2020 is $3,178 per single-family residence and $2,890 per multi-family residence. The fee is adjusted annually based on the Construction Cost Index (CCI).

SLMC §16.08.100 requires the dedication of land for park or recreational purposes as a condition of approval for a tentative map. The amount of land to be dedicated may not exceed one acre per 100 lots or fraction thereof. In combination with or in lieu of such dedication or offer of dedication, the Planning Commission shall require payment of an in-lieu fee for park and recreational purposes. The in-lieu fee is in addition to the park and recreation facilities impact fee.

Shasta Lake Park System Master Plan

The City's Park System Master Plan included a recreational demand and needs assessment, as well as recommendations for types and locations of future parks and recreation facilities based on build-out of the City's General Plan. Recommendations for mini parks, neighborhood parks, community parks, special use parks, natural open space areas, and trails/pathways were included.

GoShasta Regional Active Transportation Plan

The GoShasta Regional Active Transportation Plan was prepared in February 2018 and most recently updated in August 2019. The Plan includes recommendations for improving bicycle and pedestrian connections as well as access to transit services in unincorporated areas of Shasta County and the cities of Anderson and Shasta Lake.

DISCUSSION OF IMPACTS

Questions A and B

Fire protection is provided through the Shasta Lake Fire Protection District (District). The District receives most of its revenues from property tax, and occasionally from public safety grants. In addition, in 2006 the SLFPD Board adopted a development impact fee for funding impacts of new residential and commercial developments. These impact fees ensure that new development does not

adversely impact the SLFPD's ability to provide fire protection services. In addition, the proposed project would not result in the need for new fire facilities that could have an adverse impact on the environment.

The City contracts with the Shasta County Sheriff's Department (Department) for law enforcement services. The Department provides 24-hour service for the City of Shasta Lake. In emergencies, additional personnel are available through the full resources of the Sheriff's Department and mutual aid agreements with other agencies. A new law enforcement center was constructed in the City in 2012-2013 and was sized according to projections of future law enforcement needs. No new law enforcement facilities or expansion of the existing facility are required. The City ensures adequate funding for law enforcement services through the annual budgeting process.

Because the proposed project would not require new or expanded fire or police protection facilities, there would be no impact.

Question C

The proposed project is located in the Gateway Unified School District (GUSD). Schools within the City limits include Grand Oaks Elementary School (K-5) on Grand Avenue; Shasta Lake School (K-8) on Vallecito Street; Central Valley High School on La Mesa Avenue, and Mountain Lakes High School at the intersection of Lake Boulevard and Shasta Dam Boulevard. GUSD also has two alternative education schools and one charter school outside of the City limits.

All new residential and commercial/industrial projects in Shasta County are required to pay a school impact fee prior to issuance of a building permit. For fiscal year 2020/2021, the fee for residential development is $4.08 per square foot; the fee for commercial/industrial development is $0.66 per square foot.

The Gateway Unified School District has experienced a decline in enrollment in the past five years, dropping from 3,928 students in 2013-14 to 2,502 students in 2017-18; the decline in student enrollment is projected to continue into the future (FCMAT, 2019). Therefore, although the proposed project would result in an increase in population, due to declining enrollment in the School District, no new schools or expansion of existing schools are anticipated, and there would be no impact.

Questions D and E

Also see discussion in Section 4.16 under Question B.

As stated under Regulatory Context, the City's Park System Master Plan provides recommendations for types and locations of future parks facilities based on build-out of the City's General Plan. The Parks System Master Plan does not identify any mini parks, neighborhood parks, community parks, or special use parks in the project area. The Master Plan shows a trail system along the property frontage on Pine Grove Avenue, and an off-site open space area and trail system along Churn Creek to the west. The GoShasta Active Transportation Plan identifies a "community walking connection" on Pine Grove Avenue between Jorzack Way and Ashby Road.

In order to satisfy the requirement for a trail system along Pine Grove Avenue, the existing separated sidewalk along Pine Grove Avenue, west of the project site, would be extended along the property's frontage. Landscaping, including street trees, would be planted adjacent to the sidewalk in accordance with City requirements. Impacts of those improvements are discussed in each applicable resource section of this Initial Study, and mitigation measures are included as warranted to ensure that environmental impacts associated with these improvements are avoided/minimized. The proposed project would not generate the need for other new or expanded public facilities. Therefore, impacts would be less than significant.

CUMULATIVE IMPACTS

Cumulative projects in the City, including growth resulting from build-out of the City's General Plan, will result in increased demand for public services. When a discretionary project includes new or altered governmental facilities, the facilities are included in CEQA review for the project to ensure that significant environmental impacts associated with such facilities are avoided/minimized.

As documented above, the proposed project does not require new or expanded fire or police protection facilities or new or expanded school facilities. There are no other public facilities that would be impacted by the proposed project. Impacts associated with installing a trail system (paved sidewalk) along Pine Grove Avenue are discussed in each applicable resource section of this Initial Study; mitigation measures are included as warranted to ensure that environmental impacts associated with these improvements are avoided/minimized. The proposed project would not generate the need for other new or expanded public facilities. Therefore, the project's impact on public services and facilities would not be cumulatively considerable.

MITIGATION

None necessary

DOCUMENTATION

City of Shasta Lake. 2005. City of Shasta Lake Park System Master Plan. http://ca-shastalake.civiccities.com/DocumentCenter/Home/View/34. Accessed December 2019.

_____. 1999. City of Shasta Lake General Plan. http://www.cityofshastalake.org/documentcenter/view/115. Accessed December 2019.

Fiscal Crisis & Management Assistance Team. 2019. Gateway Unified School District Fiscal Health Risk Analysis. https://www.fcmat.org/PublicationsReports/Gateway%20USD%20FHRA%20final%209-3-2019.pdf. Accessed May 2020.

4.16 RECREATION

Would the project:

Issues and Supporting Evidence	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
a. 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. Include recreational facilities, or require the construction or expansion of recreational facilities, which might have an adverse physical effect on the environment?	☐	☐	☒	☐

REGULATORY CONTEXT

There are no federal or State regulations pertaining to public services that apply to the proposed project.

LOCAL

The Shasta Lake General Plan includes the following objectives, policies, and implementation measures that apply to the proposed project:

Open Space Element		
Objectives:	OSR-2	Provide public access to open-space and recreation resources consistent with the need to protect these resources and consider the rights of private property owners.
	OSR-4	Link existing and future development in a manner that provides open space and recreational opportunities.
	OSR-5	Provide sufficient park facilities to serve the City's population.
Policies:	OSR-d	The City may require the dedication of land and/or improvement of open space, parks, or the payment of in lieu-fees in accordance with City development standards as part of the entitlement and/or building permit process.
	OSR-e	Provide for neighborhood parks.
Implementation Measures:	OSR-(3)	Evaluate the feasibility of developing smaller neighborhood parks, of about two acres, in selected areas where a landscape maintenance district or other funding mechanisms can be utilized and where the development pattern lends itself to such facilities.
	OSR-(4)	The Land Use Map identifies a community park in the Pine Grove Avenue area along Churn Creek which would be a combination of natural open space, trails and formal park facilities. Residential and industrial development within the area would contribute to the development of the park. A landscape maintenance district or other funding mechanisms would be required to fund ongoing maintenance.
	OSR-(5)	Evaluate the establishment of a network of bike and trail systems extending throughout the City. The system will be a combination of the existing and future road and sidewalk system and through greenbelt areas along existing creeks, streams, floodplains, natural open space and NH and NP designated areas. Public access will be preserved through new and existing development to enable future use of such trails. The Circulation Map identifies the system that could be located along minor arterials and collector streets and within certain creek corridors. A parkway system could connect the Salt Creek and Churn Creek corridors along Pine Grove Avenue and the future Shasta Gateway Industrial Drive (formerly Arrowhead Avenue) between Churn Creek and Cascade Boulevard.

Shasta Lake Municipal Code

The SLMC includes the following requirements that apply to the proposed project:

SLMC §13.08.050 requires park and recreation facilities impact fees to be paid prior to issuance of a building permit for new residential development. The purpose of the fee is to provide for the planning, acquisition, improvement, expansion, and financing of public parks, playground, and recreational facilities. The fee for permits issued in 2020 is $3,178 per single-family residence and $2,890 per multi-family residence. The fee is adjusted annually based on the Construction Cost Index (CCI).

SLMC §16.08.100 requires the dedication of land for park or recreational purposes as a condition of approval for a tentative map. The amount of land to be dedicated may not exceed one acre per 100 lots or fraction thereof. In combination with or in lieu of such dedication or offer of dedication, the Planning Commission shall require payment of an in-lieu fee for park and recreational purposes.

Shasta Lake Park System Master Plan

The City's Park System Master Plan included a recreational demand and needs assessment, as well as recommendations for types and locations of future parks and recreation facilities based on build-out of the City's General Plan. Recommendations for mini parks, neighborhood parks, community parks, special use parks, natural open space areas, and trails/pathways were included.

GoShasta Regional Active Transportation Plan

The GoShasta Regional Active Transportation Plan was prepared in February 2018 and most recently updated in August 2019. The Plan includes recommendations for improving bicycle and pedestrian connections as well as access to transit services in unincorporated areas of Shasta County and the cities of Anderson and Shasta Lake.

DISCUSSION OF IMPACTS

Questions A and B

See discussion in Section 4.15 under Questions D and E.

In order to satisfy the requirement for a trail system along Pine Grove Avenue, the existing separated sidewalk along Pine Grove Avenue, west of the project site, would be extended along the property's frontage. Landscaping, including street trees, would be planted adjacent to the sidewalk in accordance with City requirements. Impacts of those improvements are discussed in each applicable resource section of this Initial Study, and mitigation measures are included as warranted to ensure that environmental impacts associated with these improvements are avoided/minimized.

In addition, SLMC §16.08.100 requires the dedication of one acre per 100 lots of land for park or recreational purposes as a condition of approval for a tentative map. In combination with or in lieu of such dedication or offer of dedication, the Planning Commission shall require payment of an in-lieu fee for park and recreational purposes.

The in-lieu fee was $747 in 2008 and is adjusted annually based on the CCI. It is estimated that the in-lieu fee in 2019, was ±$937. In addition, the City adopted a park and recreation facilities impact fee to ensure that new development funds a proportionate fair share of costs associated with the planning, acquisition, improvement, expansion, and financing of public parks, playgrounds, and recreational facilities.

The impact fee is paid prior to issuance of a building permit for each dwelling. The fee for permits issued in 2020 was $3,178 per single-family residence. The fee is adjusted annually based on the CCI. Based on a total of 80 lots, parks impact fees generated by the proposed project could total up to $254,240, depending on the annual CCI adjustment and when the fee is paid.

As documented in this Initial Study, construction of the separated sidewalk along Pine Grove Avenue would not result in adverse impacts, and the proposed project would contribute to the cost of maintaining existing parks/recreational facilities; therefore, impacts would be less than significant.

CUMULATIVE IMPACTS

The proposed project and other new construction projects in the City are required to dedicate park land and/or pay in-lieu fees, as well as pay a park and recreation facilities impact fee prior to issuance of a building permit. The purpose of the dedication requirements/fee programs is to ensure that new development contributes to additional park and recreation facilities attributable to the impact of the

development, and contributes to the cost of maintaining existing park and recreation facilities. Therefore, the project's impacts of recreational facilities would not be cumulatively considerable.

MITIGATION

None necessary.

DOCUMENTATION

City of Shasta Lake. 1999. City of Shasta Lake General Plan. http://www.cityofshastalake.org/documentcenter/view/115. Accessed May 2020.

4.17 TRANSPORTATION

Would the project:

Issues and Supporting Evidence	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
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(b) (criteria for analyzing transportation impacts – vehicle miles traveled)?	☐	☐	☐	☒
c. Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☒	☐	☐
d. Result in inadequate emergency access?	☐	☐	☐	☒

REGULATORY CONTEXT

FEDERAL

There are no federal regulations pertaining to transportation that apply to the proposed project.

STATE

California Environmental Quality Act

SB 743 of 2013 (CEQA Guidelines §15064.3 *et seq.*) was enacted as a means to balance the needs of congestion management with statewide goals related to infill development, promotion of public health through active transportation, and reduction of GHGs. Pursuant to SB 743, traffic congestion is no longer considered a significant impact on the environment under CEQA. The new metric bases the traffic impact analysis on vehicle-miles travelled (VMT).

VMT refers to the amount and distance of automobile travel attributable to a project. Other relevant considerations may include the effects of a project on transit and non-motorized travel. A lead agency has discretion to choose the most appropriate methodology to evaluate a project's VMT, including whether to express the change in absolute terms, per capita, per household, or in any other measure. The requirement to use the VMT metric became effective statewide on July 1, 2020.

LOCAL

City of Shasta Lake

The Shasta Lake General Plan includes the following objectives, policies, and implementation measures that apply to the proposed project:

Circulation Element		
Objectives:	C-1	Provide for safe and efficient vehicular movement.
	C-2	Promote alternative travel modes, including transit, pedestrian and bicycle circulation systems and Transportation Demand Management (TDM) programs.
	C-5	Design and implement the circulation system to protect natural features, conserve energy, and mitigate, to the degree feasible, air and noise pollution.
Policies:	C-a	Monitor, maintain and improve, as necessary, the operation, safety and performance of the street system, including roadway surfaces, capacity, and traffic signals. For capacity and operational purposes, strive to attain a Level of Service (LOS) "C," to the maximum degree feasible, so that potential traffic congestion on streets and at intersections is minimized.
	C-b	Improve unpaved roads, driveways and parking areas.
	C-f	Encourage bicycle and pedestrian transportation, both on-and off-street.
	C-g	Construct, improve and maintain the system of curb, gutters, sidewalks and crosswalks for pedestrian circulation safety and drainage control.
	C-j	Protect natural features, to the degree feasible, when maintaining and expanding the City's circulation system.
Implementation Measures:	C-(8)	Continue to require that new development pays a fair share of the costs of street and other traffic and transportation improvements based on traffic generated and impacts on service levels.
	C-(11)	Development of vacant parcels will require the construction, or a deferral agreement for the construction of curb, gutter, sidewalk and the necessary tie-in paving along the street frontage of the affected parcel(s), whichever combination of improvements are applicable, as a requirement of the entitlement or building permit approval. A deferral of curb, gutter and sidewalks can be considered for existing vacant parcels where drainage requirements have not been established. New development that requires road extension beyond parcel frontage will be required to construct and/or pave, at minimum, the road surface and insure proper drainage. Development of vacant parcels will require the Developer or property owner to pay a fee that will be used toward the improvement of the "Minor Arterial" and "Collector" streets identified in Circulation Table C-1 that are located within the geographic area (identified in the Planning and Circulation Areas Map) the parcels are located within. Circulation Table C-1 and the Land Use & Circulation Map identify the existing and future "Minor Arterial" and "Collector" Street system

in the City of Shasta Lake. The system not only reflects a priority for moving vehicles throughout the City in a safe and expeditious manner, but also prioritizes the movement of pedestrians, in particular children to and from schools, parks and commercial uses. As part of the Capital Improvement Plan programming process, the City will prioritize the "Collector" streets to be improved from the fees collected within each geographic zone.

C-(13) Development proposals shall be reviewed according to the provisions of the zoning and subdivision ordinance to insure that adequate access, on-site circulation, parking and loading areas are provided.

C-(14) Development shall mitigate any adverse impacts of a proposed development project on the existing street system. This may include necessary street improvements, traffic signs or signals.

C-(15) Design roads created by development to tie into the existing and anticipated road systems.

C-(16) Discourage through traffic in residential neighborhoods without inhibiting the movement of residents. Traffic diversions, stop signs, or the street design or alignment may accomplish this.

C-(17) As part of the development review process, include consideration of the visual aspects of a development from roadways. Aesthetic consideration shall include architectural compatibility and landscaping. Development review will include visibility requirements at intersections.

C-(19) Require sidewalks in all new public and private developments.

C-(22) Review proposed designs for large traffic generating uses with transit service in mind, and require minor arterial and collector streets to be improved to provide bus loading and unloading without disruption of through traffic.

C-(23) Ensure compatibility of proposed City actions with the transportation plans of the City of Redding, Shasta County and Caltrans.

GoShasta Regional Active Transportation Plan

The GoShasta Regional Active Transportation Plan was prepared in February 2018 and most recently updated in August 2019. The Plan includes recommendations for improving bicycle and pedestrian connections as well as access to transit services in unincorporated areas of Shasta County and the cities of Anderson and Shasta Lake.

DISCUSSION OF IMPACTS

Questions A and B

The City's General Plan references the LOS metric to identify potential impacts to the transportation system; however, as stated under Regulatory Context, as of July 1, 2020, traffic congestion is no longer considered a significant impact on the environment under CEQA. Transportation analyses under CEQA now focuses on reducing VMT by creating alternative transportation networks and promoting a mix of land uses that reduce the need to drive.

Thresholds of Significance

The City has not adopted thresholds of significance based on VMT. Therefore, the analysis of potential impacts during construction is addressed qualitatively pursuant to CEQA Guidelines

§15064.3(b)(3), while analysis of operational impacts is addressed quantitatively in accordance with guidance provided by the Governor's Office of Research and Planning in its *Technical Advisory on Evaluating Transportation Impacts in CEQA* (2018). Under this guidance, residential developments that generate VMT that is 15 percent or more below the existing residential VMT per capita, measured against the region or city, would have a less-than significant transportation impact.

Construction Traffic

As discussed in Section 4.9 under Question F, there would be short-term increases in local traffic associated with construction workers and equipment. However, construction-related traffic would be minor due to the overall scale of the construction activities. Further, construction activities would not impede use of bicycle or pedestrian facilities or interfere with transit services in the area. Therefore, impacts during construction would be less than significant.

Operational Traffic

VMT for the proposed project was calculated based on the average daily trips generated by the proposed project and the average length of the trips. According to the Traffic Impact Study for the project (W-Trans, 2020; **Appendix G**), each dwelling unit is expected to generate an average of 9.44 trips per day, with an average trip length of 5.77 miles. Therefore, daily VMT for the 80-unit project is estimated at 4,356.

According to California Department of Finance estimates, as of January 1, 2020, homes in the City of Shasta Lake had an average of 2.56 persons per household. At this household size, the proposed project would house ±205 persons, and the per capita VMT would be ±21.3.

The 2018 Regional Transportation Plan and Sustainable Communities Strategy (Shasta Regional Transportation Agency, 2018) estimates the average daily VMT per capita for the region as shown in **Table 4.17-1. Table 4.17-1** includes only those trip categories that are subject to SB 375. Because projected per capita VMT for the project is over 20 percent less than the current/projected per capita VMT for the region, impacts associated with VMT would be less than significant.

Table 4.17-1
Regional Vehicle Miles Traveled – 2015 and Projected

Year	Total Daily VMT	VMT per Capita
2015	4,969,064	27.5
2020	5,105,238	26.8
2035	6,096,106	28.6
2040	6,453,567	29.1

Source: Shasta Regional Transportation Plan, 2018.

Alternative Transportation

The GoShasta Regional Active Transportation Plan (ATP) was prepared in 2018 as a collaborative effort between the Shasta Regional Transportation Agency, Shasta County, the cities of Anderson, Redding, and Shasta Lake, and other local agencies and individuals. The ATP includes recommended improvements identified by the City to improve bicycle and pedestrian connections within the Shasta Lake city limits.

The ATP identifies a "Community Walking Connection" on Pine Grove Avenue between Jorzack Way and Ashby Road. Approximately 500 feet of this connection was constructed as a separated sidewalk from Jorzack Way to the west as part of the Deer Creek Manor Subdivision (see **Photo 4.17-1**). In addition, approximately 0.4 miles of paved separated sidewalk has been constructed on Pine Grove Avenue from the western boundary of the project site to the west. The proposed project includes construction of a separated sidewalk along the property's frontage along Pine Grove Avenue. Landscaping, including street trees, would be planted adjacent to the sidewalk in accordance with City requirements. Roadways within the proposed subdivision would include sidewalks on both sides of the street.

Photo 4.17-1. Separated sidewalk and Class II bike lane along south side of Pine Grove Ave.

The ATP and the City's Park System Master Plan show a future off-street shared-use path along Churn Creek between Oasis Road and Pine Grove Avenue. The ATP also shows a future off-street shared use path along Pine Grove Avenue. The proposed project does not include any components that would interfere with the future shared-use paths.

There is presently a Class II bike lane (on-street designated bike lane) on both sides of Pine Grove Avenue. The proposed project does not include any components that would remove, change the location of, or impede use of any existing sidewalk, bicycle lane, or ride sharing or public transportation facility. There are no other adopted policies, plans or programs related to alternative transportation that would apply to the proposed project.

Because projected per capita VMT for the project is over 20 percent less than the current/projected per capita VMT for the region, the Developer would construct a separated sidewalk along the property's frontage along Pine Grove Avenue in accordance with the GoShasta Regional Active Transportation Plan, and would construct sidewalks connecting the subdivision to Pine Grove Avenue in accordance with City standards, the project would not conflict with a program, plan, ordinance, or policy addressing the circulation system; impacts would be less than significant.

Question C

The W-Trans TIS includes a discussion on collision history for the study intersections 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's Statewide Integrated Traffic Records System (SWITRS) reports for the period July 1, 2013, through June 30, 2018.

The analysis concluded that the intersections of Pine Grove Avenue/Lake Boulevard and Pine Grove Avenue/Ashby Road had higher collision rates than the statewide average for that type of facility; the remaining study intersections had collision rates below the statewide average for similar facilities.

There were five collisions at Pine Grove Avenue/Lake Boulevard and three collisions at Pine Grove Avenue/Ashby Road during the five-year reporting period. All of these collisions were classified as broadside crashes, which are generally attributed to high speeds on the intersection approaches with free flow. The TIS concludes that neither intersection warrants the installation of a traffic signal, but both may be considered for the installation of all-way stop signs. It should be noted that the intersection of Pine Grove Avenue and Lake Boulevard is not within the City limits, and the City has no jurisdiction to require specific traffic control measures at this intersection.

The TIS also evaluated potential sight-distance issues at the project's ingress/egress point on Pine Grove Avenue based on sight distance criteria contained in the *Highway Design Manual* published by Caltrans. The recommended sight distance at intersections of public streets is based on corner sight

distances, with approach travel speed used as the basis for determining the recommended sight distance.

For the posted speed limit of 50 miles per hour (MPH) on Pine Grove Avenue, the minimum corner sight distance needed is 550 feet. Sight distance for northbound vehicles on Chaucer Way at its intersection with Pine Grove Avenue extends more than 700 feet to the west, but is limited to ±450 feet to the east due to horizontal and vertical curves in the roadway.
In terms of potential incompatible uses, Pine Grove Avenue is designated as an arterial street in the City's General Plan and is the primary truck route for industrial/manufacturing businesses within the Shasta Gateway Industrial Park. Pine Grove Avenue is also the main route for logging trucks travelling to Sierra Pacific Industries on El Cajon Avenue off of Ashby Road.

Pine Grove Avenue along the project's property frontage has one lane in each direction and a center two-way left-turn lane (TWLTL) to help facilitate turning movements. The existing roadway was built with room to allow taper and acceleration lanes to be installed as properties along the roadway develop. Because sight distance east of the future intersection of Chaucer Way and Pine Grove Avenue is inadequate for the posted speed limit, the TIS recommends that the TWLTL be restriped to include a westbound acceleration lane. This would allow motor vehicles to turn left onto Pine Grove Avenue and accelerate before merging with westbound through traffic. A conceptual striping layout for Pine Grove Avenue at the project intersection is included in the TIS.

In addition, SLMC Section 17.84.040 states that in order to provide safe sight distance at street intersections, all plant material within a thirty (30) foot triangle at the intersection of streets shall be no more than two feet in height above the curb level, except for trees that are trimmed so that no branches extend lower than six feet above curb level. In addition, new signage installed near the intersection must be placed outside of the sight triangle.

MM 4.17.1 includes measures to ensure that potential hazards associated with sight distance are less than significant.

Question D

See discussion in Section 4.9 under Question F. The project would not result in inadequate emergency access; there would be no impact.

CUMULATIVE IMPACTS

The proposed project and cumulative projects, including build-out of the City's General Plan, would generate traffic on local streets. All discretionary projects in the City are reviewed on a case-by-case basis to ensure consistency with local transportation plans. Where necessary, mitigation measures are included to minimize the potential for safety hazards associated with traffic generated by the project. These measures could include installation of traffic improvements (e.g., stop signs, turn lanes, signals, etc.), or payment of a proportionate fair of future improvements to minimize the potential for cumulative impacts. **MM 4.17.1** is included to minimize the potential for traffic impacts associated with sight distance. The Developer will also pay the City's transportation system impact fee in place at the time a building permit is issued for each of the dwelling units. Therefore, the proposed project's cumulative transportation impacts are less than significant.

MITIGATION

MM 4.17.1 The following measures shall be implemented to minimize the potential for traffic hazards associated with sight distance:

a. The final improvement plans shall reflect restriping Pine Grove Avenue to include a westbound acceleration lane as recommended in the final W-Trans Traffic Impact Study for the Windsor Estates 3 project.

b. All plant material and signage within a 30-foot triangle at the intersection of Chaucer Way and Pine Grove Avenue shall be no more than two feet in height above the curb level. Trees that are trimmed so that no branches extend lower than six feet above curb level are allowed.

DOCUMENTATION

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W-Trans. 2020. Traffic Impact Study for the Windsor Estates 3 Project.

4.18 TRIBAL CULTURAL RESOURCES

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

Issues and Supporting Evidence	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
a. A resource listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in PRC §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 PRC §5024.1? In applying the criteria set forth in subdivision (c) of PRC §5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☒	☐	☐

REGULATORY CONTEXT

There are no federal or local regulations pertaining to tribal cultural resources that apply to the proposed project.

STATE

Assembly Bill 52 (2014)

Public Resources Code §21084.2 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."* In order to determine whether a project may have such an effect, a lead agency is required to consult with a California Native American tribe if the tribe requested to the lead agency to be informed of proposed projects in the area, and the tribe responds within 30 days of receipt of the notification and requests the consultation. The consultation must commence prior to the release of a negative declaration, mitigated negative declaration, or environmental impact report. Pursuant to PRC §21084.3, lead agencies must, when feasible, avoid damaging effects to a tribal cultural resource and must consider measures to mitigate any identified impact.

Definition of Tribal Cultural Resource

PRC §21074 states:

(a) "Tribal cultural resources" are either of the following:

(1) Sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are either of the following:

(A) Included or determined to be eligible for inclusion in the California Register of Historical Resources.

(B) Included in a local register of historical resources as defined in subdivision (k) of §5020.1.

(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 subdivision (c) of §5024.1. In applying the criteria set forth in subdivision (c) of §5024.1 for the purposes of this paragraph, the lead agency shall consider the significance of the resource to a California Native American tribe.

(b) A cultural landscape that meets the criteria of subdivision (a) is a tribal cultural resource to the extent that the landscape is geographically defined in terms of the size and scope of the landscape.

(c) A historical resource described in §21084.1, a unique archaeological resource as defined in subdivision (g) of §21083.2, or a "nonunique archaeological resource" as defined in subdivision (h) of §21083.2 may also be a tribal cultural resource if it conforms to the criteria of subdivision (a).

Senate Bill (SB) 18 (2004) Traditional Tribal Cultural Places

CGC §65352.3 (SB 18, 2004) requires local governments to contact tribal organizations identified by the Native American Heritage Commission (NAHC) prior to adopting or amending a general plan or specific plan, and prior to designating open space. The intent of SB 18 is to provide Native American tribes an opportunity to participate in land use decisions for the purpose of protecting or mitigating impacts to Native American cultural resources and sacred sites.

DISCUSSION OF IMPACTS

Questions A and B

See discussion in Section 1.7 (Tribal Cultural Resources Consultation) and Section 4.5 under Questions A and B. The City consulted with Native American tribes in accordance with PRC §21084.2 (AB 52, 2014) and CGC §65352.3 (SB 18, 2004).

To address Native American concerns, **MM 4.5.2** is included to require that construction personnel and their supervisors receive training from a qualified archaeologist and/or Native American representative regarding cultural and tribal cultural resources that may be present in the project site. Representatives from the Wintu Tribe of Northern California & Toyon-Wintu Center shall be given the opportunity to review the training materials and participate in the initial training.

MM 4.5.3 requires that a minimum of one week in advance of any ground-disturbing activities, the Wintu Tribe of Northern California & Toyon-Wintu Center shall be notified and offered the opportunity for a Native American representative to voluntarily monitor ground-disturbing activities.

In accordance with **MM 4.5.4**, in the event that cultural resources or human remains of Native American descent are identified during earth disturbance, the Wintu Tribe of Northern California & Toyon Wintu Center shall be requested to provide a Native American monitor to observe subsequent earth-disturbing construction activities on potentially sensitive lands. Costs associated with such Native American monitoring shall be the responsibility of the Developer.

Implementation of **MM 4.5.2** through **MM 4.5.4** ensures that no impacts to tribal cultural resources would occur.

CUMULATIVE IMPACTS

Cumulative projects in the vicinity of the project area have the potential to impact tribal cultural resources. Tribal cultural resources are afforded special legal protections designed to reduce the cumulative effects of development. Potential cumulative projects and the proposed project would be subject to the protection of tribal cultural resources afforded by Public Resources Code §21084.3. Given the non-renewable nature of tribal cultural resources, any impact to tribal cultural sites, features, places, landscapes, or objects could be considered cumulatively considerable. As documented above, implementation of **MM 4.5.2** through **MM 4.5.4** ensures that no impacts to tribal cultural resources would occur.

MITIGATION

Implementation of **MM 4.5.2 through MM 4.5.4.**

DOCUMENTATION

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Jensen and Associates. 1997. Archaeological Inventory Survey, Pine Grove Avenue Road Extension Project, City of Shasta Lake, Shasta County, California. Confidential document on file at NEIC/CHRIS.

_____. 1993. Addendum to Archaeological Inventory Survey Report Force Main Routes for Reclamation and Sewage Lines, Wastewater Treatment Facility Improvement and Reclamation, City of Shasta Lake, Shasta County, California. Confidential document on file at NEIC/CHRIS.

_____. 1993. Archaeological Inventory Survey, Shasta Dam Public Utilities District's Proposed New Water System Force Main, to be Constructed West of Interstate 5 and Pine Grove, Shasta County, California. Confidential document on file at NEIC/CHRIS.

4.19 UTILITIES AND SERVICE SYSTEMS

Would the project:

Issues and Supporting Evidence	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
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 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 that 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?	☐	☐	☐	☒

REGULATORY CONTEXT

FEDERAL

There are no federal regulations pertaining to utilities and service systems that apply to the proposed project.

STATE

Senate Bill 610 (2001)

Under SB 610 (2001) water supply assessments must be included in any environmental documentation for certain projects that are subject to CEQA. As stated in Water Code §10912(b), *"[if] a public water system has fewer than 5,000 service connections, then "project" means any proposed… development that would account for an increase of 10 percent or more in the number of the public water system's existing service connections…"* Water Code §10910(c)(4) states that the water supply assessment for the project shall include a discussion with regard to whether the City's water supply during normal, single dry and multiple dry water years during a 20-year projection will meet the projected water demand associated with the proposed project, in addition to existing and planned future uses.

California Environmental Quality Act

§15155 of the CEQA Guidelines requires that a Water Supply Assessment be completed for "water-demand" projects. CEQA's definition of a water-demand project is the same as described in Water Code §10912(b). §15155(e) of the CEQA Guidelines states:

> *"The city or county lead agency shall include the water assessment, and any water acquisition plan in the EIR, negative declaration, or mitigated negative declaration, or any supplement thereto, prepared for the water-demand project, and may include an evaluation of the water assessment and water acquisition plan information within such environmental document. The city or county lead agency shall determine, based on the entire record, whether projected water supplies will be sufficient to satisfy the demands of the project, in addition to existing and planned future uses. If a city or county lead agency determines that water supplies will not be sufficient, the city or county lead agency shall include that determination in its findings for the water-demand project."*

Urban Water Management Planning Act

California Water Code §10610 *et seq.* requires that all public water systems providing water for municipal purposes to more than 3,000 customers, or supplying more than 3,000 acre-feet (AF) per year, prepare an urban water management plan (UWMP). UWMPs must identify and quantify available water supplies and current and projected water use and demands, and plan for maintaining adequate water supply reliability during normal, dry, and multiple dry water years.

California Integrated Waste Management Act

The California Integrated Waste Management Act (CIWMA) of 1989, as amended, was enacted to reduce, recycle, and reuse solid waste generated in the State. The CIWMA requires cities and counties to divert 50 percent of the total waste stream from landfill disposal. Under the CIWMA, cities and counties must prepare Solid Waste Management Plans and Source Reduction and Recycling Elements to implement CIWMA goals.

Assembly Bill (AB) 1668 and Senate Bill (SB) 606 of 2018

AB 1668 and SB 606, approved by the Governor on May 31, 2018, require the SWRCB, in coordination with the DWR, to establish long-term urban water use efficiency standards by June 30, 2022. The new laws set a standard of 55 gallons per-person, per-day through Jan. 1, 2025; 52.5 gallons per day from 2025 to 2030; and 50 gallons per day beginning in 2030. The bills require DWR to conduct studies of landscaping and climate throughout the State by 2021 and provide the resulting data to SWRCB and local water suppliers for development of urban water use objectives.

California Building Standards Code

The CALGreen Code, included as Part 11 of the CBSC, includes requirements for construction waste reduction, disposal, and recycling to reduce the amount of waste from new construction and demolition that would be sent to landfills, and to encourage reuse and recycling of construction waste products (e.g., carpet, wood, aggregate, shingles, wallboard, and other materials that have recyclable value). At least 65 percent of nonhazardous construction and demolition waste must be recycled and/or salvaged for reuse. A Construction Waste Management Plan must be submitted with the building permit application for approval by the Building Official. The CALGreen Code also includes mandatory water conservation measures for both indoor and outdoor water use. Indoor measures require the use of water conserving plumbing fixtures and fittings.

LOCAL

City of Shasta Lake

The Shasta Lake General Plan includes the following objectives, policy, and implementation measures that apply to the proposed project:

Conservation and Land Use Elements		
Objectives:	PF-3	Improve and maintain the Citywide water system facilities.
	PF-4	Improve and maintain the Citywide wastewater system facilities.
	PF-5	Encourage water conservation in all new development through the use of measures which result in the more efficient use of water.
Policy:	PF-c	Evaluate the water infrastructure system and develop a plan to improve the system, where applicable.
Implementation Measures:	PF-(3)	As part of the project review and building permit process, ensure that all new development has a minimal impact on natural drainage channels and flow capacity.
	PF-(7)	Evaluate, and if feasible, implement a requirement that new development pay its fair share of costs associated with the provision and maintenance of streets, parks, water supply and treatment, wastewater treatment and disposal, drainage, and facilities for police and fire protection.
	W-(7)	Explore alternatives to storm water collection methods, including the use of detention/retention basins to implement the "no net runoff" concept.

Water Efficient Landscaping Ordinance

SLMC Chapter 15.10 (Water Efficient Landscaping) was adopted to reduce outdoor water use by requiring more efficient irrigation systems and by limiting the portion of landscapes that can be covered in turf. Installation of over 2,500 square feet of landscaping for public agency and private development projects that require a building permit, grading permit, plan check, or design review requires a Landscape Documentation Package (LDP) to be submitted to the City. The City's Building Official is responsible for ensuring that the water efficient landscaping requirements are implemented.

DISCUSSION OF IMPACTS

Question A

Water Treatment Facilities

According to the City's 2015-2026 Water Master Plan (WMP), the City's sole source of water supply is surface water from Lake Shasta that is treated at the City's Fisherman's Point Water Treatment Plant (WTP) located outside the City limits near Shasta Dam. The WTP is currently rated to treat a maximum flow of up to 6.7 MGD. The WTP must be capable of treating the maximum daily demand (MDD), which is the highest production in one day in a given year and usually occurs in the summer.

The WMP states that in 2014, when mandatory water conservation measures were in place, the average daily demand (ADD) was 1.78 MGD, and the MDD was 4.8 MGD. In 2015, the ADD was estimated at 2.35 MGD, and the MDD was estimated at 5.12 MGD. The projected ADD in 2036 is 2.9 MGD, and the projected MDD is 6.32 MGD.

According to the WMP, future ADD and MDD projections were based on land uses identified in the General Plan. As stated under Question B, the project's estimated ADD is 54,000 GPD (0.054 MGD) and the estimated MDD would be 117,720 GPD (0.12 MGD)[1]. Therefore, the project would not exceed the capacity of the WTP, and no new or expanded water treatment facilities are required. The Developer would pay the City's Plant and Facility Capacity Charges at the time a building permit is issued to ensure that the project contributes a fair share toward future expansion of water treatment and storage facilities.

[1] *Based on a peaking factor of 2.18 as used in the City's WMP.*

Wastewater Treatment Facilities

As documented under Question C, no new or expanded wastewater treatment facilities are required to serve the proposed project.

Utility Infrastructure

Utility infrastructure (water, electric, natural gas, and telecommunications) would be extended to the project site from the current northern terminus of Chaucer Way. The sewer lines would be extended from Chaucer Way to serve the southern areas of the project site and from Pine Grove Avenue to serve the northern areas of the site. Potential impacts of these improvements are addressed in the applicable resource sections in this Initial Study. Implementation of applicable mitigation measures identified in Section 1.11 ensures that impacts associated with installation of utilities are less than significant.

Question B

According to the City's 2015 UWMP (adopted August 16, 2016), the City had 3,820 connections in 2015. The requirement for an SB 610 water supply assessment would be triggered if a project included 382 service connections. As discussed below, the proposed project does not meet the threshold for requiring a formal water supply assessment; however, CEQA requires that the lead agency demonstrate that sufficient water supplies are available to serve the project from existing entitlements and resources. If water supplies are not sufficient to serve the project, the City must identify a plan for acquiring additional water.

In the UWMP, future water demand projections for the City were estimated by taking into consideration past water demands and future growth rates. Based on growth rates projected in the City's General Plan and Housing Element, it was determined that a 1 percent annual growth rate would be used to calculate the City's future water demands. **Table 4.19-1** identifies the City's current long-term water supply entitlements. In addition, the City has purchased supplemental water in the past from the McConnell Foundation and Centerville Community Services District during drought years.

Table 4.19-1
City of Shasta Lake Long-Term Water Supply Contracts and Agreements

Water Supplier	Agreement Type	Allocation (AF)	Source	Term
U.S. Bureau of Reclamation (BOR)	Purchase	4,430	Central Valley Project (CVP)	40 Years
Anderson-Cottonwood Irrigation District	Transfer	2,000	CVP	40 Years (Subject to Approval)
Shasta County Water Agency	Purchase	50	CVP	Long-Term (Pending)
	Total:	**6,480**		

As shown in **Table 4.19-1**, the City has a long-term agreement with the Anderson-Cottonwood Irrigation District (ACID) for the transfer of 2,000 AF of water per year. Transfers of CVP water must be approved by BOR following environmental review. BOR's 2007-2008 environmental review process included completion of a Temperature Impact Analysis utilizing output from the CalSim II model. CalSim II is a hydrologic planning model used to simulate operations of CVP and State Water Project (SWP) reservoirs and water delivery systems under specified scenarios.

On February 28, 2008, BOR provided written correspondence to the City stating that the withdrawal of water from Lake Shasta at Shasta Dam could potentially impact the cold-water pool (CWP) and affect downstream river temperatures, thereby resulting in detrimental impacts to river fisheries. For this reason, BOR approved the long-term transfer of only 140 AF of ACID water per year. The Shasta County Water Agency has also agreed to transfer 50 AF of water to the City under a long-term agreement; however, BOR has not approved this transfer due to the CWP issue.

In July 2019, BOR prepared an Environmental Assessment (EA) to evaluate BOR's decision to transfer up to 2,000 AF of ACID water annually to the City for a five-year period, beginning in contract year 2019.

The EA included an analysis of the potential for the water transfer to affect flow rates in the Sacramento River. The analysis concluded that changes in flow rates related to the proposed transfer would be insignificant. The EA also analyzed the potential for the water transfer to affect water temperature in the Sacramento River below Keswick Dam. The analysis concluded that the change in downstream temperatures in the area of concern would be, on average, less than one hundredth of a degree Fahrenheit, which effectively represents immeasurable values in a riverine environment.

The EA concluded that the water transfer would not have any adverse effects on the environment, and a Finding of No Significant Impact was adopted by BOR on August 20, 2019. The annual transfer is subject to review and subsequent approval by BOR.

Table 4.19-2 identifies the City's projected annual water demands from 2020 through 2040. To project the number of connections per customer sector, it was assumed that the number of connections will grow consistently with the projected water demands; this is based on the relative distribution of customer types, accounts, and water use reported for 2015. Actual future water demands may vary significantly based on the magnitude and type of future development and water conservation measures taken by each customer sector.

Table 4.19-2
City of Shasta Lake Projected Annual Water Demands by Customer Sector

Land Use Type	Projected Water Use (AF)					
	2015 (Actual)	2020	2025	2030	2035	2040
Single-Family	1,059	1,809	1,901	1,998	2,100	2,207
Multi-Family	66	113	118	125	131	138
Commercial and Institutional	130	222	233	245	258	271
Industrial	186	318	334	351	369	388
Landscape	44	75	79	83	87	92
Totals:	**1,485**	**2,537**	**2,665**	**2,802**	**2,945**	**3,096**

Source: City of Shasta Lake 2015 Urban Water Management Plan

During drought years, the BOR allocation can be reduced by up to 50 percent. It is important to note that the BOR reduction is based on the average water produced over the prior three years – not on the total contract amounts. In addition, because the ACID and Shasta County Water Agency water supplies are CVP water, these allocations also may be reduced up to 75 percent in a drought year. **Table 4.19-3** provides an estimate of the City's projected supply and demand in

a non-drought year, with no reduction to the water allocation[2]. As shown in **Table 4.19-3**, the City has sufficient water in a non-drought year through 2040.

Table 4.19-3
Normal Year Supply and Demand Projections (Acre Feet)

	2020	2025	2030	2035	2040
Supply	4,570	4,570	4,570	4,570	4,570
Demand	2,537	2,665	2,802	2,945	3,096
Surplus	**2,033**	**1,905**	**1,768**	**1,625**	**1,474**

Source: City of Shasta Lake 2015 Urban Water Management Plan

Table 4.19-4 shows available water in a drought year in 2040, assuming that the average units of production for the previous three-years is 3,096 AF (projected demand in 2040).

Table 4.19-4
Water Supplies Available in a Drought Year (2040)

Percent Reduced	Reduced Allocation (AF)	Supply Available (AF)
15	2,632	-464
25	2,322	-774
35	2,012	-1,084
50	1,548	-1,548

Estimated Project Water Demand

The City's Water Master Plan estimates the ADD for a single-family residence at 470 GPD. This includes both indoor and outdoor water use. Based on 80 dwelling units, water demands for the proposed project at buildout would be ±37,600 GPD (±42 acre-feet per year).

Conclusion

As shown in **Table 4.19-3**, the City has sufficient water supply to serve the proposed project and other projects in the City during a non-drought year. As shown in **Table 4.19-4**, the City has insufficient water in a drought-year (projected to 2040) if BOR reduces the City's allocation.

However, when the City's allocation is reduced, the City may purchase supplemental water from a third-party purveyor if such water is available. In addition, SLMC Chapter 13.14 includes the City's Water Conservation and Drought Contingency Plan that details the stages of action to be undertaken during a reduction in available water supply. In a drought year, City Council may declare a water shortage emergency and impose mandatory water conservation restrictions on all customers to offset the water supply reduction.

Pursuant to SLMC Chapter 13.14, all large water users, such as industrial uses, schools, supermarkets, etc., must develop or update their water conservation plans and submit the plan to the city's water conservation coordinator for approval. The plan must address all rationing stages as follows: Stage 1: Demonstrate a 10 percent reduction in water usage; Stage 2: Demonstrate a 20 percent reduction in water usage; Stage 3: Demonstrate a 30 percent reduction in water usage; Stage

[2] *Demand estimates do not include the proposed project. Projections are based on the City's currently approved long-term allocation of 4,570 AF (4,430 AF from BOR and 140 AF from ACID).*

4: Demonstrate a 40 percent reduction in water usage; and Stage 5: Demonstrate a 50 percent reduction in water usage.

In addition, as stated under Regulatory Context, AB 1668 and SB 606, approved by the Governor on May 31, 2018, impose new/expanded requirements on State water agencies and local water suppliers and provide for greater state oversight of local water suppliers' water use, even in non-drought years. The bills were adopted in response to the Governor's May 2016 Executive Order, which called for making water conservation a "way of life" in California. AB 1668 and SB 606 require the SWRCB, in coordination with the DWR, to establish long-term urban water use efficiency standards by June 30, 2022.

The new laws set a standard of 55 gallons per-person, per-day through January 1, 2025; 52.5 gallons per day from 2025 to 2030; and 50 gallons per day beginning in 2030. The bills require DWR to conduct studies of landscaping and climate throughout the State by 2021 and provide the resulting data to SWRCB and local water suppliers for development of urban water use objectives.

Therefore, because the City's Building Official will ensure compliance with State and local water-efficiency regulations through the plan review and inspection process, and all customers in the City are required to implement mandatory water use restrictions when the City declares a water shortage emergency, the City would have sufficient water supplies available to serve the project and other foreseeable projects during normal, dry, and multiple dry years. Impacts would be less than significant.

Question C

The City's Wastewater Treatment Plant (WWTP) was initially constructed in 1977 and consisted of a 0.5-million-gallon per day (MGD) extended aeration facility. In 1996, the WWTP was converted to an advanced secondary treatment facility with an average dry weather flow (ADWF) of 1.3 MGD, and it can accommodate a design peak dry weather flow of up to 5.3 MGD. The WWTP is currently operating at an average flow of 0.8 MGD. Due to RWQCB dilution requirements for the discharge of treated effluent to Churn Creek, the City recently upgraded the WWTP to allow treated effluent to be discharged to Churn Creek year-round, which increased the effective treatment capacity of the WWTP to its original design capacity of 1.3 MGD.

According to the City's 2016-2026 Wastewater Master Plan, one single-family household equivalent (HE) is approximately 170 GPD, and the proposed project would generate ±13,600 GPD of wastewater. The WWTP has adequate capacity to accommodate an additional ±2,900 HEs, and no additional wastewater treatment facilities are required. Impacts would be less than significant.

Questions D and E

As discussed under Regulatory Context, the CALGreen Code requires that a Construction Waste Management Plan be submitted with the building permit application and be approved by the Building Official prior to issuance of a building permit. Because the City's Building Official would ensure compliance through the plan check and inspection processes, impacts during construction would be less than significant.

The City has a franchise agreement with Waste Management, Inc., to provide curb-side garbage, green waste, and recycling pickup and disposal services in the City. Solid waste is disposed of at the Richard W. Curry/West Central Sanitary Landfill on Clear Creek Road in Igo. According to CalRecycle, the landfill has a maximum permitted capacity of 13,115,844 cubic yards. As of December 1, 2013, the remaining capacity was 6,589,044 cubic yards, and the landfill's estimated closure year was 2032. The landfill is permitted to allow a maximum throughput of 700 tons per day. The landfill accepts agricultural waste, construction/demolition waste, industrial waste, mixed municipal waste, sludge (biosolids), and tires.

The Anderson Landfill, located at 18703 Cambridge Road in Anderson, provides additional services, and is operated by Waste Management. According to CalRecycle, the landfill has a maximum

capacity of 16,353,000 cubic yards. As of January 1, 2015, the remaining capacity was 10,409,132 cubic yards, and the landfill's estimated closure year was 2093. The landfill is permitted to allow a maximum throughput of 1,850 tons per day, and. The landfill accepts agricultural waste, asbestos, ash, construction/demolition waste, industrial waste, mixed municipal waste, sludge (biosolids), tires, and wood waste.

According to CalRecycle, the average waste generation rate for single-family residences ranges from 8 to 12 pounds per day. This includes all materials discarded, whether or not they are later recycled or disposed in a landfill.

Based on this estimate, the proposed project is anticipated to generate between 640 and 960 pounds (0.32 to 0.48 tons) of solid waste per day, which represents a negligible percentage of the daily capacity of the landfills (700 tons per day for the Richard W. Curry Landfill and 1,850 tons for the Anderson Landfill). Therefore, the project would not generate solid waste in excess of state or local standards and would not exceed the capacity of local infrastructure. The City provides recycling and green waste disposal services for all residential development in the City; therefore, the project would not impair the attainment of solid waste reduction goals or conflict with federal, State, or local management and reduction statutes and regulations related to solid waste. Operational impacts would be less than significant.

CUMULATIVE IMPACTS

Cumulative projects, including growth resulting from build-out of the City's General Plan, would result in the need for new utility infrastructure. There would also be an increased demand for potable water and wastewater treatment, and increased generation of solid waste. All new development projects in the City are reviewed on a case-by-case basis to determine the need for new or expanded infrastructure improvements. Required improvements are constructed in accordance with local and State requirements, and any required mitigation measures are identified during the environmental review process to ensure that impacts are less than significant.

In drought years, City Council may declare a water shortage emergency and impose voluntary and mandatory water conservation restrictions on all customers to offset any water supply reductions. All large water users must develop a water conservation plan and submit the plan to the City's water conservation coordinator for approval. Because all customers in the City are required to implement mandatory water use restrictions when the City declares a water shortage emergency, and all large water users must prepare and comply with a water conservation plan, the City would have sufficient water supplies available during normal, dry, and multiple dry years.

In addition, all development projects are required to comply with State and local regulations pertaining to solid waste disposal and recycling. Compliance with existing local and State regulations ensures that the proposed project's contribution to cumulative impacts to utility and service systems is less than significant.

MITIGATION

None necessary.

DOCUMENTATION

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4.20 WILDFIRE

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

Issues and Supporting Evidence	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
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 downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	☐	☒

REGULATORY CONTEXT

FEDERAL

There are no federal regulations pertaining to wildfire that apply to the proposed project.

STATE

California Department of Forestry and Fire Protection (CAL FIRE)

The Bates Bill (AB 337), enacted in 1992, required CAL FIRE to work with local governments to identify high fire hazard severity zones throughout each county in the State. CAL FIRE adopted Fire Hazard Severity Zone (FHSZ) Maps for State Responsibility Areas (SRAs) in November 2007. Pursuant to California Government Code §51175-51189, CAL FIRE also recommended FHSZs for Local Responsibility Areas (LRAs). The project site and properties to the north, east, and west are located in a LRA Very High Fire Hazard Severity Zone (VHFHSZ).

California Fire, Building, and Residential Codes

California Fire Code, Part 9, Chapter 49 (Wildland-Urban Interface Fire Areas), California Building Code Chapter 7A (Materials and Construction Methods for Exterior Wildfire Exposure), and California Residential Code Section R337 include standards for new construction in Wildland-Urban Interface Fire Areas (fire hazard severity zones). A Wildland-Urban Interface Fire Area is defined as a geographic area identified by the State as a Fire Hazard Severity Zone in accordance with PRC §4291 through §4204, and Government Code §51175 through §51189, or other areas designated by the local enforcing agency to be at a significant risk from wildfires.

The purpose of the standards is to prevent a building from being ignited by flying embers that can travel as much as a mile away from a wildfire and to contribute to a systematic reduction in fire-related losses through the use of performance and prescriptive requirements. In addition, as of 2011, the CRC requires that automatic fire sprinkler systems be installed in all new single-family residences to protect all areas of a dwelling unit in the event of a fire.

Senate Bill 901 (2018)

SB 901 of 2018 (California Public Utilities Code [PUC] Section 8387) requires all electric utilities to adopt a Wildfire Mitigation Plan (WMP) by December 31, 2019. The purpose of the Plan is to minimize the risk of catastrophic wildfire caused by overhead electric lines and related electrical equipment.

On November 5, 2019, the Shasta Lake City Council adopted its first WMP that went into effect on January 1, 2020. The City's WMP incorporates the California Public Utility Commission's Fire-Threat Maps as well as the Electric Department's Vegetation Management Plan and Asset Inspection Plan. As required by the PUC, in May 2020, Siemens Industry, Inc., conducted an independent review of the City's WMP and found that the WMP conforms to all requirements of PUC §8387.

In addition to the City's Electric Utility, PG&E has overhead electrical lines and related equipment within the City limits. On June 4, 2019, the CPUC issued a decision on PG&E's 2019 Wildfire Mitigation Plan, finding that the Plan contains all required elements set forth in SB 901. On May 7, 2020, the CPUC's Wildfire Safety Division issued a draft approval of PG&E's 2020 Wildfire Mitigation Plan for consideration by the CPUC Board in June 2020.

LOCAL

The Shasta Lake General Plan includes the following objective and policies that apply to the proposed project:

Safety Element		
Objective:	FS-1	Protect development from wildland and non-wildland fires by requiring development to incorporate design measures responsive to the risk from this hazard.

Policies:	FS-b	All land divisions and development shall be required to conform to *Shasta Lake Fire Protection District Fire Safety Standards.*
	FS-c	Known fire hazard information should be reported as part of every general plan amendment, zone change, use permit, variance, building site approval, and all other land development applications subject to environmental assessment.

DISCUSSION OF IMPACTS

Question A

See discussion in Section 4.9 under Question F. The project would not impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan; therefore, there would be no impact.

Question B

Construction

As discussed in Section 4.9 under Questions A and B, there is a possibility that blasting may be required, and blasting activities have the potential to exacerbate wildfire risks. However, if blasting is required, blasting operations must be conducted by or be under the direct supervision of a blaster holding a valid California Blaster's License. The California Fire Code also requires that blasters be familiar with potential hazards and required safety precautions identified in the California Fire Code and the National Fire Protection Association (NFPA) Explosive Materials Code.

If blasting is necessary, **MM 4.9.1** requires that a Blasting Plan, prepared by a qualified blasting specialist, must be completed prior to any blasting activities. Blasting activities would be conducted in accordance with applicable DIR regulations and Section 5607 of the California Fire Code. In addition, equipment and tools used during construction activities may create sparks and increase the risk of wildfire. Implementation of **MM 4.9.2** ensures impacts during construction are less than significant.

Operational

As stated under Regulatory Context, the project site and properties to the north, east, and west are located in a LRA Very High Fire Hazard Severity Zone (VHFHSZ). Thus, there is a potential for exposure of project occupants to pollutants from a wildfire and/or the uncontrolled spread of a wildfire. As discussed in Section 4.9 under Question G, the project is subject to the provisions of Chapter 7A of the CBC and Chapter R337 of the CRC. These regulations require incorporation of fire-resistant building materials in new residential dwellings to increasing the ability the dwelling to resist the intrusion of flames or burning embers projected by a vegetation fire. In addition, the CRC requires that automatic fire sprinkler systems be installed in all new single-family residences to protect all areas of a dwelling unit in the event of a fire. These regulations also require that a minimum of 100 feet of defensible space must be maintained around each side of an occupied structure so a wildfire burning under average weather conditions would be unlikely to ignite the structure.

The City's Building Official and SLFPD's Fire Marshal review all improvement and construction plans in the City prior to issuance of a grading permit or building permit to ensure compliance with applicable State building and fire code requirements. In addition, the City's Building Official and SLFPD's Fire Marshal conduct a final inspection prior to issuance of a Certificate of Occupancy to ensure that the structure(s) complies with applicable fire codes and standards. Compliance with the State and local regulations noted above minimizes the potential for project occupants to be exposed to pollutant concentrations from a wildfire and minimizes the potential for uncontrolled spread of a wildfire. Impacts would be less than significant.

Question C

The proposed project would not require installation of infrastructure that could exacerbate fire hazards (e.g., overhead power lines in vegetated areas); would not construct roads or otherwise intrude into natural spaces in a manner that would increase wildlife hazards in the long term; and would not require installation of emergency water sources, or other fire prevention/suppression infrastructure. Therefore, the increased risk of fire due to project infrastructure and the potential for ongoing impacts due to infrastructure is less than significant.

Question D

The severity of post-fire impacts is based, in part, on the intensity of the fire, the slope of the burned area, the stability of the slope, and physical properties of the soils. During intensive rain in a burn area, soils on moderate to steep slopes can become unstable. Properties below/downstream of burn areas are at an increased risk for post-fire flooding and landslides due to increased runoff.

According to the City's LHMP, the most significant fire that encompassed the project site was the South Pacific Railroad Fire in 1963. The project area consists of gently sloping lands and moderately steep slopes with a low potential for post-fire erosion, landslides, or other slope instability. In addition, as stated in Section 4.10, the project must incorporate measures to reduce storm water runoff both during construction and post-construction to ensure that the proposed project would not substantially alter the existing drainage pattern of the site in a manner that would result in flooding or substantial additional sources of runoff.

Therefore, because the project site has not recently been subject to wildfire, and the project has been designed to minimize potential impacts to existing drainage and flow paths, the potential for post-fire impacts would be less than significant.

CUMULATIVE IMPACTS

The proposed project would not impair an adopted emergency response plan or emergency evacuation plan; therefore, it would not contribute to cumulative impacts related to such plans. In addition, the proposed project would not contribute individually or cumulatively to increased risks associated with post-fire hazards. Because the City is located within a Fire Hazard Severity Zone, all new construction in the City is required to comply with State Building and Fire Codes that were adopted to protect life and property from wildfire risks. Because the proposed project will comply with adopted standards related to wildfire risks, the project's cumulative impact to increased risks of wildfire would be less than significant.

MITIGATION

Implementation of **MM 4.9.1** and **MM 4.9.2.**

DOCUMENTATION

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4.21 MANDATORY FINDINGS OF SIGNIFICANCE

Issues and Supporting Evidence	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
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 rare or endangered plants or animals, or eliminate important examples of the major periods of California history or prehistory?	☐	☒	☐	☐
b. Does the project have impacts that are individually limited, but cumulatively considerable? "Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.	☐	☒	☐	☐
c. Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☒	☐	☐

DISCUSSION OF IMPACTS

Question A

As discussed in the applicable environmental resource sections above, the proposed project could result in loss of forestry resources, increased air emissions, possible effects to special-status wildlife species, disturbance of nesting birds (if present), introduction and spread of noxious weeds during construction, impacts to cultural and tribal cultural resources (if present), unstable soil conditions, disturbance of paleontological resources (if present), increased runoff due to the addition of impervious surfaces, temporarily increased noise and vibration levels, and temporarily increased risk of wildfires. However, mitigation measures are included to reduce all potential impacts to less-than-significant levels.

Question B

The potential cumulative impacts of the proposed project have been analyzed within the discussion of each environmental resource area above. Mitigation measures are included to reduce all potential impacts to a less than significant level.

Question C

As discussed in the applicable environmental resource sections above, the proposed project could result in adverse effects on human beings due to temporarily increased risk of wildfires, temporarily increased air emissions, and temporary construction-related noise and vibration levels. However, mitigation measures are included to reduce all potential impacts to less than significant levels.

SECTION 5.0 LIST OF PREPARERS

ENPLAN

Donald Burk ..... Environmental Services Manager
Carla L. Thompson, AICP ..... Senior Environmental Planner
Kiara Cuerpo-Hadsall.....Environmental Planner
Sabrina Hofkin ..... Wildlife Biologist
John Luper ..... Environmental Scientist
Jacques Peltier ..... Archaeologist
Tia Piotrowski ..... Production Coordinator

City of Shasta Lake

Jessaca Lugo.....Assistant City Manager
Peter Bird .....Associate Planner

SECTION 6.0 ABBREVIATIONS AND ACRONYMNS

AB	Assembly Bill
ADWF	Average Dry Weather Flow
AQAP	Air Quality Attainment Plan
AQMD	Air Quality Management District
APCD	Air Pollution Control District
APE	Area of Potential Effects
ATP	GoShasta Regional Active Transportation Plan
BAMMs	Best Available Mitigation Measures
BAU	Business as Usual
BMP	Best Management Practice
BRA	Biological Resource Assessment
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CalEPA	California Environmental Protection Agency
CAL FIRE	California Department of Forestry and Fire Protection
Cal/OSHA	California Occupational Safety and Health Administration
Caltrans	California Department of Transportation
CAP	Criteria Air Pollutants
CARB	California Air Resources Board
CASQA	California Stormwater Quality Association
CBSC	California Building Standards Code
CCI	Construction Cost Index
CCR	California Code of Regulations
CCV	California Central Valley
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CGC	California Government Code
CH_4	Methane
CNDDB	California Natural Diversity Data Base
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
County	Shasta County
CRHR	California Register of Historical Resources
CVRWQCB	Central Valley Regional Water Quality Control Board
CWA	Clean Water Act

CY	Cubic Yards
dBA	Decibels
DBH	Diameter at Breast Height
Developer	Cornerstone Development Group, Inc.
DOC	Department of Conservation
DPS	Distinct Population Segment
DTSC	California Department of Toxic Substances Control
EHD	Environmental Health Department
EHS	Extremely Hazardous Substance
EO	Executive Order
ERM	Environmental Resources Management
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Act
FESA	Federal Endangered Species Act
FHSZ	Fire Hazard Severity Zone
GHG	Greenhouse Gas Emissions
GWP	Global Warming Potential
H_2S	Hydrogen Sulfide
HCP	Habitat Conservation Plan
HE	Household equivalent
HFC	Hydrofluorocarbons
HSC	California Health and Safety Code
I-5	Interstate 5
IBC	International Building Code
IS	Initial Study
LRA	Local Responsibility Area
MACT	Maximum Achievable Control Technology
MBTA	Migratory Bird Treaty Act
MCL	Maximum Contaminant Level
mg/m^3	Milligrams per Cubic Meter
MND	Mitigated Negative Declaration
MPO	Metropolitan Planning Organization
MRZ	Mineral Resource Zone
MUTCD	California Manual on Uniform Traffic Control Devices

NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission
NCCP	Natural Community Conservation Plan
NEIC	Northeast Information Center of the California Historical Resources Information System
NEHRA	National Earthquake Hazards Reduction Act
NEPA	National Environmental Policy Act
NF_3	Nitrogen Trifluoride
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
N_2	Nitrogen
N_2O	Nitrous Oxide
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
NO_X	Oxides of Nitrogen
NPDES	National Pollutant Discharge Elimination System
NPPA	California Native Plant Protection Act
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSVAB	Northern Sacramento Valley Air Basin
NSVPA	Northern Sacramento Valley Planning Area
NWP	Nationwide Permit
O&M	Operations and Maintenance
O_2	Oxygen
O_3	Ozone
OHWM	Ordinary High Water Mark
OSHA	Occupational Safety and Health Act
Pb	Lead
PERP	Portable Equipment Registration Program
PF	Public Facilities
PFC	Perfluorocarbons
$PM_{2.5}$	Particulate Matter, 2.5 microns in size
PM_{10}	Particulate Matter, 10 microns in size
PPB	Parts per Billion
PPM	Parts per Million
PRC	Public Resources Code
PV	Photovoltaic
PVC	Polyvinyl Chloride

PWWF	Peak Wet Weather Flow
QSD	Qualified SWPPP Developer
RCAP	Regional Climate Action Plan
RCRA	Resource Conservation and Recovery Act
RMP	Risk Management Plan
ROG	Reactive Organic Gases
RWQCB	Regional Water Quality Control Board
SB	Senate Bill
SCAQMD	Shasta County Air Quality Management District
SCS	Sustainable Communities Strategy
SDWA	Safe Drinking Water Act
SF_6	Sulfur Hexafluoride
SGIP	Shasta Gateway Industrial Park
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SMA	California Subdivision Map Act
SMARA	The Surface Mining and Reclamation Act
SMP	Sewer Master Plan
SO_2	Sulfur Dioxide
SO_4	Sulfates
SO_X	Sulfur Oxides
SRA	State Responsibility Area
SRTA	Shasta Regional Transportation Agency
SRWR	Sacramento River Winter Run
SSC	Species of Special Concern
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
SVAQEEP	Sacramento Valley Air Quality Engineering and Enforcement Professionals
TAC	Toxic Air Contaminants
TIS	Traffic Impact Study
TPQ	Federal Threshold Planning Quantity
TPZ	Timberland Production Zone
TWLTL	Two-Way Left-Turn Lane
USACE	United States Army Corps of Engineers
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency
USFWA	United States Fish and Wildlife Service
USGS	United States Geological Survey

UWMP	Urban Water Management Plan
VHFHSZ	Very High Fire Hazard Severity Zone
VMT	Vehicle Miles Travelled
VOC	Volatile Organic Compounds
WDRs	Waste Discharge Requirements
WMP	Wildfire Mitigation Plan
WQO	Water Quality Objectives
WWTP	Wastewater Treatment Plant
$\mu g/m^3$	Micrograms per Cubic Meter

APPENDIX A

Air Quality and Greenhouse Gas Assessment
ECORP, 2019

Updated CALEEMod Reports, 2020

Windsor Estates 3

Air Quality and Greenhouse Gas Assessment

City of Shasta Lake, California

Prepared For:
Cornerstone Development
P.O. Box 71101
Shasta Lake, CA 96079
April 2019

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

ECORP Consulting, Inc. has assisted public and private land owners with environmental regulation compliance since 1987. We offer full service capability, from initial baseline environmental studies through environmental planning review, permitting negotiation, liaison to obtain legal agreements, mitigation design, construction monitoring, and compliance reporting.

ECORP Consulting, Inc. 55 Hanover Lane, Suite A Chico, CA 95928

● *Phone: (530) 965-5925* ● *Web: www.ecorpconsulting.com*

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ATTACHMENTS

Attachment A – CalEEMod Output File for Air Quality Emissions

Attachment B – CalEEMod Output File for Greenhouse Gas Emissions

1.0 INTRODUCTION

This report documents the results of an assessment of both air quality and greenhouse gas emissions (GHG) completed for the Windsor Estates 3 Project (Project), which includes the construction of 74 single-family residential units in the City of Shasta Lake (City). This assessment was prepared using methodologies and assumptions recommended in the rules and regulations of the Shasta County Air Quality Management District. Regional and local existing conditions are presented, along with pertinent emissions standards and regulations. The purpose of this assessment is to estimate Project-generated criteria air pollutants and GHG emissions attributable to the Project and to determine the level of impact the Project would have on the environment.

1.1 Project Location and Description

The Project site is located in the City of Shasta Lake, located in the south-central portion of Shasta County. The Project site is approximately 52 acres and located on the south side of Pine Grove Avenue approximately one mile west of Interstate 5 (I-5) (see **Figure 1**). The site is generally bound by undeveloped land and a single-family residence to the west, Pine Grove Avenue to the north, undeveloped land and single-family residences to the east, and a single-family neighborhood to the south (see **Figure 2**). The Project site is characterized by vacant, wooded, undeveloped land.

The Project proposes to construct 74 single-family residences and the necessary internal circulation on 35.8 acres of the 52-acre site. Access to the site would occur at a new intersection with Pine Grove Avenue, at the location of an existing curb cut.

The Project site is designated Suburban Residential (SR) by the City of Shasta Lake General Plan. The SR General Plan designation strives for low population densities, allowing for a maximum 3 residences per acre.

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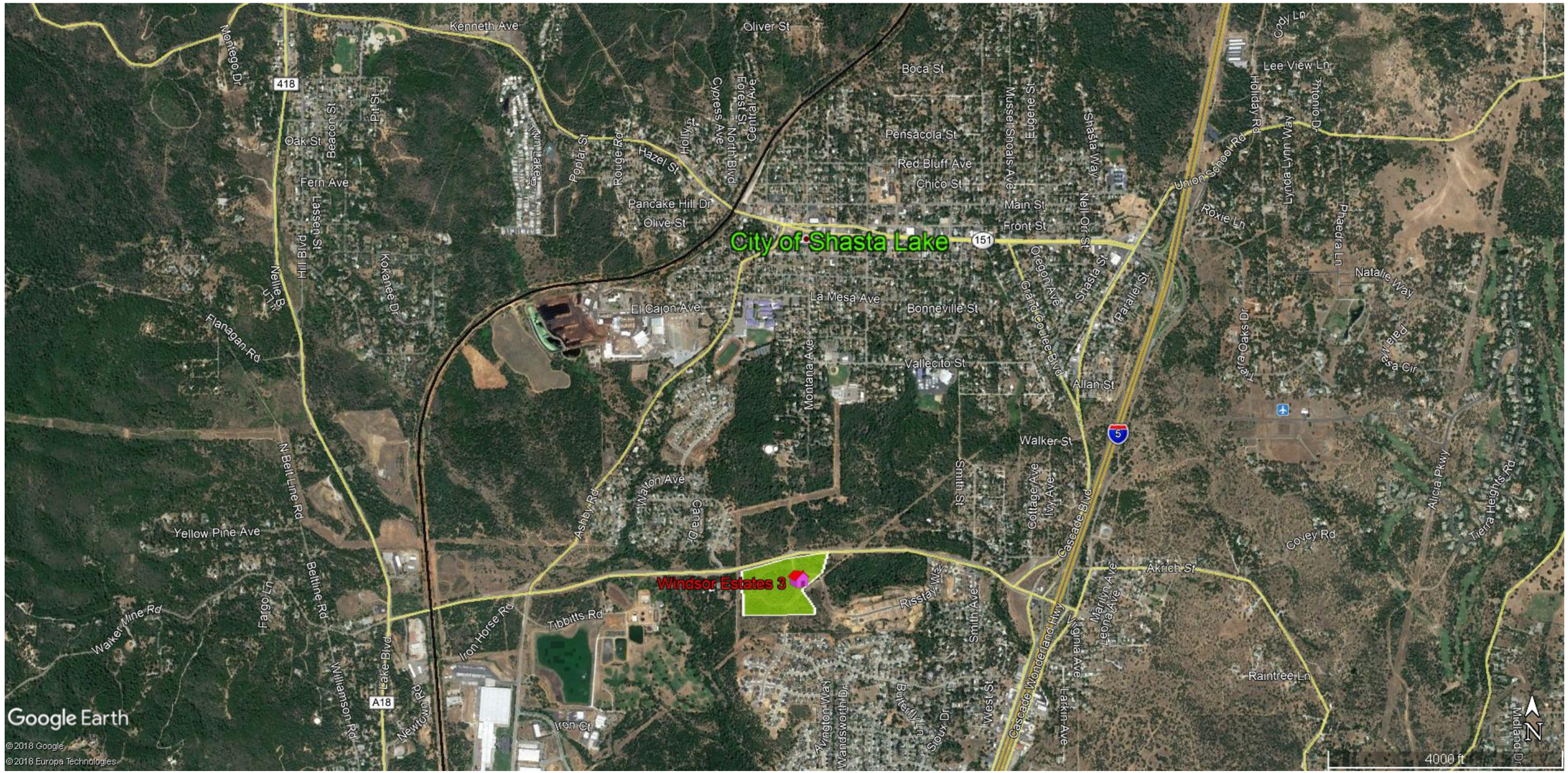

Map Date: *3/25/2019*
Photo (or Base) Source: *Google Earth 2019*

Figure 1 Project Vicinity

2019-044 Windsor Estates 3

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Map Date: *3/25/2019*
Photo (or Base) Source: *Google Earth 2019*

Figure 2 Project Location

2019-044 Windsor Estates 3

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2.0 AIR QUALITY

2.1 Air Quality Setting

Air quality in a region is determined by its topography, meteorology, and existing air pollutant sources. These factors are discussed below, along with the current regulatory structure that applies to the Northern Sacramento Valley Air Basin (NSVAB), which encompasses the Project site, pursuant to the regulatory authority of the Shasta County Air Quality Management District (SCAQMD).

Northern Sacramento Valley Air Basin

The California Air Resources Board (CARB) divides the state into air basins that share similar meteorological and topographical features. Shasta Lake lies in the NSVAB, which includes Sutter, Yuba, Colusa, Butte, Glenn, Tehama, and Shasta counties. The NSVAB is bounded on the north and west by the Coastal Mountain Range and on the east by the southern end of the Cascade Mountain Range and the northern end of the Sierra Nevada. These mountain ranges reach heights in excess of 6,000 feet above mean sea level, with individual peaks rising much higher. The mountains form a substantial physical barrier to locally created pollution as well as to pollution transported northward on prevailing winds from the Sacramento metropolitan area (SVAQEEP 2015).

The environmental conditions of Shasta County are conducive to potentially adverse air quality conditions. The basin area traps pollutants between two mountain ranges to the east and the west. This problem is exacerbated by a temperature inversion layer that traps air at lower levels below an overlying layer of warmer air. Prevailing winds in the area are generally from the south and southwest. Sea breezes flow over the San Francisco Bay Area and into the Sacramento Valley, transporting pollutants from the large urban areas. Growth and urbanization in Shasta County have also contributed to an increase in emissions.

Criteria Air Pollutants

Criteria air pollutants are defined as those pollutants for which the federal and state governments have established air quality standards for outdoor or ambient concentrations to protect public health with a determined margin of safety. Ozone (O_3), coarse particulate matter (PM_{10}), and fine particulate matter ($PM_{2.5}$) are generally considered to be regional pollutants because they or their precursors affect air quality on a regional scale. Pollutants such as carbon monoxide (CO), nitrogen dioxide (NO_2), and sulfur dioxide (SO_2) are considered to be local pollutants because they tend to accumulate in the air locally. PM is also considered a local pollutant. Health effects commonly associated with criteria pollutants are summarized in **Table 2-1**.

Table 2-1. Criteria Air Pollutants- Summary of Common Sources and Effects		
Pollutant	**Major Man-Made Sources**	**Human Health & Welfare Effects**
CO	An odorless, colorless gas formed when carbon in fuel is not burned completely; a component of motor vehicle exhaust.	Reduces the ability of blood to deliver oxygen to vital tissues, effecting the cardiovascular and nervous system. Impairs vision, causes dizziness, and can lead to unconsciousness or death.
NO_2	A reddish-brown gas formed during fuel combustion for motor vehicles, energy utilities and industrial sources.	Respiratory irritant; aggravates lung and heart problems. Precursor to ozone and acid rain. Causes brown discoloration of the atmosphere.
O_3	Formed by a chemical reaction between reactive organic gases (ROGs) and nitrous oxides (NOx) in the presence of sunlight. Common sources of these precursor pollutants include motor vehicle exhaust, industrial emissions, solvents, paints and landfills.	Irritates and causes inflammation of the mucous membranes and lung airways; causes wheezing, coughing and pain when inhaling deeply; decreases lung capacity; aggravates lung and heart problems. Damages plants; reduces crop yield.
PM_{10} & $PM_{2.5}$	Power plants, steel mills, chemical plants, unpaved roads and parking lots, wood-burning stoves and fireplaces, automobiles and others.	Increased respiratory symptoms, such as irritation of the airways, coughing, or difficulty breathing; aggravated asthma; development of chronic bronchitis; irregular heartbeat; nonfatal heart attacks; and premature death in people with heart or lung disease. Impairs visibility (haze).
SO_2	A colorless, nonflammable gas formed when fuel containing sulfur is burned. Examples are refineries, cement manufacturing, and locomotives.	Respiratory irritant. Aggravates lung and heart problems. Can damage crops and natural vegetation. Impairs visibility.

Source: CAPCOA 2013

Toxic Air Contaminants

In addition to the criteria pollutants discussed above, toxic air contaminants (TACs) are another group of pollutants of concern. TACs are considered either carcinogenic or noncarcinogenic based on the nature of the health effects associated with exposure to the pollutant. For regulatory purposes, carcinogenic TACs are assumed to have no safe threshold below which health impacts would not occur, and cancer risk is expressed as excess cancer cases per one million exposed individuals. Noncarcinogenic TACs differ in that there is generally assumed to be a safe level of exposure below which no negative health impact is believed to occur. These levels are determined on a pollutant-by-pollutant basis.

There are many different types of TACs, with varying degrees of toxicity. Sources of TACs include industrial processes such as petroleum refining and chrome plating operations, commercial operations such as gasoline stations and dry cleaners, and motor vehicle exhaust. Public exposure to TACs can result from emissions from normal operations, as well as from accidental releases of hazardous materials during upset conditions. The health effects of TACs include cancer, birth defects, neurological damage, and death.

Ambient Air Quality

Ambient air quality at the Project site can be inferred from ambient air quality measurements conducted at nearby air quality monitoring stations. CARB maintains over 60 monitoring stations throughout California. O_3, PM_{10} and $PM_{2.5}$ are the pollutant species most potently affecting the Project region. The Shasta Lake – 13791 Lake Boulevard air quality monitoring station, located approximately 2.1 miles northwest of the Project site, monitors ambient concentrations of O_3. The Shasta Lake – 4066 La Mesa Avenue air quality monitoring station, located approximately 0.7 mile north of the site, monitors ambient concentrations of PM_{10}. The nearest air quality monitoring station to the Project site that monitors concentrations of $PM_{2.5}$ is the Redding – Health Department station, located approximately 6 miles to the south. Ambient emission concentrations will vary due to localized variations in emission sources and climate and should be considered "generally" representative of ambient concentrations in the Project area.

Table 2-2 summarizes the published data concerning O_3, $PM_{2.5}$, PM_{10} since 2015 for each year that the monitoring data is provided.

Table 2-2. Summary of Ambient Air Quality Data

Pollutant Standards	2015	2016	2017
O_3 (Measured at the Shasta Lake – 13791 Lake Boulevard Air Quality Monitoring Station)			
Max 1-hour concentration (ppm)	0.091	0.093	0.096
Max 8-hour concentration (ppm) (state/federal)	0.083 / 0.082	0.082 / 0.082	0.089 / 0.088
Number of days above 1-hour standard (state/federal)	0 / 0	0 / 0	1 / 0
Number of days above 8-hour standard (state/federal)	17 / 12	14 / 13	13 / 13
PM_{10} (Measured at the Shasta Lake – 406 La Mesa Avenue Air Quality Monitoring Station)			
Max 24-hour concentration (µg/m3) (state/federal)	84.4 / 87.2	32.2 / 33.2	83.6 / 87.6
Number of days above 24-hour standard (state/federal)	6.1 / 0	0 / 0	* / 0
$PM_{2.5}$ (Measured at the Redding – Health Department Air Quality Monitoring Station)			
Max 24-hour concentration (µg/m3) (state/federal)	64.6 / 64.6	12.6 / 12.6	67.3 / 67.3
Number of days above federal 24-hour standard	6.0	0.0	6.1

Source: CARB 2018
$\mu g/m^3$ = micrograms per cubic meter; ppm = parts per million
** = Insufficient data available*

The U.S. Environment Protection Agency (EPA) and CARB designate air basins or portions of air basins and counties as being in "attainment" or "nonattainment" for each of the criteria pollutants. Areas that do not meet the standards are classified as nonattainment areas. The National Ambient Air Quality Standards (NAAQS) (other than O_3, PM_{10}, $PM_{2.5}$, and those based on annual averages or arithmetic mean) are not to

be exceeded more than once per year. The NAAQS for O_3, PM_{10}, and $PM_{2.5}$ are based on statistical calculations over one- to three-year periods, depending on the pollutant. The California Ambient Air Quality Standards (CAAQS) are not to be exceeded during a three-year period. The attainment status for the Shasta County portion of the NSVAB is included in **Table 2-3.**

The determination of whether an area meets the state and federal standards is based on air quality monitoring data. Some areas are unclassified, which means there is insufficient monitoring data for determining attainment or nonattainment. Unclassified areas are typically treated as being in attainment. Because the attainment/nonattainment designation is pollutant specific, an area may be classified as nonattainment for one pollutant and attainment for another. Similarly, because the state and federal standards differ, an area could be classified as attainment for the federal standards of a pollutant and as nonattainment for the state standards of the same pollutant. The region is designated as nonattainment for the state O_3 standard (CARB 2017a).

Table 2-3. Attainment Status of Criteria Pollutants in the Shasta County Portion of the NSVAB

Pollutant	State Designation	Federal Designation
O_3	Nonattainment	Attainment
PM_{10}	Attainment	Unclassified
$PM_{2.5}$	Attainment	Unclassified/Attainment
CO	Unclassified	Unclassified/Attainment
NO_2	Attainment	Unclassified/Attainment
SO_2	Attainment	Unclassified/Attainment

Source: CARB 2017a

In 1994, the air districts in the NSVAB, which includes the SCAQMD, prepared an air quality attainment plan for O_3. Updated every three years since adoption, the current *2015 Air Quality Attainment Plan* includes forecast reactive organic gas (ROG) and nitrogen oxide (NO_x) emissions (ozone precursors) for the entire NSVAB through the year 2020. The *2015 Air Quality Attainment Plan* provides local guidance for air basins to achieve attainment of the California ambient air quality O_3 standard.

2.2 Regulatory Framework

Federal

Clean Air Act

The Clean Air Act (CAA) of 1970 and the CAA Amendments of 1971 required the EPA to establish the NAAQS, with states retaining the option to adopt more stringent standards or to include other specific pollutants. On April 2, 2007, the Supreme Court found that carbon dioxide is an air pollutant covered by the CAA; however, no NAAQS have been established for carbon dioxide.

These standards are the levels of air quality considered safe, with an adequate margin of safety, to protect the public health and welfare. They are designed to protect those "sensitive receptors" most susceptible to further respiratory distress such as asthmatics, the elderly, very young children, people already weakened by other disease or illness, and persons engaged in strenuous work or exercise. Healthy adults can tolerate occasional exposure to air pollutant concentrations considerably above these minimum standards before adverse effects are observed.

The EPA has classified air basins (or portions thereof) as being in attainment, nonattainment, or unclassified for each criteria air pollutant, based on whether or not the NAAQS have been achieved. If an area is designated unclassified, it is because inadequate air quality data were available as a basis for a nonattainment or attainment designation. **Table 2-3** lists the federal attainment status of the Shasta County portion of the NSVAB for the criteria pollutants.

State

California Clean Air Act

The California Clean Air Act (CCAA) allows states to adopt ambient air quality standards and other regulations provided that they are at least as stringent as federal standards. CARB, a part of the California Environmental Protection Agency, is responsible for the coordination and administration of both federal and state air pollution control programs within California, including setting the CAAQS. CARB also conducts research, compiles emission inventories, develops suggested control measures, and provides oversight of local programs. CARB establishes emissions standards for motor vehicles sold in California, consumer products (such as hairspray, aerosol paints, and barbecue lighter fluid), and various types of commercial equipment. It also sets fuel specifications to further reduce vehicular emissions. CARB also has primary responsibility for the development of California's State Implementation Plan (SIP), for which it works closely with the federal government and the local air districts.

Local

Shasta County Air Quality Management District

The SCAQMD is designated by law to adopt and enforce regulations to achieve and maintain ambient air quality standards. The SCAQMD, along with other air districts in the NSVAB, has committed to jointly prepare and implement the *NSVAB Air Quality Attainment Plan* for the purpose of achieving and maintaining healthful air quality throughout the air basin. In addition, the SCAQMD adopts and enforces controls on stationary sources of air pollutants through its permit and inspection programs, and it regulates agricultural burning. Other responsibilities include monitoring air quality, preparing clean air plans, and responding to citizen complaints concerning air quality.

All projects in Shasta County are subject to applicable SCAQMD rules and regulations in effect at the time of construction. Descriptions of specific rules applicable to construction resulting from implementation of the Proposed Project may include, but are not limited to:

- SCAQMD Rule 2-1A, Authorities to Construct/Permits to Operate, allows any person to use construction equipment for construction activities, and must obtain a permit to operate prior to installation activities.
- SCAQMD Rule 3-2, Specific Air Contaminants, controls the amount of air contaminants allowed to be discharged into the atmosphere.
- Architectural coatings and solvents used at the Project shall be compliant with SCAQMD Rule 3-31, Architectural Coatings.
- Cutback and emulsified asphalt application shall be conducted in accordance with SCAQMD Rule 3-15, Cutback and Emulsified Asphalt.
- SCAQMD Rule 3-16, Fugitive, Indirect, or Non-traditional Sources, controls the emission of fugitive dust during earth-moving, construction, demolition, bulk storage, and conditions resulting in wind erosion.

2.3 Air Quality Emissions Impact Assessment

Thresholds of Significance

The impact analysis provided below is based on the following California Environmental Quality Act (CEQA) Guidelines Appendix G thresholds of significance. The Project would result in a significant impact to air quality if it would:

1) Result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors).

2) Conflict with or obstruct implementation of any applicable air quality plan.

3) Expose sensitive receptors to substantial pollutant concentrations.

4) Result in other emissions (such as those leading to odors adversely affecting a substantial number of people).

SCAQMD significance thresholds are used to determine air quality impacts in this analysis. These thresholds are consistent with New Source Review Rule 2-1 adopted by the SCAQMD Board in 1993, as required by the California Clean Air Act. The thresholds of significance are summarized in **Table 2-4.**

Table 2-4. Shasta County Air Quality Management District Thresholds of Significance – Pounds per Day			
Threshold	**NOx**	**ROG**	**PM10**
Level A Thresholds	25	25	80
Level B Thresholds	137	137	137

The SCAQMD recommends that projects apply Standard Mitigation Measures (SMM) and appropriate Best Available Mitigation Measures (BAMM) when a project exceeds Level A thresholds and SMM, BAMM, and special BAMM when a project exceeds Level B thresholds. Projects that cannot mitigate emissions to levels below the Level B thresholds are considered significant. Based on these standards, the effects of the Proposed Project have been categorized as either a "less than significant impact" or a "potentially significant impact." Mitigation measures are recommended for potentially significant impacts. If a potentially significant impact cannot be reduced to a less-than-significant level through the application of mitigation, it is categorized as a significant and unavoidable impact.

By its very nature, air pollution is largely a cumulative impact. No single project is sufficient in size, by itself, to result in nonattainment of ambient air quality standards. Instead, a project's individual emissions contribute to existing cumulatively significant adverse air quality impacts. If a project's individual emissions exceed its identified significance thresholds, the project would be cumulatively considerable. Projects that do not exceed significance thresholds would not be considered cumulative considerable.

Methodology

Air quality impacts were assessed in accordance with methodologies recommended by CARB and the SCAQMD. Where criteria air pollutant quantification was required, emissions were modeled using the California Emissions Estimator Model (CalEEMod), version 2016.3.2. CalEEMod is a statewide land use emissions computer model designed to quantify potential criteria pollutant emissions associated with both construction and operations from a variety of land use projects. Project construction-generated air pollutant emissions were primarily calculated using CalEEMod model defaults for Shasta County. Operational air pollutant emissions were based on the Project site plans and automobile trip rates and distances calculated by the traffic engineering firm, W-Trans (2019). The anticipated Project fleet mix was adjusted to more accurately reflect the traffic instigated by a residential land use, based on the Federal Highway Administration's Highway Noise Prediction Model (FHWA-RD-77-108).

Impact Analysis

PROJECT CONSTRUCTION-GENERATED CRITERIA AIR QUALITY EMISSIONS

Construction Significance Analysis

Construction-generated emissions are temporary and short term but have the potential to represent a significant air quality impact. Three basic sources of short-term emissions will be generated through construction of the Proposed Project: operation of the construction vehicles (i.e., excavators, trenchers, dump trucks), the creation of fugitive dust during clearing and grading, and the use of asphalt or other

oil-based substances during paving activities. Construction activities such as excavation and grading operations, construction vehicle traffic, and wind blowing over exposed soils would generate exhaust emissions and fugitive particulate matter emissions that affect local air quality at various times during construction. Effects would be variable depending on the weather, soil conditions, the amount of activity taking place, and the nature of dust control efforts. The dry climate of the area during the summer months creates a high potential for dust generation.

Construction-generated emissions associated wthe Proposed Project were calculated using the CARB-approved CalEEMod computer program, which is designed to model emissions for land use development projects, based on typical construction requirements. See **Attachment A** for more information regarding the construction assumptions, including construction equipment and duration, used in this analysis.

Predicted maximum daily construction-generated emissions for the Proposed Project are summarized in **Table 2-5**. Construction-generated emissions are short term and of temporary duration, lasting only as long as construction activities occur, but would be considered a significant air quality impact if the volume of pollutants generated exceeds the SCAQMD's thresholds of significance.

Table 2-5. Construction-Related Emissions

Construction Year	Pollutant (pounds per day)				
	ROG	NO_X	CO	PM_{10}	$PM_{2.5}$
Construction in Year One	4.88	54.62	34.64	20.68	12.19
Construction in Year Two	2.33	20.23	18.54	1.51	1.16
Construction in Year Three	2.09	18.38	18.11	1.35	1.01
Construction in Year Four	76.00	16.51	17.76	1.20	0.87
Level A Significance Threshold	*25*	*25*	*None*	*80*	*None*
Exceed Level A Threshold	**Yes**	**Yes**	**No**	**No**	**No**
Level B Significance Threshold	*137*	*137*	*None*	*137*	*None*
Exceed Level B Threshold?	**No**	**No**	**No**	**No**	**No**

*Source: CalEEMod version 2016.3.2. Refer to **Attachment A** for Model Data Outputs.*
Notes: Building construction, paving, and painting assumed to occur simultaneously.

As shown in **Table 2-5**, daily emissions associated with the construction of the Proposed Project would exceed the Level A significance threshold for ROG and NO_X emissions. No pollutants would surpass the Level B significance thresholds during the assumed construction period. The SCAQMD recommends that projects apply SMM and appropriate BAMM when a project exceeds Level A thresholds in order to be considered less than significant. To comply with SCAQMD recommendations, Mitigation Measure AQ-1 is recommended, which includes various dust control measures to reduce fugitive PM_{10} and $PM_{2.5}$, such as

regular watering of disturbed areas, providing track-out devices that reduce soil from trucks being 'tracked' onto adjacent roadways, covering stockpiles, and limiting on-site vehicle speeds. Mitigation Measure AQ-1 also contains measures to reduce O_3 precursor emissions from construction equipment. Implementation of Mitigation Measure AQ-1 would reduce impacts resulting from construction-generated emissions associated with Project construction.

Recommended Mitigation

AQ-1: Prior to issuance of a grading permit, the Project applicant shall submit a grading plan for review and approval by the City of Shasta Lake Planning Division. The following specifications shall be included on the permit to reduce short-term air quality impacts attributable to the on-site and off-site construction activities:

- During all construction activities, all architectural coatings applied shall contain a low content of volatile organic compounds (VOC) (i.e., 100 grams/liter) as required by the California Green Building Code.
- All construction equipment shall be maintained and properly tuned in accordance with manufacturers' specifications. Equipment maintenance records shall be kept on-site and made available upon request by the City of Shasta Lake or Shasta County AQMD.
- All material excavated, stockpiled, or graded shall be sufficiently watered to prevent fugitive dust from leaving property boundaries and causing a public nuisance or a violation of an ambient air standard. Watering shall occur at least twice daily with complete site coverage, preferably in the mid-morning and after work is completed each day.
- All unpaved areas (including unpaved roads) with vehicle traffic shall be watered periodically or have dust palliatives applied for stabilization of dust emissions.
- All on-site vehicles shall be limited to a speed of 15 miles per hour on unpaved roads.
- All land clearing, grading, earth-moving, or excavation activities on the Project site shall be suspended when sustained winds are expected to exceed 20 miles per hour.
- All portions of the development site which have been stripped of vegetation by construction activities shall be stabilized in accordance with the approved stormwater pollution prevention plan.
- All trucks hauling dirt, sand, soil, or loose material shall be covered or shall maintain at least 2 feet of freeboard (i.e., minimum vertical distance between top of the load and the trailer) in accordance with the requirements of California Vehicle Code Section 23114. This provision will be enforced by local law enforcement agencies.
- All material transported off-site shall be either sufficiently watered or securely covered to prevent a public nuisance.
- Prior to final occupancy, the applicant shall re-establish ground cover on the construction site through seeding and watering.
- Off-road construction equipment shall not be left idling for periods longer than 5 minutes when not in use.

- Maintain all construction equipment in proper tune according to manufacturer's specifications.
- Maximize to the extent feasible, the use of diesel construction equipment meeting current CARB certification standards for off-road heavy-duty diesel engines.
- Registration in the CARB DOORS program (www.arb.ca.gov/msprog/ordiesel/ordiesel.htm) and meeting all applicable standards for replacement and/or retrofit.
- All portable equipment, including generators and air compressors rated over 50 brake horse power, shall be registered in the Portable Equipment Registration Program (https://ww2.arb.ca.gov/our-work/programs/portable-equipment-registration-program-perp), or permitted through the SCAQMD as a stationary source.

Implementation of Mitigation Measure AQ-1 would be required as part of any grading permit issued for the Project. As shown in **Table 2-5**, Project emissions do not exceed the SCAQMD Level B Threshold; thus, impacts from construction-generated air pollutants would be less than significant with the implementation of Mitigation Measure AQ-1.

PROJECT OPERATIONS CRITERIA AIR QUALITY EMISSIONS

Operational Significance Analysis

Implementation of the Project would result in long-term operational emissions of criteria air pollutants such as PM_{10}, $PM_{2.5}$, CO, and SO_2 as well as O_3 precursors such as ROG and NO_X. Project-generated increases in emissions would be predominantly associated with the assumed amount of wood burned in Project fireplaces and motor vehicle use. Long-term operational emissions attributable to the Project are identified in **Table 2-6** and compared to the regional operational significance thresholds promulgated by the SCAQMD.

Table 2-6. Operational-Related Emissions					
Emission Source	**Pollutant (pounds per day)**				
	ROG	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**
Summer Emissions					
Area	117.55	1.60	143.14	19.63	19.63
Energy	0.05	0.48	0.20	0.03	0.03
Mobile	3.75	2.76	22.34	2.76	0.75
Total	**121.23**	**4.86**	**165.69**	**22.43**	**20.42**
Winter Emissions					
Area	117.55	1.60	143.14	19.63	19.63
Energy	0.05	0.48	0.20	0.03	0.03
Mobile	2.65	3.11	22.63	2.76	0.75
Total	**120.26**	**5.21**	**165.97**	**22.43**	**20.42**
Level A Significance Threshold	*25*	*25*	*None*	*80*	*None*
Exceed Level A Threshold	**Yes**	**No**	**No**	**No**	**No**
Level B Significance Threshold	*137*	*137*	*None*	*137*	*None*
Exceed Level B Threshold?	**No**	**No**	**No**	**No**	**No**

*Source: CalEEMod version 2016.3.2. Refer to **Attachment A** for Model Data Outputs.*

As shown in **Table 2-6**, daily emissions associated with Project operations would exceed the Level A significance threshold for ROG emissions. No pollutants would surpass the Level B significance thresholds during operations. As previously described, the SCAQMD recommends that projects apply SMM and appropriate BAMM when a project exceeds Level A thresholds in order to be considered less than significant. To comply with SCAQMD recommendations, Mitigation Measures AQ-2 and AQ-3 are recommended. Implementation of these measures would prohibit the installation of wood stoves (fireplaces are acceptable) and require energy efficient lighting, energy efficient and automated air conditioning controls, exterior electrical outlets, and street design that maximizes pedestrian access to transit stops.

Recommended Mitigation

AQ-2: Prior to the issuance of individual building permits, the Shasta Lake Planning Division shall confirm that all construction documents and specifications stipulate that the installation of wood stoves is prohibited. Masonry fireplaces are acceptable.

AQ-3: Prior to the issuance of individual building permits, the Shasta Lake Planning Division shall confirm that all Project plans and specifications include all feasible Standard Mitigation Measures and Level A Measures as defined by the SCAQMD including:

- The Project shall provide for the use of energy-efficient lighting (includes controls) and process systems such as water heaters, furnaces, and boiler units.
- The Project shall utilize energy-efficient and automated controls for air conditioning.
- Residential structures shall include exterior electric outlets in the front and rear.
- Streets shall be designed to maximize pedestrian access to transit stops where feasible.

As shown in **Table 2-6**, Project emissions do not exceed the SCAQMD Level B Threshold; thus, impacts from Project operations would be less than significant with the implementation of Mitigation Measures AQ-2 and AQ-3.

As identified in **Table 2-3**, the Shasta County portion of the NSVAB is listed as a nonattainment area for the state O_3 standard. O_3 is a health threat to persons who already suffer from respiratory diseases and can cause severe ear, nose and throat irritation and increases susceptibility to respiratory infections. Particulate matter can adversely affect the human respiratory system. As shown in **Table 2-6**, the Proposed Project would result in increased emissions of the O_3 precursor pollutants ROG and NO_x, however, the correlation between a project's emissions and increases in nonattainment days, or frequency or severity of related illnesses, cannot be accurately quantified. The overall strategy for reducing air pollution and related health effects in Shasta County is contained in the 2015 *NSVAB Air Quality Attainment Plan*. The 2015 *NSVAB Air Quality Attainment Plan* provides control measures that reduce emissions to attain state ambient air quality standards by their applicable deadlines such as the application of available cleaner technologies, best management practices, incentive programs, as well as development and implementation of zero and near-zero technologies and control methods. The CEQA thresholds of significance established by the SCAQMD are designed to meet the objectives of the *Air Quality Attainment Plan* and in doing so achieve attainment status with state standards. As noted above, the Project would increase the emission of these pollutants, but would not exceed the thresholds of significance established by the SCAQMD for purposes of reducing air pollution and its deleterious health effects.

CONFLICT WITH THE 2015 AIR QUALITY ATTAINMENT PLAN

Under state law, the California Clean Air Act requires an air quality attainment plan to be prepared for areas designated as nonattainment with regard to state ambient air quality standards. Air quality attainment plans outline emissions limits and control measures to achieve and maintain these standards by the earliest practical date. As previously stated, the Shasta County portion of the NSVAB is classified nonattainment for the state O_3 standard.

The *2015 Air Quality Attainment Plan* is the most recent air quality planning document covering Shasta County. Air quality attainment plans are a compilation of new and previously submitted plans, programs (such as monitoring, modeling, permitting, etc.), district rules, state regulations, and federal controls describing how the state will attain ambient air quality standards. State law makes CARB the lead agency for all purposes related to the *Air Quality Attainment Plan*. Local air districts prepare air quality attainment plans and submit them to CARB for review and approval. The *2015 Air Quality Attainment Plan* includes forecast ROG and NO_X emissions (O_3 precursors) for the entire NSVAB through the year 2020. The plan also includes control strategies necessary to attain the California O_3 standard at the earliest practicable date, as well as developed emissions inventories and associated emissions projections for the region showing a downtrend for both ROG and NO_X.

Implementation of the Project would result in long-term emissions from area and mobile emission sources, which could conflict with air quality planning in the *2015 Air Quality Attainment Plan*. The consistency of the Proposed Project with the *2015 Air Quality Attainment Plan* is determined by its consistency with air pollutant emission projections in the plan. The *2015 Air Quality Attainment Plan* addresses growth by projecting the growth in emissions based on different indicators. For example, population forecasts adopted by local governments are used to forecast population-related emissions. Through the planning process, emission growth is offset by basin-wide controls on stationary, area, and transportation sources of air pollution. In other words, the plans and control measures in the *Air Quality Attainment Plan* are based on information derived from projected growth in order to predict future emissions and then determine strategies and regulatory controls for the reduction of emissions. Growth projections for the City of Shasta Lake are based on the City of Shasta Lake General Plan. As such, projects in the City that propose development consistent with the growth anticipated by the City General Plan would be consistent with the *Air Quality Attainment Plan*. In the event that a project would propose a development that is less dense than that associated with the General Plan, the project would likewise be consistent with the *Air Quality Attainment Plan.* If a project however, proposes a development that is denser than that assumed in the General Plan, the project may be in conflict with the *Air Quality Attainment Plan* and could therefore result in a significant impact on air quality.

The City of Shasta Lake General Plan identifies the Project site as being within the SR land use designation. The SR General Plan designation strives for low population densities, allowing for a maximum 3 residences per acre. The Project's proposed uses would be consistent with this land use designation. As such, no impact would occur.

EXPOSURE OF SENSITIVE RECEPTORS TO TOXIC AIR CONTAMINANTS

Sensitive receptors are defined 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 people with illnesses. Examples of these sensitive receptors are residences, schools, hospitals, and daycare centers. CARB has identified the following groups of individuals as the most likely to be affected by air pollution: the elderly over 65, children under 14, athletes, and persons with cardiovascular and chronic respiratory diseases such as asthma, emphysema, and bronchitis.

Construction-Generated Air Contaminants

Construction-related activities would result in temporary, short-term Project-generated emissions of diesel particulate matter (DPM) from the exhaust of off-road, heavy-duty diesel equipment for site preparation (e.g., clearing, grading); soil hauling truck traffic; paving; application of architectural coatings; and other miscellaneous activities. For construction activity, DPM is the primary TAC of concern. Particulate exhaust emissions from diesel-fueled engines (i.e., DPM) were identified as a TAC by the CARB in 1998. The potential cancer risk from the inhalation of DPM, as discussed below, outweighs the potential for all other health impacts (i.e., non-cancer chronic risk, short-term acute risk) and health impacts from other TACs. Accordingly, DPM is the focus of this discussion.

Based on the emission modeling conducted the maximum construction-related annual emissions of $PM_{2.5}$ exhaust, considered a surrogate for DPM, would be 2.20 pounds per day (see **Attachment A**) during construction activity ($PM_{2.5}$ exhaust is considered a surrogate for DPM because more than 90 percent of DPM is less than 1 microgram in diameter and therefore is a subset of particulate matter under 2.5 microns in diameter (i.e., $PM_{2.5}$), according to CARB. Most $PM_{2.5}$ derives from combustion, such as use of gasoline and diesel fuels by motor vehicles.) Furthermore, even during the most intense construction, emissions of DPM would be generated from different locations on the Project site, rather than a single location, because different types of construction activities (e.g., site preparation, grading, building construction) would not occur at the same place at the same time.

The dose to which receptors are exposed is the primary factor used to determine health risk (i.e., potential exposure to TAC emission levels that exceed applicable standards). Dose is a function of the concentration of a substance or substances in the environment and the duration of exposure to the substance. Dose is positively correlated with time, meaning that a longer exposure period would result in a higher exposure level for any exposed receptor. Thus, the risks estimated for an exposed individual are higher if a fixed exposure occurs over a longer period of time. According to the Office of Environmental Health Hazard Assessment (OEHHA), health risk assessments, which determine the exposure of sensitive receptors to TAC emissions, should be based on a 70-, 30-, or 9-year exposure period; further, such assessments should be limited to the period/duration of activities associated with the Proposed Project. Consequently, an important consideration is the fact that construction of the Proposed Project is not anticipated to last 9 consecutive years, the minimum duration of exposure from which to calculate health risk, and that on a day-to-day basis construction activity generally spans eight hours as opposed to throughout the entire day.

Another important consideration is the proximity of nearby sensitive receptors. Studies show that DPM disperses rapidly (e.g., according to CARB (2005) DPM concentrations decrease by 70 percent at 500 feet from the source), and receptors must be in close proximity to emission sources (over a substantial span of time) in order to be exposed to concentrations of concern. The nearest sensitive residential receptors around the Project site are 260 feet distant at the nearest, as measured from the western boundary of the Project site. As previously described, emissions of DPM would be generated from different locations on the Project site, rather than a single location, because different types of construction activities would not occur at the same place at the same time. The center of the Project site is approximately 825 feet from this residence.

Given the locations of potential receptors relative to potential DPM emission sources and the temporary nature of construction activities, the concentrations and durations of any TAC exposure that might occur as a result of Project construction would be less than significant.

Operational Air Contaminants

The Proposed Project involves the construction of a residential neighborhood. The Proposed Project will not include the provision of new permanent stationary or mobile sources of emissions, and therefore, by its very nature, will not generate quantifiable air toxic emissions from Project operations.

Carbon Monoxide Hot Spots

It has long been recognized that CO exceedances are caused by vehicular emissions, primarily when idling at intersections. Concentrations of CO are a direct function of the number of vehicles, length of delay, and traffic flow conditions. Under certain meteorological conditions, CO concentrations close to congested intersections that experience high levels of traffic and elevated background concentrations may reach unhealthy levels, affecting nearby sensitive receptors. Given the high traffic volume potential, areas of high CO concentrations, or "hot spots," are typically associated with intersections that are projected to operate at unacceptable levels of service during the peak commute hours. However, transport of this criteria pollutant is extremely limited, and CO disperses rapidly with distance from the source under normal meteorological conditions. Furthermore, vehicle emissions standards have become increasingly more stringent in the last 20 years. Currently, the CO standard in California is a maximum of 3.4 grams per mile for passenger cars (requirements for certain vehicles are more stringent). With the turnover of older vehicles, introduction of cleaner fuels, and implementation of control technology on industrial facilities, CO concentrations in the Project vicinity have steadily declined.

Accordingly, with the steadily decreasing CO emissions from vehicles, even very busy intersections do not result in exceedances of the CO standard. The analysis prepared for CO attainment in the South Coast Air Quality Management District *1992 Federal Attainment Plan for Carbon Monoxide* (1992 CO Plan) in Los Angeles County can be used to demonstrate the potential for CO exceedances. The South Coast Air Quality Management District CO hot spot analysis was conducted for four busy intersections in Los Angeles County during the peak morning and afternoon time periods. The intersections evaluated included Long Beach Boulevard and Imperial Highway (Lynwood), Wilshire Boulevard and Veteran Avenue (Westwood), Sunset Boulevard and Highland Avenue (Hollywood), and La Cienega Boulevard and Century

Boulevard (Inglewood). The busiest intersection evaluated was at Wilshire Boulevard and Veteran Avenue, which has a traffic volume of approximately 100,000 vehicles per day. The Los Angeles County Metropolitan Transportation Authority evaluated the level of service in the vicinity of the Wilshire Boulevard/Veteran Avenue intersection and found it to be level of service (LOS) E at peak morning traffic and LOS F at peak afternoon traffic (LOS E and F are the two least efficient traffic LOS ratings). Even with the inefficient LOS and volume of traffic, the CO analysis concluded that there was no violation of CO standards (South Coast Air Quality Management District 1992).

According to the traffic impact study prepared for the Project (W-Trans 2019), the Project is anticipated to generate 699 trips daily on average. Because the Proposed Project would not increase traffic volumes at any intersection to more than 100,000 vehicles per day, there is no likelihood of the Project traffic exceeding CO values. Additionally, we can assume that these trips are only being generated when an event is occurring at the Project area.

ODORS

Typically, odors are regarded as an annoyance rather than a health hazard. However, manifestations of a person's reaction to foul odors can range from psychological (e.g., irritation, anger, or anxiety) to physiological (e.g., circulatory and respiratory effects, nausea, vomiting, and headache).

With respect to odors, the human nose is the sole sensing device. The ability to detect odors varies considerably among the population and overall is quite subjective. Some individuals have the ability to smell minute quantities of specific substances; others may not have the same sensitivity but may have sensitivities to odors of other substances. In addition, people may have different reactions to the same odor; in fact, an odor that is offensive to one person (e.g., from a fast-food restaurant) may be perfectly acceptable to another. It is also important to note that an unfamiliar odor is more easily detected and is more likely to cause complaints than a familiar one. This is because of the phenomenon known as odor fatigue, in which a person can become desensitized to almost any odor and recognition only occurs with an alteration in the intensity.

Quality and intensity are two properties present in any odor. The quality of an odor indicates the nature of the smell experience. For instance, if a person describes an odor as flowery or sweet, then the person is describing the quality of the odor. Intensity refers to the strength of the odor. For example, a person may use the word "strong" to describe the intensity of an odor. Odor intensity depends on the odorant concentration in the air. When an odorous sample is progressively diluted, the odorant concentration decreases. As this occurs, the odor intensity weakens and eventually becomes so low that the detection or recognition of the odor is quite difficult. At some point during dilution, the concentration of the odorant reaches a detection threshold. An odorant concentration below the detection threshold means that the concentration in the air is not detectable by the average human.

Land uses commonly considered to be potential sources of obnoxious odorous emissions include agriculture (farming and livestock), wastewater treatment plants, food processing plants, chemical plants, composting facilities, refineries, landfills, dairies, and fiberglass molding. The Proposed Project does not

include any of these uses. Residential land uses are not considered to be a source of obnoxious odors. No odor-related impact would occur.

3.0 GREENHOUSE GAS EMISSIONS

3.1 Greenhouse Gas Setting

Certain gases in the earth's atmosphere, classified as GHGs, play a critical role in determining the earth's surface temperature. Solar radiation enters the earth's atmosphere from space. A portion of the radiation is absorbed by the earth's surface and a smaller portion of this radiation is reflected back toward space. This absorbed radiation is then emitted from the earth as low-frequency infrared radiation. The frequencies at which bodies emit radiation are proportional to temperature. Because the earth has a much lower temperature than the sun, it emits lower-frequency radiation. Most solar radiation passes through GHGs; however, infrared radiation is absorbed by these gases. As a result, radiation that otherwise would have escaped back into space is instead "trapped," resulting in a warming of the atmosphere. This phenomenon, known as the greenhouse effect, is responsible for maintaining a habitable climate on earth. Without the greenhouse effect, the earth would not be able to support life as we know it.

Prominent GHGs contributing to the greenhouse effect are carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Fluorinated gases also make up a small fraction of the GHGs that contribute to climate change. Fluorinated gases include chlorofluorocarbons, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride; however, it is noted that these gases are not associated with typical land use development. Human-caused emissions of these GHGs in excess of natural ambient concentrations are believed to be responsible for intensifying the greenhouse effect and leading to a trend of unnatural warming of the earth's climate, known as global climate change or global warming. It is "extremely likely" that more than half of the observed increase in global average surface temperature from 1951 to 2010 was caused by the anthropogenic increase in GHG concentrations and other anthropogenic factors together (IPCC 2014).

Table 3-1 describes the primary GHGs attributed to global climate change, including their physical properties, primary sources, and contributions to the greenhouse effect.

Each GHG differs in its ability to absorb heat in the atmosphere based on the lifetime, or persistence, of the gas molecule in the atmosphere. CH_4 traps over 25 times more heat per molecule than CO_2, and N_2O absorbs 298 times more heat per molecule than CO_2 (IPCC 2014). Often, estimates of GHG emissions are presented in carbon dioxide equivalents (CO_2e), which weight each gas by its global warming potential (GWP). Expressing GHG emissions in CO_2e takes the contribution of all GHG emissions to the greenhouse effect and converts them to a single unit equivalent to the effect that would occur if only CO_2 were being emitted.

Climate change is a global problem. GHGs are global pollutants, unlike criteria air pollutants and toxic air contaminants, which are pollutants of regional and local concern. Whereas pollutants with localized air quality effects have relatively short atmospheric lifetimes (about one day), GHGs have long atmospheric lifetimes (one to several thousand years). GHGs persist in the atmosphere for long enough time periods to be dispersed around the globe. Although the exact lifetime of any particular GHG molecule is dependent on multiple variables and cannot be pinpointed, it is understood that more CO_2 is emitted into the atmosphere than is sequestered by ocean uptake, vegetation, or other forms. Of the total annual human-caused CO_2 emissions, approximately 55 percent is sequestered through ocean and land uptakes every

year, averaged over the last 50 years, whereas the remaining 45 percent of human-caused CO_2 emissions remains stored in the atmosphere (IPCC 2013).

Table 3-1. Greenhouse Gases

Greenhouse Gas	Description
CO_2	Carbon dioxide is a colorless, odorless gas. CO_2 is emitted in a number of ways, both naturally and through human activities. The largest source of CO_2 emissions globally is the combustion of fossil fuels such as coal, oil, and gas in power plants, automobiles, industrial facilities, and other sources. A number of specialized industrial production processes and product uses such as mineral production, metal production, and the use of petroleum-based products can also lead to CO_2 emissions. The atmospheric lifetime of CO_2 is variable because it is so readily exchanged in the atmosphere.[1]
CH_4	Methane is a colorless, odorless gas and is the major component of natural gas, about 87 percent by volume. It is also formed and released to the atmosphere by biological processes occurring in anaerobic environments. Methane is emitted from a variety of both human-related and natural sources. Human-related sources include fossil fuel production, animal husbandry (intestinal fermentation in livestock and manure management), rice cultivation, biomass burning, and waste management. These activities release significant quantities of CH_4 to the atmosphere. Natural sources of CH_4 include wetlands, gas hydrates, permafrost, termites, oceans, freshwater bodies, non-wetland soils, and other sources such as wildfires. The atmospheric lifetime of CH_4 is about12 years.[2]
N_2O	Nitrous oxide is a clear, colorless gas with a slightly sweet odor. Nitrous oxide is produced by both natural and human-related sources. Primary human-related sources of N_2O are agricultural soil management, animal manure management, sewage treatment, mobile and stationary combustion of fossil fuels, adipic acid production, and nitric acid production. N_2O is also produced naturally from a wide variety of biological sources in soil and water, particularly microbial action in wet tropical forests. The atmospheric lifetime of N_2O is approximately 120 years.[3]

Sources: [1] EPA 2016a, [2] EPA 2016b, [3] EPA 2016c

The quantity of GHGs that it takes to ultimately result in climate change is not precisely known; suffice it to say the quantity is enormous, and no single project alone would measurably contribute to a noticeable incremental change in the global average temperature or to global, local, or microclimates. From the standpoint of CEQA, GHG impacts to global climate change are inherently cumulative.

Sources of Greenhouse Gas Emissions

In June 2017, CARB released the 2017 edition of the California GHG inventory covering calendar year 2015 emissions. In 2015, California emitted 440.4 million gross metric tons of CO_2e including from imported electricity. Combustion of fossil fuel in the transportation sector was the single largest source of California's GHG emissions in 2015, accounting for approximately 37 percent of total GHG emissions in the state. This sector was followed by the industrial sector (21 percent) and the electric power sector (including both in-state and out-of-state sources) (19 percent) (CARB 2017b).

Emissions of CO_2 are by-products of fossil fuel combustion. CH_4, a highly potent GHG, primarily results from off-gassing (the release of chemicals from nonmetallic substances under ambient or greater pressure conditions) and is largely associated with agricultural practices and landfills. N_2O is also largely attributable to agricultural practices and soil management. Carbon dioxide sinks, or reservoirs, include vegetation and the ocean, which absorb CO_2 through sequestration and dissolution (CO_2 dissolving into the water), respectively, two of the most common processes for removing carbon dioxide from the atmosphere.

The City has developed a full inventory of GHG emissions from all sectors within the City, including building energy (electricity and natural gas), water (water demand and wastewater), solid waste, transportation, off-road vehicles, recreation, and stationary sources (industrial). In 2008, the community's total baseline emissions included 215,988 metric tons of CO_2e emissions. Energy production and consumption generated the largest portion of emissions at 82,943 metric tons of CO_2e (38 percent of the total emissions). Stationary sources, such as Sierra Pacific Industries and Knauf Insulation, generated the second highest amount of emissions in the City at 72,038 metric tons of CO_2e (33 percent of the total emissions), followed by transportation emissions at 48,106 metric tons of CO_2e (22 percent of the total emissions). The water and offroad/recreation sectors comprise the remaining 7 percent of the emissions inventory (SCAQMD 2012).

3.2 Regulatory Framework

State

Executive Order S-3-05

Executive Order (EO) S-3-05, signed by Governor Arnold Schwarzenegger in 2005, proclaims that California is vulnerable to the impacts of climate change. It declares that increased temperatures could reduce the Sierra Nevada snowpack, further exacerbate California's air quality problems, and potentially cause a rise in sea levels. To combat those concerns, the executive order established total GHG emission targets for the state. Specifically, emissions are to be reduced to the 2000 level by 2010, the 1990 level by 2020, and to 80 percent below the 1990 level by 2050.

While dated, this executive order remains relevant because a more recent California Appellate Court decision, *Cleveland National Forest Foundation v. San Diego Association of Governments* (November 24, 2014) 231 Cal.App.4th 1056, examined whether it should be viewed as having the equivalent force of a legislative mandate for specific emissions reductions. While the California Supreme Court ruled that the San Diego Association of Governments did not abuse its discretion by declining "to adopt the 2050 goal as a measure of significance in light of the fact that the Executive Order does not specify any plan or implementation measures to achieve its goal, the decision also recognized that the goal of a 40 percent reduction in 1990 GHG levels by 2030 is "widely acknowledged" as a "necessary interim target to ensure that California meets its longer-range goal of reducing greenhouse gas emissions 80 percent below 1990 levels by the year 2050.

Assembly Bill 32 Climate Change Scoping Plan and Updates

In 2006, the California legislature passed Assembly Bill 32 (Health and Safety Code §38500 et seq., or AB 32), also known as the Global Warming Solutions Act. AB 32 requires CARB to design and implement feasible and cost-effective emission limits, regulations, and other measures, such that statewide GHG emissions are reduced to 1990 levels by 2020 (representing a 25 percent reduction in emissions). AB 32 anticipates that the GHG reduction goals will be met, in part, through local government actions. CARB has identified a GHG reduction target of 15 percent from current levels for local governments and notes that successful implementation relies on local governments' land use planning and urban growth decisions.

Pursuant to AB 32, CARB adopted a Scoping Plan in December 2008, which was re-approved by CARB on August 24, 2011, that outlines measures to meet the 2020 GHG reduction goals. To meet these goals, California must reduce its GHG emissions by 30 percent below projected 2020 business-as-usual emissions levels or about 15 percent from today's levels. The Scoping Plan recommends measures for further study and possible State implementation, such as new fuel regulations. It estimates that a reduction of 174 million metric tons of CO_2e (about 191 million U.S. tons) from the transportation, energy, agriculture, and forestry sectors and other sources could be achieved should the State implement all of the measures in the Scoping Plan.

The Scoping Plan is required by AB 32 to be updated at least every five years. The first update to the AB 32 Scoping Plan was approved on May 22, 2014 by CARB. The 2017 Scoping Plan Update was adopted on December 14, 2017. The Scoping Plan Update addresses the 2030 target established by Senate Bill 32 (SB 32) as discussed below and establishes a proposed framework of action for California to meet a 40 percent reduction in GHG emissions by 2030 compared to 1990 levels. The key programs that the Scoping Plan Update builds on include: increasing the use of renewable energy in the state, the Cap-and-Trade Regulation, the Low Carbon Fuel Standard, and reduction of methane emissions from agricultural and other wastes.

Executive Order B-30-15

On April 20, 2015 Governor Brown signed Executive Order B-30-15 to establish a California GHG reduction target of 40 percent below 1990 levels by 2030. The Governor's executive order aligns California's GHG reduction targets with those of leading international governments such as the 28-nation European Union, which adopted the same target in October 2014. California is on track to meet or exceed the target of reducing GHG emissions to 1990 levels by 2020, as established in the California Global Warming Solutions Act of 2006 (AB 32, discussed above). California's new emission reduction target of 40 percent below 1990 levels by 2030 will make it possible to reach the ultimate goal of reducing emissions 80 percent below 1990 levels by 2050. This is in line with the scientifically established levels needed in the U.S. to limit global warming below 2 degrees Celsius, the warming threshold at which major climate disruptions are projected, such as super droughts and rising sea levels.

Senate Bill 32 and Assembly Bill 197 of 2016

In August 2016, Governor Brown signed SB 32 and AB 197, which serve to extend California's GHG reduction programs beyond 2020. SB 32 amended the Health and Safety Code to include Section 38566, which contains language to authorize CARB to achieve a statewide GHG emission reduction of at least 40 percent below 1990 levels by no later than December 31, 2030. SB 32 codified the targets established by EO B-30-15 for 2030, which set the next interim step in the State's continuing efforts to pursue the long-term target expressed in EOs S-3-05 and B-30-15 of 80 percent below 1990 emissions levels by 2050.

Senate Bill X1-2 of 2011, Senate Bill 350 of 2015, and Senate Bill 100 of 2018

SB X1-2 of 2011 requires all California utilities to generate 33 percent of their electricity from renewables by 2020. SB X1-2 sets a three-stage compliance period requiring all California utilities, including independently-owned utilities, energy service providers, and community choice aggregators, to generate

20 percent of their electricity from renewables by December 31, 2013; 25 percent by December 31, 2016; and 33 percent by December 31, 2020. SB X1-2 also requires the renewable electricity standard to be met increasingly with renewable energy that is supplied to the California grid from sources within, or directly proximate to, California.

In October 2015, SB 350 was signed by Governor Brown, which requires retail sellers and publicly-owned utilities to procure 50 percent of their electricity from renewable resources by 2030. In 2018, SB 100 was signed by Governor Brown, codifying a goal of 60 percent renewable procurement by 2030 and 100 percent by 2045 RPS.

Local

Shasta Regional Climate Action Plan

In 2010, the SCAQMD initiated the regional climate action planning (RCAP) process. The primary objectives of the RCAP process are to contribute to the State's climate protection efforts and to provide CEQA review streamlining benefits for development projects in the region's four jurisdictions: the City of Anderson, the City of Redding, the City of Shasta Lake, and the unincorporated areas of Shasta County. To facilitate these objectives, the SCAQMD worked with the four jurisdictions to prepare community-specific, independent climate action plans that contain GHG emission inventories and forecasts, emission reduction measures, and implementation and monitoring programs. The RCAP document serves as a collection of the individual climate action plans and demonstrates the region's commitment to the State's GHG reduction efforts (Shasta County 2012).

Shasta Regional Transportation Agency Regional Transportation Plan / Sustainable Communities Strategy

In 2018, the Shasta Regional Transportation Agency (SRTA) adopted the 2018 Regional Transportation Plan/ Sustainable Communities Strategy (2018 RTP/SCS). The 2018 RTP/SCS charts a course for closely integrating land use and transportation so that the region can grow smartly and sustainably. The 2018 RTP/SCS is a long-range visioning plan to encourage and promote the safe and efficient management, operation, and development of a regional intermodal transportation system that, when linked with appropriate land use planning, will serve the mobility needs of goods and people. The RTP/SCS is required to meet the region's GHG emissions reduction targets, established by CARB for the years 2020 and 2035. Currently, SRTA's is tasked by CARB to achieve a 4 percent reduction in mobile-source GHG emissions compared to 2005 vehicle emissions in 2020 and 2035.

3.3 Greenhouse Gas Emissions Impact Assessment

Thresholds of Significance

The impact analysis provided below is based on the following CEQA Guidelines Appendix G thresholds of significance. The Project would result in a significant impact to greenhouse gas emissions if it would:

1) Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment.

2) Conflict with any applicable plan, policy, or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases.

The SCAQMD does not promulgate thresholds for GHG emissions; therefore, the analysis will rely on a multi-tiered approach to analyzing GHG. First, Project GHG emissions will be compared with the thresholds established in Tehama County. As with Shasta County and the Project site, Tehama County is located within the NSVAB and therefore mass emission thresholds of significance developed in that county are appropriate. Furthermore, the California Air Pollution Control Officers Association (CAPCOA) has provided guidance for determining the significance of GHG emissions generated from land use development projects. CAPCOA also considers projects that generate more than 900 metric tons of GHG to be significant. Additionally, the Project will be compared for consistency with the GHG inventory prepared in the Shasta Regional Climate Action Plan, as well as compliance with the Plan's mandatory measures for new development. Lastly, Project GHG emissions will also be compared for consistency with the goals and assumptions of the SRTA 2018 RTP/SCS, which establishes an overall GHG target for the Project region consistent with both the target date of AB 32 (2020) and the post-2020 GHG reduction goals of SB 32.

Methodology

GHG impacts were assessed in accordance with methodologies recommended by CARB and the SCAQMD. Where quantification was required, GHG emissions were modeled using CalEEMod, version 2016.3.2. CalEEMod is a statewide land use emissions computer model designed to quantify potential GHG emissions associated with both construction and operations from a variety of land use projects. Project construction-generated GHG emissions were primarily calculated using CalEEMod model defaults for Shasta County. The one-time release of CO_2 emissions resultant of the removal of on-site trees and vegetation is accounted. Operational air pollutant emissions were based on the Project site plans and automobile trip rates and distances calculated by the traffic engineering firm, W-Trans (2019). The anticipated Project fleet mix was adjusted to more accurately reflect the traffic instigated by a residential land use, based on the Federal Highway Administration's Highway Noise Prediction Model (FHWA-RD-77-108). The Project will result in indirect GHG emissions associated with the generation of electricity, and the CO_2 intensity factor surrounding regional electricity production is adjusted specific to the City of Shasta Lake using information provided by the EPA's Power Profiler (2018).

Impact Analysis

CONTRIBUTION OF GREENHOUSE GAS EMISSIONS

Construction

Construction-related activities that would generate GHG emissions include worker commute trips, haul trucks carrying supplies and materials to and from the Project site, and off-road construction equipment (e.g., dozers, loaders, excavators). **Table 3-2** illustrates the specific construction-generated GHG emissions that would result from construction of the Project.

Table 3-2. Construction-Related Greenhouse Gas Emissions	
Emissions Source	**CO_2e (Metric Tons/Year)**
Construction in Year One	418
Construction in Year Two	371
Construction in Year Three	367
Construction in Year Four	233
Site Vegetation Removal	500
Project Construction Total	**1,889**

*Source: CalEEMod version 2016.3.2. Refer to **Attachment B** for Model Data Outputs.*

As shown in **Table 3-2**, Project construction, including the emissions released during the one-time removal of site vegetation, would result in the generation of approximately 1,889 metric tons of CO_2e over the course of construction. Once construction is complete and site vegetation is removed, the generation of these GHG emissions would cease. The amortized construction emissions are added to the annual average operational emissions.

Operations

Operation of the Project would result in GHG emissions predominantly associated with motor vehicle use. Long-term operational GHG emissions attributable to the Project are identified in **Table 3-3** and compared to the Tehama County Air Pollution Control District's numeric bright-line threshold of 900 metric tons of CO_2e annually. While significance thresholds promulgated in Tehama County are not binding in the City of Shasta Lake, they are helpful for comparison purposes. As with Shasta County and the Project site, Tehama County is located within the NSVAB and therefore mass emission thresholds of significance developed in that county are appropriate due to the similarities in regional geography as well as land use patterns. Additionally, the CAPCOA has provided guidance for determining the significance of GHG emissions generated from land use development projects. CAPCOA also considers projects that generate more than 900 metric tons of GHG to be significant.

Table 3-3. Operational-Related Greenhouse Gas Emissions	
Emissions Source	**CO_2e (Metric Tons/ Year)**
Construction Emissions (amortized over the 30-year life of the Project)	46
Emissions Released from Vegetation Removal (amortized over the 30-year life of the Project)	17
Area Source Emissions	64
Energy Source Emissions	260
Mobile Source Emissions	445
Solid Waste Emissions	27
Water Emissions	15
Total Emissions	**874**
TCAPCD & CAPCOA Threshold	*900*
Exceed TCAPCD/CAPCOA Threshold?	**No**

*Source: CalEEMod version 2016.3.2. Refer to **Attachment B** for Model Data Outputs.*
Notes: Emissions calculation accounts for Mitigation Measure AQ-2.

As shown in **Table 3-3**, operational-generated emissions would not exceed the numeric bright-line threshold of 900 metric tons of CO_2e annually. This threshold, established by both the Tehama County Air Pollution Control District and CAPCOA, was developed based on substantial evidence that it represents a quantitative level of GHG emissions, compliance with which means that the environmental impact of the GHG emissions will normally not be considerable under CEQA.

Additionally, the Project is compared for consistency with two plans established to reduce GHG emissions.

CONFLICT WITH ANY APPLICABLE PLAN, POLICY, OR REGULATION OF AN AGENCY ADOPTED FOR THE PURPOSE OF REDUCING THE EMISSIONS OF GREENHOUSE GASES

Shasta Regional Climate Action Plan

As previously described, the SCAQMD initiated the RCAP process in 2010. The primary objectives of the RCAP process are to contribute to the State's climate protection efforts and to provide CEQA review streamlining benefits for development projects in the region's four jurisdictions. The RCAP establishes a community-wide emissions reduction target of 15 percent below 2008 levels by 2020, following guidance from CARB and the Governor's Office of Planning and Research. CARB and the California Attorney General have determined this approach to be consistent with the statewide AB 32 goal of reducing emissions to 1990 levels by the year 2020. To facilitate these objectives, the SCAQMD worked with the four jurisdictions to prepare community-specific, independent climate action plans that contain GHG emission inventories and forecasts, emission reduction measures, and implementation and monitoring programs.

Both the existing and the projected City-wide GHG inventories in the RCAP were derived based on the land use designations and associated designations defined in the City of Shasta Lake General Plan. The Proposed Project is consistent with the land use designation and development density presented in the General Plan. As previously stated, the Project site is designated SR by the City of Shasta Lake General Plan. The SR General Plan designation strives for low population densities, allowing for a maximum 3 residences per acre. The Project is consistent with the SR designation. Since the Project is consistent with the General Plan it is consistent with the types, intensity, and patterns of land use envisioned for the site vicinity in the General Plan, and as a result, the Project would not conflict with the land use assumptions or exceed the population or job growth projections used by the City to develop the RCAP.

To meet emissions reduction targets, the RCAP relies on a combination of statewide actions and local emissions reduction efforts. The RCAP identifies both mandatory and voluntary emission reduction measures that would apply to different types of proposed projects, such as the Windsor Estates 3 Project. For each of the mandatory measures, the CAP either reinforces the implementation of current codes and ordinances or recommends changes to the City's codes and ordinances that would result in GHG reductions. RCAP Measure BE-2: *New Construction*, is the primary mandatory RCAP requirement applicable to new development projects. Measure BE-2 states that all new residential projects shall demonstrate 15 percent higher efficiency than the California Title 24 Building Efficiency Standards (also known as the California Energy Code).[1] The remaining RCAP measures are essentially voluntary, relying on assumed levels of community participation to create communitywide emission reductions.

All development in Shasta Lake, including the Project, is required to adhere to all City-adopted policy provisions, including those contained in the RCAP. The Project would not conflict with the RCAP, and no aspects of the Project would inhibit RCAP measures.

Shasta Regional Transportation Association Regional Transportation Plan / Sustainable Communities Plan

The 2018 RTP/SCS embodies a collective vision for the region's future and is developed with input from local governments, including the City of Shasta Lake. The RTP/SCS establishes GHG emissions goals for automobiles and light-duty trucks for 2020 and 2035 and establishes an overall GHG target for the region consistent with both the statewide GHG-reduction targets for 2020 and the post-2020 statewide GHG reduction goals. The 2018 RTP/SCS is a long-range visioning plan to encourage and promote the safe and efficient management, operation, and development of a regional intermodal transportation system that, when linked with appropriate land use planning, will serve the mobility needs of goods and people. Future investments seek to reduce traffic bottlenecks, improve the efficiency of the region's network, and expand mobility choices. The RTP/SCS is an important planning document for the region, allowing project sponsors to qualify for federal funding. In addition, the RTP/SCS is supported by a combination of

[1] *The 2016 update to the Building Energy Efficiency Standards focuses on several key areas to improve the energy efficiency of newly constructed buildings and additions and alterations to existing buildings. The most significant efficiency improvements to the residential Standards include improvements for attics, walls, water heating, and lighting. The 2016 Building Energy Efficiency Standards are 28 percent more efficient than previous standards for residential construction. Energy-efficient buildings require less electricity, and increased energy efficiency reduces fossil fuel consumption and decreases GHG emissions.*

transportation and land use strategies that help the region achieve state GHG emission reduction goals and federal Clean Air Act requirements, preserve open space areas, improve public health and roadway safety, support the vital goods movement industry, and use resources more efficiently.

The core strategy of the 2018 RTP/SCS is focused growth in existing Shasta County communities along the existing transportation network. This strategy allows the best "bang for the buck" in achieving key regional economic, environmental and equity goals: It builds upon existing community characteristics, efficiently leverages existing infrastructure, and mitigates impacts on areas with less development. The RTP/SCS identifies forecasted residential growth areas throughout Shasta County which are areas focused for residential growth and development.

The Project site is located in an area anticipated for 101 – 500 residential units in the RTP/SCS (SRTA 2018, Figure 48). Since the Project site is in a location planned for residential growth in the RTP/SCS planning period, it is included in an area where residential development is both predicted and encouraged in the RTP/SCS. Therefore, the Project is consistent with 2018 RTP/SCS and it can be assumed that regional mobile emissions will continue to decrease in line with the goals of 2018 RTP/SCS with implementation of the Proposed Project. Implementing the 2018 RTP/SCS will greatly reduce the regional GHG emissions from transportation, and the Proposed Project will not obstruct the achievement of RTP/SCS emission reduction targets.

The Proposed Project would not conflict with an adopted plan, policy, or regulation pertaining to GHGs. As described, the Project is consistent with the type, intensity, and patterns of land use envisioned for the site vicinity in the General Plan, and as a result, the Project would not conflict with the land use assumptions or exceed the population or job growth projections used by the City to develop the RCAP. Additionally, all development in Shasta Lake, including the Project, is required to adhere to all City-adopted policy provisions, including Measure BE-2: *New Construction*, the mandatory RCAP requirement applicable to new development projects. Furthermore, the Project is proposed for a location consistent with the land use anticipated for the site in the 2018 RTP/SCS (101 – 500 residential units), and therefore will not obstruct the achievement of the RTP/SCS emission reduction targets.

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Updated CalEEMod Reports

June 2020

Windsor 3 Subdivision

Shasta County AQMD Air District, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	80.00	Dwelling Unit	35.00	144,000.00	205

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	82
Climate Zone	3			**Operational Year**	2024
Utility Company					
CO2 Intensity (lb/MWhr)	496.5	**CH4 Intensity (lb/MWhr)**	0.034	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Windsor 3 Subdivision - Shasta County AQMD Air District, Summer

Project Characteristics - CO2, CH4, and N2O emissions factors per U.S. EPA Power Profiler, Emissions and Generation Resource Integrated Database (eGRID), data released January 2020.

Land Use - Population based on California Department of Finance Population and Housing Estimates, January 2020; 2.56 persons per household. Assumes an average dwelling unit size of 1,800 square feet.

Construction Phase - Road paving would occur prior to commencement of home construction. Architectural coatings associated primarily with housing construction and would overlap the Building Construction phase.

On-road Fugitive Dust - Vehicle speed limited to 15 mph in unpaved areas during construction.

Vehicle Trips - Trip generation and trip length per W-Trans Traffic Impact Study for the Windsor Estates 3 Project, 2020.

Fleet Mix - Fleet mix assumes 0.7% heavy-duty trucks and 1.8% medium-duty trucks for this project.

Energy Use -

Land Use Change -

Sequestration - Sequestration - Conservation estimate based on City's tree planting requirements and mitigation measure for tree replacement.

Construction Off-road Equipment Mitigation - Construction mitigation pursuant to mitigation measures.

Mobile Land Use Mitigation -

Area Mitigation -

Energy Mitigation - Pursuant to Initial Study prepared for 2019 update to the California Energy Efficiency Standards.

Water Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstructionPhase	NumDays	55.00	740.00
tblConstructionPhase	PhaseEndDate	6/7/2024	6/28/2024
tblConstructionPhase	PhaseEndDate	1/5/2024	3/22/2024
tblConstructionPhase	PhaseEndDate	3/22/2024	5/21/2021
tblConstructionPhase	PhaseStartDate	3/23/2024	8/30/2021
tblConstructionPhase	PhaseStartDate	3/6/2021	5/24/2021
tblConstructionPhase	PhaseStartDate	1/6/2024	3/8/2021
tblFleetMix	HHD	0.10	7.0000e-003
tblFleetMix	LDA	0.54	0.57

tblFleetMix	LDT1	0.03	0.09
tblFleetMix	LDT2	0.18	0.24
tblFleetMix	LHD1	0.03	7.0000e-003
tblFleetMix	LHD2	5.6830e-003	7.0000e-003
tblFleetMix	MCY	5.2540e-003	0.06
tblFleetMix	MDV	0.10	0.02
tblFleetMix	MH	1.1330e-003	1.5160e-003
tblFleetMix	MHD	0.01	7.0000e-003
tblFleetMix	OBUS	1.3120e-003	1.3510e-003
tblFleetMix	SBUS	1.2600e-003	1.3110e-003
tblFleetMix	UBUS	1.1720e-003	1.2960e-003
tblLandUse	LotAcreage	25.97	35.00
tblLandUse	Population	229.00	205.00
tblOnRoadDust	MeanVehicleSpeed	40.00	15.00
tblOnRoadDust	MeanVehicleSpeed	40.00	15.00
tblProjectCharacteristics	CH4IntensityFactor	0	0.034
tblProjectCharacteristics	CO2IntensityFactor	0	496.5
tblProjectCharacteristics	N2OIntensityFactor	0	0.004
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblSequestration	NumberOfNewTrees	0.00	375.00
tblVehicleTrips	HO_TL	7.90	5.70
tblVehicleTrips	HO_TTP	37.80	36.00
tblVehicleTrips	HS_TL	7.10	5.70
tblVehicleTrips	HS_TTP	21.20	22.00
tblVehicleTrips	HW_TL	16.80	5.70
tblVehicleTrips	ST_TR	9.91	9.44
tblVehicleTrips	SU_TR	8.62	9.44

tblVehicleTrips	WD_TR	9.52	9.44

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					
2020	4.5841	50.2891	33.0749	0.0648	18.2962	2.1990	20.4952	9.9917	2.0231	12.0147	0.0000	6,280.2070	6,280.2070	1.9519	0.0000	6,329.0046
2021	8.4547	46.4811	31.8902	0.0647	8.9288	1.9870	10.9158	3.6643	1.8281	5.4923	0.0000	6,271.8651	6,271.8651	1.9512	0.0000	6,320.6443
2022	8.2279	18.0536	19.9636	0.0368	0.5022	0.8960	1.3983	0.1344	0.8478	0.9823	0.0000	3,535.1020	3,535.1020	0.6625	0.0000	3,551.6635
2023	8.0611	16.5394	19.6802	0.0366	0.5022	0.7743	1.2766	0.1344	0.7328	0.8672	0.0000	3,514.8403	3,514.8403	0.6497	0.0000	3,531.0833
2024	7.9362	15.4888	19.4782	0.0364	0.5022	0.6779	1.1801	0.1344	0.6412	0.7757	0.0000	3,496.5736	3,496.5736	0.6440	0.0000	3,512.6722
Maximum	**8.4547**	**50.2891**	**33.0749**	**0.0648**	**18.2962**	**2.1990**	**20.4952**	**9.9917**	**2.0231**	**12.0147**	**0.0000**	**6,280.2070**	**6,280.2070**	**1.9519**	**0.0000**	**6,329.0046**

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					
2020	4.5841	50.2891	33.0749	0.0648	8.3597	2.1990	10.5587	4.5298	2.0231	6.5529	0.0000	6,280.2070	6,280.2070	1.9519	0.0000	6,329.0046
2021	8.4547	46.4811	31.8902	0.0647	4.1585	1.9870	6.1455	1.6862	1.8281	3.5142	0.0000	6,271.8651	6,271.8651	1.9512	0.0000	6,320.6443
2022	8.2279	18.0536	19.9636	0.0368	0.5022	0.8960	1.3983	0.1344	0.8478	0.9823	0.0000	3,535.1020	3,535.1020	0.6625	0.0000	3,551.6635
2023	8.0611	16.5394	19.6802	0.0366	0.5022	0.7743	1.2766	0.1344	0.7328	0.8672	0.0000	3,514.8403	3,514.8403	0.6497	0.0000	3,531.0833
2024	7.9362	15.4888	19.4782	0.0364	0.5022	0.6779	1.1801	0.1344	0.6412	0.7757	0.0000	3,496.5736	3,496.5736	0.6440	0.0000	3,512.6722
Maximum	**8.4547**	**50.2891**	**33.0749**	**0.0648**	**8.3597**	**2.1990**	**10.5587**	**4.5298**	**2.0231**	**6.5529**	**0.0000**	**6,280.2070**	**6,280.2070**	**1.9519**	**0.0000**	**6,329.0046**

	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**	**51.19**	**0.00**	**41.70**	**52.92**	**0.00**	**36.96**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

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	126.9459	2.4670	157.7258	0.2742		21.2262	21.2262		21.2262	21.2262	2,221.7385	943.6489	3,165.3874	2.0617	0.1748	3,269.0073
Energy	0.0618	0.5281	0.2247	3.3700e-003		0.0427	0.0427		0.0427	0.0427		674.1722	674.1722	0.0129	0.0124	678.1785
Mobile	3.6424	2.5396	21.6378	0.0296	2.9197	0.0259	2.9455	0.7764	0.0241	0.8005		2,937.6893	2,937.6893	0.3201		2,945.6918
Total	**130.6501**	**5.5347**	**179.5883**	**0.3071**	**2.9197**	**21.2948**	**24.2144**	**0.7764**	**21.2930**	**22.0694**	**2,221.7385**	**4,555.5104**	**6,777.2488**	**2.3947**	**0.1871**	**6,892.8775**

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	126.9459	2.4670	157.7258	0.2742		21.2262	21.2262		21.2262	21.2262	2,221.7385	943.6489	3,165.3874	2.0617	0.1748	3,269.0073
Energy	0.0618	0.5281	0.2247	3.3700e-003		0.0427	0.0427		0.0427	0.0427		674.1722	674.1722	0.0129	0.0124	678.1785
Mobile	3.5727	2.4584	20.7160	0.0282	2.7737	0.0248	2.7985	0.7376	0.0231	0.7607		2,799.8957	2,799.8957	0.3062		2,807.5500
Total	**130.5804**	**5.4535**	**178.6666**	**0.3057**	**2.7737**	**21.2937**	**24.0674**	**0.7376**	**21.2920**	**22.0296**	**2,221.7385**	**4,417.7167**	**6,639.4552**	**2.3808**	**0.1871**	**6,754.7357**

	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	**0.05**	**1.47**	**0.51**	**0.45**	**5.00**	**0.01**	**0.61**	**5.00**	**0.00**	**0.18**	**0.00**	**3.02**	**2.03**	**0.58**	**0.00**	**2.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	10/10/2020	11/20/2020	5	30	
2	Grading	Grading	11/21/2020	3/5/2021	5	75	
3	Building Construction	Building Construction	5/24/2021	3/22/2024	5	740	
4	Architectural Coating	Architectural Coating	8/30/2021	6/28/2024	5	740	
5	Paving	Paving	3/8/2021	5/21/2021	5	55	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 187.5

Acres of Paving: 0

Residential Indoor: 291,600; Residential Outdoor: 97,200; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (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
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Grading	Excavators	2	8.00	158	0.38
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Building Construction	Generator Sets	1	8.00	84	0.74
Paving	Pavers	2	8.00	130	0.42
Paving	Rollers	2	8.00	80	0.38
Grading	Graders	1	8.00	187	0.41
Paving	Paving Equipment	2	8.00	132	0.36
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Grading	Scrapers	2	8.00	367	0.48
Building Construction	Welders	1	8.00	46	0.45

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
Site Preparation	7	18.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	20.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	29.00	9.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	6.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Soil Stabilizer

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Site Preparation - 2020

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					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Off-Road	4.0765	42.4173	21.5136	0.0380		2.1974	2.1974		2.0216	2.0216		3,685.1016	3,685.1016	1.1918		3,714.8975
Total	**4.0765**	**42.4173**	**21.5136**	**0.0380**	**18.0663**	**2.1974**	**20.2637**	**9.9307**	**2.0216**	**11.9523**		**3,685.1016**	**3,685.1016**	**1.1918**		**3,714.8975**

3.2 Site Preparation - 2020

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
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
Worker	0.1206	0.0825	1.0049	2.4800e-003	0.2299	1.5700e-003	0.2315	0.0610	1.4500e-003	0.0624		246.9076	246.9076	8.5400e-003		247.1210
Total	**0.1206**	**0.0825**	**1.0049**	**2.4800e-003**	**0.2299**	**1.5700e-003**	**0.2315**	**0.0610**	**1.4500e-003**	**0.0624**		**246.9076**	**246.9076**	**8.5400e-003**		**247.1210**

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					8.1298	0.0000	8.1298	4.4688	0.0000	4.4688			0.0000			0.0000
Off-Road	4.0765	42.4173	21.5136	0.0380		2.1974	2.1974		2.0216	2.0216	0.0000	3,685.1016	3,685.1016	1.1918		3,714.8975
Total	**4.0765**	**42.4173**	**21.5136**	**0.0380**	**8.1298**	**2.1974**	**10.3272**	**4.4688**	**2.0216**	**6.4904**	**0.0000**	**3,685.1016**	**3,685.1016**	**1.1918**		**3,714.8975**

3.2 Site Preparation - 2020

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
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
Worker	0.1206	0.0825	1.0049	2.4800e-003	0.2299	1.5700e-003	0.2315	0.0610	1.4500e-003	0.0624		246.9076	246.9076	8.5400e-003		247.1210
Total	**0.1206**	**0.0825**	**1.0049**	**2.4800e-003**	**0.2299**	**1.5700e-003**	**0.2315**	**0.0610**	**1.4500e-003**	**0.0624**		**246.9076**	**246.9076**	**8.5400e-003**		**247.1210**

3.3 Grading - 2020

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					8.6733	0.0000	8.6733	3.5965	0.0000	3.5965			0.0000			0.0000
Off-Road	4.4501	50.1975	31.9583	0.0620		2.1739	2.1739		2.0000	2.0000		6,005.8653	6,005.8653	1.9424		6,054.4257
Total	**4.4501**	**50.1975**	**31.9583**	**0.0620**	**8.6733**	**2.1739**	**10.8472**	**3.5965**	**2.0000**	**5.5965**		**6,005.8653**	**6,005.8653**	**1.9424**		**6,054.4257**

3.3 Grading - 2020

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
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
Worker	0.1340	0.0916	1.1166	2.7600e-003	0.2555	1.7400e-003	0.2572	0.0678	1.6100e-003	0.0694		274.3418	274.3418	9.4800e-003		274.5789
Total	**0.1340**	**0.0916**	**1.1166**	**2.7600e-003**	**0.2555**	**1.7400e-003**	**0.2572**	**0.0678**	**1.6100e-003**	**0.0694**		**274.3418**	**274.3418**	**9.4800e-003**		**274.5789**

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					3.9030	0.0000	3.9030	1.6184	0.0000	1.6184			0.0000			0.0000
Off-Road	4.4501	50.1975	31.9583	0.0620		2.1739	2.1739		2.0000	2.0000	0.0000	6,005.8653	6,005.8653	1.9424		6,054.4257
Total	**4.4501**	**50.1975**	**31.9583**	**0.0620**	**3.9030**	**2.1739**	**6.0769**	**1.6184**	**2.0000**	**3.6184**	**0.0000**	**6,005.8653**	**6,005.8653**	**1.9424**		**6,054.4257**

3.3 Grading - 2020

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
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
Worker	0.1340	0.0916	1.1166	2.7600e-003	0.2555	1.7400e-003	0.2572	0.0678	1.6100e-003	0.0694		274.3418	274.3418	9.4800e-003		274.5789
Total	**0.1340**	**0.0916**	**1.1166**	**2.7600e-003**	**0.2555**	**1.7400e-003**	**0.2572**	**0.0678**	**1.6100e-003**	**0.0694**		**274.3418**	**274.3418**	**9.4800e-003**		**274.5789**

3.3 Grading - 2021

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					8.6733	0.0000	8.6733	3.5965	0.0000	3.5965			0.0000			0.0000
Off-Road	4.1912	46.3998	30.8785	0.0620		1.9853	1.9853		1.8265	1.8265		6,007.0434	6,007.0434	1.9428		6,055.6134
Total	**4.1912**	**46.3998**	**30.8785**	**0.0620**	**8.6733**	**1.9853**	**10.6587**	**3.5965**	**1.8265**	**5.4230**		**6,007.0434**	**6,007.0434**	**1.9428**		**6,055.6134**

3.3 Grading - 2021

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
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
Worker	0.1236	0.0813	1.0117	2.6600e-003	0.2555	1.6900e-003	0.2572	0.0678	1.5600e-003	0.0693		264.8217	264.8217	8.3700e-003		265.0309
Total	**0.1236**	**0.0813**	**1.0117**	**2.6600e-003**	**0.2555**	**1.6900e-003**	**0.2572**	**0.0678**	**1.5600e-003**	**0.0693**		**264.8217**	**264.8217**	**8.3700e-003**		**265.0309**

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					3.9030	0.0000	3.9030	1.6184	0.0000	1.6184			0.0000			0.0000
Off-Road	4.1912	46.3998	30.8785	0.0620		1.9853	1.9853		1.8265	1.8265	0.0000	6,007.0434	6,007.0434	1.9428		6,055.6134
Total	**4.1912**	**46.3998**	**30.8785**	**0.0620**	**3.9030**	**1.9853**	**5.8883**	**1.6184**	**1.8265**	**3.4449**	**0.0000**	**6,007.0434**	**6,007.0434**	**1.9428**		**6,055.6134**

3.3 Grading - 2021

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
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
Worker	0.1236	0.0813	1.0117	2.6600e-003	0.2555	1.6900e-003	0.2572	0.0678	1.5600e-003	0.0693		264.8217	264.8217	8.3700e-003		265.0309
Total	**0.1236**	**0.0813**	**1.0117**	**2.6600e-003**	**0.2555**	**1.6900e-003**	**0.2572**	**0.0678**	**1.5600e-003**	**0.0693**		**264.8217**	**264.8217**	**8.3700e-003**		**265.0309**

3.4 Building Construction - 2021

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	1.9009	17.4321	16.5752	0.0269		0.9586	0.9586		0.9013	0.9013		2,553.3639	2,553.3639	0.6160		2,568.7643
Total	**1.9009**	**17.4321**	**16.5752**	**0.0269**		**0.9586**	**0.9586**		**0.9013**	**0.9013**		**2,553.3639**	**2,553.3639**	**0.6160**		**2,568.7643**

3.4 Building Construction - 2021

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
Vendor	0.0304	0.9533	0.1891	2.4400e-003	0.0552	2.7900e-003	0.0580	0.0159	2.6700e-003	0.0186		254.8484	254.8484	0.0201		255.3503
Worker	0.1792	0.1179	1.4670	3.8600e-003	0.3704	2.4500e-003	0.3729	0.0982	2.2600e-003	0.1005		383.9914	383.9914	0.0121		384.2948
Total	**0.2097**	**1.0711**	**1.6561**	**6.3000e-003**	**0.4256**	**5.2400e-003**	**0.4308**	**0.1141**	**4.9300e-003**	**0.1191**		**638.8398**	**638.8398**	**0.0322**		**639.6451**

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	1.9009	17.4321	16.5752	0.0269		0.9586	0.9586		0.9013	0.9013	0.0000	2,553.3639	2,553.3639	0.6160		2,568.7643
Total	**1.9009**	**17.4321**	**16.5752**	**0.0269**		**0.9586**	**0.9586**		**0.9013**	**0.9013**	**0.0000**	**2,553.3639**	**2,553.3639**	**0.6160**		**2,568.7643**

3.4 Building Construction - 2021

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
Vendor	0.0304	0.9533	0.1891	2.4400e-003	0.0552	2.7900e-003	0.0580	0.0159	2.6700e-003	0.0186		254.8484	254.8484	0.0201		255.3503
Worker	0.1792	0.1179	1.4670	3.8600e-003	0.3704	2.4500e-003	0.3729	0.0982	2.2600e-003	0.1005		383.9914	383.9914	0.0121		384.2948
Total	**0.2097**	**1.0711**	**1.6561**	**6.3000e-003**	**0.4256**	**5.2400e-003**	**0.4308**	**0.1141**	**4.9300e-003**	**0.1191**		**638.8398**	**638.8398**	**0.0322**		**639.6451**

3.4 Building Construction - 2022

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	1.7062	15.6156	16.3634	0.0269		0.8090	0.8090		0.7612	0.7612		2,554.3336	2,554.3336	0.6120		2,569.6322
Total	**1.7062**	**15.6156**	**16.3634**	**0.0269**		**0.8090**	**0.8090**		**0.7612**	**0.7612**		**2,554.3336**	**2,554.3336**	**0.6120**		**2,569.6322**

3.4 Building Construction - 2022

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
Vendor	0.0283	0.9027	0.1740	2.4200e-003	0.0552	2.4300e-003	0.0576	0.0159	2.3200e-003	0.0182		252.6892	252.6892	0.0192		253.1700
Worker	0.1663	0.1050	1.3362	3.7200e-003	0.3704	2.3800e-003	0.3728	0.0982	2.1900e-003	0.1004		370.0659	370.0659	0.0107		370.3342
Total	**0.1946**	**1.0077**	**1.5101**	**6.1400e-003**	**0.4256**	**4.8100e-003**	**0.4304**	**0.1141**	**4.5100e-003**	**0.1186**		**622.7551**	**622.7551**	**0.0300**		**623.5042**

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	1.7062	15.6156	16.3634	0.0269		0.8090	0.8090		0.7612	0.7612	0.0000	2,554.3336	2,554.3336	0.6120		2,569.6322
Total	**1.7062**	**15.6156**	**16.3634**	**0.0269**		**0.8090**	**0.8090**		**0.7612**	**0.7612**	**0.0000**	**2,554.3336**	**2,554.3336**	**0.6120**		**2,569.6322**

3.4 Building Construction - 2022

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
Vendor	0.0283	0.9027	0.1740	2.4200e-003	0.0552	2.4300e-003	0.0576	0.0159	2.3200e-003	0.0182		252.6892	252.6892	0.0192		253.1700
Worker	0.1663	0.1050	1.3362	3.7200e-003	0.3704	2.3800e-003	0.3728	0.0982	2.1900e-003	0.1004		370.0659	370.0659	0.0107		370.3342
Total	**0.1946**	**1.0077**	**1.5101**	**6.1400e-003**	**0.4256**	**4.8100e-003**	**0.4304**	**0.1141**	**4.5100e-003**	**0.1186**		**622.7551**	**622.7551**	**0.0300**		**623.5042**

3.4 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	1.5728	14.3849	16.2440	0.0269		0.6997	0.6997		0.6584	0.6584		2,555.2099	2,555.2099	0.6079		2,570.4061
Total	**1.5728**	**14.3849**	**16.2440**	**0.0269**		**0.6997**	**0.6997**		**0.6584**	**0.6584**		**2,555.2099**	**2,555.2099**	**0.6079**		**2,570.4061**

3.4 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
Vendor	0.0213	0.7381	0.1488	2.3800e-003	0.0552	9.7000e-004	0.0561	0.0159	9.3000e-004	0.0168		248.4252	248.4252	0.0135		248.7636
Worker	0.1551	0.0940	1.2232	3.5700e-003	0.3704	2.3200e-003	0.3727	0.0982	2.1400e-003	0.1004		356.0845	356.0845	9.5300e-003		356.3227
Total	**0.1764**	**0.8320**	**1.3720**	**5.9500e-003**	**0.4256**	**3.2900e-003**	**0.4289**	**0.1141**	**3.0700e-003**	**0.1172**		**604.5097**	**604.5097**	**0.0231**		**605.0863**

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	1.5728	14.3849	16.2440	0.0269		0.6997	0.6997		0.6584	0.6584	0.0000	2,555.2099	2,555.2099	0.6079		2,570.4061
Total	**1.5728**	**14.3849**	**16.2440**	**0.0269**		**0.6997**	**0.6997**		**0.6584**	**0.6584**	**0.0000**	**2,555.2099**	**2,555.2099**	**0.6079**		**2,570.4061**

3.4 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
Vendor	0.0213	0.7381	0.1488	2.3800e-003	0.0552	9.7000e-004	0.0561	0.0159	9.3000e-004	0.0168		248.4252	248.4252	0.0135		248.7636
Worker	0.1551	0.0940	1.2232	3.5700e-003	0.3704	2.3200e-003	0.3727	0.0982	2.1400e-003	0.1004		356.0845	356.0845	9.5300e-003		356.3227
Total	**0.1764**	**0.8320**	**1.3720**	**5.9500e-003**	**0.4256**	**3.2900e-003**	**0.4289**	**0.1141**	**3.0700e-003**	**0.1172**		**604.5097**	**604.5097**	**0.0231**		**605.0863**

3.4 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	1.4716	13.4438	16.1668	0.0270		0.6133	0.6133		0.5769	0.5769		2,555.6989	2,555.6989	0.6044		2,570.8077
Total	**1.4716**	**13.4438**	**16.1668**	**0.0270**		**0.6133**	**0.6133**		**0.5769**	**0.5769**		**2,555.6989**	**2,555.6989**	**0.6044**		**2,570.8077**

3.4 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
Vendor	0.0204	0.7243	0.1394	2.3600e-003	0.0552	9.1000e-004	0.0561	0.0159	8.7000e-004	0.0168		246.4124	246.4124	0.0135		246.7499
Worker	0.1453	0.0845	1.1284	3.4300e-003	0.3704	2.2700e-003	0.3727	0.0982	2.0900e-003	0.1003		342.2118	342.2118	8.4900e-003		342.4240
Total	**0.1657**	**0.8087**	**1.2678**	**5.7900e-003**	**0.4256**	**3.1800e-003**	**0.4288**	**0.1141**	**2.9600e-003**	**0.1171**		**588.6242**	**588.6242**	**0.0220**		**589.1739**

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	1.4716	13.4438	16.1668	0.0270		0.6133	0.6133		0.5769	0.5769	0.0000	2,555.6989	2,555.6989	0.6044		2,570.8077
Total	**1.4716**	**13.4438**	**16.1668**	**0.0270**		**0.6133**	**0.6133**		**0.5769**	**0.5769**	**0.0000**	**2,555.6989**	**2,555.6989**	**0.6044**		**2,570.8077**

3.4 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
Vendor	0.0204	0.7243	0.1394	2.3600e-003	0.0552	9.1000e-004	0.0561	0.0159	8.7000e-004	0.0168		246.4124	246.4124	0.0135		246.7499
Worker	0.1453	0.0845	1.1284	3.4300e-003	0.3704	2.2700e-003	0.3727	0.0982	2.0900e-003	0.1003		342.2118	342.2118	8.4900e-003		342.4240
Total	**0.1657**	**0.8087**	**1.2678**	**5.7900e-003**	**0.4256**	**3.1800e-003**	**0.4288**	**0.1141**	**2.9600e-003**	**0.1171**		**588.6242**	**588.6242**	**0.0220**		**589.1739**

3.5 Architectural Coating - 2021

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	6.0881					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2189	1.5268	1.8176	2.9700e-003		0.0941	0.0941		0.0941	0.0941		281.4481	281.4481	0.0193		281.9309
Total	**6.3070**	**1.5268**	**1.8176**	**2.9700e-003**		**0.0941**	**0.0941**		**0.0941**	**0.0941**		**281.4481**	**281.4481**	**0.0193**		**281.9309**

3.5 Architectural Coating - 2021

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
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
Worker	0.0371	0.0244	0.3035	8.0000e-004	0.0766	5.1000e-004	0.0771	0.0203	4.7000e-004	0.0208		79.4465	79.4465	2.5100e-003		79.5093
Total	**0.0371**	**0.0244**	**0.3035**	**8.0000e-004**	**0.0766**	**5.1000e-004**	**0.0771**	**0.0203**	**4.7000e-004**	**0.0208**		**79.4465**	**79.4465**	**2.5100e-003**		**79.5093**

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	6.0881					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2189	1.5268	1.8176	2.9700e-003		0.0941	0.0941		0.0941	0.0941	0.0000	281.4481	281.4481	0.0193		281.9309
Total	**6.3070**	**1.5268**	**1.8176**	**2.9700e-003**		**0.0941**	**0.0941**		**0.0941**	**0.0941**	**0.0000**	**281.4481**	**281.4481**	**0.0193**		**281.9309**

3.5 Architectural Coating - 2021

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
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
Worker	0.0371	0.0244	0.3035	8.0000e-004	0.0766	5.1000e-004	0.0771	0.0203	4.7000e-004	0.0208		79.4465	79.4465	2.5100e-003		79.5093
Total	**0.0371**	**0.0244**	**0.3035**	**8.0000e-004**	**0.0766**	**5.1000e-004**	**0.0771**	**0.0203**	**4.7000e-004**	**0.0208**		**79.4465**	**79.4465**	**2.5100e-003**		**79.5093**

3.5 Architectural Coating - 2022

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	6.0881					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2045	1.4085	1.8136	2.9700e-003		0.0817	0.0817		0.0817	0.0817		281.4481	281.4481	0.0183		281.9062
Total	**6.2927**	**1.4085**	**1.8136**	**2.9700e-003**		**0.0817**	**0.0817**		**0.0817**	**0.0817**		**281.4481**	**281.4481**	**0.0183**		**281.9062**

3.5 Architectural Coating - 2022

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
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
Worker	0.0344	0.0217	0.2765	7.7000e-004	0.0766	4.9000e-004	0.0771	0.0203	4.5000e-004	0.0208		76.5654	76.5654	2.2200e-003		76.6209
Total	**0.0344**	**0.0217**	**0.2765**	**7.7000e-004**	**0.0766**	**4.9000e-004**	**0.0771**	**0.0203**	**4.5000e-004**	**0.0208**		**76.5654**	**76.5654**	**2.2200e-003**		**76.6209**

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	6.0881					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2045	1.4085	1.8136	2.9700e-003		0.0817	0.0817		0.0817	0.0817	0.0000	281.4481	281.4481	0.0183		281.9062
Total	**6.2927**	**1.4085**	**1.8136**	**2.9700e-003**		**0.0817**	**0.0817**		**0.0817**	**0.0817**	**0.0000**	**281.4481**	**281.4481**	**0.0183**		**281.9062**

3.5 Architectural Coating - 2022

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
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
Worker	0.0344	0.0217	0.2765	7.7000e-004	0.0766	4.9000e-004	0.0771	0.0203	4.5000e-004	0.0208		76.5654	76.5654	2.2200e-003		76.6209
Total	**0.0344**	**0.0217**	**0.2765**	**7.7000e-004**	**0.0766**	**4.9000e-004**	**0.0771**	**0.0203**	**4.5000e-004**	**0.0208**		**76.5654**	**76.5654**	**2.2200e-003**		**76.6209**

3.5 Architectural Coating - 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					
Archit. Coating	6.0881					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1917	1.3030	1.8111	2.9700e-003		0.0708	0.0708		0.0708	0.0708		281.4481	281.4481	0.0168		281.8690
Total	**6.2798**	**1.3030**	**1.8111**	**2.9700e-003**		**0.0708**	**0.0708**		**0.0708**	**0.0708**		**281.4481**	**281.4481**	**0.0168**		**281.8690**

3.5 Architectural Coating - 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
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
Worker	0.0321	0.0194	0.2531	7.4000e-004	0.0766	4.8000e-004	0.0771	0.0203	4.4000e-004	0.0208		73.6727	73.6727	1.9700e-003		73.7219
Total	**0.0321**	**0.0194**	**0.2531**	**7.4000e-004**	**0.0766**	**4.8000e-004**	**0.0771**	**0.0203**	**4.4000e-004**	**0.0208**		**73.6727**	**73.6727**	**1.9700e-003**		**73.7219**

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	6.0881					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1917	1.3030	1.8111	2.9700e-003		0.0708	0.0708		0.0708	0.0708	0.0000	281.4481	281.4481	0.0168		281.8690
Total	**6.2798**	**1.3030**	**1.8111**	**2.9700e-003**		**0.0708**	**0.0708**		**0.0708**	**0.0708**	**0.0000**	**281.4481**	**281.4481**	**0.0168**		**281.8690**

3.5 Architectural Coating - 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
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
Worker	0.0321	0.0194	0.2531	7.4000e-004	0.0766	4.8000e-004	0.0771	0.0203	4.4000e-004	0.0208		73.6727	73.6727	1.9700e-003		73.7219
Total	**0.0321**	**0.0194**	**0.2531**	**7.4000e-004**	**0.0766**	**4.8000e-004**	**0.0771**	**0.0203**	**4.4000e-004**	**0.0208**		**73.6727**	**73.6727**	**1.9700e-003**		**73.7219**

3.5 Architectural Coating - 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					
Archit. Coating	6.0881					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1808	1.2188	1.8101	2.9700e-003		0.0609	0.0609		0.0609	0.0609		281.4481	281.4481	0.0159		281.8443
Total	**6.2689**	**1.2188**	**1.8101**	**2.9700e-003**		**0.0609**	**0.0609**		**0.0609**	**0.0609**		**281.4481**	**281.4481**	**0.0159**		**281.8443**

3.5 Architectural Coating - 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
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
Worker	0.0301	0.0175	0.2335	7.1000e-004	0.0766	4.7000e-004	0.0771	0.0203	4.3000e-004	0.0208		70.8024	70.8024	1.7600e-003		70.8463
Total	**0.0301**	**0.0175**	**0.2335**	**7.1000e-004**	**0.0766**	**4.7000e-004**	**0.0771**	**0.0203**	**4.3000e-004**	**0.0208**		**70.8024**	**70.8024**	**1.7600e-003**		**70.8463**

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	6.0881					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1808	1.2188	1.8101	2.9700e-003		0.0609	0.0609		0.0609	0.0609	0.0000	281.4481	281.4481	0.0159		281.8443
Total	**6.2689**	**1.2188**	**1.8101**	**2.9700e-003**		**0.0609**	**0.0609**		**0.0609**	**0.0609**	**0.0000**	**281.4481**	**281.4481**	**0.0159**		**281.8443**

3.5 Architectural Coating - 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
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
Worker	0.0301	0.0175	0.2335	7.1000e-004	0.0766	4.7000e-004	0.0771	0.0203	4.3000e-004	0.0208		70.8024	70.8024	1.7600e-003		70.8463
Total	**0.0301**	**0.0175**	**0.2335**	**7.1000e-004**	**0.0766**	**4.7000e-004**	**0.0771**	**0.0203**	**4.3000e-004**	**0.0208**		**70.8024**	**70.8024**	**1.7600e-003**		**70.8463**

3.6 Paving - 2021

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	1.2556	12.9191	14.6532	0.0228		0.6777	0.6777		0.6235	0.6235		2,207.2109	2,207.2109	0.7139		2,225.0573
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.2556**	**12.9191**	**14.6532**	**0.0228**		**0.6777**	**0.6777**		**0.6235**	**0.6235**		**2,207.2109**	**2,207.2109**	**0.7139**		**2,225.0573**

3.6 Paving - 2021

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
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
Worker	0.0927	0.0610	0.7588	1.9900e-003	0.1916	1.2700e-003	0.1929	0.0508	1.1700e-003	0.0520		198.6163	198.6163	6.2800e-003		198.7732
Total	**0.0927**	**0.0610**	**0.7588**	**1.9900e-003**	**0.1916**	**1.2700e-003**	**0.1929**	**0.0508**	**1.1700e-003**	**0.0520**		**198.6163**	**198.6163**	**6.2800e-003**		**198.7732**

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	1.2556	12.9191	14.6532	0.0228		0.6777	0.6777		0.6235	0.6235	0.0000	2,207.2109	2,207.2109	0.7139		2,225.0573
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.2556**	**12.9191**	**14.6532**	**0.0228**		**0.6777**	**0.6777**		**0.6235**	**0.6235**	**0.0000**	**2,207.2109**	**2,207.2109**	**0.7139**		**2,225.0573**

3.6 Paving - 2021

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
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
Worker	0.0927	0.0610	0.7588	1.9900e-003	0.1916	1.2700e-003	0.1929	0.0508	1.1700e-003	0.0520		198.6163	198.6163	6.2800e-003		198.7732
Total	**0.0927**	**0.0610**	**0.7588**	**1.9900e-003**	**0.1916**	**1.2700e-003**	**0.1929**	**0.0508**	**1.1700e-003**	**0.0520**		**198.6163**	**198.6163**	**6.2800e-003**		**198.7732**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Improve Pedestrian Network

Provide Traffic Calming Measures

	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	3.5727	2.4584	20.7160	0.0282	2.7737	0.0248	2.7985	0.7376	0.0231	0.7607		2,799.8957	2,799.8957	0.3062		2,807.5500
Unmitigated	3.6424	2.5396	21.6378	0.0296	2.9197	0.0259	2.9455	0.7764	0.0241	0.8005		2,937.6893	2,937.6893	0.3201		2,945.6918

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Single Family Housing	755.20	755.20	755.20	1,391,439	1,321,867
Total	755.20	755.20	755.20	1,391,439	1,321,867

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
Single Family Housing	5.70	5.70	5.70	42.00	22.00	36.00	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Single Family Housing	0.567335	0.086340	0.235934	0.018000	0.007000	0.007000	0.007000	0.007000	0.001351	0.001296	0.058918	0.001311	0.001516

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Install High Efficiency Lighting

Percent of Electricity Use Generated with Renewable 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	0.0618	0.5281	0.2247	3.3700e-003		0.0427	0.0427		0.0427	0.0427		674.1722	674.1722	0.0129	0.0124	678.1785
NaturalGas Unmitigated	0.0618	0.5281	0.2247	3.3700e-003		0.0427	0.0427		0.0427	0.0427		674.1722	674.1722	0.0129	0.0124	678.1785

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					
Single Family Housing	5730.46	0.0618	0.5281	0.2247	3.3700e-003		0.0427	0.0427		0.0427	0.0427		674.1722	674.1722	0.0129	0.0124	678.1785
Total		**0.0618**	**0.5281**	**0.2247**	**3.3700e-003**		**0.0427**	**0.0427**		**0.0427**	**0.0427**		**674.1722**	**674.1722**	**0.0129**	**0.0124**	**678.1785**

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					
Single Family Housing	5.73046	0.0618	0.5281	0.2247	3.3700e-003		0.0427	0.0427		0.0427	0.0427		674.1722	674.1722	0.0129	0.0124	678.1785
Total		**0.0618**	**0.5281**	**0.2247**	**3.3700e-003**		**0.0427**	**0.0427**		**0.0427**	**0.0427**		**674.1722**	**674.1722**	**0.0129**	**0.0124**	**678.1785**

6.0 Area Detail

6.1 Mitigation Measures Area

Windsor 3 Subdivision - Shasta County AQMD Air District, Summer

Use Low VOC Paint - Residential Interior

Use Low VOC Paint - Residential Exterior

	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	126.9459	2.4670	157.7258	0.2742		21.2262	21.2262		21.2262	21.2262	2,221.7385	943.6489	3,165.3874	2.0617	0.1748	3,269.0073
Unmitigated	126.9459	2.4670	157.7258	0.2742		21.2262	21.2262		21.2262	21.2262	2,221.7385	943.6489	3,165.3874	2.0617	0.1748	3,269.0073

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	1.2343					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	3.0816					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	122.4316	2.3910	151.1285	0.2738		21.1897	21.1897		21.1897	21.1897	2,221.7385	931.7647	3,153.5032	2.0503	0.1748	3,256.8380
Landscaping	0.1984	0.0760	6.5973	3.5000e-004		0.0366	0.0366		0.0366	0.0366		11.8842	11.8842	0.0114		12.1693
Total	**126.9459**	**2.4670**	**157.7258**	**0.2742**		**21.2262**	**21.2262**		**21.2262**	**21.2262**	**2,221.7385**	**943.6489**	**3,165.3873**	**2.0617**	**0.1748**	**3,269.0073**

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	1.2343					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	3.0816					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	122.4316	2.3910	151.1285	0.2738		21.1897	21.1897		21.1897	21.1897	2,221.7385	931.7647	3,153.5032	2.0503	0.1748	3,256.8380
Landscaping	0.1984	0.0760	6.5973	3.5000e-004		0.0366	0.0366		0.0366	0.0366		11.8842	11.8842	0.0114		12.1693
Total	**126.9459**	**2.4670**	**157.7258**	**0.2742**		**21.2262**	**21.2262**		**21.2262**	**21.2262**	**2,221.7385**	**943.6489**	**3,165.3873**	**2.0617**	**0.1748**	**3,269.0073**

7.0 Water Detail

7.1 Mitigation Measures Water

Install Low Flow Bathroom Faucet

Install Low Flow Kitchen Faucet

Install Low Flow Toilet

Install Low Flow Shower

Use Water Efficient Irrigation System

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

Windsor 3 Subdivision

Shasta County AQMD Air District, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	80.00	Dwelling Unit	35.00	144,000.00	205

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	82
Climate Zone	3			**Operational Year**	2024
Utility Company					
CO2 Intensity (lb/MWhr)	496.5	**CH4 Intensity (lb/MWhr)**	0.034	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CO2, CH4, and N2O emissions factors per U.S. EPA Power Profiler, Emissions and Generation Resource Integrated Database (eGRID), data released January 2020.

Land Use - Population based on California Department of Finance Population and Housing Estimates, January 2020; 2.56 persons per household. Assumes an average dwelling unit size of 1,800 square feet.

Construction Phase - Road paving would occur prior to commencement of home construction. Architectural coatings associated primarily with housing construction and would overlap the Building Construction phase.

On-road Fugitive Dust - Vehicle speed limited to 15 mph in unpaved areas during construction.

Vehicle Trips - Trip generation and trip length per W-Trans Traffic Impact Study for the Windsor Estates 3 Project, 2020.

Fleet Mix - Fleet mix assumes 0.7% heavy-duty trucks and 1.8% medium-duty trucks for this project.

Energy Use -

Land Use Change -

Sequestration - Sequestration - Conservation estimate based on City's tree planting requirements and mitigation measure for tree replacement.

Construction Off-road Equipment Mitigation - Construction mitigation pursuant to mitigation measures.

Mobile Land Use Mitigation -

Area Mitigation -

Energy Mitigation - Pursuant to Initial Study prepared for 2019 update to the California Energy Efficiency Standards.

Water Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstructionPhase	NumDays	55.00	740.00
tblConstructionPhase	PhaseEndDate	6/7/2024	6/28/2024
tblConstructionPhase	PhaseEndDate	1/5/2024	3/22/2024
tblConstructionPhase	PhaseEndDate	3/22/2024	5/21/2021
tblConstructionPhase	PhaseStartDate	3/23/2024	8/30/2021
tblConstructionPhase	PhaseStartDate	3/6/2021	5/24/2021
tblConstructionPhase	PhaseStartDate	1/6/2024	3/8/2021
tblFleetMix	HHD	0.10	7.0000e-003
tblFleetMix	LDA	0.54	0.57

tblFleetMix	LDT1	0.03	0.09
tblFleetMix	LDT2	0.18	0.24
tblFleetMix	LHD1	0.03	7.0000e-003
tblFleetMix	LHD2	5.6830e-003	7.0000e-003
tblFleetMix	MCY	5.2540e-003	0.06
tblFleetMix	MDV	0.10	0.02
tblFleetMix	MH	1.1330e-003	1.5160e-003
tblFleetMix	MHD	0.01	7.0000e-003
tblFleetMix	OBUS	1.3120e-003	1.3510e-003
tblFleetMix	SBUS	1.2600e-003	1.3110e-003
tblFleetMix	UBUS	1.1720e-003	1.2960e-003
tblLandUse	LotAcreage	25.97	35.00
tblLandUse	Population	229.00	205.00
tblOnRoadDust	MeanVehicleSpeed	40.00	15.00
tblOnRoadDust	MeanVehicleSpeed	40.00	15.00
tblProjectCharacteristics	CH4IntensityFactor	0	0.034
tblProjectCharacteristics	CO2IntensityFactor	0	496.5
tblProjectCharacteristics	N2OIntensityFactor	0	0.004
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblSequestration	NumberOfNewTrees	0.00	375.00
tblVehicleTrips	HO_TL	7.90	5.70
tblVehicleTrips	HO_TTP	37.80	36.00
tblVehicleTrips	HS_TL	7.10	5.70
tblVehicleTrips	HS_TTP	21.20	22.00
tblVehicleTrips	HW_TL	16.80	5.70
tblVehicleTrips	ST_TR	9.91	9.44
tblVehicleTrips	SU_TR	8.62	9.44

tblVehicleTrips	WD_TR	9.52	9.44

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					
2020	0.1289	1.3669	0.8116	1.5400e-003	0.4645	0.0645	0.5291	0.2095	0.0594	0.2689	0.0000	135.3872	135.3872	0.0420	0.0000	136.4367
2021	0.5878	2.9782	2.6803	4.9400e-003	0.2842	0.1457	0.4300	0.0993	0.1360	0.2353	0.0000	432.6582	432.6582	0.1065	0.0000	435.3211
2022	1.0662	2.3496	2.5582	4.7200e-003	0.0622	0.1165	0.1787	0.0167	0.1102	0.1269	0.0000	410.9456	410.9456	0.0781	0.0000	412.8969
2023	1.0448	2.1521	2.5239	4.7000e-003	0.0622	0.1007	0.1628	0.0167	0.0953	0.1120	0.0000	408.7726	408.7726	0.0765	0.0000	410.6859
2024	0.4577	0.5084	0.6469	1.2000e-003	0.0169	0.0225	0.0394	4.5400e-003	0.0214	0.0259	0.0000	104.8343	104.8343	0.0181	0.0000	105.2858
Maximum	**1.0662**	**2.9782**	**2.6803**	**4.9400e-003**	**0.4645**	**0.1457**	**0.5291**	**0.2095**	**0.1360**	**0.2689**	**0.0000**	**432.6582**	**432.6582**	**0.1065**	**0.0000**	**435.3211**

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					
2020	0.1289	1.3669	0.8116	1.5400e-003	0.2128	0.0645	0.2773	0.0953	0.0594	0.1546	0.0000	135.3871	135.3871	0.0420	0.0000	136.4365
2021	0.5878	2.9782	2.6803	4.9400e-003	0.1534	0.1457	0.2991	0.0515	0.1360	0.1875	0.0000	432.6577	432.6577	0.1065	0.0000	435.3206
2022	1.0662	2.3496	2.5582	4.7200e-003	0.0622	0.1165	0.1787	0.0167	0.1102	0.1269	0.0000	410.9452	410.9452	0.0781	0.0000	412.8965
2023	1.0448	2.1521	2.5239	4.7000e-003	0.0622	0.1007	0.1628	0.0167	0.0953	0.1120	0.0000	408.7722	408.7722	0.0765	0.0000	410.6855
2024	0.4577	0.5084	0.6469	1.2000e-003	0.0169	0.0225	0.0394	4.5400e-003	0.0214	0.0259	0.0000	104.8342	104.8342	0.0181	0.0000	105.2857
Maximum	**1.0662**	**2.9782**	**2.6803**	**4.9400e-003**	**0.2128**	**0.1457**	**0.2991**	**0.0953**	**0.1360**	**0.1875**	**0.0000**	**432.6577**	**432.6577**	**0.1065**	**0.0000**	**435.3206**

	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**	**42.99**	**0.00**	**28.55**	**46.72**	**0.00**	**21.07**	**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	8-3-2020	11-2-2020	0.4003	0.4003
2	11-3-2020	2-2-2021	1.7026	1.7026
3	2-3-2021	5-2-2021	0.8491	0.8491
4	5-3-2021	8-2-2021	0.6199	0.6199
5	8-3-2021	11-2-2021	0.8609	0.8609
6	11-3-2021	2-2-2022	0.9113	0.9113

7	**2-3-2022**	**5-2-2022**	0.8358	0.8358
8	**5-3-2022**	**8-2-2022**	0.8635	0.8635
9	**8-3-2022**	**11-2-2022**	0.8638	0.8638
10	**11-3-2022**	**2-2-2023**	0.8444	0.8444
11	**2-3-2023**	**5-2-2023**	0.7823	0.7823
12	**5-3-2023**	**8-2-2023**	0.8083	0.8083
13	**8-3-2023**	**11-2-2023**	0.8085	0.8085
14	**11-3-2023**	**2-2-2024**	0.7950	0.7950
15	**2-3-2024**	**5-2-2024**	0.5206	0.5206
16	**5-3-2024**	**8-2-2024**	0.1534	0.1534
		Highest	1.7026	1.7026

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	5.8252	0.1049	6.7900	0.0113		0.8721	0.8721		0.8721	0.8721	82.6366	35.6269	118.2635	0.0772	6.5000e-003	122.1303
Energy	0.0113	0.0964	0.0410	6.2000e-004		7.7900e-003	7.7900e-003		7.7900e-003	7.7900e-003	0.0000	269.4563	269.4563	0.0130	3.3200e-003	270.7687
Mobile	0.5014	0.4930	3.7178	4.9100e-003	0.5056	4.7000e-003	0.5103	0.1350	4.3800e-003	0.1394	0.0000	442.3496	442.3496	0.0535	0.0000	443.6874
Waste						0.0000	0.0000		0.0000	0.0000	10.4033	0.0000	10.4033	0.6148	0.0000	25.7737
Water						0.0000	0.0000		0.0000	0.0000	1.6536	8.9419	10.5955	0.1705	4.0800e-003	16.0735
Total	**6.3379**	**0.6942**	**10.5489**	**0.0168**	**0.5056**	**0.8846**	**1.3901**	**0.1350**	**0.8842**	**1.0192**	**94.6935**	**756.3747**	**851.0682**	**0.9289**	**0.0139**	**878.4336**

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	5.8252	0.1049	6.7900	0.0113		0.8721	0.8721		0.8721	0.8721	82.6366	35.6269	118.2635	0.0772	6.5000e-003	122.1303
Energy	0.0113	0.0964	0.0410	6.2000e-004		7.7900e-003	7.7900e-003		7.7900e-003	7.7900e-003	0.0000	183.6216	183.6216	7.0700e-003	2.6300e-003	184.5810
Mobile	0.4885	0.4767	3.5668	4.6800e-003	0.4803	4.5100e-003	0.4848	0.1282	4.1900e-003	0.1324	0.0000	421.6940	421.6940	0.0512	0.0000	422.9749
Waste						0.0000	0.0000		0.0000	0.0000	10.4033	0.0000	10.4033	0.6148	0.0000	25.7737
Water						0.0000	0.0000		0.0000	0.0000	1.3229	7.5136	8.8365	0.1364	3.2700e-003	13.2203
Total	**6.3250**	**0.6780**	**10.3979**	**0.0166**	**0.4803**	**0.8844**	**1.3646**	**0.1282**	**0.8841**	**1.0123**	**94.3628**	**648.4560**	**742.8189**	**0.8867**	**0.0124**	**768.6802**

	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	**0.20**	**2.34**	**1.43**	**1.37**	**5.00**	**0.02**	**1.83**	**5.00**	**0.02**	**0.68**	**0.35**	**14.27**	**12.72**	**4.55**	**10.79**	**12.49**

2.3 Vegetation

Vegetation

	CO2e
Category	MT
New Trees	265.5000
Vegetation Land Change	-500.5000
Total	**-235.0000**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	10/10/2020	11/20/2020	5	30	
2	Grading	Grading	11/21/2020	3/5/2021	5	75	
3	Building Construction	Building Construction	5/24/2021	3/22/2024	5	740	
4	Architectural Coating	Architectural Coating	8/30/2021	6/28/2024	5	740	
5	Paving	Paving	3/8/2021	5/21/2021	5	55	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 187.5

Acres of Paving: 0

Residential Indoor: 291,600; Residential Outdoor: 97,200; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (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
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Grading	Excavators	2	8.00	158	0.38
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Building Construction	Generator Sets	1	8.00	84	0.74
Paving	Pavers	2	8.00	130	0.42
Paving	Rollers	2	8.00	80	0.38
Grading	Graders	1	8.00	187	0.41
Paving	Paving Equipment	2	8.00	132	0.36
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Grading	Scrapers	2	8.00	367	0.48
Building Construction	Welders	1	8.00	46	0.45

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
Site Preparation	7	18.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	20.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	29.00	9.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	6.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Soil Stabilizer

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Site Preparation - 2020

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					0.2710	0.0000	0.2710	0.1490	0.0000	0.1490	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0612	0.6363	0.3227	5.7000e-004		0.0330	0.0330		0.0303	0.0303	0.0000	50.1460	50.1460	0.0162	0.0000	50.5515
Total	**0.0612**	**0.6363**	**0.3227**	**5.7000e-004**	**0.2710**	**0.0330**	**0.3040**	**0.1490**	**0.0303**	**0.1793**	**0.0000**	**50.1460**	**50.1460**	**0.0162**	**0.0000**	**50.5515**

3.2 Site Preparation - 2020

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	1.5600e-003	1.3300e-003	0.0123	3.0000e-005	3.2800e-003	2.0000e-005	3.3000e-003	8.7000e-004	2.0000e-005	8.9000e-004	0.0000	3.0081	3.0081	1.0000e-004	0.0000	3.0106
Total	**1.5600e-003**	**1.3300e-003**	**0.0123**	**3.0000e-005**	**3.2800e-003**	**2.0000e-005**	**3.3000e-003**	**8.7000e-004**	**2.0000e-005**	**8.9000e-004**	**0.0000**	**3.0081**	**3.0081**	**1.0000e-004**	**0.0000**	**3.0106**

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					0.1220	0.0000	0.1220	0.0670	0.0000	0.0670	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0612	0.6363	0.3227	5.7000e-004		0.0330	0.0330		0.0303	0.0303	0.0000	50.1460	50.1460	0.0162	0.0000	50.5514
Total	**0.0612**	**0.6363**	**0.3227**	**5.7000e-004**	**0.1220**	**0.0330**	**0.1549**	**0.0670**	**0.0303**	**0.0974**	**0.0000**	**50.1460**	**50.1460**	**0.0162**	**0.0000**	**50.5514**

3.2 Site Preparation - 2020

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	1.5600e-003	1.3300e-003	0.0123	3.0000e-005	3.2800e-003	2.0000e-005	3.3000e-003	8.7000e-004	2.0000e-005	8.9000e-004	0.0000	3.0081	3.0081	1.0000e-004	0.0000	3.0106
Total	**1.5600e-003**	**1.3300e-003**	**0.0123**	**3.0000e-005**	**3.2800e-003**	**2.0000e-005**	**3.3000e-003**	**8.7000e-004**	**2.0000e-005**	**8.9000e-004**	**0.0000**	**3.0081**	**3.0081**	**1.0000e-004**	**0.0000**	**3.0106**

3.3 Grading - 2020

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					0.1867	0.0000	0.1867	0.0587	0.0000	0.0587	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0645	0.7279	0.4634	9.0000e-004		0.0315	0.0315		0.0290	0.0290	0.0000	79.0022	79.0022	0.0256	0.0000	79.6410
Total	**0.0645**	**0.7279**	**0.4634**	**9.0000e-004**	**0.1867**	**0.0315**	**0.2183**	**0.0587**	**0.0290**	**0.0877**	**0.0000**	**79.0022**	**79.0022**	**0.0256**	**0.0000**	**79.6410**

3.3 Grading - 2020

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	1.6700e-003	1.4300e-003	0.0132	4.0000e-005	3.5200e-003	3.0000e-005	3.5500e-003	9.4000e-004	2.0000e-005	9.6000e-004	0.0000	3.2309	3.2309	1.1000e-004	0.0000	3.2336
Total	**1.6700e-003**	**1.4300e-003**	**0.0132**	**4.0000e-005**	**3.5200e-003**	**3.0000e-005**	**3.5500e-003**	**9.4000e-004**	**2.0000e-005**	**9.6000e-004**	**0.0000**	**3.2309**	**3.2309**	**1.1000e-004**	**0.0000**	**3.2336**

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					0.0840	0.0000	0.0840	0.0264	0.0000	0.0264	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0645	0.7279	0.4634	9.0000e-004		0.0315	0.0315		0.0290	0.0290	0.0000	79.0021	79.0021	0.0256	0.0000	79.6409
Total	**0.0645**	**0.7279**	**0.4634**	**9.0000e-004**	**0.0840**	**0.0315**	**0.1156**	**0.0264**	**0.0290**	**0.0554**	**0.0000**	**79.0021**	**79.0021**	**0.0256**	**0.0000**	**79.6409**

3.3 Grading - 2020

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	1.6700e-003	1.4300e-003	0.0132	4.0000e-005	3.5200e-003	3.0000e-005	3.5500e-003	9.4000e-004	2.0000e-005	9.6000e-004	0.0000	3.2309	3.2309	1.1000e-004	0.0000	3.2336
Total	**1.6700e-003**	**1.4300e-003**	**0.0132**	**4.0000e-005**	**3.5200e-003**	**3.0000e-005**	**3.5500e-003**	**9.4000e-004**	**2.0000e-005**	**9.6000e-004**	**0.0000**	**3.2309**	**3.2309**	**1.1000e-004**	**0.0000**	**3.2336**

3.3 Grading - 2021

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					0.2379	0.0000	0.2379	0.0869	0.0000	0.0869	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0964	1.0672	0.7102	1.4300e-003		0.0457	0.0457		0.0420	0.0420	0.0000	125.3385	125.3385	0.0405	0.0000	126.3519
Total	**0.0964**	**1.0672**	**0.7102**	**1.4300e-003**	**0.2379**	**0.0457**	**0.2836**	**0.0869**	**0.0420**	**0.1289**	**0.0000**	**125.3385**	**125.3385**	**0.0405**	**0.0000**	**126.3519**

3.3 Grading - 2021

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	2.4500e-003	2.0100e-003	0.0190	5.0000e-005	5.5900e-003	4.0000e-005	5.6300e-003	1.4900e-003	4.0000e-005	1.5200e-003	0.0000	4.9471	4.9471	1.5000e-004	0.0000	4.9509
Total	**2.4500e-003**	**2.0100e-003**	**0.0190**	**5.0000e-005**	**5.5900e-003**	**4.0000e-005**	**5.6300e-003**	**1.4900e-003**	**4.0000e-005**	**1.5200e-003**	**0.0000**	**4.9471**	**4.9471**	**1.5000e-004**	**0.0000**	**4.9509**

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					0.1071	0.0000	0.1071	0.0391	0.0000	0.0391	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0964	1.0672	0.7102	1.4300e-003		0.0457	0.0457		0.0420	0.0420	0.0000	125.3383	125.3383	0.0405	0.0000	126.3517
Total	**0.0964**	**1.0672**	**0.7102**	**1.4300e-003**	**0.1071**	**0.0457**	**0.1527**	**0.0391**	**0.0420**	**0.0811**	**0.0000**	**125.3383**	**125.3383**	**0.0405**	**0.0000**	**126.3517**

3.3 Grading - 2021

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	2.4500e-003	2.0100e-003	0.0190	5.0000e-005	5.5900e-003	4.0000e-005	5.6300e-003	1.4900e-003	4.0000e-005	1.5200e-003	0.0000	4.9471	4.9471	1.5000e-004	0.0000	4.9509
Total	**2.4500e-003**	**2.0100e-003**	**0.0190**	**5.0000e-005**	**5.5900e-003**	**4.0000e-005**	**5.6300e-003**	**1.4900e-003**	**4.0000e-005**	**1.5200e-003**	**0.0000**	**4.9471**	**4.9471**	**1.5000e-004**	**0.0000**	**4.9509**

3.4 Building Construction - 2021

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	0.1521	1.3946	1.3260	2.1500e-003		0.0767	0.0767		0.0721	0.0721	0.0000	185.3098	185.3098	0.0447	0.0000	186.4275
Total	**0.1521**	**1.3946**	**1.3260**	**2.1500e-003**		**0.0767**	**0.0767**		**0.0721**	**0.0721**	**0.0000**	**185.3098**	**185.3098**	**0.0447**	**0.0000**	**186.4275**

3.4 Building Construction - 2021

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	2.4800e-003	0.0773	0.0165	1.9000e-004	4.2400e-003	2.3000e-004	4.4600e-003	1.2300e-003	2.2000e-004	1.4500e-003	0.0000	18.2181	18.2181	1.5400e-003	0.0000	18.2566
Worker	0.0124	0.0101	0.0957	2.8000e-004	0.0282	2.0000e-004	0.0284	7.5000e-003	1.8000e-004	7.6800e-003	0.0000	24.9505	24.9505	7.6000e-004	0.0000	24.9695
Total	**0.0149**	**0.0874**	**0.1122**	**4.7000e-004**	**0.0324**	**4.3000e-004**	**0.0328**	**8.7300e-003**	**4.0000e-004**	**9.1300e-003**	**0.0000**	**43.1686**	**43.1686**	**2.3000e-003**	**0.0000**	**43.2261**

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	0.1521	1.3946	1.3260	2.1500e-003		0.0767	0.0767		0.0721	0.0721	0.0000	185.3096	185.3096	0.0447	0.0000	186.4273
Total	**0.1521**	**1.3946**	**1.3260**	**2.1500e-003**		**0.0767**	**0.0767**		**0.0721**	**0.0721**	**0.0000**	**185.3096**	**185.3096**	**0.0447**	**0.0000**	**186.4273**

3.4 Building Construction - 2021

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	2.4800e-003	0.0773	0.0165	1.9000e-004	4.2400e-003	2.3000e-004	4.4600e-003	1.2300e-003	2.2000e-004	1.4500e-003	0.0000	18.2181	18.2181	1.5400e-003	0.0000	18.2566
Worker	0.0124	0.0101	0.0957	2.8000e-004	0.0282	2.0000e-004	0.0284	7.5000e-003	1.8000e-004	7.6800e-003	0.0000	24.9505	24.9505	7.6000e-004	0.0000	24.9695
Total	**0.0149**	**0.0874**	**0.1122**	**4.7000e-004**	**0.0324**	**4.3000e-004**	**0.0328**	**8.7300e-003**	**4.0000e-004**	**9.1300e-003**	**0.0000**	**43.1686**	**43.1686**	**2.3000e-003**	**0.0000**	**43.2261**

3.4 Building Construction - 2022

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	0.2218	2.0300	2.1272	3.5000e-003		0.1052	0.1052		0.0990	0.0990	0.0000	301.2428	301.2428	0.0722	0.0000	303.0471
Total	**0.2218**	**2.0300**	**2.1272**	**3.5000e-003**		**0.1052**	**0.1052**		**0.0990**	**0.0990**	**0.0000**	**301.2428**	**301.2428**	**0.0722**	**0.0000**	**303.0471**

3.4 Building Construction - 2022

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	3.7500e-003	0.1188	0.0248	3.1000e-004	6.8900e-003	3.2000e-004	7.2100e-003	2.0000e-003	3.1000e-004	2.3000e-003	0.0000	29.3500	29.3500	2.4000e-003	0.0000	29.4099
Worker	0.0187	0.0146	0.1412	4.3000e-004	0.0458	3.1000e-004	0.0461	0.0122	2.8000e-004	0.0125	0.0000	39.0759	39.0759	1.0900e-003	0.0000	39.1032
Total	**0.0225**	**0.1335**	**0.1660**	**7.4000e-004**	**0.0527**	**6.3000e-004**	**0.0533**	**0.0142**	**5.9000e-004**	**0.0148**	**0.0000**	**68.4258**	**68.4258**	**3.4900e-003**	**0.0000**	**68.5132**

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	0.2218	2.0300	2.1272	3.5000e-003		0.1052	0.1052		0.0990	0.0990	0.0000	301.2425	301.2425	0.0722	0.0000	303.0467
Total	**0.2218**	**2.0300**	**2.1272**	**3.5000e-003**		**0.1052**	**0.1052**		**0.0990**	**0.0990**	**0.0000**	**301.2425**	**301.2425**	**0.0722**	**0.0000**	**303.0467**

3.4 Building Construction - 2022

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	3.7500e-003	0.1188	0.0248	3.1000e-004	6.8900e-003	3.2000e-004	7.2100e-003	2.0000e-003	3.1000e-004	2.3000e-003	0.0000	29.3500	29.3500	2.4000e-003	0.0000	29.4099
Worker	0.0187	0.0146	0.1412	4.3000e-004	0.0458	3.1000e-004	0.0461	0.0122	2.8000e-004	0.0125	0.0000	39.0759	39.0759	1.0900e-003	0.0000	39.1032
Total	**0.0225**	**0.1335**	**0.1660**	**7.4000e-004**	**0.0527**	**6.3000e-004**	**0.0533**	**0.0142**	**5.9000e-004**	**0.0148**	**0.0000**	**68.4258**	**68.4258**	**3.4900e-003**	**0.0000**	**68.5132**

3.4 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	0.2045	1.8700	2.1117	3.5000e-003		0.0910	0.0910		0.0856	0.0856	0.0000	301.3462	301.3462	0.0717	0.0000	303.1383
Total	**0.2045**	**1.8700**	**2.1117**	**3.5000e-003**		**0.0910**	**0.0910**		**0.0856**	**0.0856**	**0.0000**	**301.3462**	**301.3462**	**0.0717**	**0.0000**	**303.1383**

3.4 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	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	2.8200e-003	0.0969	0.0211	3.0000e-004	6.8900e-003	1.3000e-004	7.0100e-003	2.0000e-003	1.2000e-004	2.1200e-003	0.0000	28.8528	28.8528	1.6900e-003	0.0000	28.8950
Worker	0.0175	0.0131	0.1290	4.2000e-004	0.0458	3.0000e-004	0.0461	0.0122	2.8000e-004	0.0125	0.0000	37.6017	37.6017	9.7000e-004	0.0000	37.6260
Total	**0.0203**	**0.1100**	**0.1500**	**7.2000e-004**	**0.0527**	**4.3000e-004**	**0.0531**	**0.0142**	**4.0000e-004**	**0.0146**	**0.0000**	**66.4545**	**66.4545**	**2.6600e-003**	**0.0000**	**66.5210**

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	0.2045	1.8700	2.1117	3.5000e-003		0.0910	0.0910		0.0856	0.0856	0.0000	301.3458	301.3458	0.0717	0.0000	303.1380
Total	**0.2045**	**1.8700**	**2.1117**	**3.5000e-003**		**0.0910**	**0.0910**		**0.0856**	**0.0856**	**0.0000**	**301.3458**	**301.3458**	**0.0717**	**0.0000**	**303.1380**

3.4 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	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	2.8200e-003	0.0969	0.0211	3.0000e-004	6.8900e-003	1.3000e-004	7.0100e-003	2.0000e-003	1.2000e-004	2.1200e-003	0.0000	28.8528	28.8528	1.6900e-003	0.0000	28.8950
Worker	0.0175	0.0131	0.1290	4.2000e-004	0.0458	3.0000e-004	0.0461	0.0122	2.8000e-004	0.0125	0.0000	37.6017	37.6017	9.7000e-004	0.0000	37.6260
Total	**0.0203**	**0.1100**	**0.1500**	**7.2000e-004**	**0.0527**	**4.3000e-004**	**0.0531**	**0.0142**	**4.0000e-004**	**0.0146**	**0.0000**	**66.4545**	**66.4545**	**2.6600e-003**	**0.0000**	**66.5210**

3.4 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	0.0442	0.4033	0.4850	8.1000e-004		0.0184	0.0184		0.0173	0.0173	0.0000	69.5547	69.5547	0.0165	0.0000	69.9659
Total	**0.0442**	**0.4033**	**0.4850**	**8.1000e-004**		**0.0184**	**0.0184**		**0.0173**	**0.0173**	**0.0000**	**69.5547**	**69.5547**	**0.0165**	**0.0000**	**69.9659**

3.4 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	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	6.2000e-004	0.0219	4.5600e-003	7.0000e-005	1.5900e-003	3.0000e-005	1.6200e-003	4.6000e-004	3.0000e-005	4.9000e-004	0.0000	6.6052	6.6052	3.9000e-004	0.0000	6.6149
Worker	3.7900e-003	2.7100e-003	0.0274	9.0000e-005	0.0106	7.0000e-005	0.0106	2.8100e-003	6.0000e-005	2.8800e-003	0.0000	8.3398	8.3398	2.0000e-004	0.0000	8.3448
Total	**4.4100e-003**	**0.0246**	**0.0320**	**1.6000e-004**	**0.0122**	**1.0000e-004**	**0.0123**	**3.2700e-003**	**9.0000e-005**	**3.3700e-003**	**0.0000**	**14.9449**	**14.9449**	**5.9000e-004**	**0.0000**	**14.9596**

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	0.0442	0.4033	0.4850	8.1000e-004		0.0184	0.0184		0.0173	0.0173	0.0000	69.5547	69.5547	0.0165	0.0000	69.9658
Total	**0.0442**	**0.4033**	**0.4850**	**8.1000e-004**		**0.0184**	**0.0184**		**0.0173**	**0.0173**	**0.0000**	**69.5547**	**69.5547**	**0.0165**	**0.0000**	**69.9658**

3.4 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	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	6.2000e-004	0.0219	4.5600e-003	7.0000e-005	1.5900e-003	3.0000e-005	1.6200e-003	4.6000e-004	3.0000e-005	4.9000e-004	0.0000	6.6052	6.6052	3.9000e-004	0.0000	6.6149
Worker	3.7900e-003	2.7100e-003	0.0274	9.0000e-005	0.0106	7.0000e-005	0.0106	2.8100e-003	6.0000e-005	2.8800e-003	0.0000	8.3398	8.3398	2.0000e-004	0.0000	8.3448
Total	**4.4100e-003**	**0.0246**	**0.0320**	**1.6000e-004**	**0.0122**	**1.0000e-004**	**0.0123**	**3.2700e-003**	**9.0000e-005**	**3.3700e-003**	**0.0000**	**14.9449**	**14.9449**	**5.9000e-004**	**0.0000**	**14.9596**

3.5 Architectural Coating - 2021

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	0.2740					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	9.8500e-003	0.0687	0.0818	1.3000e-004		4.2300e-003	4.2300e-003		4.2300e-003	4.2300e-003	0.0000	11.4896	11.4896	7.9000e-004	0.0000	11.5094
Total	**0.2838**	**0.0687**	**0.0818**	**1.3000e-004**		**4.2300e-003**	**4.2300e-003**		**4.2300e-003**	**4.2300e-003**	**0.0000**	**11.4896**	**11.4896**	**7.9000e-004**	**0.0000**	**11.5094**

3.5 Architectural Coating - 2021

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	1.4400e-003	1.1800e-003	0.0111	3.0000e-005	3.2800e-003	2.0000e-005	3.3000e-003	8.7000e-004	2.0000e-005	8.9000e-004	0.0000	2.9037	2.9037	9.0000e-005	0.0000	2.9059
Total	**1.4400e-003**	**1.1800e-003**	**0.0111**	**3.0000e-005**	**3.2800e-003**	**2.0000e-005**	**3.3000e-003**	**8.7000e-004**	**2.0000e-005**	**8.9000e-004**	**0.0000**	**2.9037**	**2.9037**	**9.0000e-005**	**0.0000**	**2.9059**

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	0.2740					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	9.8500e-003	0.0687	0.0818	1.3000e-004		4.2300e-003	4.2300e-003		4.2300e-003	4.2300e-003	0.0000	11.4896	11.4896	7.9000e-004	0.0000	11.5093
Total	**0.2838**	**0.0687**	**0.0818**	**1.3000e-004**		**4.2300e-003**	**4.2300e-003**		**4.2300e-003**	**4.2300e-003**	**0.0000**	**11.4896**	**11.4896**	**7.9000e-004**	**0.0000**	**11.5093**

3.5 Architectural Coating - 2021

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	1.4400e-003	1.1800e-003	0.0111	3.0000e-005	3.2800e-003	2.0000e-005	3.3000e-003	8.7000e-004	2.0000e-005	8.9000e-004	0.0000	2.9037	2.9037	9.0000e-005	0.0000	2.9059
Total	**1.4400e-003**	**1.1800e-003**	**0.0111**	**3.0000e-005**	**3.2800e-003**	**2.0000e-005**	**3.3000e-003**	**8.7000e-004**	**2.0000e-005**	**8.9000e-004**	**0.0000**	**2.9037**	**2.9037**	**9.0000e-005**	**0.0000**	**2.9059**

3.5 Architectural Coating - 2022

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	0.7915					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0266	0.1831	0.2358	3.9000e-004		0.0106	0.0106		0.0106	0.0106	0.0000	33.1923	33.1923	2.1600e-003	0.0000	33.2463
Total	**0.8181**	**0.1831**	**0.2358**	**3.9000e-004**		**0.0106**	**0.0106**		**0.0106**	**0.0106**	**0.0000**	**33.1923**	**33.1923**	**2.1600e-003**	**0.0000**	**33.2463**

3.5 Architectural Coating - 2022

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	3.8700e-003	3.0300e-003	0.0292	9.0000e-005	9.4800e-003	6.0000e-005	9.5400e-003	2.5200e-003	6.0000e-005	2.5800e-003	0.0000	8.0847	8.0847	2.3000e-004	0.0000	8.0903
Total	**3.8700e-003**	**3.0300e-003**	**0.0292**	**9.0000e-005**	**9.4800e-003**	**6.0000e-005**	**9.5400e-003**	**2.5200e-003**	**6.0000e-005**	**2.5800e-003**	**0.0000**	**8.0847**	**8.0847**	**2.3000e-004**	**0.0000**	**8.0903**

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	0.7915					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0266	0.1831	0.2358	3.9000e-004		0.0106	0.0106		0.0106	0.0106	0.0000	33.1923	33.1923	2.1600e-003	0.0000	33.2463
Total	**0.8181**	**0.1831**	**0.2358**	**3.9000e-004**		**0.0106**	**0.0106**		**0.0106**	**0.0106**	**0.0000**	**33.1923**	**33.1923**	**2.1600e-003**	**0.0000**	**33.2463**

3.5 Architectural Coating - 2022

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	3.8700e-003	3.0300e-003	0.0292	9.0000e-005	9.4800e-003	6.0000e-005	9.5400e-003	2.5200e-003	6.0000e-005	2.5800e-003	0.0000	8.0847	8.0847	2.3000e-004	0.0000	8.0903
Total	**3.8700e-003**	**3.0300e-003**	**0.0292**	**9.0000e-005**	**9.4800e-003**	**6.0000e-005**	**9.5400e-003**	**2.5200e-003**	**6.0000e-005**	**2.5800e-003**	**0.0000**	**8.0847**	**8.0847**	**2.3000e-004**	**0.0000**	**8.0903**

3.5 Architectural Coating - 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					
Archit. Coating	0.7915					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0249	0.1694	0.2355	3.9000e-004		9.2100e-003	9.2100e-003		9.2100e-003	9.2100e-003	0.0000	33.1923	33.1923	1.9900e-003	0.0000	33.2419
Total	**0.8164**	**0.1694**	**0.2355**	**3.9000e-004**		**9.2100e-003**	**9.2100e-003**		**9.2100e-003**	**9.2100e-003**	**0.0000**	**33.1923**	**33.1923**	**1.9900e-003**	**0.0000**	**33.2419**

3.5 Architectural Coating - 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	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	3.6200e-003	2.7100e-003	0.0267	9.0000e-005	9.4800e-003	6.0000e-005	9.5400e-003	2.5200e-003	6.0000e-005	2.5800e-003	0.0000	7.7797	7.7797	2.0000e-004	0.0000	7.7847
Total	**3.6200e-003**	**2.7100e-003**	**0.0267**	**9.0000e-005**	**9.4800e-003**	**6.0000e-005**	**9.5400e-003**	**2.5200e-003**	**6.0000e-005**	**2.5800e-003**	**0.0000**	**7.7797**	**7.7797**	**2.0000e-004**	**0.0000**	**7.7847**

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	0.7915					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0249	0.1694	0.2354	3.9000e-004		9.2100e-003	9.2100e-003		9.2100e-003	9.2100e-003	0.0000	33.1923	33.1923	1.9900e-003	0.0000	33.2419
Total	**0.8164**	**0.1694**	**0.2354**	**3.9000e-004**		**9.2100e-003**	**9.2100e-003**		**9.2100e-003**	**9.2100e-003**	**0.0000**	**33.1923**	**33.1923**	**1.9900e-003**	**0.0000**	**33.2419**

3.5 Architectural Coating - 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	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	3.6200e-003	2.7100e-003	0.0267	9.0000e-005	9.4800e-003	6.0000e-005	9.5400e-003	2.5200e-003	6.0000e-005	2.5800e-003	0.0000	7.7797	7.7797	2.0000e-004	0.0000	7.7847
Total	**3.6200e-003**	**2.7100e-003**	**0.0267**	**9.0000e-005**	**9.4800e-003**	**6.0000e-005**	**9.5400e-003**	**2.5200e-003**	**6.0000e-005**	**2.5800e-003**	**0.0000**	**7.7797**	**7.7797**	**2.0000e-004**	**0.0000**	**7.7847**

3.5 Architectural Coating - 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					
Archit. Coating	0.3957					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0118	0.0792	0.1177	1.9000e-004		3.9600e-003	3.9600e-003		3.9600e-003	3.9600e-003	0.0000	16.5962	16.5962	9.3000e-004	0.0000	16.6195
Total	**0.4075**	**0.0792**	**0.1177**	**1.9000e-004**		**3.9600e-003**	**3.9600e-003**		**3.9600e-003**	**3.9600e-003**	**0.0000**	**16.5962**	**16.5962**	**9.3000e-004**	**0.0000**	**16.6195**

3.5 Architectural Coating - 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	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	1.7000e-003	1.2200e-003	0.0123	4.0000e-005	4.7400e-003	3.0000e-005	4.7700e-003	1.2600e-003	3.0000e-005	1.2900e-003	0.0000	3.7385	3.7385	9.0000e-005	0.0000	3.7408
Total	**1.7000e-003**	**1.2200e-003**	**0.0123**	**4.0000e-005**	**4.7400e-003**	**3.0000e-005**	**4.7700e-003**	**1.2600e-003**	**3.0000e-005**	**1.2900e-003**	**0.0000**	**3.7385**	**3.7385**	**9.0000e-005**	**0.0000**	**3.7408**

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	0.3957					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0118	0.0792	0.1177	1.9000e-004		3.9600e-003	3.9600e-003		3.9600e-003	3.9600e-003	0.0000	16.5961	16.5961	9.3000e-004	0.0000	16.6195
Total	**0.4075**	**0.0792**	**0.1177**	**1.9000e-004**		**3.9600e-003**	**3.9600e-003**		**3.9600e-003**	**3.9600e-003**	**0.0000**	**16.5961**	**16.5961**	**9.3000e-004**	**0.0000**	**16.6195**

3.5 Architectural Coating - 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	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	1.7000e-003	1.2200e-003	0.0123	4.0000e-005	4.7400e-003	3.0000e-005	4.7700e-003	1.2600e-003	3.0000e-005	1.2900e-003	0.0000	3.7385	3.7385	9.0000e-005	0.0000	3.7408
Total	**1.7000e-003**	**1.2200e-003**	**0.0123**	**4.0000e-005**	**4.7400e-003**	**3.0000e-005**	**4.7700e-003**	**1.2600e-003**	**3.0000e-005**	**1.2900e-003**	**0.0000**	**3.7385**	**3.7385**	**9.0000e-005**	**0.0000**	**3.7408**

3.6 Paving - 2021

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	0.0345	0.3553	0.4030	6.3000e-004		0.0186	0.0186		0.0172	0.0172	0.0000	55.0646	55.0646	0.0178	0.0000	55.5098
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0345**	**0.3553**	**0.4030**	**6.3000e-004**		**0.0186**	**0.0186**		**0.0172**	**0.0172**	**0.0000**	**55.0646**	**55.0646**	**0.0178**	**0.0000**	**55.5098**

3.6 Paving - 2021

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	2.2000e-003	1.8000e-003	0.0170	5.0000e-005	5.0100e-003	3.0000e-005	5.0500e-003	1.3300e-003	3.0000e-005	1.3700e-003	0.0000	4.4362	4.4362	1.4000e-004	0.0000	4.4396
Total	**2.2000e-003**	**1.8000e-003**	**0.0170**	**5.0000e-005**	**5.0100e-003**	**3.0000e-005**	**5.0500e-003**	**1.3300e-003**	**3.0000e-005**	**1.3700e-003**	**0.0000**	**4.4362**	**4.4362**	**1.4000e-004**	**0.0000**	**4.4396**

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	0.0345	0.3553	0.4030	6.3000e-004		0.0186	0.0186		0.0172	0.0172	0.0000	55.0645	55.0645	0.0178	0.0000	55.5097
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0345**	**0.3553**	**0.4030**	**6.3000e-004**		**0.0186**	**0.0186**		**0.0172**	**0.0172**	**0.0000**	**55.0645**	**55.0645**	**0.0178**	**0.0000**	**55.5097**

3.6 Paving - 2021

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	2.2000e-003	1.8000e-003	0.0170	5.0000e-005	5.0100e-003	3.0000e-005	5.0500e-003	1.3300e-003	3.0000e-005	1.3700e-003	0.0000	4.4362	4.4362	1.4000e-004	0.0000	4.4396
Total	**2.2000e-003**	**1.8000e-003**	**0.0170**	**5.0000e-005**	**5.0100e-003**	**3.0000e-005**	**5.0500e-003**	**1.3300e-003**	**3.0000e-005**	**1.3700e-003**	**0.0000**	**4.4362**	**4.4362**	**1.4000e-004**	**0.0000**	**4.4396**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Improve Pedestrian Network

Provide Traffic Calming Measures

	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	0.4885	0.4767	3.5668	4.6800e-003	0.4803	4.5100e-003	0.4848	0.1282	4.1900e-003	0.1324	0.0000	421.6940	421.6940	0.0512	0.0000	422.9749
Unmitigated	0.5014	0.4930	3.7178	4.9100e-003	0.5056	4.7000e-003	0.5103	0.1350	4.3800e-003	0.1394	0.0000	442.3496	442.3496	0.0535	0.0000	443.6874

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Single Family Housing	755.20	755.20	755.20	1,391,439	1,321,867
Total	755.20	755.20	755.20	1,391,439	1,321,867

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
Single Family Housing	5.70	5.70	5.70	42.00	22.00	36.00	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Single Family Housing	0.567335	0.086340	0.235934	0.018000	0.007000	0.007000	0.007000	0.007000	0.001351	0.001296	0.058918	0.001311	0.001516

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Install High Efficiency Lighting

Percent of Electricity Use Generated with Renewable 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	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	72.0048	72.0048	4.9300e-003	5.8000e-004	72.3010
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	157.8395	157.8395	0.0108	1.2700e-003	158.4887
NaturalGas Mitigated	0.0113	0.0964	0.0410	6.2000e-004		7.7900e-003	7.7900e-003		7.7900e-003	7.7900e-003	0.0000	111.6168	111.6168	2.1400e-003	2.0500e-003	112.2801
NaturalGas Unmitigated	0.0113	0.0964	0.0410	6.2000e-004		7.7900e-003	7.7900e-003		7.7900e-003	7.7900e-003	0.0000	111.6168	111.6168	2.1400e-003	2.0500e-003	112.2801

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					
Single Family Housing	2.09162e+006	0.0113	0.0964	0.0410	6.2000e-004		7.7900e-003	7.7900e-003		7.7900e-003	7.7900e-003	0.0000	111.6168	111.6168	2.1400e-003	2.0500e-003	112.2801
Total		**0.0113**	**0.0964**	**0.0410**	**6.2000e-004**		**7.7900e-003**	**7.7900e-003**		**7.7900e-003**	**7.7900e-003**	**0.0000**	**111.6168**	**111.6168**	**2.1400e-003**	**2.0500e-003**	**112.2801**

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					
Single Family Housing	2.09162e+006	0.0113	0.0964	0.0410	6.2000e-004		7.7900e-003	7.7900e-003		7.7900e-003	7.7900e-003	0.0000	111.6168	111.6168	2.1400e-003	2.0500e-003	112.2801
Total		**0.0113**	**0.0964**	**0.0410**	**6.2000e-004**		**7.7900e-003**	**7.7900e-003**		**7.7900e-003**	**7.7900e-003**	**0.0000**	**111.6168**	**111.6168**	**2.1400e-003**	**2.0500e-003**	**112.2801**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Single Family Housing	700859	157.8395	0.0108	1.2700e-003	158.4887
Total		**157.8395**	**0.0108**	**1.2700e-003**	**158.4887**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Single Family Housing	319725	72.0048	4.9300e-003	5.8000e-004	72.3010
Total		**72.0048**	**4.9300e-003**	**5.8000e-004**	**72.3010**

6.0 Area Detail

6.1 Mitigation Measures Area

Use Low VOC Paint - Residential Interior

Use Low VOC Paint - Residential Exterior

	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	5.8252	0.1049	6.7900	0.0113		0.8721	0.8721		0.8721	0.8721	82.6366	35.6269	118.2635	0.0772	6.5000e-003	122.1303
Unmitigated	5.8252	0.1049	6.7900	0.0113		0.8721	0.8721		0.8721	0.8721	82.6366	35.6269	118.2635	0.0772	6.5000e-003	122.1303

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	0.2253					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.5624					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	5.0197	0.0980	6.1963	0.0112		0.8688	0.8688		0.8688	0.8688	82.6366	34.6566	117.2932	0.0763	6.5000e-003	121.1367
Landscaping	0.0179	6.8400e-003	0.5938	3.0000e-005		3.2900e-003	3.2900e-003		3.2900e-003	3.2900e-003	0.0000	0.9703	0.9703	9.3000e-004	0.0000	0.9936
Total	**5.8252**	**0.1049**	**6.7900**	**0.0113**		**0.8721**	**0.8721**		**0.8721**	**0.8721**	**82.6366**	**35.6269**	**118.2635**	**0.0772**	**6.5000e-003**	**122.1303**

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	0.2253					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.5624					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	5.0197	0.0980	6.1963	0.0112		0.8688	0.8688		0.8688	0.8688	82.6366	34.6566	117.2932	0.0763	6.5000e-003	121.1367
Landscaping	0.0179	6.8400e-003	0.5938	3.0000e-005		3.2900e-003	3.2900e-003		3.2900e-003	3.2900e-003	0.0000	0.9703	0.9703	9.3000e-004	0.0000	0.9936
Total	**5.8252**	**0.1049**	**6.7900**	**0.0113**		**0.8721**	**0.8721**		**0.8721**	**0.8721**	**82.6366**	**35.6269**	**118.2635**	**0.0772**	**6.5000e-003**	**122.1303**

7.0 Water Detail

7.1 Mitigation Measures Water

Install Low Flow Bathroom Faucet

Install Low Flow Kitchen Faucet

Install Low Flow Toilet

Install Low Flow Shower

Use Water Efficient Irrigation System

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	8.8365	0.1364	3.2700e-003	13.2203
Unmitigated	10.5955	0.1705	4.0800e-003	16.0735

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Single Family Housing	5.21232 / 3.28603	10.5955	0.1705	4.0800e-003	16.0735
Total		**10.5955**	**0.1705**	**4.0800e-003**	**16.0735**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Single Family Housing	4.16986 / 3.08558	8.8365	0.1364	3.2700e-003	13.2203
Total		**8.8365**	**0.1364**	**3.2700e-003**	**13.2203**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	10.4033	0.6148	0.0000	25.7737
Unmitigated	10.4033	0.6148	0.0000	25.7737

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Single Family Housing	51.25	10.4033	0.6148	0.0000	25.7737
Total		**10.4033**	**0.6148**	**0.0000**	**25.7737**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Single Family Housing	51.25	10.4033	0.6148	0.0000	25.7737
Total		**10.4033**	**0.6148**	**0.0000**	**25.7737**

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

	Total CO2	CH4	N2O	CO2e
Category	MT			
Unmitigated	-235.0000	0.0000	0.0000	-235.0000

11.1 Vegetation Land Change

Vegetation Type

	Initial/Final	Total CO2	CH4	N2O	CO2e
	Acres	MT			
Scrub	52 / 17	-500.5000	0.0000	0.0000	-500.5000
Total		**-500.5000**	**0.0000**	**0.0000**	**-500.5000**

11.2 Net New Trees

Species Class

	Number of Trees	Total CO2	CH4	N2O	CO2e
		MT			
Miscellaneous	375	265.5000	0.0000	0.0000	265.5000
Total		**265.5000**	**0.0000**	**0.0000**	**265.5000**

APPENDIX B

Biological Resource Assessment
Gallaway Enterprises, 2018

gallaway
ENTERPRISES

117 Meyers Street, Suite 120, Chico CA 95928

BIOLOGICAL RESOURCE ASSESSMENT

Aquatic and Terrestrial Wildlife, and Botanical Resources

Mission Hills Subdivision

May 2018

Prepared for:
Cornerstone Development
Attn: Mike Nedeker
P.O. Box 71101
Shasta Lake, CA 96079

Prepared by:
Gallaway Enterprises
117 Meyers Street, Suite 120
Chico CA 95928
(530) 332-9909
Contact: Kevin Sevier
www.gallawayenterprises.com

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BIOLOGICAL RESOURCE ASSESSMENT

Mission Hills Subdivision

Project Location:

City of Shasta Lake, Shasta County, California

Sec 31, T33N, R4W & Sec 6, T32N, R4W

INTRODUCTION

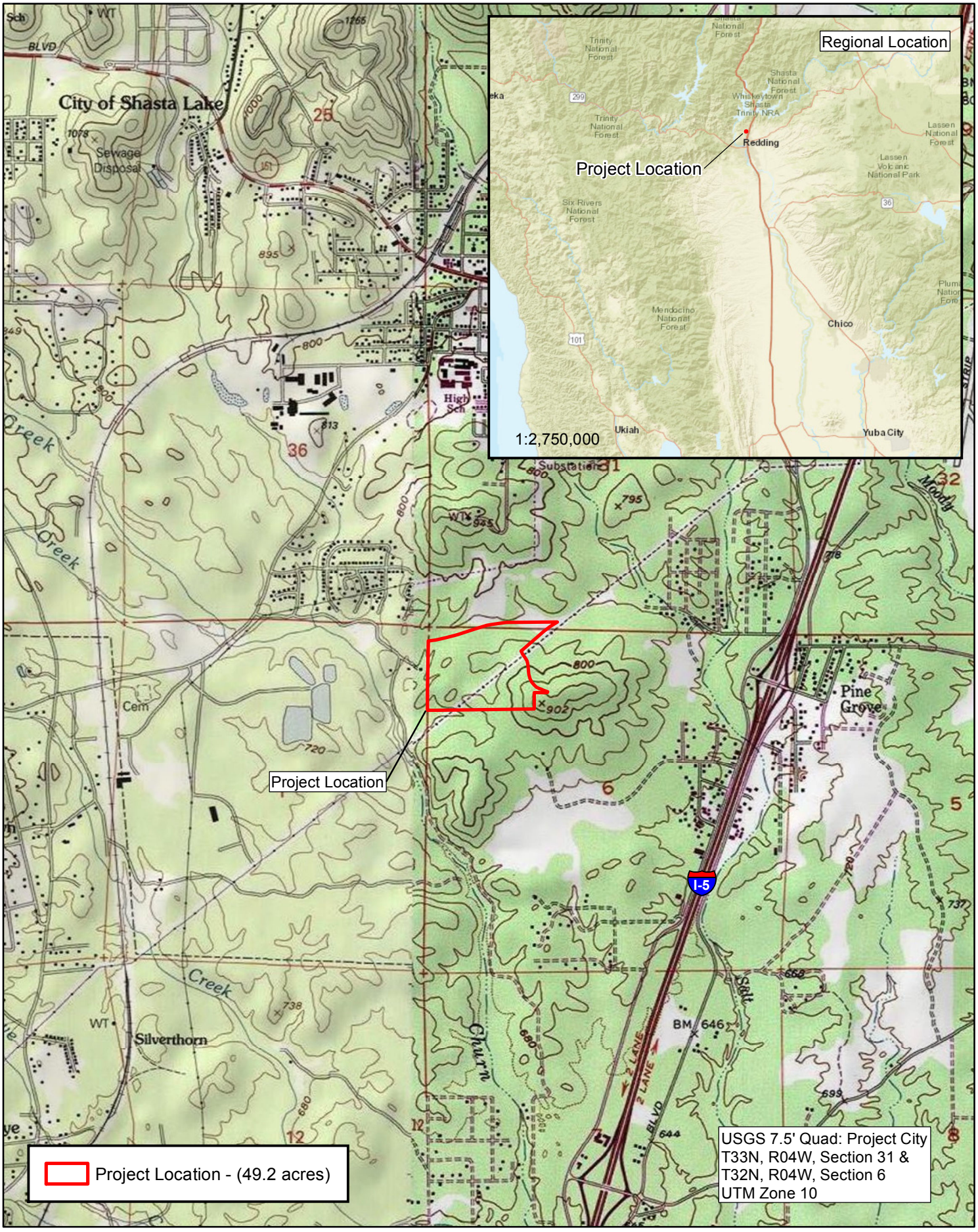
Purpose and Overview

The purpose of this biological resource assessment (BRA) is to document endangered, threatened, sensitive, and rare species and their critical habitats that occur or may occur in the biological survey area (BSA) of the Mission Hills Subdivision (Project) located on the south side of Pine Grove Avenue in the City of Shasta Lake, Shasta County, California (**Figure 1**)**.** The Project area is approximately 49 acres. Private development is currently planned for this site.

The BSA is the area where the focus of the biological survey is conducted (**Figure 2**). Gallaway Enterprises conducted a habitat assessment in the BSA to evaluate site conditions and potential for biological and botanical species to occur. Other primary references consulted include species lists and information gathered using United States Fish and Wildlife Service's (USFWS) Information, Planning, and Conservation System (IPaC), California Department of Fish and Wildlife's (CDFW) California Natural Diversity Database (CNDDB), the California Native Plant Society's (CNPS) list of rare and endangered plants, and literature review. The results of the BRA are the findings of surveys, habitat assessments, and recommendations for avoidance and minimization measures.

Project Location and Environmental Setting

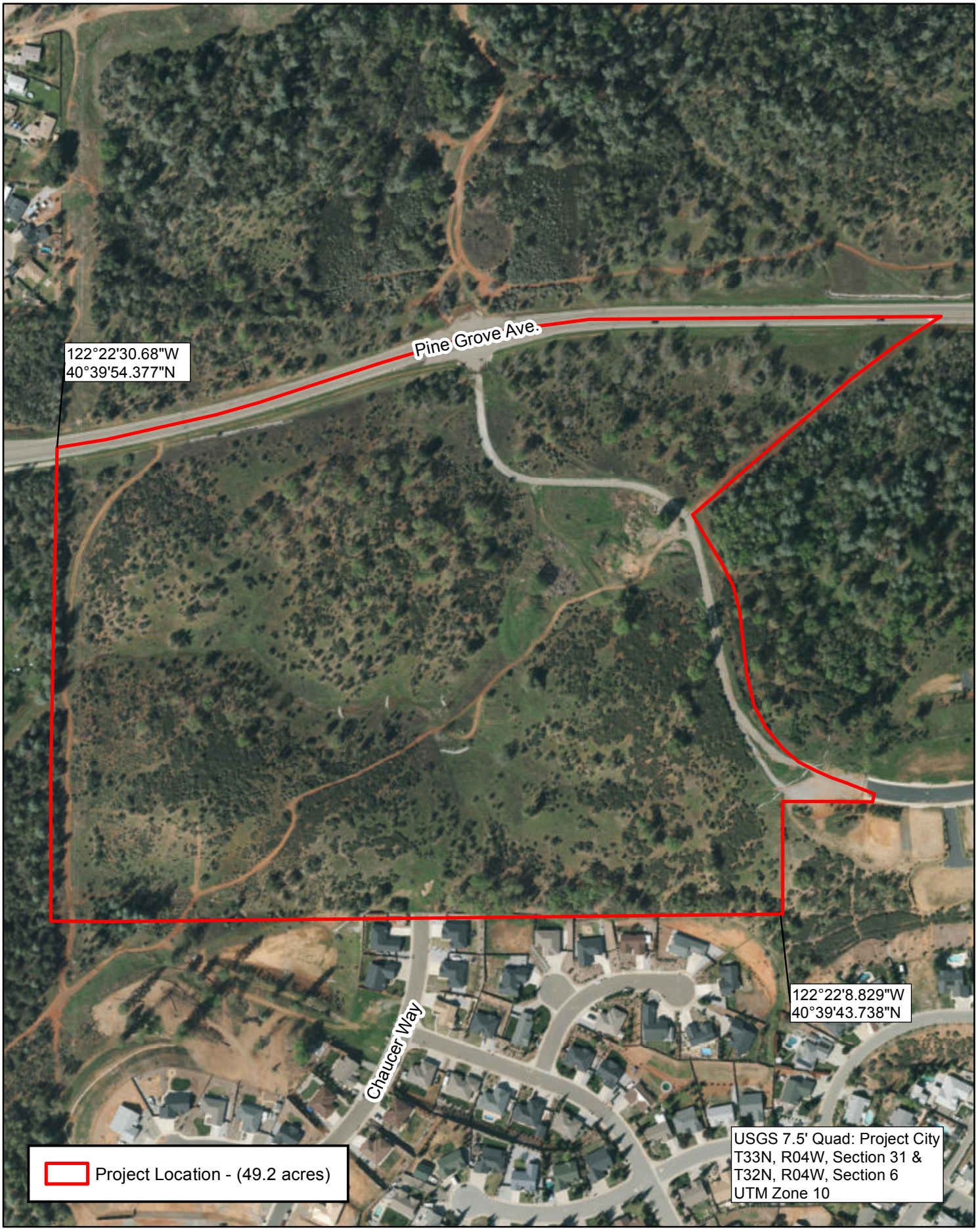
The BSA is located off of Pine Grove Avenue approximately 1 mile west of the with Interstate 5 within the City of Shasta Lake, Shasta County, California, Latitude 40.66350, Longitude -122.37224, within the United States Geological Survey (USGS) "Project City, CA" quadrangle primarily in Section 31 of Township 33N, Range 4W with a small portion within Section 6 of Township 32N, Range 4W. The BSA is bound by Pine Grove Avenue to the north, residential subdivisions to the south and east, and private land to the west with a small rural residential building. The BSA is located in the foothills associated with the Klamath Mountains and is situated south of the Shasta Lake at an elevation ranging from 712 to 890 feet above sea level. The BSA and adjacent open land consists of blue oak-foothill pine vegetation with small patches of dense mixed chaparral habitat dominated by manzanita. The overall topography of the BSA is relatively hilly or rolling terrain. A few ephemeral drainages and seasonal swales occur within the western portion of the BSA that all flow off-site toward the west.



Mission Hills Subdivision
Regional Location
Figure 1

gallaway ENTERPRISES

GE# 17-109 Map Date: 10/04/17



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0 100 200 Feet
NORTH

Data Sources: USGS, ESRI, USDA NAIP Imagery:03/17/16, Shasta County

Mission Hills Subdivision
Project Survey Area
Figure 2

gallaway ENTERPRISES
GE# 17-109 Map Date: 10/04/17

The average annual precipitation is 64 inches and the average annual temperature is 62.4° F (Western Regional Climate Center 2018) in the region where the survey area is located. The Property ranges in elevation from 760 to 900 feet above sea level and is sloped between 5-15 percent. Soils within the survey area are loams with a natural restrictive layer ranging from 21 to more than 50 inches in depth (NRCS 2018).

METHODS

References Consulted

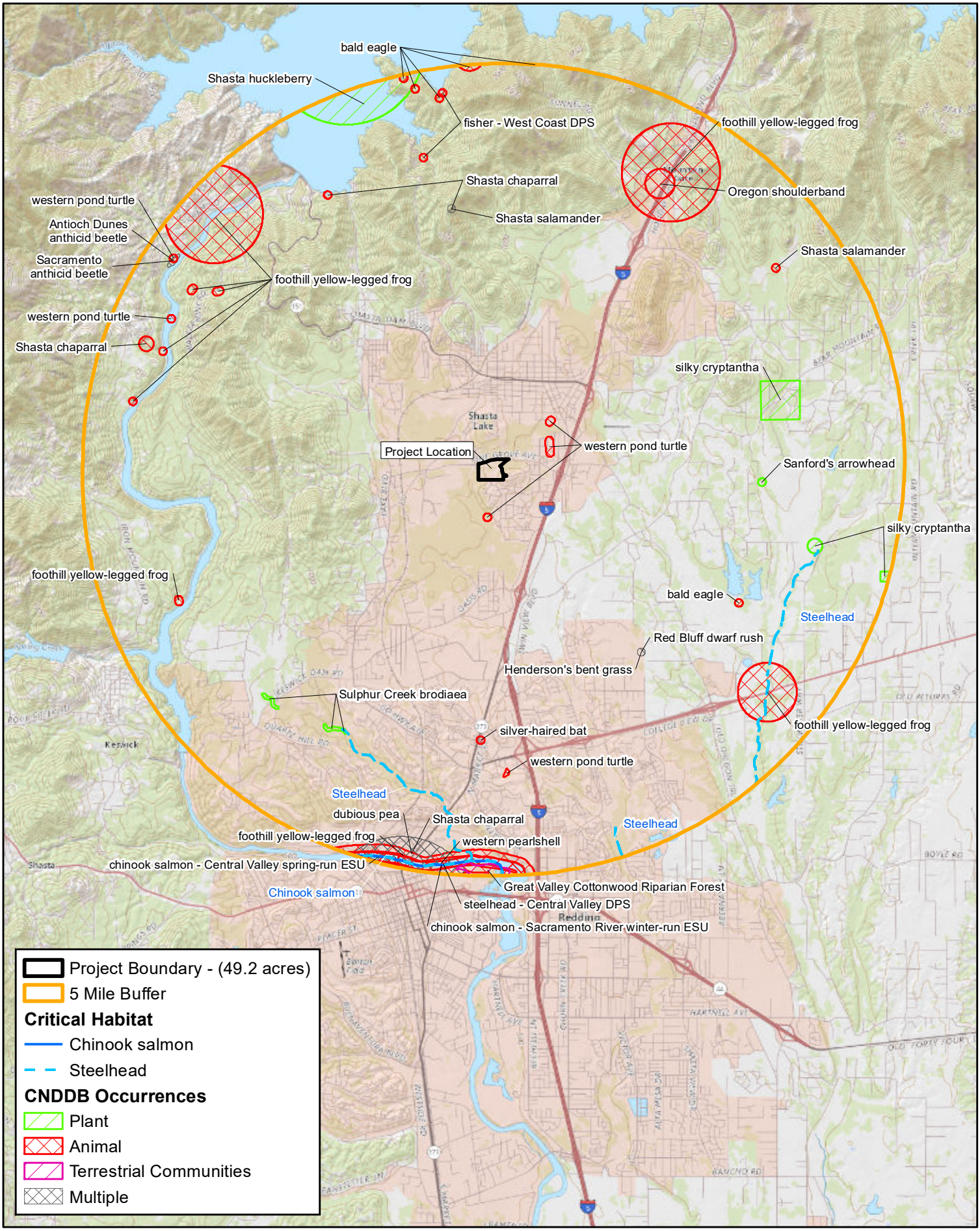
Gallaway Enterprises obtained lists of special-status species that occur in the vicinity of the BSA. The CNDDB Geographic Information System (GIS) database was also consulted and showed special-status species within a five (5) mile radius of the BSA (**Figure 3**). Other primary sources of information regarding the occurrence of federally listed threatened, endangered, purposed and candidate species, and their habitats within the BSA used in the preparation of this BRA are:

- Species lists obtained from the USFWS for the BSA, May 17, 2018 (**Appendix A; Species Lists**);
- The results of a species record search of the CDFW CNDDB, RareFind 5, for the 7.5 minute USGS Project City (4012263) and 8 surrounding quadrangles (**Appendix A; Species Lists**);
- The review of the CNPS Inventory of Rare and Endangered Vascular Plants of California for the 7.5 minute USGS Project City (4012263) and 8 surrounding quadrangles (**Appendix A; Species Lists**);
- USFWS Critical Habitat Portal, May 17, 2018; and
- Results from field surveys conducted by Gallaway Enterprises on September 29, 2017 and May 7, 2018 (**Appendix B; Observed Species List**).

Special-Status Species

Special-status species that have potential to occur in the BSA are those that fall into one of the following categories:

- Listed as threatened or endangered, or are proposed or candidates for listing under the California Endangered Species Act (CESA, 14 California Code of Regulations 670.5) or the Federal Endangered Species Act (ESA, 50 Code of Federal Regulations 17.12);
- Listed as a SSC by CDFW or protected under the California Fish and Game Code (i.e Fully Protected Species);
- Ranked by the CNPS as 1A, 1B, or 2;
- Protected under the Migratory Bird Treaty Act (MBTA);
- Protected under the Bald and Golden Eagle Protection Act; or
- Species that are otherwise protected under policies or ordinances at the local or regional level as required by the California Environmental Quality Act (CEQA, §15380).



1:100,000

0 0.5 1 Miles

NORTH

Data Sources: ESRI; USGS; Shasta County, CNDDB, USFWS

Mission Hills Subdivision
CNDDB and Critical Habitat Occurrences
Figure 3

gallaway ENTERPRISES

GE: #17-109 Map Date: 05/25/18

Critical Habitat

The Endangered Species Act requires that critical habitat be designated for all species listed under the Endangered Species Act. Critical habitat is designated for areas that provide essential habitat elements that enable a species survival and which are occupied by the species during the species listing under the Endangered Species Act. Areas outside of the species range of occupancy during the time of its listing can also be determined as critical habitat if the agency decides that the area is essential to the conservation of the species.

The USFWS Critical Habitat Portal was accessed on May 17, 2018 to determine if critical habitat occurred within the BSA. Appropriate Federal Registers were also used to confirm the presence or absence of critical habitat. There is currently no critical habitat present within the Project area.

Biological and Botanical Surveys

Field surveys were conducted on September 29, 2017 by Gallaway Enterprises senior biologist Jody Gallaway and on May 7, 2018 by senior botanist Elena Gregg. A general biological survey was conducted on both survey dates to determine the presence of special-status species and their habitats within the BSA. A CDFW protocol-level rare plant survey was conducted on May 7, 2018. The surveys were conducted by walking in all accessible areas of the BSA and taking inventory of observed species and habitat elements.

Habitat Assessment

A habitat assessment of the BSA was conducted on September 29, 2017 May 7, 2018. The purpose of the habitat assessment is to determine if suitable habitat occurs within the BSA for special-status species. The habitat assessment was conducted by walking the entire BSA and recording specific habitat types and elements. If habitat was observed for special-status species it was then evaluated for quality based on vegetation composition and structure, physical features (e.g. soils, elevation), micro-climate, surrounding area, presence of predatory species and available resources (e.g. prey items, nesting substrates), and land use patterns.

RESULTS

Vegetation Communities

Blue Oak-Foothill Pine (BOP)

Blue Oak-Foothill Pine is the dominant vegetation community within the BSA. Common species observed within the BSA were foothill pine (*Pinus sabiniana*), blue oak (*Quercus douglasii*), live oak (*Quercus wislizeni*), and toyon (*Heteromeles arbutifolia*), with a dense understory of mixed shrub vegetation including common manzanita (*Arctostaphylos manzanita*) and buckbrush (*Ceanothus cuneatus*). Some other species observed were black oak (*Quercus kelloggii*), foothill honeysuckle (*Lonicera interrupta*), and poison oak (*Toxicodendron diversilobum*). The Blue Oak-Foothill Pine habitat type provides foraging ground for a variety of wildlife species and breeding habitat for terrestrial reptiles and ground nesting mammals.

Mixed Chaparral (MCH)

Mixed Chaparral habitat occurs as patches within the BSA. Common species observed within the BSA were common manzanita, buckbrush, poison oak, and the occasional toyon, blue oak, and foothill honeysuckle. The understory ranged from bare ground to an annual herbaceous dominated community. The Mixed Chaparral habitat type provides foraging for a variety of wildlife species and breeding habitat for terrestrial reptiles and ground nesting mammals.

Aquatic Habitat

Riverine (RIV)

Riverine is the sub-dominant habitat type in the BSA. There are several small ephemeral drainages within the BSA, which eventually drain into upper Churn Creek. Riverine habitat occurs along Nelson Creek, Churn Creek, and the ephemeral tributaries. All of the riverine habitat within the BSA has ephemeral hydrology. Herbaceous vegetation grows within the banks of many of these ephemeral drainages indicating lower flow velocities. These drainages are primarily open with little to no tree canopy. Many wildlife species rely on aquatic insects as a significant source of food. Many wildlife species also use riverine habitats for a source of water for hydration.

Wetlands in Annual Grassland (AGS)

Depressional wetlands often occur in annual grassland habitats. Small patches of annual grassland habitat occur throughout the BSA where the tree canopy opens. Within these herbaceous plant dominated openings a few seasonal swales occur within the BSA. These seasonal swales are portions of the ephemeral drainages where the ordinary high water mark is lacking and water movement slows. Many wildlife species utilize wetland habitats for a source of water and food.

Non-vegetated Habitat

Barren (BAR)

Barren habitat is typified by non-vegetated soil, rock, and gravel. Only a small percentage of the BSA contains barren habitat. There is one paved/gravel road within the BSA and a few unpaved, dirt roads throughout the BSA that are functional for transportation. The barren habitat type provides low quality habitat to wildlife.

Special-Status Species

A summary of special-status species assessed for potential occurrence within the BSA based on the USFWS species list, CNDDB, and the CNPS list of rare and endangered plants within the Project City (4012263), Bohemotash Mountain (4012274), O'Brien (4012273), Bella Vista (4012262), Palo Cedro (4012252), Minnesota Mountain (4012272), Shasta Dam (4012264), Redding (4012254), and Enterprise (4012253) USGS 7.5 minute quadrangles, and their potential to occur within the BSA are described in

Table 1. Potential for occurrence was determined by reviewing database queries from federal and state agencies and evaluating habitat characteristics.

The following special-status species have potential to occur within the BSA based on the presence of suitable habitat and/or known records of species occurrence within the vicinity of the BSA.

Endangered, Threatened and Rare Plants

A botanical survey and habitat assessment was conducted within the BSA on May 7, 2018. There is no potential for most special-status plant species to occur within the BSA, with the exception of Redding checkerbloom (**Table 1**). A list of all plant species observed during the habitat assessment is provided in **Appendix B**.

Table 1. Special-status species and their potential to occur within the BSA of the Mission Hills Subdivision, Shasta Lake, CA.

Common Name *(Scientific Name)*	**Status** Fed/State/CNPS	**Associated Habitats**	**Potential for Occurrence**
PLANTS			
Shasta ageratina (*Ageratina shastensis*)	_/_/1B.2	Chaparral and lower montane coniferous forest in rocky, often carbonate and limestone outcropping microhabitat. (BP: Jun – Oct)	None. There is no suitable microhabitat within the BSA and the BSA is outside of Shasta ageratina's known elevation range.
Big-scale balsamroot (*Balsamorhiza macrolepis*)	_/_/1B.2	Chaparral, valley and foothill grassland and cismontane woodland. Microhabitat is serpentinite and cobbly soils. (BP: Mar – Jun)	None. There is no suitable microhabitat within the BSA and the species was not observed during the protocol-level botanical survey.
Sulphur Creek brodiaea (*Brodiaea matsonii*)	_/_/1B.1	Cismontane woodland (streambanks), meadows and seeps. Microhabitat is rocky, metamorphic amphibolite schist. (BP: May – Jun)	None. There is no suitable microhabitat within the BSA and the species was not observed during the protocol-level botanical survey.
Northern clarkia (*Clarkia borealis ssp. borealis*)	_/_/1B.3	Chaparral, cismontane woodland, and lower montane coniferous forest, often found in roadcuts. (BP: Jun – Sep)	None. There is no suitable habitat within the BSA, and the BSA is outside of northern clarkia's known elevation range.

Common Name *(Scientific Name)*	**Status** Fed/State/CNPS	**Associated Habitats**	**Potential for Occurrence**
PLANTS			
Silky cryptantha (*Cryptantha crinita*)	_/_/1B.2	On cobble bars of streams with open canopy. (BP: Apr – May)	None. There is no suitable cobble substrate present within the drainages within the BSA.
Shasta limestone monkeyflower (*Erythranthe taylorii*)	_/_/1B.1	Openings in cismontane woodland and lower montane coniferous forest. Microhabitat is carbonate crevices and rocky outcrops. (BP: [Feb] Apr – May)	None. Carbonate crevices and rocky outcrops do not occur within the BSA and the BSA is outside of Shasta limestone monkeyflower's known elevation range.
Shasta fawn lily (*Erythronium shastense*)	_/_/1B.2	Cismontane woodland, lower montane coniferous forest. Microhabitat is usually carbonate, rocky, north-facing or shaded. (BP: [Feb] Mar – Apr)	None. Necessary microhabitat elements are absent from the BSA and the BSA is outside of Shasta fawn lily's known elevation range.
Boggs Lake hedge-hyssop (*Gratiola heterosepala*)	_/_/1B.2	Freshwater marshes and swamps, sometimes on lake margins, vernal pools. Microhabitat is clay soils. (BP: Apr – Aug)	None. There is no suitably wet habitat within the BSA.
Red Bluff dwarf rush (*Juncus leiospermus var. leiospermus*)	_/_/1B.1	Vernal pools and mesic habitat in chaparral, cismontane woodland, valley and foothill grassland. (BP: Mar – Jun)	None. There is no vernal pool habitat present within the BSA.
Legenere (*Legenere limosa*)	_/_/1B.1	Vernal pools. (BP: Apr – Jun)	None. There is no vernal pool habitat present within the BSA.

Common Name *(Scientific Name)*	**Status** Fed/State/CNPS	**Associated Habitats**	**Potential for Occurrence**
PLANTS			
Cantelow's lewisia (*Lewisia cantelovii*)	_/_/1B.2	Broadleafed upland forest, chaparral, cismontane woodland, lower montane coniferous forest. Microhabitat is mesic, granitic, sometimes serpentinite seeps. (BP: May – Oct)	None. There is no mesic, granitic, or seep habitat within the BSA and the BSA is outside of Cantelow's lewisia's known elevation range.
Bellinger's meadowfoam (*Limnanthes floccosa ssp. bellingeriana*)	_/_/1B.2	Edges of meadows and seeps, vernally wet sites including damp stony flats. 984 ft (BP: Apr – Jun)	None. There is no suitably wet habitat within the BSA the species was not observed during the protocol-level botanical survey.
Shasta snow-wreath (*Neviusia cliftonii*)	_/_/1B.2	Cismontane woodland, Lower montane coniferous forest, Riparian woodland in the mountains around Lake Shasta. Often found by streamsides; sometimes carbonate, volcanic, or metavolcanic. (BP: Apr – Jun)	None. There is no suitable habitat within the BSA, the BSA is outside of Shasta snow-wreath's known elevation range, and the species was not observed during the protocol-level botanical survey.
Slender Orcutt grass (*Orcuttia tenuis*)	FT/SE/1B.1	Deep vernal pools. (BP: May – Sep [Oct])	None. There is no vernal pool habitat present within the BSA.
Ahart's Paronychia (*Paronychia ahartii*)	_/_/1B.1	Valley and foothill grassland and cismontane woodland. Microhabitat is stony, nearly barren clay of swales and higher ground around vernal pools. (BP: Feb – Jun)	None. There is no suitable habitat within the BSA and the species was not observed during the protocol-level botanical survey.

Common Name *(Scientific Name)*	**Status** Fed/State/CNPS	**Associated Habitats**	**Potential for Occurrence**
PLANTS			
Sanford's arrowhead (*Sagittaria sanfordii*)	_/_/1B.2	Marshes and swamps (assorted shallow freshwater). (BP: May – Oct [Nov])	None. There is no suitably wet habitat present within the BSA.
Canyon Creek stonecrop (*Sedum obtusatum ssp. paradisum*)	_/_/1B.3	Broadleafed upland forest, chaparral, lower montane coniferous forest, subalpine coniferous forest. Microhabitat is granitic, rocky. (BP: May – Jun)	None. There is no granitic rocky habitat present within the BSA and the BSA is outside of Canyon Creek stonecrop's known elevation range.
Redding checkerbloom (*Sidalcea celata*)	_/_/3	Cismontane woodland (sometimes serpentinite) (BP: Apr – Aug)	**Present**. Species observed during the protocol-level botanical survey.
Shasta huckleberry (*Vaccinium shastense ssp. shastense*)	_/_/1B.3	Chaparral, cismontane woodland, lower montane coniferous forest, riparian forest, subalpine coniferous forest. Microhabitat is acidic, mesic; often streambanks; sometimes seeps, rocky outcrops, roadsides, and disturbed areas. (BP: Dec – May [Sep])	None. There is no suitable habitat within the BSA and the BSA is outside of Shasta huckleberry's known elevation range.
Oval-leaved viburnum (*Viburnum ellipticum*)	_/_/2B.3	Chaparral, cismontane woodland, lower montane coniferous forest above 705 feet in elevation. (BP: May – Jun)	None. Species not observed within the BSA during the protocol-level botanical survey.

Common Name *(Scientific Name)*	**Status** Fed/State/CNPS	**Associated Habitats**	**Potential for Occurrence**
INVERTEBRATES			
Shasta crayfish (*Pacifastacus fortis*)	FE/_/_	Cool spring-fed lakes, rivers and streams. Only known from the Pit, Fall and Hat Creek drainages.	None. There is no suitable habitat within the BSA and the drainages present are not hydrologically connected to the known habitat range for this species.
Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*)	FT/_/_	Blue elderberry shrubs usually associated with riparian areas.	None. No blue elderberry shrubs were observed within the BSA.
Vernal pool fairy shrimp *(Branchinecta lynchi)*	FT/_/_	Vernal pools and seasonally ponded areas.	None. There is no vernal pool habitat or features with suitable hydrology within the BSA.
Vernal pool tadpole shrimp *(Lepidurus packardi)*	FE/_/_	Deep vernal pools.	None. There is no vernal pool habitat within the BSA.
FISH			
There is no potential within the BSA for any special-status fish species due to the ephemeral nature of the drainages present.			
AMPHIBIANS			
Pacific tailed frog (*Ascaphus truei)*	_/SSC/_	Restricted to perennial montane streams. Tadpoles require water below 15°C.	None. There is no suitable habitat within the BSA. Pacific tailed frog require montane habitat that does not occur in the foothills where the BSA is located.
Foothill yellow-legged frog (*Rana boylii)*	_/SC,SSC/_	Streams with consistent flow, slow side waters with cobble and boulders for oviposition.	None. The drainages present in the BSA are too ephemeral to support this species.

Common Name *(Scientific Name)*	**Status** Fed/State/CNPS	**Associated Habitats**	**Potential for Occurrence**
AMPHIBIANS			
California red-legged frog (*Rana draytonii)*	FT/SSC/_	Streams with consistent flow, slow side waters with cobble and boulders for oviposition.	None. There is no suitable habitat within the BSA and California red-legged frogs are not known to historically occur in the Klamath mountains (USFWS 2002) so the BSA is outside the species range.
Western spadefoot (*Spea hammondii*)	_/SSC/_	Occurs primarily in grassland habitats, but can be found in valley-foothill hardwood woodlands. Vernal pools are essential for breeding and egg-laying.	None. The ephemeral drainages and seasonal swales in the BSA do not support suitable habitat and there are no nearby CNDDB records of this species.
Shasta salamander (*Hydromantes shastae*)	_/ST/_	Occurs in rocky talus near Lake Shasta at 1,000-3,000 feet elevation.	None**.** The BSA is outside of Shasta salamander's known elevation range and no suitable limestone areas occur in the BSA.
REPTILES			
Western pond turtle (*Emys marmorata*)	_/SSC/_	Perennial bodies of water with deep pools, locations for haul out, and locations for ovipositon.	None. The ephemeral drainages and seasonal swales in the BSA do not support suitable habitat for this species.
BIRDS			
Tricolored blackbird *(Agelaius tricolor)*	_/SC-SSC/_	Colonial nester in large freshwater marshes. Does most of its foraging in open habitats such as farm fields, pastures, cattle pens, large lawns.	None. There is no marsh, irrigated pastures, or open water within or adjacent to the BSA. There are no CNDDB occurrences within 5 miles of the BSA; the nearest occurrence (#246) is approximately 14 miles southeast of the BSA.
American peregrine falcon *(Falco peregrinus anatum)*	_/FP/_	Open country with cliffs and ledges for perching and nesting.	None. There is no suitable foraging or nesting habitat in the BSA.

Common Name *(Scientific Name)*	**Status** Fed/State/CNPS	**Associated Habitats**	**Potential for Occurrence**
BIRDS			
Bald Eagle *(Haliaeetus leucocephalus)*	_/SE,FP/_	Coast, large lakes and river systems, with open forests with large trees and snags.	None. There is no suitable foraging or nesting habitat in the BSA.
Bank swallow (*Riparia riparia*)	_/ST/_	Requires vertical banks/cliffs with fine-textured/sandy soils near streams, rivers, lakes, ocean to dig nesting hole.	None**.** There is no suitable nesting habitat within the BSA.
Northern spotted owl (*Strix occidentalis caurina*)	FT/_/_	Forests characterized by dense canopy closure of mature and old-growth trees, abundant logs, standing snags, and live trees with broken tops.	None**.** There is no suitable habitat within the BSA, as there is a lack of dense canopy cover, old-growth trees, and snags. There are no CNDDB occurrences of northern spotted owl within the foothill area of Shasta County.
MAMMALS			
Pallid bat *(Antrozous pallidus)*	_/SSC/_	Rocky outcroppings to open, sparsely vegetated grasslands with nearby water source. Day and night roosts include crevices in rocky outcrops and cliffs, caves, mines, trees (e.g., cavities and exfoliating bark), and various human structures (i.e. bridges).	Low**.** Mature trees with exfoliating bark and cavities within the BSA provide roosting habitat within the BSA; however, CNDDB occurrences of roosting pallid bats in Shasta County are limited to bridges (#111, 112, and 428). In addition, there are no known pallid bat CNDDB occurrences within 5 miles of the BSA.
Townsend's big-eared bat *(Corynorhinus townsendii)*	_/SSC/_	Roosts in mines and open caverns.	None**.** There is no suitable roosting habitat within the BSA.

Common Name *(Scientific Name)*	**Status** Fed/State/CNPS	**Associated Habitats**	**Potential for Occurrence**
MAMMALS			
Western red bat *(Lasiurus blossevillii)*	_/SSC/_	Riparian areas dominated by walnuts, oaks, willows, cottonwoods, and sycamores where they roost in these broad-leafed trees.	Low. Western red bats are known to roost on oak trees, but are generally only found in riparian areas. There are no CNDDB occurrences within 5 miles of the BSA.
West coast fisher *(Pekania pennanti)*	_/SSC/_	North coast coniferous forest, old-growth, riparian forest.	None. There is no suitable habitat within the BSA.

CODE DESIGNATIONS
FE = Federally-listed Endangered **FT** = Federally-listed Threatened **FC** = Federal Candidate Species **SE or ST=** State Listed as Endangered or Threatened **SC** = State Candidate Threatened or Endangered **SSC** = State Species of Special Concern **FP** = State Fully Protected Species
Potential for Occurrence: for plants it is considered the potential to occur during the survey period; for birds and bats it is considered the potential to breed, forage, roost, over-winter, or stop-over in the BSA during migration. Any bird or bat species could fly over the BSA, but this is not considered a potential occurrence. The categories for the potential for occurrence include: **None:** The species or natural community is known not to occur, and has no potential to occur in the BSA based on sufficient surveys, the lack suitable habitat, and/or the BSA is well outside of the known distribution of the species. **Low:** Potential habitat in the BSA is sub-marginal and/or the species is known to occur in the vicinity of the BSA. **Moderate:** Suitable habitat is present in the BSA and/or the species is known to occur in the vicinity of the BSA. Pre-construction surveys may be required. **High:** Habitat in the BSA is highly suitable for the species and there are reliable records close to the BSA, but the species was not observed. Pre-construction surveys required, with the exception of indicators for foraging habitat. **Known:** Species was detected in the BSA or a recent reliable record exists for the BSA.

Redding Checkerbloom

Redding checkerbloom (*Sidalcea celata*) is a perennial herb that is native to California and is endemic to California. It has the CNPS Rare Plant Rank 3, meaning this plant is on a review list and more information about this species is needed (CNPS 2018).

CNDDB Occurrences

There are no recorded occurrences of this species within CNDDB's Rarefind, however, collection location data from the Consortium of California Herbaria identified a collection of Redding checkerbloom in the

vicinity of the intersection of Akrich Street and Old Oregon Trail /Oasis Road, approximately 2 miles from the BSA.

Status of Redding Checkerbloom Occurring in the BSA

Redding checkerbloom was observed in multiple locations within the BSA. The plant was observed in the understory of blue oaks and occasionally under manzanita (**Figure 4**).

Endangered, Threatened and Special Status Wildlife

A wildlife habitat assessment was conducted within the BSA on September 29, 2017 and May 7, 2018. Suitable habitat was identified for several avian species protected under the Migratory Bird Treaty Act (MBTA) and bats protected by the CFGC. A list of all wildlife species observed during the habitat assessment is provided in **Appendix B**.

Pallid Bat

Pallid bats are designated as a CDFW SSC. Pallid bats roost alone, in small groups (2 to 20 bats), or gregariously (100s of individuals). Day and night roosts include crevices in rocky outcrops and cliffs, caves, mines, trees (e.g., basal hollows of coast redwoods and giant sequoias, bole cavities of oaks, exfoliating Ponderosa pine and valley oak bark, deciduous trees in riparian areas, and fruit trees in orchards), and various human structures such as bridges (especially wooden and concrete girder designs), barns, porches, bat boxes, and human-occupied as well as vacant buildings. Roosts generally have unobstructed entrances/exits, and are high above the ground, warm, and inaccessible to terrestrial predators. However, this species has also been found roosting on or near the ground under burlap sacks, stone piles, rags, and baseboards. Lewis 1996 found that pallid bats have low roost fidelity and both pregnant and lactating pallid bats changed roosts an average of once every 1.4 days throughout the summer. Overwintering roosts have relatively cool, stable temperatures and are located in protected structures beneath the forest canopy or on the ground, out of direct sunlight. In other parts of the species' range, males and females have been found hibernating alone or in small groups, wedged deeply into narrow fissures in mines, caves, and buildings. At low latitudes, outdoor winter activity has been reported at temperatures between –5 and 10 °C.

CNDDB Occurrences

There are four (4) CNDDB occurrences of pallid bat in Shasta County. Three (3) of the occurrences positively identify bridges as the known roost sites, the fourth occurrence does not list a roost site and/or type. The nearest CNDDB occurrence (#111) is 11 miles southwest of the BSA in the Brady Creek bridge on Kennedy Memorial Drive.

Status of Pallid Bat occurring in the BSA

Mature trees within the BSA that have suitable habitat elements (e.g. cavities, peeling bark) may provide suitable day roost habitat; however, there are no CNDDB occurrences within 10 miles of the BSA therefore there is low potential for pallid bats to occur within the BSA.

NORTH

1:3,500

0 100 200 Feet

Mission Hills Subdivision
Redding Checkerbloom Occurrences
Figure 4

gallaway ENTERPRISES

Data Sources: ESRI; USDA NAIP Imagery: 03/17/16, Shasta County

GE: #17-109 Map Date: 06/04/18

Western Red Bat

Western red bat is designated as a CDFW SSC. Western red bats are typically solitary, roosting primarily in the foliage of trees or shrubs. Day roosts are commonly in edge habitats adjacent to streams or open fields, in orchards, and sometimes in urban areas. There may be an association with intact riparian habitat (particularly willows, cottonwoods, and sycamores). Roost sites are generally hidden from view from all directions except below; lack obstruction beneath, allowing the bat to drop downward for flight; lack lower perches that would allow visibility by predators; have dark ground cover to minimize solar reflection; have nearby vegetation to reduce wind and dust; and are generally located on the south or southwest side of a tree. Red bats generally begin to forage one to two hours after sunset. Although some may forage all night, most typically have an initial foraging period corresponding to the early period of nocturnal insect activity, and a minor secondary activity period corresponding to insects that become active several hours before sunrise. Red bats mate in late summer or early fall. Females become pregnant in spring and have a pregnancy of 80-90 days. Females may have litters of up to five pups per year. This species is considered to be highly migratory. Although generally solitary, red bats appear to migrate in groups and forage in close association with one another in summer. The timing of migration and the summer ranges of males and females seem to be different. Winter behavior of this species is poorly understood (Western Bat Working Group).

CNDDB Occurrences

The nearest CNDDB occurrence (#4) is approximately 10 miles southwest of the BSA near Salt Creek.

Status of Western Red Bats Occurring within the BSA

Oak and other broadleaf trees occur within the BSA and provide suitable roosting habitat for western red bats; however, western red bats are closely associated with riparian habitat and there is no riparian habitat within the BSA. Therefore, there is a low potential for western red bats to occur within the BSA.

Migratory Birds and Raptors

Nesting birds are protected under the Migratory Bird Treaty Act (MBTA) (16 USC 703) and the California Fish and Game Code (CFGC) (§3503). The MBTA (16 USC §703) prohibits the killing of migratory birds or the destruction of their occupied nests and eggs except in accordance with regulations prescribed by the USFWS. The bird species covered by the MBTA includes nearly all of those that breed in North America, excluding introduced (i.e. exotic) species (50 Code of Federal Regulations §10.13). Activities that involve the removal of vegetation including trees, shrubs, grasses, and forbs or ground disturbance has the potential to affect bird species protected by the MBTA.

The CFGC (§3503.5) states that it is "unlawful to take, possess, or destroy any birds in the order Falconiformes (hawks, eagles, and falcons) or Strigiformes (owls) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto." Take includes the disturbance of an active nest resulting in the abandonment or loss of young. The CFGC (§3503) also states that "it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto."

CNDDB Occurrences

The majority of migratory birds and raptors protected under the MBTA and CFGC are not recorded on the CNDDB because they are abundant and widespread.

Status of Migratory Birds and Raptors occurring in the BSA

There is suitable nesting habitat for a variety of ground, shrub and tree nesting avian species throughout the BSA.

REGULATORY FRAMEWORK

The following describes federal, state, and local environmental laws and policies that may be relevant if the BSA were to be developed or modified.

Federal

Waters of the United States, Clean Water Act, Section 404

The US Army Corps of Engineers (Corps) and the U.S. Environmental Protection Agency (EPA) regulate the discharge of dredged or fill material into jurisdictional waters of the United States, under the Clean Water Act (§404). The term "waters of the United States" is an encompassing term that includes "wetlands" and "other waters." Wetlands have been defined for regulatory purposes as follows: "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (33 CFR 328.3, 40 CFR 230.3). Wetlands generally include swamps, marshes, bogs, and similar areas." other waters of the United States are seasonal or perennial water bodies, including lakes, stream channels, drainages, ponds, and other surface water features, that exhibit an ordinary high-water mark but lack positive indicators for one or more of the three wetland parameters (i.e., hydrophytic vegetation, hydric soil, and wetland hydrology) (33 CFR 328.4). The Corps may issue either individual permits on a case-by-case basis or general permits on a program level. General permits are pre-authorized and are issued to cover similar activities that are expected to cause only minimal adverse environmental effects. Nationwide permits are general permits issued to cover particular fill activities. All nationwide permits have general conditions that must be met for the permits to apply to a particular Project, as well as specific conditions that apply to each nationwide permit.

Clean Water Act, Section 401

The Clean Water Act (§401) requires water quality certification and authorization for placement of dredged or fill material in wetlands and Other Waters of the United States. In accordance with the Clean Water Act (§401), criteria for allowable discharges into surface waters have been developed by the State Water Resources Control Board, Division of Water Quality. The resulting requirements are used as criteria in granting National Pollutant Discharge Elimination System (NPDES) permits or waivers, which are obtained through the Regional Water Quality Control Board (RWQCB) per the Clean Water Act (§402). Any activity or facility that will discharge waste (such as soils from construction) into surface waters, or from which waste may be discharged, must obtain an NPDES permit or waiver from the

RWQCB. The RWQCB evaluates an NPDES permit application to determine whether the proposed discharge is consistent with the adopted water quality objectives of the basin plan.

Federal Endangered Species Act

The United States Congress passed the Federal Endangered Species Act (FESA) in 1973 to protect species that are endangered or threatened with extinction. The ESA is intended to operate in conjunction with the National Environmental Policy Act (NEPA) to help protect the ecosystems upon which endangered and threatened species depend.

Under the FESA, species may be listed as either "endangered" or "threatened." Endangered means a species is in danger of extinction throughout all or a significant portion of its range. Threatened means a species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. All species of plants and animals, except non-native species and pest insects, are eligible for listing as endangered or threatened. The USFWS also maintains a list of "candidate" species. Candidate species are species for which there is enough information to warrant proposing them for listing, but that have not yet been proposed. "Proposed" species are those that have been proposed for listing, but have not yet been listed.

The FESA makes it unlawful to "take" a listed animal without a permit. Take is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct." Through regulations, the term "harm" is defined as "an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering."

Migratory Bird Treaty Act

The MBTA (16 USC §703) prohibits the killing of migratory birds or the destruction of their occupied nests and eggs except in accordance with regulations prescribed by the USFWS. The bird species covered by the MBTA includes nearly all of those that breed in North America, excluding introduced (i.e. exotic) species (50 Code of Federal Regulations §10.13). Activities that involve the removal of vegetation including trees, shrubs, grasses, and forbs or ground disturbance has the potential to affect bird species protected by the MBTA. Thus, vegetation removal and ground disturbance in areas with breeding birds should be conducted outside of the breeding season (approximately March 1 through August 31 in the Central Valley). If vegetation removal or ground disturbance activities are conducted during the breeding season, then a qualified biologist must determine if there are any nests of bird species protected under the MBTA present in the construction area prior to commencement of construction. If active nests are located or presumed present, then appropriate avoidance measures (e.g. spatial or temporal buffers) must be implemented.

State of California

California Endangered Species Act

The California Endangered Species Act (CESA) is similar to the ESA, but pertains to state-listed endangered and threatened species. The CESA requires state agencies to consult with the CDFW when preparing documents to comply with the California Environmental Quality Act (CEQA). The purpose is to ensure that the actions of the lead agency do not jeopardize the continued existence of a listed species or result in the destruction, or adverse modification of habitat essential to the continued existence of those species. In addition to formal listing under the federal and state endangered species acts, "species of special concern" receive consideration by CDFW. Species of special concern are those whose numbers, reproductive success, or habitat may be threatened.

California Fish and Game Code (§3503.5)

The CFGC (§3503.5) states that it is "unlawful to take, possess, or destroy any birds in the order Falconiformes (hawks, eagles, and falcons) or Strigiformes (all owls except barn owls) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto." Take includes the disturbance of an active nest resulting in the abandonment or loss of young. The CFGC (§3503) also states that "it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto."

Lake and Streambed Alteration Agreement, CFGC (§1602)

The CDFW is a trustee agency that has jurisdiction under the CFGC (§1600 et seq.). The California Fish and Game Code (§1602), requires that a state or local government agency, public utility, or private entity must notify CDFW if a proposed Project will "substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake designated by the department, or use any material from the streambeds… except when the department has been notified pursuant to Section 1601." If an existing fish or wildlife resource may be substantially adversely affected by the activity, CDFW may propose reasonable measures that will allow protection of those resources. If these measures are agreeable to the parties involved, they may enter into an agreement with CDFW identifying the approved activities and associated mitigation measures.

Rare and Endangered Plants

The CNPS maintains a list of plant species native to California with low population numbers, limited distribution, or otherwise threatened with extinction. This information is published in the Inventory of Rare and Endangered Vascular Plants of California. Potential impacts to populations of CNPS California Rare Plant Rank (CRPR) plants receive consideration under CEQA review. The CNPS CRPR categorizes plants as follows:

- Rank 1A: Plants presumed extinct in California;

- Rank 1B: Plants rare, threatened, or endangered in California or elsewhere;
- Rank 2A: Plants presumed extirpated or extinct in California, but not elsewhere;
- Rank 2B: Plants rare, threatened, or endangered in California, but more numerous elsewhere;
- Rank 3: Plants about which we need more information; and
- Rank 4: Plants of limited distribution.

The California Native Plant Protection Act (CFGC §1900-1913) prohibits the taking, possessing, or sale within the state of any plants with a state designation of rare, threatened, or endangered as defined by CDFW. An exception to this prohibition allows landowners, under specific circumstances, to take listed plant species, provided that the owners first notify CDFW and give the agency at least 10 days to retrieve (and presumably replant) the plants before they are destroyed. Fish and game Code §1913 exempts from the 'take' prohibition "the removal of endangered or rare native plants from a canal, lateral channel, building site, or road, or other right of way."

California Environmental Quality Act Guidelines §15380

Although threatened and endangered species are protected by specific federal and state statutes, CEQA Guidelines §15380(d) provides that a species not listed on the federal or state list of protected species may be considered rare or endangered if the species can be shown to meet certain specified criteria. These criteria have been modeled based on the definition in the ESA and the section of the CFGC dealing with rare, threatened, and endangered plants and animals. The CEQA Guidelines (§15380) allows a public agency to undertake a review to determine if a significant effect on species that have not yet been listed by either the USFWS or CDFW (e.g. candidate species, species of concern) would occur. Thus, CEQA provides an agency with the ability to protect a species from a project's potential impacts until the respective government agencies have an opportunity to designate the species as protected, if warranted.

CONCLUSIONS AND RECOMMENDATIONS

Endangered, Threatened and Rare Plants

Redding checkerbloom, a CNPS Rank 3 plant species, was observed within the BSA during the protocol-level botanical survey conducted on May 7, 2018. Since a Rank 3 plant is considered to be on a review list, more information is still needed on the plant to make a rarity determination. It is recommended that Redding checkerbloom be avoided to the greatest extent feasible. However, if avoidance is not feasible, impacts to this species from construction activities should be identified during the California Environmental Quality Act (CEQA) review process. Recommended mitigation measures included documenting the acreage of occupied habitat impacted, submitting a California Native Species Field

Survey Form to CDFW, and notifying CDFW at least 10 days prior to affecting Redding Checkerbloom to allow CDFW to salvage of the species.

Endangered, Threatened, and Special-status Wildlife

The following minimization and mitigation measures further reduce or eliminate project associated impacts to special-status wildlife species.

Western Red and Pallid Bats

To minimize impacts to bat species protected by the CFGC the following are recommended avoidance and minimization measures:

- Mature trees should be removed and/or fallen between September 16 – March 15 outside of the bat maternity season. Trees should be removed at dusk to minimize impacts to roosting bats.

Migratory Birds and Raptors

To avoid impacts to avian species protected under the MBTA and the CFGC the following are recommended avoidance and minimization measures for migratory birds and raptors:

- Project activities including site grubbing and vegetation removal shall be initiated outside of the bird nesting season (February 1 – August 31).

- If Project activities cannot be initiated outside of the bird nesting season than the following will occur:
  - A qualified biologist will conduct a pre-construction survey within 250 feet of the BSA, where accessible, within 7 days prior to the start of Project activities.

  - If an active nest (i.e. containing egg(s) or young) is observed within the BSA or in an area adjacent to the BSA where impacts could occur, then a species protection buffer will be established. The species protection buffer will be defined by the qualified biologist based on the species, nest type and tolerance to disturbance. Construction activity shall be prohibited within the buffer zones until the young have fledged or the nest fails. Nests shall be monitored by a qualified biologist once per week and a report submitted to the CEQA lead agency weekly.

Other Natural Resources

Waters of the United States

If activities occur within the OHWM and/or result in fill or discharge to any Waters of the U.S which include but are not limited to, intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands," sloughs, prairie potholes, wet meadows, playa lakes, vernal pools or natural ponds, then the following will need to be obtain:

- Prior to any discharge or fill material into Waters of the U.S, authorization under a Nationwide Permit or Individual Permit shall be obtained from the Corps. For fill requiring a CWA §404 permit, a water quality certification from the Regional Water Quality Board (Clean Water Act §401) shall also be obtained prior to discharge of dredged or fill material.

- Prior to any activities that would obstruct the flow of or alter the bed, channel, or bank of any perennial, intermittent or ephemeral creeks, notification of streambed alteration shall be submitted to the CDFW, and, if required, a Lake and Streambed Alteration Agreement (§1602) shall be obtained.

Mitigation requirements for the fill of Waters of the U.S. will be satisfied by purchasing mitigation credits for like kind resource at an agency approved mitigation bank.

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LIST OF PREPARERS

Elena Gregg. Senior Botanist. B.S. in Environmental Biology and Management, University of California, Davis. Mrs. Gregg has over 11 years' experience conducting rare plant surveys, habitat assessments, wetland delineations, and preparing reports.

Jody Gallaway. Senior Biologist and President of Gallaway Enterprises, Inc. M.S. Biology. B.S. Biology. California State University, Chico. Mrs. Gallaway has had over 20 years of extensive work experience in the Sacramento Valley and surrounding areas working with local, state and federal agencies, agricultural communities, and the private sector conducting environmental surveys and reports.

Appendix A

Species List

Selected Elements by Common Name

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: Quad IS (Project City (4012263) OR Bohemotash Mtn. (4012274) OR O'Brien (4012273) OR Bella Vista (4012262) OR Palo Cedro (4012252) OR Minnesota Mtn. (4012272) OR Shasta Dam (4012264) OR Redding (4012254) OR Enterprise (4012253))

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Ahart's paronychia *Paronychia ahartii*	PDCAR0L0V0	None	None	G3	S3	1B.1
American peregrine falcon *Falco peregrinus anatum*	ABNKD06071	Delisted	Delisted	G4T4	S3S4	FP
Antioch Dunes anthicid beetle *Anthicus antiochensis*	IICOL49020	None	None	G1	S1	
bald eagle *Haliaeetus leucocephalus*	ABNKC10010	Delisted	Endangered	G5	S3	FP
bank swallow *Riparia riparia*	ABPAU08010	None	Threatened	G5	S2	
Bellinger's meadowfoam *Limnanthes floccosa ssp. bellingeriana*	PDLIM02041	None	None	G4T2T3	S1	1B.2
big-scale balsamroot *Balsamorhiza macrolepis*	PDAST11061	None	None	G2	S2	1B.2
Boggs Lake hedge-hyssop *Gratiola heterosepala*	PDSCR0R060	None	Endangered	G2	S2	1B.2
Butte County fritillary *Fritillaria eastwoodiae*	PMLIL0V060	None	None	G3Q	S3	3.2
California linderiella *Linderiella occidentalis*	ICBRA06010	None	None	G2G3	S2S3	
Cantelow's lewisia *Lewisia cantelovii*	PDPOR04020	None	None	G3	S3	1B.2
Canyon Creek stonecrop *Sedum obtusatum ssp. paradisum*	PDCRA0A0U3	None	None	G4G5T3	S3	1B.3
chinook salmon - Central Valley spring-run ESU *Oncorhynchus tshawytscha pop. 6*	AFCHA0205A	Threatened	Threatened	G5	S1	
chinook salmon - Sacramento River winter-run ESU *Oncorhynchus tshawytscha pop. 7*	AFCHA0205B	Endangered	Endangered	G5	S1	
dubious pea *Lathyrus sulphureus var. argillaceus*	PDFAB25101	None	None	G5T1T2	S1S2	3
fisher - West Coast DPS *Pekania pennanti*	AMAJF01021	None	Candidate Threatened	G5T2T3Q	S2S3	SSC
foothill yellow-legged frog *Rana boylii*	AAABH01050	None	Candidate Threatened	G3	S3	SSC
great egret *Ardea alba*	ABNGA04040	None	None	G5	S4	
Great Valley Cottonwood Riparian Forest *Great Valley Cottonwood Riparian Forest*	CTT61410CA	None	None	G2	S2.1	

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Great Valley Valley Oak Riparian Forest *Great Valley Valley Oak Riparian Forest*	CTT61430CA	None	None	G1	S1.1	
Great Valley Willow Scrub *Great Valley Willow Scrub*	CTT63410CA	None	None	G3	S3.2	
Henderson's bent grass *Agrostis hendersonii*	PMPOA040K0	None	None	G2Q	S2	3.2
Klamath sideband *Monadenia churchi*	IMGASC7010	None	None	G2G3	S2	
kneecap lanx *Lanx patelloides*	IMGASL7030	None	None	G2	S2	
legenere *Legenere limosa*	PDCAM0C010	None	None	G2	S2	1B.1
North American porcupine *Erethizon dorsatum*	AMAFJ01010	None	None	G5	S3	
northern clarkia *Clarkia borealis ssp. borealis*	PDONA05062	None	None	G3T3	S3	1B.3
Oregon shoulderband *Helminthoglypta hertleini*	IMGASC2280	None	None	G1	S1S2	
osprey *Pandion haliaetus*	ABNKC01010	None	None	G5	S4	WL
oval-leaved viburnum *Viburnum ellipticum*	PDCPR07080	None	None	G4G5	S3?	2B.3
Pacific lamprey *Entosphenus tridentatus*	AFBAA02100	None	None	G4	S4	SSC
pallid bat *Antrozous pallidus*	AMACC10010	None	None	G5	S3	SSC
purple martin *Progne subis*	ABPAU01010	None	None	G5	S3	SSC
Red Bluff dwarf rush *Juncus leiospermus var. leiospermus*	PMJUN011L2	None	None	G2T2	S2	1B.1
Sacramento anthicid beetle *Anthicus sacramento*	IICOL49010	None	None	G1	S1	
Sanford's arrowhead *Sagittaria sanfordii*	PMALI040Q0	None	None	G3	S3	1B.2
Shasta ageratina *Ageratina shastensis*	PDASTBX0R0	None	None	G3	S3	1B.2
Shasta chaparral *Trilobopsis roperi*	IMGASA2030	None	None	G1	S1	
Shasta fawn lily *Erythronium shastense*	PMLIL0U0V0	None	None	G2	S2	1B.2
Shasta hesperian *Vespericola shasta*	IMGASA4070	None	None	G1	S1	

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Shasta huckleberry *Vaccinium shastense ssp. shastense*	PDERI181Z1	None	None	G4T3	S3	1B.3
Shasta limestone monkeyflower *Erythranthe taylorii*	PDPHR01080	None	None	G2	S2	1B.1
Shasta salamander *Hydromantes shastae*	AAAAD09030	None	Threatened	G1G2	S3	
Shasta sideband *Monadenia troglodytes troglodytes*	IMGASC7091	None	None	G1G2T1T2	S1S2	
Shasta snow-wreath *Neviusia cliftonii*	PDROS14020	None	None	G2	S2	1B.2
silky cryptantha *Cryptantha crinita*	PDBOR0A0Q0	None	None	G2	S2	1B.2
silver-haired bat *Lasionycteris noctivagans*	AMACC02010	None	None	G5	S3S4	
slender Orcutt grass *Orcuttia tenuis*	PMPOA4G050	Threatened	Endangered	G2	S2	1B.1
spotted bat *Euderma maculatum*	AMACC07010	None	None	G4	S3	SSC
steelhead - Central Valley DPS *Oncorhynchus mykiss irideus pop. 11*	AFCHA0209K	Threatened	None	G5T2Q	S2	
Sulphur Creek brodiaea *Brodiaea matsonii*	PMLIL0C0H0	None	None	G1	S1	1B.1
Townsend's big-eared bat *Corynorhinus townsendii*	AMACC08010	None	None	G3G4	S2	SSC
tricolored blackbird *Agelaius tricolor*	ABPBXB0020	None	Candidate Endangered	G2G3	S1S2	SSC
valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	IICOL48011	Threatened	None	G3T2	S2	
vernal pool fairy shrimp *Branchinecta lynchi*	ICBRA03030	Threatened	None	G3	S3	
vernal pool tadpole shrimp *Lepidurus packardi*	ICBRA10010	Endangered	None	G4	S3S4	
western pearlshell *Margaritifera falcata*	IMBIV27020	None	None	G4G5	S1S2	
western pond turtle *Emys marmorata*	ARAAD02030	None	None	G3G4	S3	SSC
western spadefoot *Spea hammondii*	AAABF02020	None	None	G3	S3	SSC
Wintu sideband *Monadenia troglodytes wintu*	IMGASC7092	None	None	G1G2T1T2	S1S2	
woolly meadowfoam *Limnanthes floccosa ssp. floccosa*	PDLIM02043	None	None	G4T4	S3	4.2

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Yuma myotis	AMACC01020	None	None	G5	S4	
Myotis yumanensis						

Record Count: 62

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

NOT FOR CONSULTATION

Location

Shasta County, California

Local office

Sacramento Fish And Wildlife Office

(916) 414-6600
(916) 414-6713

Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

NOT FOR CONSULTATION

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Birds

NAME	STATUS

Northern Spotted Owl Strix occidentalis caurina — Threatened
There is **final** critical habitat for this species. Your location is outside the critical habitat.
https://ecos.fws.gov/ecp/species/1123

Amphibians

NAME	STATUS
California Red-legged Frog Rana draytonii There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/2891	Threatened

Fishes

NAME	STATUS
Delta Smelt Hypomesus transpacificus There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/321	Threatened

Crustaceans

NAME	STATUS
Shasta Crayfish Pacifastacus fortis No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8284	Endangered
Vernal Pool Fairy Shrimp Branchinecta lynchi There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/498	Threatened

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Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

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The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT

THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)

Bald Eagle Haliaeetus leucocephalus — Breeds Jan 1 to Aug 31
This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

California Thrasher Toxostoma redivivum — Breeds Jan 1 to Jul 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Common Yellowthroat Geothlypis trichas sinuosa — Breeds May 20 to Jul 31
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/2084

Costa's Hummingbird Calypte costae — Breeds Jan 15 to Jun 10
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/9470

Golden Eagle Aquila chrysaetos — Breeds Jan 1 to Aug 31
This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/1680

Lewis's Woodpecker Melanerpes lewis — Breeds Apr 20 to Sep 30
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9408

Nuttall's Woodpecker Picoides nuttallii — Breeds Apr 1 to Jul 20
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/9410

Oak Titmouse Baeolophus inornatus — Breeds Mar 15 to Jul 15
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9656

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Rufous Hummingbird selasphorus rufus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/8002

Song Sparrow Melospiza melodia — Breeds Feb 20 to Sep 5
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Spotted Towhee Pipilo maculatus clementae — Breeds Apr 15 to Jul 20
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/4243

Yellow-billed Magpie Pica nuttalli — Breeds Apr 1 to Jul 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9726

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Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of

presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

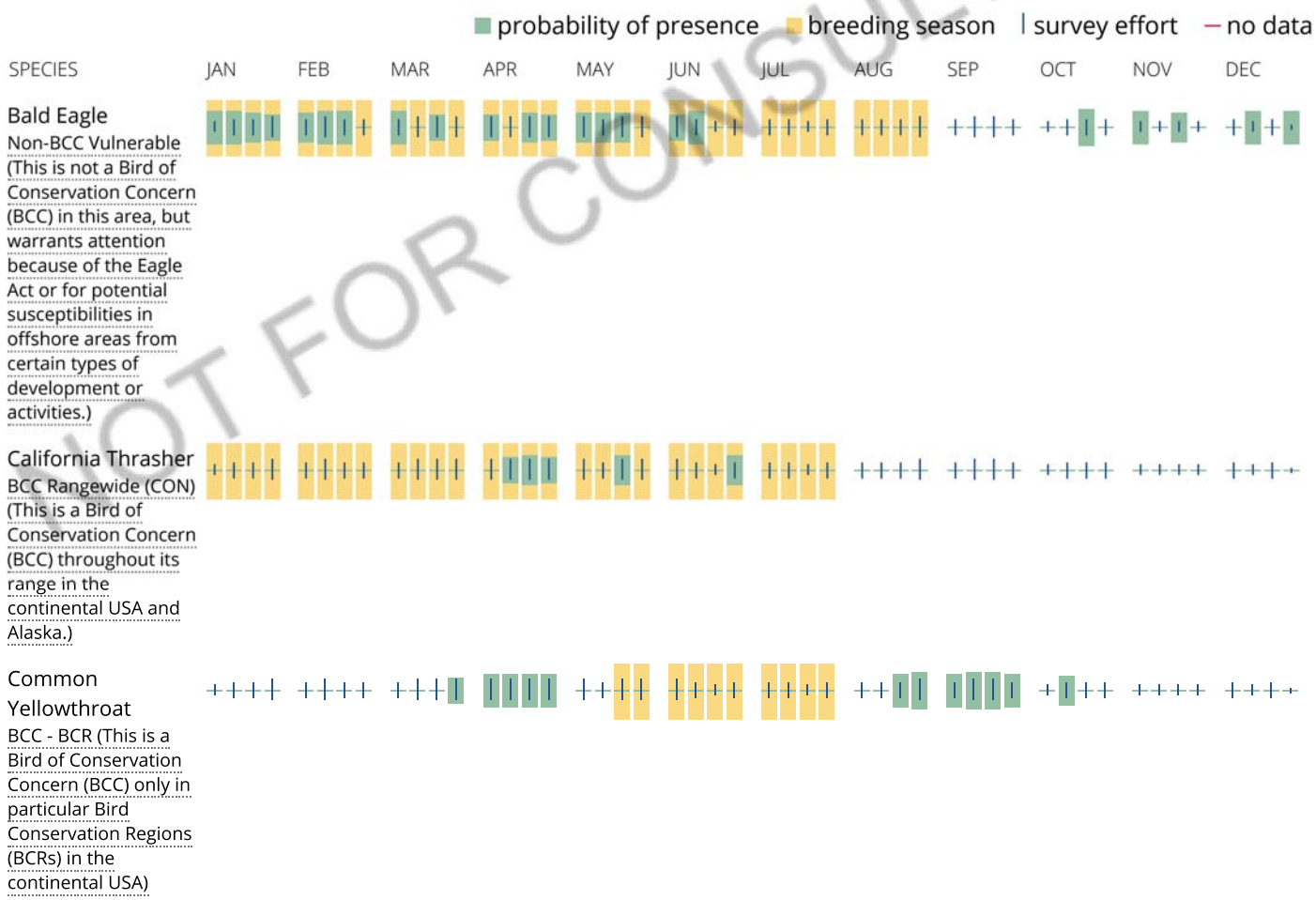
Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



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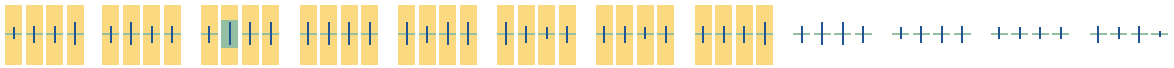
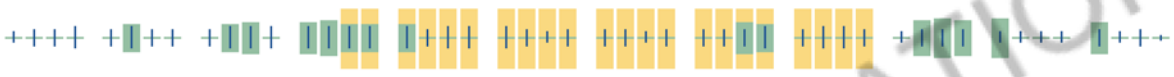
Costa's Hummingbird
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

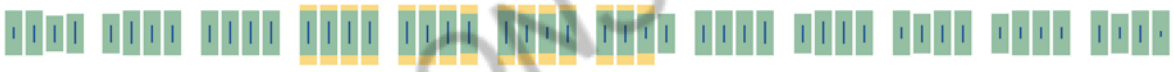
Golden Eagle
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)



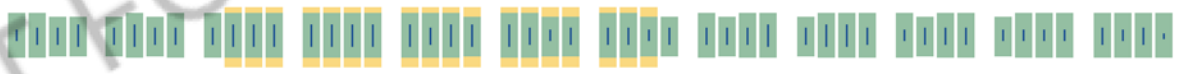
Lewis's Woodpecker
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Nuttall's Woodpecker
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

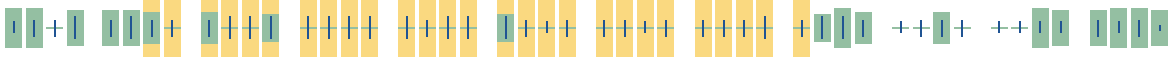


Oak Titmouse
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Rufous Hummingbird
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Song Sparrow
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



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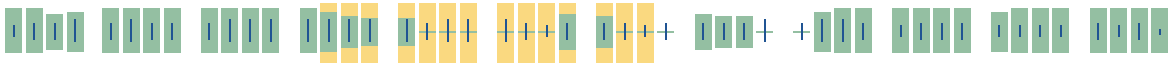
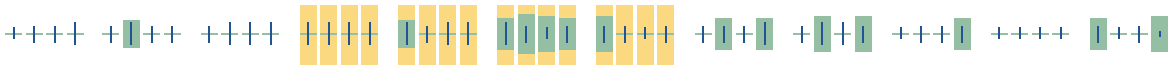
Spotted Towhee
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



Yellow-billed Magpie
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the E-bird Explore Data Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

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To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ “What does IPaC use to generate the migratory birds potentially occurring in my specified location”. Please be aware this report provides the “probability of presence” of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the “no data” indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to

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confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

Wildlife refuges and fish hatcheries

REFUGE AND FISH HATCHERY INFORMATION IS NOT AVAILABLE AT THIS TIME

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

THERE ARE NO KNOWN WETLANDS AT THIS LOCATION.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

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Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

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Inventory of Rare and Endangered Plants - 7th edition interface

v7-18mar 3-19-18

Status: search results - Thu, May. 17, 2018 12:54 ET c

{QUADS_123} =~ m/647A|665C|665D|646B|646C|664C|647B|647C|647D/ Search

Tip: `Lathyrus Astragalus` returns species from both genera.[all tips and help.][search history]

Your Quad Selection: Project City (647A) 4012263, Bohemotash Mountain (665C) 4012274, O'brien (665D) 4012273, Bella Vista (646B) 4012262, Palo Cedro (646C) 4012252, Minnesota Mountain (664C) 4012272, Shasta Dam (647B) 4012264, Redding (647C) 4012254, Enterprise (647D) 4012253

Hits 1 to 23 of 23

Requests that specify topo quads will return only Lists 1-3.

To save selected records for later study, click the ADD button.

ADD checked items to Plant Press | check all | check none

Selections will appear in a new window.

open	save	hits	scientific	common	family	CNPS
		1	**Ageratina shastensis**	Shasta ageratina	Asteraceae	List 1B.2
		1	**Agrostis hendersonii**	Henderson's bent grass	Poaceae	List 3.2
		1	**Balsamorhiza macrolepis**	big-scale balsamroot	Asteraceae	List 1B.2
		1	**Brodiaea matsonii**	Sulphur Creek brodiaea	Themidaceae	List 1B.1
		1	**Clarkia borealis ssp. borealis**	northern clarkia	Onagraceae	List 1B.3
		1	**Cryptantha crinita**	silky cryptantha	Boraginaceae	List 1B.2
		1	**Erythranthe taylorii**	Shasta limestone monkeyflower	Phrymaceae	List 1B.1
		1	**Erythronium shastense**	Shasta fawn lily	Liliaceae	List 1B.2
		1	**Fritillaria eastwoodiae**	Butte County fritillary	Liliaceae	List 3.2
		1	**Gratiola heterosepala**	Boggs Lake hedge-hyssop	Plantaginaceae	List 1B.2
		1	**Juncus leiospermus var. leiospermus**	Red Bluff dwarf rush	Juncaceae	List 1B.1
		1	**Lathyrus sulphureus var. argillaceus**	dubious pea	Fabaceae	List 3
		1	**Legenere limosa**	legenere	Campanulaceae	List 1B.1
		1	**Lewisia cantelovii**	Cantelow's lewisia	Montiaceae	List 1B.2
		1	**Limnanthes floccosa ssp. bellingeriana**	Bellinger's meadowfoam	Limnanthaceae	List 1B.2
		1	**Neviusia cliftonii**	Shasta snow-wreath	Rosaceae	List 1B.2
		1	**Orcuttia tenuis**	slender Orcutt grass	Poaceae	List 1B.1
		1	**Paronychia ahartii**	Ahart's paronychia	Caryophyllaceae	List 1B.1
		1	**Sagittaria sanfordii**	Sanford's arrowhead	Alismataceae	List

						1B.2
		1	**Sedum obtusatum ssp. paradisum**	Canyon Creek stonecrop	Crassulaceae	List 1B.3
		1	**Sidalcea celata**	Redding checkerbloom	Malvaceae	List 3
		1	**Vaccinium shastense ssp. shastense**	Shasta huckleberry	Ericaceae	List 1B.3
		1	**Viburnum ellipticum**	oval-leaved viburnum	Adoxaceae	List 2B.3

To save selected records for later study, click the ADD button.
ADD checked items to Plant Press | check all | check none
Selections will appear in a new window.

No more hits.

Appendix B

Observed Species

Plant Species Observed within the Mission Hills Subdivision Project May 7, 2018	
Scientific Name	**Common Name**
Acmispon americanus	Spanish lotus
Aesculus californica	California buckeye
Aira caryophyllea	Silver hairgrass
Allium amplectens	Clasping onion
Anthoxanthum odoratum	Sweet vernal grass
Arctostaphylos manzanita ssp. manzanita	Big manzanita
Aristolochia californica	California pipevine
Avena barbata	Wild oats
Brassica nigra	Black mustard
Briza maxima	Greater quaking-grass
Briza minor	Lesser quaking-grass
Bromus diandrus	Rip-gut brome
Bromus hordeaceus	Soft chess
Bromus madritensis ssp. rubens	Red brome
Calochortus coeruleus	Blue star tulip
Calystegia occidentalis ssp. occidentalis	Western morning glory
Carduus pycnocephalus	Italian thistle
Castilleja attenuata	Valley tassels
Ceanothus cuneatus var. cuneatus	Buck brush
Centaurea solstitialis	Yellow star thistle
Cerastium glomeratum	Mouse-eared chickweed
Cercis occidentalis	Western redbud
Chlorogalum pomeridianum var. pomeridianum	Wavyleaf soap-plant
Dichelostemma capitatum	Blue dicks
Dichelostemma volubile	Twining ookow
Drymocallis glandulosa var. reflexa	Sticky cinquefoil
Elymus caput-medusae	Medusahead
Elymus glaucus	Blue wildrye
Eriophyllum lanatum var. grandiflorum	Large-flowered wooly sunflower
Erodium brachycarpum	Foothill filaree
Festuca bromoides	Six-weeks fescue
Festuca myuros	Rattail fescue
Festuca perennis	Rye-grass
Frangula californica	California coffeeberry
Galium parisiense	Wall bedstraw
Geranium dissectum	Cut-leaved geranium
Githopsis specularioides	Common bluecup
Heteromeles arbutifolia	Toyon
Hordeum marinum ssp. *gussoneanum*	Mediterranean barley
Hordeum murinum	Wall hare barley
Hypericum perforatum	Klamathweed
Hypochaeris glabra	Smooth cat's ear
Juncus tenuis	Slender rush

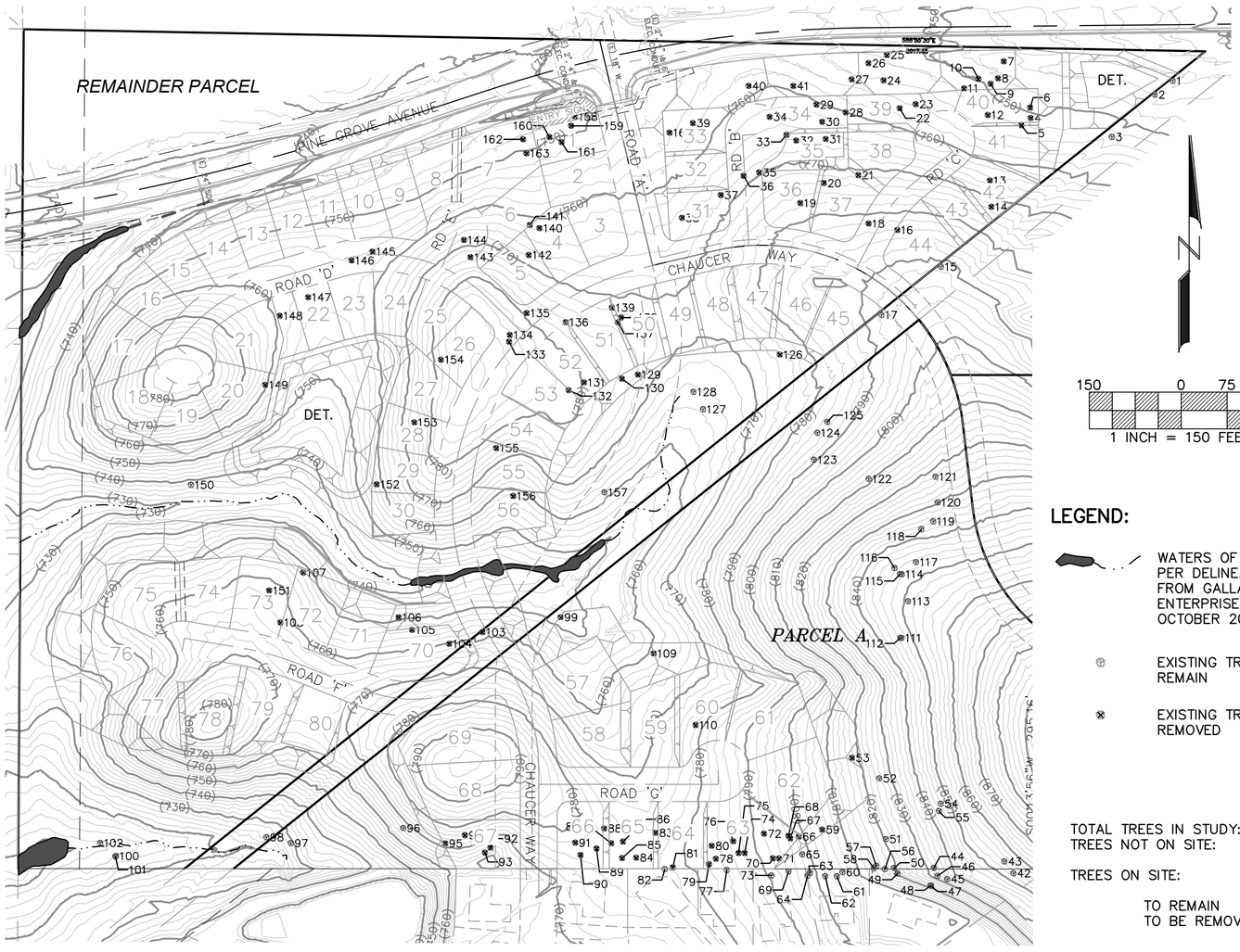
Scientific Name	**Common Name**
Keckiella lemmonii	Bush beardtongue
Leontodon saxatilis	Hawkbit
Lepidium nitidum	Shinning pepperweed
Logfia gallica	Narrowleaf cottonrose
Lonicera interrupta	Chaparral honeysuckle
Lupinus nanus	Sky lupine
Lysimachia arvensis	Scarlet pimpernel
Matricaria discoidea	Common pineapple weed
Medicago polymorpha	Common bur-clover
Mentha pulegium	Pennyroyal
Micropus californicus var. californicus	Q tips
Mimulus guttatus	Seep monkeyflower
Navarretia sp.	Pincushion plant
Odontostomum hartwegii	Hartweg's odontostomum
Petrorhgia dubia	Grass-pink
Pinus sabiniana	Gray pine
Plagiobothrys fulvus	Common popcorn flower
Plagiobothrys stipitatus var. *micranthus*	Small-flowered popcornflower
Plantago erecta	Erect plantain
Polypogon monspeliensis	Rabbitsfoot grass
Pseudognaphalium luteoalbum	Weedy cudweed
Quercus douglasii	Blue oak
Quercus kelloggii	California black oak
Quercus wislizeni	Live oak
Ranunculus muricatus	Prickle-seeded buttercup
Ranunculus occidentalis var. occidentalis	Western buttercup
Raphanus sativus	Radish
Rubus armeniacus	Himalayan blackberry
Rumex crispus	Curly dock
Salix lasiolepis	Arroyo willow
Sanicula bipinnatifida	Purple sanicle
Senecio vulgaris	Old-man-in-the-Spring
Sherardia arvensis	Field-madder
Sidalcea celata	**Redding checkerbloom (CNPS Rank 3)**
Silybum marianum	Milk thistle
Sonchus asper	Sow thistle
Spergularia bocconi	Sandspurry
Thalictrum fendleri	Meadow rue
Torilis arvensis	Hedge parsley
Toxicodendron diversilobum	Poison oak
Trifolium dubium	Shamrock clover
Trifolium hirtum	Rose clover
Trifolium incarnatum	Crimson clover
Trifolium microcephalum	Maiden clover
Trifolium varigatum	White-tipped clover

Scientific Name	Common Name
Trifolium willdenovii	Wildcat clover
Veronica anagallis-aquatica	Water speedwell
Vicia sativa	Garden vetch
Vicia villosa	Winter vetch
Vitis californica	Wild grape

Wildlife Species Observed Within the Mission Hills Subdivision BSA May 7, 2018	
Scientific Name	**Common Name**
Birds	
Accipiter cooperii	Cooper's hawk
Aphelocoma californica	Scrub jay
Callipepla californica	California quail
Cathartes aura	Turkey vulture
Corvus brachyrhynchos	American crow
Corvus corax	Common raven
Melanerpes formicivorus	Acorn woodpecker
Meleagris gallopavo	Wild turkey
Melozone crissalis	Spotted towhee
Psaltriparus minimus	Bushtit
Sayornis nigricans	Black phoebe
Spinus psaltria	Lesser goldfinch
Spizella passerina	Chipping sparrow
Mammals	
Odocoileus hemionus	Mule deer
Sciurus griseus	Western gray squirrel
Reptiles and Amphibians	
Elgaria multicarinata	Southern alligator lizard
Sceloporus occidentalis occidentalis	Northwestern fence lizard

APPENDIX C

Tree Inventory
Sharrah Dunlap Sawyer, 2020



LEGEND:

WATERS OF THE U.S. PER DELINEATION FROM GALLAWAY ENTERPRISES DATED OCTOBER 2017

EXISTING TREE TO REMAIN

EXISTING TREE TO BE REMOVED

TOTAL TREES IN STUDY: 164
TREES NOT ON SITE: 23

TREES ON SITE: 141

TO REMAIN 34
TO BE REMOVED 107

Tree #	Species	DBH	Cond.	Health	Remain	Remove
89	Qk	F16,13,10	G	G		X
90	Qd	13	G	G		X
91	Qk	15	G	G		X
92	Qw	F11,+	G	G		X
93	Qw	12	G	G		X
94	Qw	S12,11,10,+	G	G		X
95	Qw	S10,+	G	G		X
96	Qw	S17,+	P	P	X	
97	Qd	16	P	P	X	
98	Qd	15	G	G	n/a	n/a
99	Qd	18	G	G		X
100	Ps	13	G	G	X	
101	Ps	13	G	G	X	
102	Ps	22	G	G	X	
103	Qw	16	G	G	n/a	n/a
104	Qw	F13,11	G	G		X
105	Qk	S10,10,10,+	G	G		X
106	Qw	11	G	G		X
107	Qk	S10,+	G	G		X
108	Qk	S10,+	G	G		X
109	Qd	20	G	G		X
110	Qw	23	P	P		X
111	Qw	S12,11,+	G	G	X	
112	Qw	S13,11,+	G	G	X	
113	Qw	S14,+	G	G	X	
114	Qw	S15,13	G	G	X	
115	Qw	S11,+	G	G	X	
116	Qw	13	G	G	X	
117	Qk	10	G	G	X	
118	Qk	S12,10	G	G	X	
119	Qk	S10,+	G	G	X	
120	Qk	S11,+	G	G	X	
121	Qk	28	G	G	X	
122	Qk	14	G	G	X	
123	Qk	30	P	P	X	
124	Qw	19	G	G	X	
125	Qk	S11,11,10,+	G	G	X	
126	Qk	19	G	G		X
127	Qk	S17,15,13	G	G	X	
128	Qk	11	G	G	X	
129	Qk	S11,11,+	G	G		X
130	Qw	15	G	G		X

Tree #	Species	DBH	Cond.	Health	Remain	Remove
131	Qk	S10,+	G	G		X
132	Qk	21	P	G		X
133	Qk	S11,10,+	G	G		X
134	Qw	10	G	G		X
135	Qk	S11,10,+	G	G		X
136	Qk	F10,+	G	G		X
137	Qk	13	G	G		X
138	Qk	S12,+	G	G		X
139	Qk	F15,12	G	G		X
140	Qw	18	G	G		X
141	Qk	S11,+	G	G		X
142	Qk	S10,+	G	G		X
143	Qk	20	G	G		X
144	Qk	F10,+	G	G		X
145	Qw	S10,+	G	G		X
146	Qk	S11,+	G	G		X
147	Qw	S13,+	G	G		X
148	Qw	S11,+	G	G		X
149	Qw	F14,10	P	G		X
150	Qw	S12,+	G	G	X	
151	Qk	S10,+	G	G		X
152	Qk	14	G	G		X
153	Qw	22	G	G		X
154	Qw	13	G	G		X
155	Qk	S10,+	G	G		X
156	Qw	11	G	G		X
157	Qw	S15,15	G	G	X	
158	Ps	15	G	G		X
159	Qw	S14,+	G	G		X
160	Qw	14	G	G		X
161	Qw	S12,+	G	G		X
162	Qw	11	G	G		X
163	Ps	10	P	G		X
164	Qw	S10,11,+	G	G		X

TREE LEGEND:

Qd	BLUE OAK
Qk	BLACK OAK
Qw	LIVE OAK
Ps	FOOTHILL PINE
S	STUMP SPROUTS
F	FORKED TREE W/FORK BELOW D.B.H.
+	MORE THAN ONE STEM UNDER 10" D.B.H.
G	GOOD HEALTH
P	POOR HEALTH
n/a	TREE FOUND NOT TO BE ON PROPERTY

Tree #	Species	DBH	Cond.	Health	Remain	Remove
1	Qd	F13,12,12	G	G	n/a	n/a
2	Qd	12	G	G	n/a	n/a
3	Qd	17	G	G	n/a	n/a
4	Qd	18	G	G		X
5	Qd	14	G	G		X
6	Qd	20	G	G		X
7	Qd	29	G	G		X
8	Qd	14	G	G		X
9	Qd	12	G	G		X
10	Qd	18	G	G		X
11	Qd	16	G	G		X
12	Qd	16	G	G		X
13	Qk	S10,10	G	G		X
14	Qk	26	G	G		X
15	Qk	S,11,11,10,10	G	G	n/a	n/a
16	Qk	F11,11	G	G		X
17	Qk	S19,16,X	G	G	n/a	n/a
18	Qk	13	G	G		X
19	Qk	F21,19	G	G		X
20	Qk	10	G	G		X
21	Qk	F10,+	G	G		X
22	Qd	16	G	G		X

Tree #	Species	DBH	Cond.	Health	Remain	Remove
23	Qd	F10,10	P	P		X
24	Qd	19	G	G		X
25	Qd	13	G	G		X
26	Qd	14	G	G		X
27	Qd	16	G	G		X
28	Qd	20	G	G		X
29	Qd	15	G	G		X
30	Qd	14	G	G		X
31	Qd	12	G	G		X
32	Qk	17	P	P		X
33	Qd	F12,+	G	G		X
34	Qd	F13,11,+	G	G		X
35	Qd	12	P	P		X
36	Qd	14	G	G		X
37	Qk	12	G	G		X
38	Qk	F12,11,+	G	G		X
39	Qw	F14,12	G	G		X
40	Qd	15	G	G		X
41	Qd	12	G	G		X
42	Qw	S10,10,10	G	G	n/a	n/a
43	Qw	11	G	G	X	
44	Qw	F15,13,12	G	G	X	

Tree #	Species	DBH	Cond.	Health	Remain	Remove
45	Qw	14	G	G	n/a	n/a
46	Qw	13	P	P	n/a	n/a
47	Qw	12	G	G	n/a	n/a
48	Qw	F11,+	G	G	n/a	n/a
49	Qw	13	P	P	n/a	n/a
50	Qw	S11,+	G	G	X	
51	Qd	19	G	G	X	
52	Qk	29	G	G	X	
53	Qk	29	G	G		X
54	Qw	19	G	G	X	
55	Qw	F21,10	G	G	X	
56	Qw	13	G	G	n/a	n/a
57	Qw	11	P	P	X	
58	Qw	F11,11	G	G	X	
59	Qw	F15,12	G	G		X
60	Qw	11	G	G	n/a	n/a
61	Qk	S11,11,11,+	G	G	n/a	n/a
62	Qw	15	G	G	n/a	n/a
63	Qw	12	G	G	n/a	n/a
64	Qk	F13,11,+	G	G	n/a	n/a
65	Qd	34	G	G	X	
66	Qk	11	G	G		X

Tree #	Species	DBH	Cond.	Health	Remain	Remove
67	Qd	11	P	P		X
68	Qd	13	P	P		X
69	Qk	12	G	G	n/a	n/a
70	Qw	14	G	G		X
71	Qk	S12,+	G	G		X
72	Qk	S14, +	G	G		X
73	Ps	22	G	G	n/a	n/a
74	Qw	12	G	G		X
75	Qw	S12,+	G	G		X
76	Qw	10	G	G		X
77	Qk	S12,12,11	G	G	n/a	n/a
78	Qk	10	G	G		X
79	Qw	11	G	G		X
80	Qw	F17,+	G	G		X
81	Qw	11	G	G		X
82	Qw	11	G	G	n/a	n/a
83	Qk	F22,17	G	G		X
84	Qk	F24,19,18,15	G	G		X
85	Qk	F12,+	G	G		X
86	Qk	F13,11	G	G		X
87	Qw	15	G	G		X
88	Qk	26	G	G		X

NOTE: REPLACEMENT TREES SHALL BE PROVIDED IN ACCORDANCE WITH THE STANDARDS IN SECTION 12.36.070 OF THE CITY OF SHASTA LAKE MUNICIPAL CODE. THIS INCLUDES THE NUMBER AND SPECIES OF TREES TO BE PLANTED AND TIMING FOR REPLANTING.

WINDSOR ESTATES 3
TREE INVENTORY SHEET

BEING A PORTION OF THE NORTH ½ OF THE NORTHWEST ¼ OF SECTION 6, T. 32N., R. 4W., M.D.M. IN THE CITY OF SHASTA LAKE, SHASTA COUNTY, CALIFORNIA

FOR

CORNERSTONE DEVELOPMENT GROUP, INC.

BY

SHARRAH DUNLAP SAWYER, INC.
Civil Engineering • Land Planning • Surveying & Mapping
Landscape Architecture • Presentation Graphics
6590 Lockheed Drive, Redding, CA 96002
530.221.1792 voice • 530.221.8369 fax • info@sdsengineering.com

DATE: AUGUST 20, 2020 SCALE: 1"=150'

APPENDIX D

Geotechnical Investigation Report
Brown & Mills, Inc, 2003

Update to Geotechnical Report
CGI Technical Services, Inc., 2020

GEOTECHNICAL INVESTIGATION REPORT

PROPOSED RESIDENTIAL SUBDIVISION

DEER CREEK MANOR
PINE GROVE AVENUE
SHASTA LAKE, CALIFORNIA

prepared by:

BROWN & MILLS, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS ■ CONSTRUCTION MATERIALS TESTING

January 7, 2003
BMI Project No. 02S-533

Mr. Kevin Peters
Omsberg & Company
304 "N" Street
Eureka, California 95501

Subject: Geotechnical Investigation
Proposed Residential Subdivision
Deer Creek Manor
Shasta Lake, California

Dear Mr. Peters:

Brown & Mills is pleased to present the attached geotechnical investigation report for a proposed residential subdivision to be located south of Pine Grove Avenue (and west of Salt Creek) in the city of Shasta Lake, California. Based on the results of our investigation, it is our professional opinion the site may be developed for the proposed residential subdivision generally using conventional grading and foundation construction techniques. However, due to certain site conditions identified by our field exploration program, special design and/or construction provisions may be required for some project features. A brief summary of these conditions is provided below.

- Rock was initially encountered in a majority of the test pits performed for this investigation at depths as shallow as about 1 to 5 feet below existing site grade. Further, backhoe refusal on rock was encountered in the test pits designated TP-2, TP-3, TP-5, TP-6, TP-7, TP-8, TP-10, and TP-16 at depths of about 3 to 7 feet below existing site grade and outcrops of less-weathered rock were observed within some areas of the site. Based on this experience as well as our general knowledge of the site area, we anticipate even shallow trench excavations within some areas of the site will be difficult (if not impossible) with a conventional backhoe (such as a Case 580 or equivalent). Therefore, a large track-mounted excavator (such as a Caterpillar 320 or equivalent), equipped with a single ripper tooth and/or a hydraulic percussion hammer, may be required to advance some (if not most) on-site excavations. Blasting may also be required if less-weathered zones of rock are encountered within these excavations.

9940 Business Park Drive, Suite 140, Sacramento, California 95827 Phone (916)362-5541 FAX (916)362-3454

- Excavations required for general site grading are anticipated to be possible over a majority of the site and to depths of about 5 to 10 feet below existing site grade using heavy earthwork equipment (such as a Caterpillar D8 or equivalent). In areas where weathered rock is encountered, initial ripping may be required to facilitate removal of these materials. Deeper excavations, or excavations within areas of the site where shallow (or localized zones) of hard rock are encountered, may require blasting.

- In addition to possible excavation difficulties, perched water may develop above on-site rock subsequent to wet weather. The presence of perched groundwater could hinder trenching and/or earthwork operations, requiring temporary dewatering to facilitate some trench and/or deeper earthwork excavations. Further, the presence of perched groundwater could result in excessive vapor and/or water transmission into the planned structures. Hence, provisions should be incorporated into the civil design of the project to minimize surface water infiltration (see section herein entitled: "SURFACE DRAINAGE") and to intercept subsurface water (see sections herein entitled: "TRENCH BACKFILL - Water Seepage Along Trenches Backfilled With Coarse Material" and "EARTHEN SLOPES - Slope Toe Drains").

- On-site rock may require special handling and/or processing to reduce the size of the excavated material and meet the requirements provided herein for engineered fill (i.e., engineered fill should be generally less than 3 inches in maximum dimension). In order to use on-site rock for engineered fill, we recommend these materials either be: (1) processed (i.e., pulverized) with heavy equipment to reduce individual rock fragments to generally less than about 3 inches in maximum dimension; or (2) screened, raked, or selectively processed to remove individual rock fragments more than about 3 inches in maximum dimension. In general, we recommend all rock in excess of about 3 inches in maximum dimension be disposed of off-site or outside the construction limits.

- In addition to special handling and or processing procedures to meet the requirements provided herein for engineered fill, rock removed from some utility excavations may not meet the size requirements provided herein for trench backfill. Therefore, we anticipate rock materials excavated from some utility trenches may need to be removed and replaced with imported materials or finer-grained on-site soils.

- We anticipate some planned building areas may include an earthwork cut/fill transition which could be susceptible to excessive differential settlement due to nonuniform foundation subgrade conditions. This phenomenon would be especially pronounced where less-weathered rock is exposed within the cut portion of the building pad. We recommend the project Geotechnical Engineer review planned building pads during grading. If less-weathered rock is exposed within the cut portion of the lot, we

recommend this rock be excavated and replaced with engineered fill. Overexcavation of rock should include the entire building area (which has less-weathered rock present within 3 feet of finished subgrade) and extend to a depth of at least 3 feet below finished subgrade.

- Residential lots which have less-weathered rock present within the lot subgrade may be difficult to landscape and/or support landscape vegetation. Though landscape concerns are not part of this study, it may be advisable to remove and replace exposed, less-weathered rock with imported and/or on-site soil (possibly stockpiled specifically for this purpose) to facilitate future landscaping.

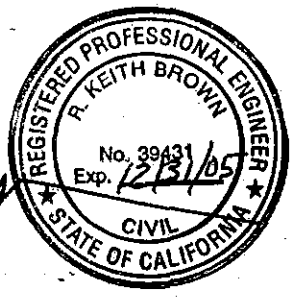
- We anticipate most cut slopes within the planned project may be constructed at a gradient of 2(h):1(v) or flatter. However, all cut slopes composed of rock should be reviewed during grading by the project Geotechnical Engineer for the presence of adverse bedding conditions. If adverse bedding conditions are encountered, flatter slopes or buttressing of the slope(s) may be required. Since the applicable method will depend on the conditions encountered as well as the location of the slope(s) with respect to adjoining natural features and possible planned improvements, the project Geotechnical Engineer should review conditions during construction and provide recommendations for possible mitigation schemes should they become necessary.

Specific comments regarding the conditions outlined above, as well as recommendations regarding the geotechnical aspects of project design and construction, are presented in the following report.

We appreciate the opportunity of providing our services for this project. If you have questions regarding this report, or if we may be of further assistance, please contact the undersigned.

Sincerely,

Brown & Mills, Inc.



R. Keith Brown, P.E.
Principal 1/7/03

cc: Client (4 bound copies)

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GEOTECHNICAL INVESTIGATION REPORT
PROPOSED RESIDENTIAL SUBDIVISION
DEER CREEK MANOR
SHASTA LAKE, CALIFORNIA

INTRODUCTION

GENERAL

This report presents the results of our geotechnical investigation for a proposed residential subdivision to be located south of Pine Grove Avenue (and west of Salt Creek) in the city of Shasta Lake, California. The purpose of our investigation was to explore and evaluate site subsurface conditions in order to develop recommendations related to the geotechnical aspects of project design and construction.

The approximate site location relative to existing topographic features and roads is shown on Plate 1.

PROPOSED CONSTRUCTION

We understand the proposed project will involve subdividing approximately 89 acres of mostly vacant land into 151 residential lots. Further, we understand one- and two-story single-family houses will be constructed on these lots. Planned houses will likely involve wood-frame structures supported on spread footings with a concrete slab-on-grade (first) floor. Maximum anticipated wall and column loads will be about one kip per lineal foot and 15 kips, respectively. Appurtenant construction will include asphalt-concrete-paved roadways, underground utilities, and landscaping.

Grading plans were not available at the time this report was prepared; however, as site topography varies from gently-to-steeply sloping, we anticipate earthwork cuts and fills required solely to achieve level building pads and provide for vehicular access will generally be less than about 15 feet in vertical extent. Excavations for underground utilities are not anticipated to exceed about 5 feet below final site grades.

A plot plan indicating the proposed project layout is shown on Plate 2.

SITE CONDITIONS

SURFACE

The project site consists of an irregularly-shaped parcel located south of Pine Grove Avenue (and west of Salt Creek) in the city of Shasta Lake, California. The site is bounded to the north by Pine Grove Avenue, to the east by Salt Creek, to the south by residential development, and to the west by mostly vacant land vegetated with grasses, brush, and trees. At the time of our field investigation, the site was partially occupied by an existing mobile home and barn-type structure. Remaining areas of the site were vacant of visible past development and were vegetated with grasses, brush, and trees. Existing topography within the immediate site area varied from gently-to-steeply sloping.

SUBSURFACE

Near-surface soils encountered within a majority of the test pits performed for this investigation consisted predominantly of loose-to-medium-dense silty sand/clayey sand to depths of about 1 to 5 feet below existing site grade. Below these near-surface soils, highly-to-slightly-weathered, weak-to-very-strong metavolcanic or volcanic rock was generally encountered to the maximum depth explored (approximately 11 feet below existing site grade). Additionally, it should be noted backhoe refusal on rock was encountered in the test pits designated TP-2, TP-3, TP-5, TP-6, TP-7, TP-8, TP-10, and TP-16 at depths of about 3 to 7 feet below existing site grade.

No free groundwater was encountered during our field investigation. It should be recognized groundwater conditions can vary depending on the season, irrigation and/or groundwater pumping practices (both on- and off-site), precipitation, runoff conditions, the level of nearby bodies of water (including canals and creeks), and possibly other factors. Therefore, groundwater conditions presented in this report may not be representative of those which may be encountered during or subsequent to construction. Further, during the winter or spring season, or shortly after significant precipitation, perched groundwater (or groundwater seepage) may be encountered above on-site rock.

A more detailed description of the subsurface conditions encountered during our field investigation is provided on the attached logs.

CONCLUSIONS AND RECOMMENDATIONS

GENERAL

Based on the results of our investigation, it is our professional opinion the site may be developed for the proposed residential subdivision generally using conventional grading and foundation construction techniques. However, due to certain site conditions identified by our field exploration program, special design and/or construction provisions may be required for some project features. A brief summary of these conditions is provided below.

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- In addition to special handling and or processing procedures to meet the requirements provided herein for engineered fill, rock removed from some utility excavations may not meet the size requirements provided herein for trench backfill. Therefore, we anticipate rock materials excavated from some utility trenches may need to be removed and replaced with imported materials or finer-grained on-site soils.

- We anticipate some planned building areas may include an earthwork cut/fill transition which could be susceptible to excessive differential settlement due to nonuniform foundation subgrade conditions. This phenomenon would be especially pronounced where less-weathered rock is exposed within the cut portion of the building pad. We recommend the project Geotechnical Engineer review planned building pads during grading. If less-weathered rock is exposed within the cut portion of the lot, we recommend this rock be excavated and replaced with engineered fill. Overexcavation of rock should include the entire building area (which has less-weathered rock present within 3 feet of finished subgrade) and extend to a depth of at least 3 feet below finished subgrade.

- Residential lots which have less-weathered rock present within the lot subgrade may be difficult to landscape and/or support landscape vegetation. Though landscape concerns are not part of this study, it may be advisable to remove and replace exposed, less-weathered rock with imported and/or on-site soil (possibly stockpiled specifically for this purpose) to facilitate future landscaping.

- We anticipate most cut slopes within the planned project may be constructed at a gradient of 2(h):1(v) or flatter. However, all cut slopes composed of rock should be reviewed during grading by the project Geotechnical Engineer for the presence of adverse bedding conditions. If adverse bedding conditions are encountered, flatter slopes or buttressing of the slope(s) may be required. Since the applicable method will depend on the conditions encountered as well as the location of the slope(s) with respect to adjoining natural features and possible planned improvements, the project Geotechnical Engineer

should review conditions during construction and provide recommendations for possible mitigation schemes should they become necessary.

Specific comments regarding the conditions outlined above, as well as recommendations regarding the geotechnical aspects of project design and construction, are presented in the following sections of this report.

ON-SITE ROCK

Anticipated Excavation Conditions

Rock was initially encountered in a majority of the test pits performed for this investigation at depths as shallow as about 1 to 5 feet below existing site grade. Further, backhoe refusal on rock was encountered in the test pits designated TP-2, TP-3, TP-5, TP-6, TP-7, TP-8, TP-10, and TP-16 at depths of about 3 to 7 feet below existing site grade and outcrops of less-weathered rock were observed within some areas of the site. Based on this experience as well as our general knowledge of the site area, we anticipate even shallow trench excavations within some areas of the site will be difficult (if not impossible) with a conventional backhoe (such as a Case 580 or equivalent). Therefore, a large track-mounted excavator (such as a Caterpillar 320 or equivalent), equipped with a single ripper tooth and/or a hydraulic percussion hammer, may be required to advance some (if not most) on-site excavations. Blasting may also be required if less-weathered zones of rock are encountered within these excavations.

Excavations required for general site grading are anticipated to be possible over a majority of the site and to depths of about 5 to 10 feet below existing site grade using heavy earthwork equipment (such as a Caterpillar D8 or equivalent). In areas where weathered rock is encountered, initial ripping may be required to facilitate removal of these materials. Deeper excavations, or excavations within areas of the site where shallow (or localized zones) of hard rock are encountered, may require blasting.

Possible Perched Groundwater Conditions

In addition to possible excavation difficulties, perched water may develop above on-site rock subsequent to wet weather. The presence of perched groundwater could hinder trenching and/or earthwork operations, requiring temporary dewatering to facilitate some trench and/or deeper earthwork excavations. Further, the presence of perched groundwater could result in excessive vapor and/or water transmission into the planned structures. Hence, provisions should be incorporated into the civil design of the project to minimize surface water infiltration (see section below entitled: "SURFACE DRAINAGE") and to intercept subsurface water (see sections below

entitled: "TRENCH BACKFILL - Water Seepage Along Trenches Backfilled With Coarse Material" and "EARTHEN SLOPES - Slope Toe Drains").

Engineered Fill Considerations

On-site rock may require special handling and/or processing to reduce the size of the excavated material and meet the requirements provided herein for engineered fill (i.e., engineered fill should be generally less than 3 inches in maximum dimension). In order to use on-site rock for engineered fill, we recommend these materials either be: (1) processed (i.e., pulverized) with heavy equipment to reduce individual rock fragments to generally less than about 3 inches in maximum dimension; or (2) screened, raked, or selectively processed to remove individual rock fragments more than about 3 inches in maximum dimension. In general, we recommend all rock in excess of about 3 inches in maximum dimension be disposed of off-site or outside the construction limits.

In addition to special handling and or processing procedures to meet the requirements provided herein for engineered fill, rock removed from some utility excavations may not meet the size requirements provided herein for trench backfill. Therefore, we anticipate rock materials excavated from some utility trenches may need to be removed and replaced with imported materials or finer-grained on-site soils.

Foundation Considerations

We anticipate some planned building areas may include an earthwork cut/fill transition which could be susceptible to excessive differential settlement due to nonuniform foundation subgrade conditions. This phenomenon would be especially pronounced where less-weathered rock is exposed within the cut portion of the building pad. We recommend the project Geotechnical Engineer review planned building pads during grading. If less-weathered rock is exposed within the cut portion of the lot, we recommend this rock be excavated and replaced with engineered fill. Overexcavation of rock should include the entire building area (which has less-weathered rock present within 3 feet of finished subgrade) and extend to a depth of at least 3 feet below finished subgrade.

Landscape Considerations

Residential lots which have less-weathered rock present within the lot subgrade may be difficult to landscape and/or support landscape vegetation. Though landscape concerns are not part of this study, it may be advisable to remove and replace exposed, less-weathered rock with imported and/or on-site soil (possibly stockpiled specifically for this purpose) to facilitate future landscaping.

SURFACE DRAINAGE

Due to the presence of shallow on-site rock across the site, we anticipate infiltration of surface water will either be minimal, or result in shallow perched groundwater. To reduce the potential for standing surface water, as well as perched groundwater beneath planned structures, we recommend any and all exposed ground surfaces surrounding planned structures (or adjoining any planned pavements) be graded to facilitate surface drainage away from foundation areas (or pavement edges). This recommended grading should achieve a minimum, downward slope of two percent, extending from the planned structures (or the edges of planned pavements), outward a minimum horizontal distance of five feet; swales or below-grade solid conduits should be used to intercept and direct this surface runoff to a suitable location for disposal. At locations where planned pavements abut unimproved, unpaved, or landscaped areas, a concrete curb should be installed to reduce water infiltration into adjoining pavement aggregate base materials. This curb should extend below the bottom of the adjacent, pavement aggregate base materials at least 4 inches into the underlying subgrade materials. Further, we recommend all roof drain discharge be collected in solid conduits and directed into the site's storm drain system or other suitable location for disposal.

Post-construction landscaping should not be allowed to interfere or restrict surface drainage away from planned structures and pavements. Further, sprinklers should be placed to avoid excessive wetting the ground surface directly adjacent to the planned structures and pavements.

SITE PREPARATION

Stripping and Grubbing

Prior to general site grading and/or construction of planned improvements, existing vegetation, organic topsoil, and any debris should be stripped (or otherwise removed) and disposed of off-site or outside the construction limits. We estimate the depth of stripping to be approximately 1 to 3 inches over a majority of the site. Deeper stripping or grubbing will be required where concentrations of organic soils, tree roots, or debris are encountered. Stripped topsoil (less any debris or large tree roots) may be stockpiled and reused for landscape purposes; however, this material should not be incorporated into any engineered fill.

Existing Utilities, Wells, and/or Foundations

If abandoned (or to be abandoned), below-grade utility lines, septic tanks, cesspools, wells, and/or foundations are known or suspected to exist, or are encountered during construction, these items should be removed and disposed of off-site; existing wells should be abandoned in

accordance with applicable regulatory requirements. Existing, below-grade utility pipelines (if any) which extend beyond the limits of the proposed construction and will be abandoned in-place should be plugged with cement grout to prevent migration of soil and/or water. All excavations resulting from removal activities should be cleaned of loose or disturbed material (including all previously-placed backfill) prior to placing any fill or backfill.

Exploratory Test Pit Backfill

Backfill used to fill exploratory test pits performed for this investigation was loosely-placed and may be susceptible to future subsidence. If planned improvements will be located over these areas, we recommend all backfill associated with these test pits be excavated and replaced with engineered fill. Approximate locations of test pits performed for this investigation are shown on Plate 2.

Scarification and Compaction

Following site stripping and any required grubbing or overexcavation, all areas to receive engineered fill should be scarified to a depth of 8 inches, uniformly moisture-conditioned to between 0 and 5 percent above the optimum moisture content, and compacted to at least 90 percent of the maximum dry density as determined by ASTM (American Society for Testing and Materials) Test Method D 1557[1]. In the event the exposed subgrade consists of undisturbed, cemented soil or on-site rock, scarification and compaction may be omitted if approved by the project Geotechnical Engineer.

Overexcavation of Loose or Disturbed Material

Within areas grubbed or otherwise disturbed below a depth of about 12 inches, in-place scarification and compaction may not be adequate to densify all disturbed soil. Therefore, overexcavation of the disturbed soil, scarification and compaction of the exposed subgrade, and replacement with engineered fill may be required in these areas.

Wet/Unstable Soil Conditions

If site preparation or grading is performed in the winter or spring season, or shortly after significant precipitation, near-surface site soils may be significantly over optimum moisture content. Further, during these same periods, perched groundwater (or groundwater seepage) will

[1] This test procedure should be used wherever relative compaction, maximum dry density, or optimum moisture content is referenced within this report.

likely be encountered above on-site rock. These conditions could hinder construction equipment as well as efforts to compact site soils to a specified level of compaction. If over optimum soil moisture content conditions are encountered during construction, disking to aerate, replacement with imported material, chemical treatment, stabilization with a geotextile fabric or grid, and/or other methods will likely be required to facilitate earthwork operations. The applicable method will depend on the contractor's capabilities as well as other project-related factors beyond the scope of this study. Therefore, if over-optimum soil conditions are encountered during construction, the project Geotechnical Engineer should review these conditions (as well as the contractor's capabilities) and, if appropriate, provide recommendations for their treatment.

TEMPORARY EXCAVATIONS

General

All temporary excavations must comply with applicable local, state, and federal safety regulations, including the current OSHA Excavation and Trench Safety Standards. Construction site safety generally is the responsibility of the contractor, who should be solely responsible for the means, methods, and sequencing of construction operations.

Construction Considerations

Construction equipment, building materials, excavated soil, vehicular traffic, and other similar loads should not be allowed near the top of any unshored or unbraced excavation. Where the stability of adjoining buildings, walls, pavements, or other similar improvements is endangered by excavation operations, support systems such as shoring, bracing, or underpinning may be required to provide structural stability and to protect personnel working within the excavation. Since excavation operations are dependent on construction methods and scheduling, the contractor should be solely responsible for the design, installation, maintenance, and performance of all shoring, bracing, underpinning, and other similar systems. Under no circumstances should comments provided herein be inferred to mean that Brown & Mills is assuming any responsibility for temporary excavations, or for the design, installation, maintenance, and performance of any shoring, bracing, underpinning, or other similar systems.

During wet weather, earthen berms or other methods should be used to prevent runoff water from entering all excavations. All runoff water within or adjacent to any excavation should be collected and disposed of outside the construction limits.

Excavation Conditions

Rock was initially encountered in a majority of the test pits performed for this investigation at depths as shallow as about 1 to 5 feet below existing site grade. Further, backhoe refusal on rock was encountered in the test pits designated TP-2, TP-3, TP-5, TP-6, TP-7, TP-8, TP-10, and TP-16 at depths of about 3 to 7 feet below existing site grade and outcrops of less-weathered rock were observed within some areas of the site. Based on this experience as well as our general knowledge of the site area, we anticipate even shallow trench excavations within some areas of the site will be difficult (if not impossible) with a conventional backhoe (such as a Case 580 or equivalent). Therefore, a large track-mounted excavator (such as a Caterpillar 320 or equivalent), equipped with a single ripper tooth and/or a hydraulic percussion hammer, may be required to advance some (if not most) on-site excavations. Blasting may also be required if less-weathered zones of rock are encountered within these excavations.

In addition to possible excavation difficulties, perched water may develop above on-site rock subsequent to wet weather. The presence of perched groundwater could hinder trenching and/or earthwork operations, requiring temporary dewatering to facilitate some trench and/or deeper earthwork excavations.

TEMPORARY DEWATERING

Depending primarily on the season, even shallow excavations may encounter groundwater perched over on-site rock. If perched groundwater is encountered during construction, dewatering may be required to facilitate construction. Since temporary dewatering will impact and be dependent on construction methods and scheduling, we recommend the contractor be solely responsible for the design, installation, maintenance, and performance of all temporary dewatering systems.

Important Note: Perched water conditions can be highly dependent on the season, precipitation, runoff conditions, and possibly other factors. Therefore, groundwater conditions presented in this report may not be representative of those which may be encountered at the time of construction. We recommend the contractor verify groundwater conditions and evaluate dewatering requirements prior to bidding and/or construction. Further, dewatering can result in ground subsidence. Hence, we recommend that if dewatering is required to facilitate construction, the contractor take whatever provisions necessary to insure the integrity of any nearby structures, pavements, below-grade utilities, or other similar improvements sensitive to ground subsidence.

SUBDRAINS

If fill is to be placed within any on-site drainage swale (or swales), it may be desirable to install a subdrain along the bottom of each of these swales. The purpose of these drains would be to intercept and remove subsurface water which would otherwise accumulate within these areas. We recommend the need for subdrains be evaluated by the project Geotechnical Engineer during grading and after any loose soil or vegetation has been cleared from these areas. If subdrains are required, we recommend they be constructed in accordance within the detail provided on Plate 22.

KEY AND BENCH REQUIREMENTS

If fill is to be placed on slopes steeper than 5(h):1(v), the slope (or slopes) to receive this material should be benched and, depending on the slope and fill configuration, a keyway constructed at the toe of slope. In general, benches should extend through any loose, soft or disturbed soil or rock, extend a minimum of 2 feet (measured horizontally) into the existing slope and be offset no more than 5 feet vertically. A typical key and bench detail is presented on Plate 23; the number and location of drains (if any) should be evaluated by the project Geotechnical Engineer at the time of construction.

ENGINEERED FILL

Materials - General

Engineered fill should generally consist of soil, soil-aggregate mixtures, and/or processed on-site rock less than 3 inches in maximum dimension, nearly-free of organic or other deleterious debris, and essentially non-plastic. Typically, well-graded mixtures of gravel, sand, non-plastic silt, processed on-site rock, and small quantities of clay are acceptable for use as engineered fill. Specific requirements for engineered fill, as well as applicable test procedures to verify material suitability, are provided on the following page.

Gradation		Test Procedures	
Sieve Size	Percent Passing	ASTM[2]	AASHTO[3]
3-inch	100	C 136	T 88
3/4 inch	70 - 100	C 136	T 88
No. 200	15 - 70	C 136	T 88
Plasticity			
Liquid Limit	Plasticity Index		
Less than 30	Less than 12	D 4318	T 89, T 90
Organic Content			
Less than 3%		D 2974	-------
Maximum Dry Density			
More than 100 pcf		D 1557	T 180

On-Site Soil Materials

In general, we anticipate near-surface, on-site soils free of organic or other deleterious debris may be used for engineered fill.

On-Site Rock Materials

In general, we anticipate on-site rock, free of organic or other deleterious debris, may be used for engineered fill. However, we anticipate on-site rock will likely require special handling and or processing to reduce the size of the excavated material and meet the requirements provided above for engineered fill (i.e., engineered fill should be generally less than 3 inches in maximum dimension). In order to use on-site rock for engineered fill, we recommend these materials either be: (1) processed (i.e., pulverized) with heavy equipment to reduce individual rock fragments to generally less than about 3 inches in maximum dimension; or (2) screened, raked, or selectively processed to remove individual rock fragments more than about 3 inches in maximum dimension.

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[2] American Society for Testing and Materials Standards (latest edition)

[3] American Association of State Highway and Transportation Officials, Standard Specifications for Transportation Materials and Methods of Sampling and Testing (latest edition)

Use of Oversize Rock Materials

Depending on the contractor's capabilities, as well as specific project requirements beyond the scope of this study, it may be desirable (and possible) to utilize rock material in excess of about 3 inches in maximum dimension within some engineered fills. In general, individual boulders and/or rock fragments (regardless of size) could be placed within the lowest portion of deep fills provided individual pieces are spaced to prevent nesting and finer-grained soil is jetted, hand-tamped, or otherwise placed to infill all voids surrounding these rocks.

Important Note: It should be recognized use of rock material in excess of about 3 inches in maximum dimension may cause excavation difficulties during construction of underground utilities and other below-grade improvements. Therefore, we recommend the project owner decide whether oversize material may be used in any engineered fill. If the project owner decides not to use this material for engineered fill, rock material in excess of about 3 inches in maximum dimension should be segregated by hand, rake, or other methods and disposed of off-site or outside the construction limits.

Imported Materials

All imported soil and/or soil-aggregate mixtures used for engineered fill should: (1) meet the material requirements outlined above (see section entitled "Materials - General"); and (2) be sampled, tested and approved by the project Geotechnical Engineer prior to being transported to the site.

Placement and Compaction

Soil, soil-aggregate mixtures, and/or processed on-site rock used for engineered fill should be uniformly moisture-conditioned to between 0 and 5 percent above the optimum moisture content, placed in horizontal lifts less than 8 inches in loose thickness, and compacted to at least 90 percent relative compaction. In pavement areas, engineered fill placed within 12 inches of finished subgrade[4] should be compacted to at least 95 percent relative compaction.

If fills in excess of 5 feet in vertical extent are planned for this project, we recommend the lower portion of these fills (i.e., fill located more than 5 feet below finished subgrade) be compacted to at least 93 percent relative compaction.

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[4] Within this report, finished subgrade refers to the top surface of on-site soil compacted during site preparation, properly compacted trench backfill, or engineered fill.

TRENCH BACKFILL

Materials

Pipe zone backfill (i.e., material beneath and in the immediate vicinity of the pipe) should consist of on-site or imported soil less than one inch in maximum dimension; trench zone backfill (i.e., material placed between the pipe zone backfill and finished subgrade) may consist of on-site soil and/or processed on-site rock which meets the material requirements previously-provided for engineered fill.

Important Note: Rock excavated from on-site trenches will likely not meet requirements provided herein for trench backfill. Therefore, we anticipate rock excavated from on-site trenches will need to be disposed of off-site or outside the construction limits and replaced with imported materials, or native soil materials specifically stockpiled for this purpose.

If imported material is used for pipe or trench zone backfill, we recommend it consist of fine-grained sand. In general, use of coarse-grained sand and/or gravel is not recommended due to the potential for soil migration into, and water seepage along, trenches backfilled with this type of material.

Recommendations provided above for pipe zone backfill are minimum requirements only. More stringent material specifications may be required to fulfill local codes and/or bedding requirements for specific types of pipe. We recommend the project Civil Engineer develop these material specifications based on planned pipe types, bedding conditions, and other factors beyond the scope of this study.

Placement and Compaction

Trench backfill should be placed and compacted in accordance with recommendations previously-provided for engineered fill. Mechanical compaction is strongly recommended; ponding or jetting should not be allowed unless specifically reviewed and approved by the project Geotechnical Engineer prior to construction.

Important Note: All pipe zone backfill should be placed on undisturbed earth materials. In the event earth materials located directly beneath the planned pipe zone backfill are disturbed during construction, these materials should either be compacted in-place (if the depth of disturbance is less than about 12 inches deep), or removed (if the depth of disturbance is greater than about 12 inches) and replaced in accordance with recommendations previously-provided for engineered fill.

Comments Regarding Utility Trenches Within Steeply-Sloped Areas

We anticipate it may be necessary to route below-grade utilities across steeply-sloped areas. In the event utility trenches are to be routed at a steep gradient, use of a cementious mixture should be considered for trench backfill to reduce the possibility of erosion or sloughing of this material.

EARTHEN SLOPES

General

We recommend earthen fill slopes be constructed at a gradient of 2(h):1(v) or flatter. We anticipate most cut slopes within the planned project may be constructed at a gradient of 2(h):1(v) or flatter. However, all cut slopes composed of rock should be reviewed during grading by the project Geotechnical Engineer for the presence of adverse bedding conditions. If adverse bedding conditions are encountered, flatter slopes or buttressing of the slope(s) may be required. Since the applicable method will depend on the conditions encountered as well as the location of the slope(s) with respect to adjoining natural features and possible planned improvements, the project Geotechnical Engineer should review conditions during construction and provide recommendations for possible mitigation schemes should they become necessary. Additionally, slopes exceeding 30 feet in vertical height and configured at a gradient steeper than 3(h):1(v) should include at least one terrace as outlined in Section 3315.2 of the Uniform Building Code (UBC, Volume 1, 1997 edition).

In general, we recommend all fill slopes be overbuilt by at least one foot (measured perpendicular to the slope) and trimmed back to provide a well-compacted slope face. Further, we recommend no additional materials, such as excess soil resulting from foundation excavations, final lot grading, landscaping, pool construction, or from other similar activities, be placed or dumped on these slopes subsequent to final trimming. Material placed or dumped on a well-compacted slope face will often excessively erode or slide once exposed to water, such as will occur from precipitation, or from excessive landscape irrigation.

Erosion Protection

All cut and fill slopes should be revegetated with deep-rooted, perennial grasses or other suitable method soon after construction. To further reduce the potential for erosion, surface runoff should not be allowed to flow onto, over, or across any on-site slope(s) more than a few feet in height. Typically, surface runoff water may be intercepted and redirected using a small berm, drainage swale, or shallow gutter (placed at the top of the slope), or by grading adjacent areas to drain away from the top of all downward trending slopes.

Slope Toe Drains

We recommend a trench drain be installed at the toe of all cut and fill slopes in excess of 5 feet in vertical height and which are sloped at a gradient of 4(h):1(v) or steeper. The purpose of this drain would be to intercept subsurface water (typically caused by excessive, upslope landscape irrigation) which can accumulate at the toe of these slopes, resulting in wet areas and surface seeps. Recommended trench drains should be installed as close as possible to the toe of these slopes and be constructed in general accordance with the detail presented on Plate 24.

Slope Seepage

In addition to possible wet areas and surface seeps near the toe area of some cut or fill slopes, it has been our experience seepage can occur along the slopes of earthwork cuts which expose rock. In general, this type of seepage is difficult to control and may not necessarily be adverse to the project. Therefore, no specific recommendations have been provided herein to address possible slope seepage. However, should significant seepage be encountered along any slope face during construction, or if seepage from planned slopes would be considered a significant nuisance by the project Owner, trench drains (similar to those outlined above - see Plate 24) should be installed along the top of all such slopes.

Setbacks

Structures located near the top (or bottom) of a slope steeper than 3(h):1(v) should maintain a minimum set-back in accordance with requirements outlined in Section 1806.5 of the Uniform Building Code (UBC, Volume 2, 1997 edition), or 3 feet (measured horizontally from the top or bottom of slope to the closest point of approach of the structure), whichever is greater. All other planned surface improvements (including pavements, sidewalks, etc.) should not be placed any closer than 2 feet (measured horizontally) from the top of any slope steeper than 3(h):1(v). In the event below-grade improvements (such as underground utilities) are to be located within the vicinity (and parallel) to any slope faces steeper than 3(h):1(v), these features should not be placed any closer than 3 feet (measured horizontally) from the nearby slope face.

Stepped Foundations

Foundations for structures situated on a slope steeper than 10(h):1(v) should be level or stepped so that the top and bottom of the foundations are level (per UBC Section 1806.4).

FOUNDATIONS

General

In our opinion, shallow spread footings, constructed of reinforced concrete and founded on undisturbed native soil, completely-to-highly-weathered on-site rock, and/or engineered fill, may be used for support of planned structures. In general, we recommend all such footings be a minimum of 12 inches wide and embedded a minimum of 12 inches below the lowest adjacent final subgrade[5].

Nonuniform Foundation Subgrade Conditions

Structures constructed in areas which have less-weathered rock present within the building subgrade may be susceptible to excessive differential settlement due to nonuniform foundation subgrade conditions. In general, if less-weathered rock is exposed within a portion of the building area (with the remaining areas composed of undisturbed on-site soil, engineered fill, and/or completely-to-highly-weathered on-site rock), the exposed rock should be excavated and replaced with engineered fill. This recommended overexcavation should include those portions of the building area underlain by less-weathered rock and extend to a depth of at least 3 feet below finished subgrade. Since it is currently not possible to determine which lots and/or building pads will have less-weathered rock exposed within the building area, we recommend the project Geotechnical Engineer review the site at the time of any lot grading to assist the contractor in assessing which areas will require removal and replacement of on-site rock.

Allowable Bearing Pressures

An allowable bearing pressure of 1,500 pounds per square foot (psf) may be used for spread foundations with the above minimum dimensions. Since the allowable bearing pressure will vary with footing width and embedment, the value provided above may be increased by 250 psf for each additional foot of width and by 500 psf for each additional foot of embedment up to a maximum allowable bearing pressure of 3,000 psf.

The allowable bearing pressure provided is a net value; therefore, the weight of the foundation (which extends below the lowest adjacent final subgrade) may be neglected when computing dead loads. The allowable bearing pressure applies to dead plus live loads, includes a calculated

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[5] Within this report, final subgrade refers to the top surface of undisturbed native soil, on-site soil compacted during site preparation, or engineered fill.

factor of safety of at least 3, and may be increased by 1/3 for short-term loading due to wind or seismic forces.

Estimated Settlements

Based on anticipated foundation dimensions and loads, we estimate maximum settlement of planned spread footings to be on the order of 3/4-inch. Differential settlement between similarly-loaded, isolated spread footings is expected to be less than 1/2-inch; differential settlement of uniformly-loaded, continuous footings is anticipated to be less than 1/2-inch within a 10-foot interval.

Lateral Resistance

Resistance to lateral loads (including those due to wind or seismic forces) may be provided by frictional resistance between the bottom of concrete foundations and the underlying soils or completely-to-highly-weathered on-site rock, and by passive soil pressure against the sides of the foundations. A coefficient of friction of 0.3 may be used between cast-in-place concrete foundations and the underlying soil or completely-to-highly-weathered on-site rock. Passive pressure available in engineered fill, undisturbed native soil, or completely-to-highly-weathered on-site rock may be taken as equivalent to the pressure exerted by a fluid weighing 275 pounds per cubic foot (pcf).

Lateral resistance parameters provided above are ultimate values. Therefore, a suitable factor of safety should be applied to these values for design purposes. The appropriate factor of safety will depend on the design condition and should be determined by the project Structural Engineer. Depending on the application, typical factors of safety could range from 1.0 to 1.5. Frictional and passive resistance may be used in combination, provided a suitable factor of safety is applied to these values during design.

Setbacks

Structures (or other similar improvements) located near the top (or bottom) of a slope steeper than 3(h):1(v) should maintain a minimum set-back in accordance with requirements outlined in Section 1806.5 of the Uniform Building Code (UBC, Volume 2, 1997 edition), or 3 feet (measured horizontally from the top or bottom of slope to the closest point of approach of the structure), whichever is greater. In the event a structure cannot be sited to maintain the minimum set-back, proposed spread footings should be deepened in accordance with requirements indicated in Figure No. 18-I-1 of the UBC.

Construction Considerations

Prior to placing steel or concrete, footing excavations should be cleaned of all debris, loose or soft soil, disturbed rock, and any water.

INTERIOR CONCRETE FLOOR SLABS SUPPORTED-ON-GRADE

Subgrade Preparation

Subgrade soils supporting interior concrete floor slabs should be scarified to a minimum depth of 8 inches, uniformly moisture-conditioned to between 0 and 5 percent above the optimum moisture content, and compacted to at least 90 percent relative compaction. Scarification and compaction may be omitted if interior slabs are to be placed directly on undisturbed on-site rock engineered fill and if approved by the project Geotechnical Engineer during construction.

Surrounding Grades

It has been our experience that ground surface grades surrounding structures can affect the post-construction presence and quantity of water beneath such structures, as well as vapor emissions from interior concrete floor slabs. In order to reduce the possibility for these potentially adverse conditions, we recommend areas adjacent to all structures be graded, or floor slabs raised, so that the bottoms of all interior concrete floor slabs are elevated at least 4 inches above adjacent, finished pad grades.

Rock Capillary Break

Interior concrete floor slabs supported-on-grade should be underlain by a capillary break consisting of free-draining durable rock at least 4 inches thick, graded such that 100 percent passes the 1-inch sieve and less than 5 percent passes the No. 4 sieve[6]. This rock should be compacted to the extent possible using light vibratory equipment prior to placing any vapor membranes or slab concrete. Further, precautions should be taken during construction to reduce contamination of the rock with soil or other materials. Contamination of the rock with soil or other materials may significantly reduce the effectiveness of the capillary break, possibly resulting in excessive (and adverse) free water transmission to the bottom of the overlying slab.

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[6] In general, Caltrans Class 2 aggregate base (or other similar material) will not meet the gradation requirements provided above for a capillary break. Therefore, we recommend this material not be used for a capillary break beneath interior concrete floor slabs supported-on-grade.

Vapor Emission Considerations

Though generally not a geotechnical consideration, it has been our experience that a plastic or vinyl membrane is often placed directly over the rock capillary break to reduce water migration from the subgrade soils up to the overlying concrete floor slab. If used, we suggest this membrane be installed in a manner to reduce punctures and penetrations. Where penetrations are unavoidable, or adjacent to footings or other similar obstructions, the vapor membrane should be placed tightly against these features. Further, it has been our experience that sand, 1 to 2 inches thick, is often placed on top of the membrane prior to placing slab concrete to promote more uniform curing of the slab. If used, we strongly suggest that concrete not be placed if sand overlying the vapor membrane has been allowed to become wet (due to precipitation or excessive moistening), or if standing water is present above the membrane. It has been our experience that excessive water beneath interior floor slabs can result in significant, post-construction vapor transmission through the slab, adversely affecting floor coverings, and possibly resulting in potentially hazardous molds.

In addition to a capillary break and vapor membrane, it has also been our experience that concrete quality is critical to the ability of concrete floor slabs to resist vapor transmission. As a minimum, we suggest that concrete used for floor slab construction possess a maximum water/cement ratio of 0.5. Since water is often added to uncured concrete to increase workability, it is important that strict quality control be exercised during the installation of all slab concrete to insure water/cement ratios are not altered prior or during placement.

It must be recognized comments provided above are suggestions only. These comments are intended to assist the project Architect, Structural Engineer, or other design professional, and should not be inferred to mean that Brown & Mills is assuming the design responsibility for interior concrete floor slabs or appurtenant vapor reduction provisions. In all cases, it is solely the responsibility of the project Architect, Structural Engineer, or other design professional to determine the design based on project specific requirements (which were beyond our knowledge or involvement with the project). In the event the project Architect, Structural Engineer, or other design professional is unfamiliar with concrete slab-on-grade issues, or if the project will include floor coverings sensitive to slab vapor emissions, a professional specializing in vapor transmission should be consulted to provide project specific recommendations and design provisions.

Vapor Emission Testing

Prior to placing floor coverings, we recommend testing be conducted to evaluate vapor emissions from all interior concrete floor slabs supported-on-grade. The purpose of this testing would be to verify that water vapor emissions are below levels normally required by the flooring

manufacturer. In the event floor slab vapor emissions are above levels normally required by the flooring manufacturer, additional curing/drying time and/or the application of sealants (or other similar product intended to reduce slab vapor emissions) may be required prior to placing any and all floor coverings.

EXTERIOR CONCRETE SLABS SUPPORTED-ON-GRADE

Subgrade soils supporting exterior concrete slabs[7] should be scarified to a minimum depth of 8 inches, uniformly moisture-conditioned to between 0 and 5 percent above the optimum moisture content, and compacted to at least 90 percent relative compaction. Scarification and compaction may be omitted if exterior slabs are to be placed directly on undisturbed on-site rock and/or engineered fill and if approved by the project Geotechnical Engineer during construction.

ADDITIONAL SERVICES

We recommend Brown & Mills review final grading and foundation plans and specifications to evaluate that recommendations contained herein have been properly interpreted and implemented during design. Further, all site earthwork activities (including site preparation, placement of engineered fill and trench backfill, construction of slab and pavement subgrades, and all foundation excavations) should be monitored by a representative from Brown & Mills.

Monitoring services are an essential component of our design services. Monitoring allows us to observe the subsurface conditions encountered during construction, evaluate the applicability of the recommendations presented in this report to the conditions encountered, and recommend appropriate changes in design or construction procedures if conditions differ from those described herein.

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[7] Within this report exterior concrete slabs supported-on-grade refers to walkways, driveways, patios, etc. and specifically excludes roadway pavements.

LIMITATIONS

This report has been prepared in substantial accordance with the generally accepted geotechnical engineering practice as it existed in the site area at the time our services were rendered. No warranty is either expressed or implied.

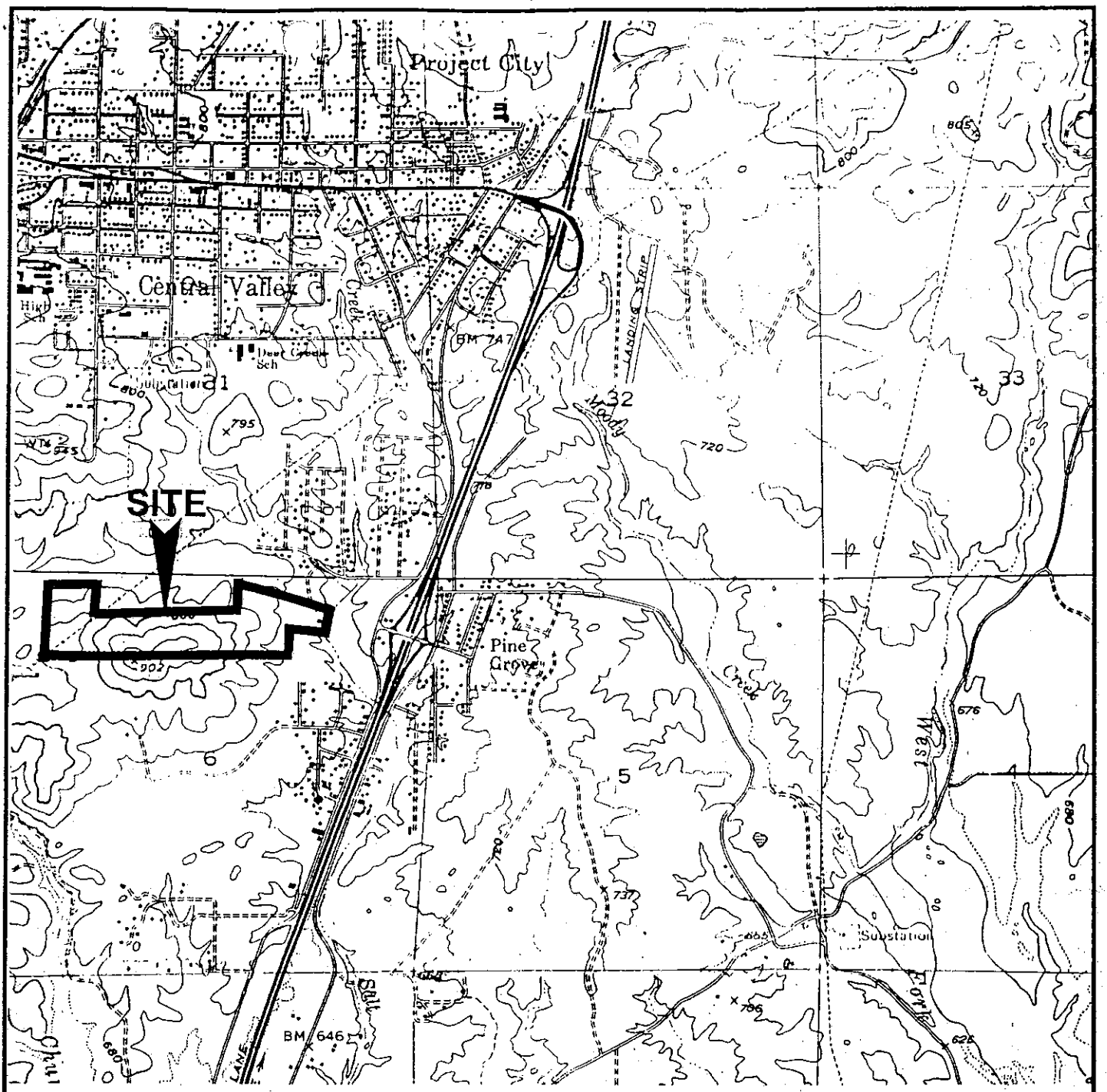
Conclusions and recommendations contained in this report were based on the conditions encountered during our field investigation and are applicable only to those project features described herein (see section entitled: "PROPOSED CONSTRUCTION"). It is possible subsurface conditions could vary between or beyond the points explored. If conditions are encountered during construction which differ from those described in this report, or if the scope or nature of the proposed construction changes, we should be notified immediately in order to review and, if deemed necessary, conduct additional studies and/or provide supplemental recommendations.

Recommendations provided in this report are based on the assumption that an adequate program of tests and observations will be conducted by Brown & Mills during the construction phase in order to evaluate compliance with our recommendations.

The scope of services provided by Brown & Mills for this project did not include the investigation and/or evaluation of toxic substances, or soil or groundwater contamination of any type. If such conditions are encountered during site development, additional studies may be required. Further, services provided by Brown & Mills for this project did not include the investigation and/or evaluation of soil corrosivity. Depending on planned pipe types, bedding conditions, and other factors beyond the scope of this study, it may be appropriate to evaluate soil corrosivity prior to development.

This report may be used only by our client and only for the purposes stated herein, within a reasonable time from its issuance. Land use, site conditions, and other factors may change over time which may require additional studies. In the event a significant period of time elapses between the date of this report and construction, Brown & Mills shall be notified of such occurrence in order to review current conditions. Depending on that review, Brown & Mills may require that additional studies be conducted and that an updated or revised report be issued.

Any party other than our client who wishes to use all or any portion of this report shall notify Brown & Mills of such intended use. Based on the intended use as well as other site-related factors, Brown & Mills may require that additional studies be conducted and that an updated or revised report be issued. Failure to comply with any of the requirements outlined above by the client or any other party shall release Brown & Mills from any liability arising from the unauthorized use of this report.



5,000 4,000 3,000 2,000 1,000 0 FEET 5,000

1 1/2 0 MILES 1

REFERENCE: PROJECT CITY QUADRANGLE, CALIFORNIA, 7.5 MINUTE SERIES, PHOTOREVISED 1969; UNITED STATES DEPARTMENT OF THE INTERIOR, GEOLOGIC SURVEY.

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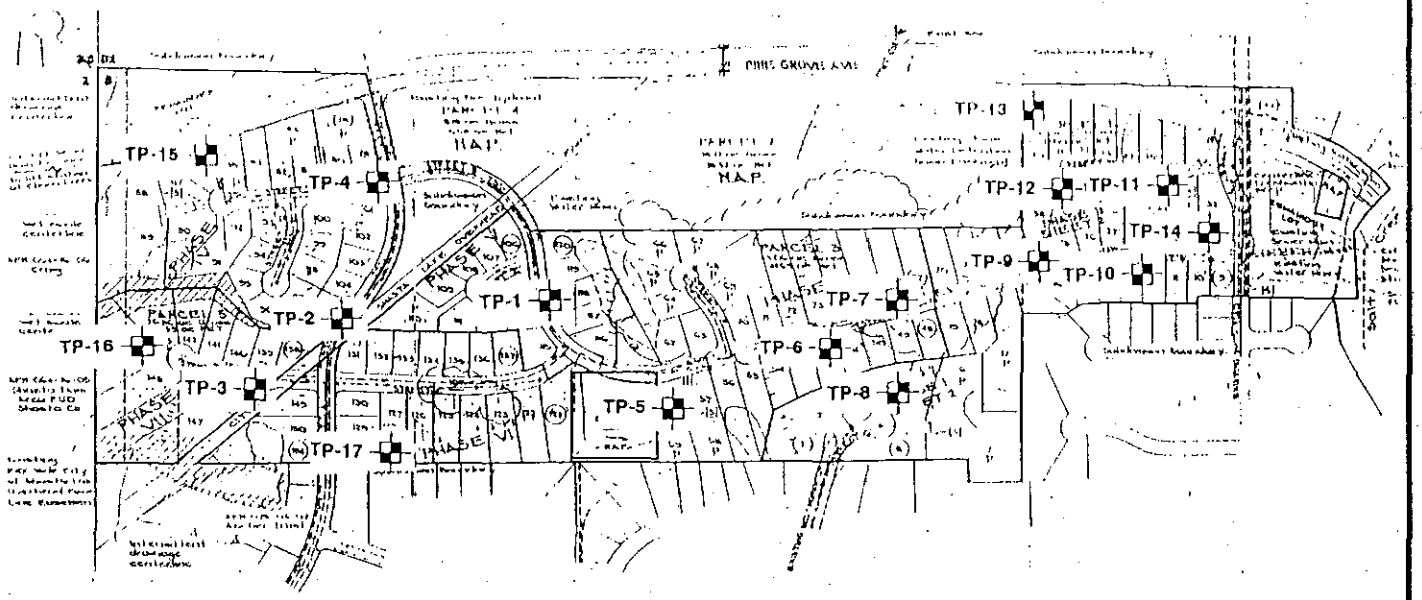
VICINITY MAP
PROPOSED RESIDENTIAL SUBDIVISION
DEER CREEK MANOR
SHASTA LAKE, CALIFORNIA

PLATE 1



NORTH

NO SCALE

LEGEND

APPROXIMATE TEST PIT LOCATION

NOTE: Test pits were located in the field by visual methods. Therefore, the locations of the test pits shown on this plan should be considered highly approximate.

REFERENCE: Plan prepared by Omsberg & Company titled: "TENTATIVE MAP," Sheet 1 of 2, dated 9/9/2002.

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SITE PLAN
PROPOSED RESIDENTIAL SUBDIVISION
DEER CREEK MANOR
SHASTA LAKE, CALIFORNIA

PLATE 2

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			SYM.	DESCRIPTION
COARSE-GRAINED SOILS MORE THAN 50% OF MATERIAL IS GREATER THAN NO. 200 SIEVE	GRAVELS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS (LITTLE OR NO FINES)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
			GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines
		GRAVELS (APPRECIABLE FINES)	GM	Silty gravels, poorly-graded gravel-sand-silt mixtures
			GC	Clayey gravels, poorly-graded gravel-sand-clay mixtures
	SANDS MORE THAN 50% OF COARSE FRACTION PASSES NO. 4 SIEVE	SANDS (LITTLE OR NO FINES)	SW	Well-graded sands, gravelly sands, little or no fines
			SP	Poorly-graded sands, gravelly sands, little or no fines
		SANDS (APPRECIABLE FINES)	SM	Silty sands, poorly-graded sand-gravel-silt mixtures
			SC	Clayey sands, poorly-graded sand-gravel-clay mixtures
FINE-GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML	Inorganic silts and very fine sands, silty or clayey fine sands, clayey silts with slight plasticity
			CL	Inorganic clays of low-to-medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic silts and clays of low plasticity
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH	Inorganic silts, micaceous or diatomaceous fine sands or silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic silts and clays of high plasticity
HIGHLY ORGANIC SOILS			PT	Peat, humus, swamp soils with high organic content

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

LOG SYMBOLS AND DEFINITIONS

FIELD	LABORATORY	
STANDARD PENETRATION SPLIT-SPOON SAMPLER (2-INCH OUTSIDE DIAMETER)	-4	% PASSING NO. 4 SIEVE (ASTM TEST METHOD C 136)
CALIFORNIA SAMPLER (3-INCH OUTSIDE DIAMETER)	-200	% PASSING NO. 200 SIEVE (ASTM TEST METHOD C 117)
MODIFIED CALIFORNIA SAMPLER (2.5-INCH OUTSIDE DIAMETER)	LL	LIQUID LIMIT (ASTM TEST METHOD D 4318)
BAG/BULK	PI	PLASTICITY INDEX (ASTM TEST METHOD D 4318)
THIN-WALLED SHELBY TUBE (3-INCH OUTSIDE DIAMETER)	R-VAL	RESISTANCE VALUE (CALTRANS TEST 301)
WATER LEVEL (LEVEL ESTABLISHED AS NOTED ON LOGS)	EI	EXPANSION INDEX (UBC STANDARD 29-2)
WATER OR SEEPAGE ENCOUNTERED (LEVEL NOT ESTABLISHED)	COL	COLLAPSE POTENTIAL (ASTM TEST METHOD D 5333)
	SP	SWELL POTENTIAL (under a specified load) (ASTM TEST METHOD D 4546)
	SL	SWELL PRESSURE (no consolidation) (ASTM TEST METHOD D 4546)

GENERAL NOTES:

1. Lines separating soil or rock strata on logs are approximate boundaries only. Actual transitions may be gradual and, in the case of selectively sampled borings, may vary by as much as the sample interval.
2. In general, Unified Soil Classification designations were evaluated using visual methods only. Actual designations (based on laboratory tests) may vary.
3. Logs represent general soil conditions on the date and at the location indicated. No warranty is provided as to the continuity of soil conditions between individual sample locations.
4. Unconfined compressive strengths reported on the logs (if any) were obtained using a pocket penetrometer.

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LOG LEGEND
PROPOSED RESIDENTIAL SUBDIVISION
DEER CREEK MANOR
SHASTA LAKE, CALIFORNIA

PLATE 3

FRACTURING	
LOG TERM	DEFINITION
Very Widely	>6 feet
Widely	2 to 6 feet
Moderately	8 to 24 inches
Closely	2-1/2 to 8 inches
Very Closely	3/4 to 2-1/2 inches

ROCK QUALITY DESIGNATION (RQD)	
RQD (%)	ROCK QUALITY
90 - 100	Excellent
75 - 90	Good
50 - 75	Fair
25 - 50	Poor
0 - 25	Very Poor

WEATHERING	
LOG TERM	DESCRIPTION / DEFINITION
Fresh	No visible sign of decomposition or discoloration. Rings under hammer impact.
Slightly Weathered	Slight discoloration inwards from open fractures; otherwise similar to fresh.
Moderately Weathered	Discoloration throughout. Strength less than fresh rock; specimens cannot be broken by hand or scraped with knife.
Highly Weathered	Specimens can be broken by hand with effort and shaved with knife. Texture becoming indistinct but fabric preserved.
Completely Weathered	Minerals decomposed to soil but fabric and structure preserved. Specimens easily crumbled or penetrated.

COMPETENCY			
CLASS	LOG TERM	DESCRIPTION / DEFINITION	APPROXIMATE RANGE OF UNCONFINED COMPRESSIVE STRENGTHS (tsf)
I	Extremely Strong	Many blows with geologic hammer required to break intact specimens.	>2000
II	Very Strong	Hand-held specimens break with pick-end of hammer under more than one blow.	1000 - 2000
III	Strong	Hand-held specimens can be broken with single, moderate blow with pick-end of hammer.	500 - 1000
IV	Moderately Strong	Specimens can be scraped with knife; light blow with pick-end of hammer causes indentations.	250 - 500
V	Weak	Specimens crumble under moderate blow with pick-end of hammer.	10 - 250
VI	Friable	Specimens crumble in hand.	N/A

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ROCK CLASSIFICATION LEGEND
PROPOSED RESIDENTIAL SUBDIVISION
DEER CREEK MANOR
SHASTA LAKE, CALIFORNIA

PLATE

4

EXPLORATION DATE	LOGGED BY	TOTAL DEPTH	TEST PIT NO.
December 10, 2002	Matt Fowler	11 feet	TP-1
EXPLORATION EQUIPMENT		**BACKFILL MATERIAL**	
John Deere 310 backhoe equipped with a 24-inch-wide bucket		Excavated soil	

FIELD						DESCRIPTION	LABORATORY		
DEPTH (IN FEET)	SAMPLE TYPE	SAMPLE NO.	BLOWS/FOOT	UNCONFINED COMP. STRENGTH (TSF)	USCS LETTER SYMBOL	SURFACE CONDITIONS: Grasses and brush GROUNDWATER CONDITIONS: No free groundwater encountered APPROX. GROUND SURFACE ELEVATION (IN FEET) ▶ N/A	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	OTHER LAB TESTS SEE LOG LEGEND FOR ABBREVIATION DEFINITIONS
1					SM/SC	***Silty SAND/Clayey SAND:*** Red-brown, moist, medium dense, weakly cemented, fine-to-medium grained			
2	X	1							
3									
4									
5									
6									
7						grades moderately cemented			
8									
9									
10									

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LOG OF EXPLORATORY TEST PIT
PROPOSED RESIDENTIAL SUBDIVISION
DEER CREEK MANOR
SHASTA LAKE, CALIFORNIA

PLATE 5

EXPLORATION DATE	LOGGED BY	TOTAL DEPTH	TEST PIT NO.
December 10, 2002	Matt Fowler	5 feet	**TP-2**
EXPLORATION EQUIPMENT		**BACKFILL MATERIAL**	
John Deere 310 backhoe equipped with a 24-inch-wide bucket		Excavated soil	

FIELD						DESCRIPTION	LABORATORY			
DEPTH (IN FEET)	SAMPLE TYPE	SAMPLE NO.	BLOWS/FOOT	UNCONFINED COMP. STRENGTH (TSF)	USCS LETTER SYMBOL	SURFACE CONDITIONS: Grasses and brush GROUNDWATER CONDITIONS: No free groundwater encountered APPROX. GROUND SURFACE ELEVATION (IN FEET) ▶ N/A	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	OTHER LAB TESTS	SEE LOG LEGEND FOR ABBREVIATION DEFINITIONS
1					SM/SC	***Silty SAND/Clayey SAND:*** Red-brown, moist, loose-to-medium-dense, fine-to-medium grained, with some fine-to-coarse gravel				
2										
3						***METAVOLCANIC ROCK:*** Red-brown and black, moderately weathered, very-closely-to-closely fractured, strong-to-very-strong				
4	X	1								
5										
6						*Test pit terminated at a depth of approximately 5 feet below existing site grade due to essential refusal on rock.*				
7										
8										
9										
10										

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LOG OF EXPLORATORY TEST PIT
PROPOSED RESIDENTIAL SUBDIVISION
DEER CREEK MANOR
SHASTA LAKE, CALIFORNIA

PLATE **6**

EXPLORATION DATE	LOGGED BY	TOTAL DEPTH	TEST PIT NO.
December 10, 2002	Matt Fowler	4-1/2 feet	TP-3
EXPLORATION EQUIPMENT		**BACKFILL MATERIAL**	
John Deere 310 backhoe equipped with a 24-inch-wide bucket		Excavated soil	

FIELD						DESCRIPTION	LABORATORY		
DEPTH (IN FEET)	SAMPLE TYPE	SAMPLE NO.	BLOWS/FOOT	UNCONFINED COMP. STRENGTH (TSF)	USCS LETTER SYMBOL	SURFACE CONDITIONS: Grasses, dense brush and trees GROUNDWATER CONDITIONS: No free groundwater encountered APPROX. GROUND SURFACE ELEVATION (IN FEET) ▶ N/A	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	OTHER LAB TESTS SEE LOG LEGEND FOR ABBREVIATION DEFINITIONS
1					SM/SC	***Silty SAND/Clayey SAND:*** Red-brown, moist, loose-to-medium-dense, fine-to-medium grained			
2						***METAVOLCANIC ROCK:*** Red-brown and black, moderately weathered, very-closely-to-closely fractured, strong-to-very-strong			
3									
4									
5						*Test pit terminated at a depth of approximately 4-1/2 feet below existing site grade due to essential refusal on rock.*			
6									
7									
8									
9									
10									

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LOG OF EXPLORATORY TEST PIT
PROPOSED RESIDENTIAL SUBDIVISION
DEER CREEK MANOR
SHASTA LAKE, CALIFORNIA

PLATE 7

EXPLORATION DATE	LOGGED BY	TOTAL DEPTH	TEST PIT NO.
December 10, 2002	Matt Fowler	10 feet	TP-4
EXPLORATION EQUIPMENT		BACKFILL MATERIAL	
John Deere 310 backhoe equipped with a 24-inch-wide bucket		Excavated soil	

FIELD						DESCRIPTION	LABORATORY			
DEPTH (IN FEET)	SAMPLE TYPE	SAMPLE NO.	BLOWS/FOOT	UNCONFINED COMP. STRENGTH (TSF)	USCS LETTER SYMBOL	SURFACE CONDITIONS: Grasses, brush, and some dumped debris GROUNDWATER CONDITIONS: No free groundwater encountered APPROX. GROUND SURFACE ELEVATION (IN FEET) ▶ N/A	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	OTHER LAB TESTS	SEE LOG LEGEND FOR ABBREVIATION DEFINITIONS
1					SM/SC	***Silty SAND/Clayey SAND:*** Red-brown, moist, medium dense, weakly cemented, fine-to-medium grained, with some fine-to-coarse gravel				
2										
3										
4										
5						***METAVOLCANIC ROCK:*** Brown, orange-brown, and dark brown, highly-to-moderately weathered, very-closely-to-closely fractured, moderately strong				
6	X	1								
7										
8						grades red-brown and black, moderately weathered, strong				
9										
10										

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LOG OF EXPLORATORY TEST PIT
PROPOSED RESIDENTIAL SUBDIVISION
DEER CREEK MANOR
SHASTA LAKE, CALIFORNIA

PLATE 8

EXPLORATION DATE	LOGGED BY	TOTAL DEPTH	TEST PIT NO.
December 10, 2002	Matt Fowler	3-1/2 feet	**TP-5**
EXPLORATION EQUIPMENT		**BACKFILL MATERIAL**	
John Deere 310 backhoe equipped with a 24-inch-wide bucket		Excavated soil	

FIELD						DESCRIPTION	LABORATORY		
DEPTH (IN FEET)	SAMPLE TYPE	SAMPLE NO.	BLOWS/FOOT	UNCONFINED COMP. STRENGTH (TSF)	USCS LETTER SYMBOL	SURFACE CONDITIONS: Sparse grasses and dense brush GROUNDWATER CONDITIONS: No free groundwater encountered APPROX. GROUND SURFACE ELEVATION (IN FEET) ▶ N/A	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	OTHER LAB TESTS SEE LOG LEGEND FOR ABBREVIATION DEFINITIONS
1					SM/SC	***Silty SAND/Clayey SAND:*** Brown, moist, loose-to-medium-dense, fine-to-medium grained			
2	X	1				***METAVOLCANIC ROCK:*** Orange-brown, light brown, and gray, slightly weathered, very-closely-to-closely fractured, very strong			
3									
4									
5						*Test pit terminated at a depth of approximately 3-1/2 feet below existing site grade due to essential refusal on rock.*			
6									
7									
8									
9									
10									

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LOG OF EXPLORATORY TEST PIT
PROPOSED RESIDENTIAL SUBDIVISION
DEER CREEK MANOR
SHASTA LAKE, CALIFORNIA

PLATE **9**

EXPLORATION DATE	LOGGED BY	TOTAL DEPTH	TEST PIT NO:
December 10, 2002	Matt Fowler	3 feet	**TP-6**
EXPLORATION EQUIPMENT		**BACKFILL MATERIAL**	
John Deere 310 backhoe equipped with a 24-inch-wide bucket		Excavated soil	

FIELD						DESCRIPTION	LABORATORY		
DEPTH (IN FEET)	SAMPLE TYPE	SAMPLE NO.	BLOWS/FOOT	UNCONFINED COMP. STRENGTH (TSF)	USCS LETTER SYMBOL	SURFACE CONDITIONS: Grasses and brush GROUNDWATER CONDITIONS: No free groundwater encountered APPROX. GROUND SURFACE ELEVATION (IN FEET): N/A	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	OTHER LAB TESTS SEE LOG LEGEND FOR ABBREVIATION DEFINITIONS
1					SM/SC	***Silty SAND/Clayey SAND:*** Brown, moist, loose-to-medium-dense, fine-to-medium grained			
2	X	1				***METAVOLCANIC ROCK:*** Orange-brown, light brown, and black, moderately-to-slightly weathered, very-closely-to-closely fractured, strong-to-very strong			
3									
4						*Test pit terminated at a depth of approximately 3 feet below existing site grade due to essential refusal on rock.*			
5									
6									
7									
8									
9									
10									

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LOG OF EXPLORATORY TEST PIT
PROPOSED RESIDENTIAL SUBDIVISION
DEER CREEK MANOR
SHASTA LAKE, CALIFORNIA

PLATE **10**

EXPLORATION DATE	LOGGED BY	TOTAL DEPTH	TEST PIT NO.
December 10, 2002	Matt Fowler	5-1/2 feet	**TP-7**
EXPLORATION EQUIPMENT		**BACKFILL MATERIAL**	
John Deere 310 backhoe equipped with a 24-inch-wide bucket		Excavated soil	

FIELD						DESCRIPTION	LABORATORY		
DEPTH (IN FEET)	SAMPLE TYPE	SAMPLE NO.	BLOWS/FOOT	UNCONFINED COMP. STRENGTH (TSF)	USCS LETTER SYMBOL	SURFACE CONDITIONS: Grasses and sparse brush and trees GROUNDWATER CONDITIONS: No free groundwater encountered APPROX. GROUND SURFACE ELEVATION (IN FEET) ▶ N/A	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	OTHER LAB TESTS SEE LOG LEGEND FOR ABBREVIATION DEFINITIONS
1					SM/SC	***Silty SAND/Clayey SAND:*** Brown, moist, medium dense, weakly cemented, fine-to-medium grained			
2									
3									
4	X	1				grades moderately cemented			
5						***VOLCANIC ROCK:*** Red-brown, orange-brown, yellow, and white, highly weathered, closely fractured, weak-to-moderately strong			
6									
7						*Test pit terminated at a depth of approximately 5-1/2 feet below existing site grade due to essential refusal on rock.*			
8									
9									
10									

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LOG OF EXPLORATORY TEST PIT
PROPOSED RESIDENTIAL SUBDIVISION
DEER CREEK MANOR
SHASTA LAKE, CALIFORNIA

PLATE **11**

EXPLORATION DATE	LOGGED BY	TOTAL DEPTH	TEST PIT NO.
December 10, 2002	Matt Fowler	7 feet	**TP-8**
EXPLORATION EQUIPMENT		**BACKFILL MATERIAL**	
John Deere 310 backhoe equipped with a 24-inch-wide bucket		Excavated soil	

FIELD						DESCRIPTION	LABORATORY		
DEPTH (IN FEET)	SAMPLE TYPE	SAMPLE NO.	BLOWS/FOOT	UNCONFINED COMP. STRENGTH (TSF)	USCS LETTER SYMBOL	SURFACE CONDITIONS: Grasses and dense brush and trees GROUNDWATER CONDITIONS: No free groundwater encountered APPROX. GROUND SURFACE ELEVATION (IN FEET) ▶ N/A	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	OTHER LAB TESTS SEE LOG LEGEND FOR ABBREVIATION DEFINITIONS
1					SM/SC	***Silty SAND/Clayey SAND:*** Red-brown, moist, loose-to-medium-dense, fine-to-medium grained			
2						***VOLCANIC ROCK:*** Red-brown, orange-brown, yellow, and white, highly weathered, closely fractured, weak			
3	X	1							
4									
5						grades moderately weathered, moderately strong			
6									
7						grades strong			
8						*Test pit terminated at a depth of approximately 7 feet below existing site grade due to essential refusal on rock.*			
9									
10									

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LOG OF EXPLORATORY TEST PIT
PROPOSED RESIDENTIAL SUBDIVISION
DEER CREEK MANOR
SHASTA LAKE, CALIFORNIA

PLATE **12**

EXPLORATION DATE	LOGGED BY	TOTAL DEPTH	TEST PIT NO.
December 10, 2002	Matt Fowler	7 feet	**TP-9**
EXPLORATION EQUIPMENT		**BACKFILL MATERIAL**	
John Deere 310 backhoe equipped with a 24-inch-wide bucket		Excavated soil	

FIELD						DESCRIPTION	LABORATORY		
DEPTH (IN FEET)	SAMPLE TYPE	SAMPLE NO.	BLOWS/FOOT	UNCONFINED COMP. STRENGTH (TSF)	USCS LETTER SYMBOL	SURFACE CONDITIONS: Grasses and dense trees GROUNDWATER CONDITIONS: No free groundwater encountered APPROX. GROUND SURFACE ELEVATION (IN FEET) ▶ N/A	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	OTHER LAB TESTS SEE LOG LEGEND FOR ABBREVIATION DEFINITIONS
1					SM/SC	***Silty SAND/Clayey SAND:*** Red-brown, moist, loose-to-medium-dense, fine-to-medium grained			
2									
3						***METAVOLCANIC ROCK:*** Orange-brown, yellow-brown, and red-brown, highly weathered, very-closely-to-closely fractured, weak			
4	X	1							
5									
6						grades highly-to-moderately weathered, weak-to-moderately strong			
7									
8									
9									
10									

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LOG OF EXPLORATORY TEST PIT
PROPOSED RESIDENTIAL SUBDIVISION
DEER CREEK MANOR
SHASTA LAKE, CALIFORNIA

PLATE **13**

EXPLORATION DATE	LOGGED BY	TOTAL DEPTH	TEST PIT NO.
December 10, 2002	Matt Fowler	4-1/2 feet	**TP-10**
EXPLORATION EQUIPMENT		**BACKFILL MATERIAL**	
John Deere 310 backhoe equipped with a 24-inch-wide bucket		Excavated soil	

FIELD						DESCRIPTION	LABORATORY		
DEPTH (IN FEET)	SAMPLE TYPE	SAMPLE NO.	BLOWS/FOOT	UNCONFINED COMP. STRENGTH (TSF)	USCS LETTER SYMBOL	SURFACE CONDITIONS: Sparse grasses and dense trees and brush GROUNDWATER CONDITIONS: No free groundwater encountered APPROX. GROUND SURFACE ELEVATION (IN FEET) ▶ N/A	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	OTHER LAB TESTS SEE LOG LEGEND FOR ABBREVIATION DEFINITIONS
1					SM/SC	***Silty SAND/Clayey SAND:*** Red-brown, moist, medium dense, fine-to-medium grained			
2						***METAVOLCANIC ROCK:*** Orange-brown, yellow-brown, red-brown, and gray, highly-to-moderately weathered, close-to-moderately fractured, moderately-strong-to-strong			
3									
4						grades moderately weathered, strong			
5						*Test pit terminated at a depth of approximately 4-1/2 feet below existing site grade due to essential refusal on rock.*			
6									
7									
8									
9									
10									

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BMI PROJECT NO. ▶ 02S-533

LOG OF EXPLORATORY TEST PIT
PROPOSED RESIDENTIAL SUBDIVISION
DEER CREEK MANOR
SHASTA LAKE, CALIFORNIA

PLATE **14**

EXPLORATION DATE	LOGGED BY	TOTAL DEPTH	TEST PIT NO.
December 10, 2002	Matt Fowler	8-1/2 feet	**TP-11**
EXPLORATION EQUIPMENT		**BACKFILL MATERIAL**	
John Deere 310 backhoe equipped with a 24-inch-wide bucket		Excavated soil	

FIELD						DESCRIPTION	LABORATORY		
DEPTH (IN FEET)	SAMPLE TYPE	SAMPLE NO.	BLOWS/FOOT	UNCONFINED COMP. STRENGTH (TSF)	USCS LETTER SYMBOL	SURFACE CONDITIONS: Sparse grasses and dense trees and brush GROUNDWATER CONDITIONS: No free groundwater encountered APPROX. GROUND SURFACE ELEVATION (IN FEET) ▶ N/A	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	OTHER LAB TESTS SEE LOG LEGEND FOR ABBREVIATION DEFINITIONS
1					SM/SC	***Silty SAND/Clayey SAND:*** Orange-brown to red-brown, dry-to-moist, medium dense, weakly cemented, fine-to-medium grained			
2						***METAVOLCANIC ROCK:*** Orange-brown, yellow-brown, and red-brown, highly weathered, closely fractured, weak			
3									
4									
5									
6									
7						grades highly weathered, weak-to-moderately strong			
8									
9									
10									

BMI

BMI PROJECT NO. ▶ 02S-533

LOG OF EXPLORATORY TEST PIT
PROPOSED RESIDENTIAL SUBDIVISION
DEER CREEK MANOR
SHASTA LAKE, CALIFORNIA

PLATE **15**

EXPLORATION DATE	LOGGED BY	TOTAL DEPTH	TEST PIT NO.
December 10, 2002	Matt Fowler	7 feet	TP-12
EXPLORATION EQUIPMENT		**BACKFILL MATERIAL**	
John Deere 310 backhoe equipped with a 24-inch-wide bucket		Excavated soil	

FIELD						DESCRIPTION	LABORATORY			
DEPTH (IN FEET)	SAMPLE TYPE	SAMPLE NO.	BLOWS/FOOT	UNCONFINED COMP. STRENGTH (TSF)	USCS LETTER SYMBOL	SURFACE CONDITIONS: Grasses and sparse trees and brush GROUNDWATER CONDITIONS: No free groundwater encountered APPROX. GROUND SURFACE ELEVATION (IN FEET) ▶ N/A	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	OTHER LAB TESTS	SEE LOG LEGEND FOR ABBREVIATION DEFINITIONS
1					SM/SC	***Silty SAND/Clayey SAND:*** Red-brown, moist, loose-to-medium-dense, fine-to-medium grained				
2						***METAVOLCANIC ROCK:*** Orange-brown, yellow-brown, and red-brown, highly weathered, closely fractured, weak				
3										
4										
5										
6						grades highly weathered, weak-to-moderately strong				
7										
8										
9										
10										

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LOG OF EXPLORATORY TEST PIT
PROPOSED RESIDENTIAL SUBDIVISION
DEER CREEK MANOR
SHASTA LAKE, CALIFORNIA

PLATE 16

EXPLORATION DATE	LOGGED BY	TOTAL DEPTH	TEST PIT NO.
December 10, 2002	Matt Fowler	8 feet	**TP-13**
EXPLORATION EQUIPMENT		**BACKFILL MATERIAL**	
John Deere 310 backhoe equipped with a 24-inch-wide bucket		Excavated soil	

FIELD						DESCRIPTION	LABORATORY		
DEPTH (IN FEET)	SAMPLE TYPE	SAMPLE NO.	BLOWS/FOOT	UNCONFINED COMP. STRENGTH (TSF)	USCS LETTER SYMBOL	SURFACE CONDITIONS: Grasses and sparse trees and brush GROUNDWATER CONDITIONS: No free groundwater encountered APPROX. GROUND SURFACE ELEVATION (IN FEET) ▶ N/A	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	OTHER LAB TESTS SEE LOG LEGEND FOR ABBREVIATION DEFINITIONS
1					SM/SC	***Silty SAND/Clayey SAND:*** Red-brown, moist, loose-to-medium-dense, fine-to-medium grained			
2									
3									
4									
5						***METAVOLCANIC ROCK:*** Orange-brown, yellow-brown, and red-brown, highly weathered, closely fractured, weak			
6						grades highly weathered, weak-to-moderately strong			
7									
8									
9									
10									

BMI

BMI PROJECT NO. ▶ 02S-533

LOG OF EXPLORATORY TEST PIT
PROPOSED RESIDENTIAL SUBDIVISION
DEER CREEK MANOR
SHASTA LAKE, CALIFORNIA

PLATE **17**

EXPLORATION DATE	LOGGED BY	TOTAL DEPTH	TEST PIT NO.
December 10, 2002	Matt Fowler	10 feet	**TP-14**
EXPLORATION EQUIPMENT		**BACKFILL MATERIAL**	
John Deere 310 backhoe equipped with a 24-inch-wide bucket		Excavated soil	

FIELD						DESCRIPTION	LABORATORY		
DEPTH (IN FEET)	SAMPLE TYPE	SAMPLE NO.	BLOWS/FOOT	UNCONFINED COMP. STRENGTH (TSF)	USCS LETTER SYMBOL	SURFACE CONDITIONS: Grasses GROUNDWATER CONDITIONS: No free groundwater encountered APPROX. GROUND SURFACE ELEVATION (IN FEET): N/A	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	OTHER LAB TESTS SEE LOG LEGEND FOR ABBREVIATION DEFINITIONS
1					SM/SC	***Silty SAND/Clayey SAND:*** Red-brown, moist, loose-to-medium-dense, fine-to-medium grained			
2						***METAVOLCANIC ROCK:*** Olive, gray, black, moderately-to-slightly weathered, very closely fractured, moderately strong			
3	X	1							
4						grades yellow-brown and orange-brown, moderately-to-slightly weathered, very-closely-to-widely fractured, moderately-strong-to-strong			
5	X	2							
6									
7						grades black, gray, and brown, highly weathered, very closely fractured, weak, with intermittent layers of clay			
8	X	3							
9									
10									

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BMI PROJECT NO. ▶ 02S-533

LOG OF EXPLORATORY TEST PIT
PROPOSED RESIDENTIAL SUBDIVISION
DEER CREEK MANOR
SHASTA LAKE, CALIFORNIA

PLATE **18**

EXPLORATION DATE	LOGGED BY	TOTAL DEPTH
December 10, 2002	Matt Fowler	8 feet
EXPLORATION EQUIPMENT		**BACKFILL MATERIAL**
John Deere 310 backhoe equipped with a 24-inch-wide bucket		Excavated soil

TEST PIT NO. TP-15

FIELD						DESCRIPTION	LABORATORY		
DEPTH (IN FEET)	SAMPLE TYPE	SAMPLE NO.	BLOWS/FOOT	UNCONFINED COMP. STRENGTH (TSF)	USCS LETTER SYMBOL	SURFACE CONDITIONS: Sparse grasses and dense brush and trees GROUNDWATER CONDITIONS: No free groundwater encountered APPROX. GROUND SURFACE ELEVATION (IN FEET) ▶ N/A	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	OTHER LAB TESTS (SEE LOG LEGEND FOR ABBREVIATION DEFINITIONS)
1					SM/SC	***Silty SAND/Clayey SAND:*** Red-brown, moist, medium dense, fine-to-medium grained			
2									
3									
4						***METAVOLCANIC ROCK:*** Orange-brown, yellow-brown, and red-brown, highly weathered, closely fractured, weak			
5									
6						grades highly-to-moderately weathered, weak-to-moderately strong			
7									
8									
9									
10									

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BMI PROJECT NO. ▶ 02S-533

LOG OF EXPLORATORY TEST PIT
PROPOSED RESIDENTIAL SUBDIVISION
DEER CREEK MANOR
SHASTA LAKE, CALIFORNIA

PLATE 19

EXPLORATION DATE	LOGGED BY	TOTAL DEPTH
December 10, 2002	Matt Fowler	4-1/2 feet
EXPLORATION EQUIPMENT		**BACKFILL MATERIAL**
John Deere 310 backhoe equipped with a 24-inch-wide bucket		Excavated soil

TEST PIT NO. TP-16

FIELD						DESCRIPTION	LABORATORY		
DEPTH (IN FEET)	SAMPLE TYPE	SAMPLE NO.	BLOWS/FOOT	UNCONFINED COMP. STRENGTH (TSF)	USCS LETTER SYMBOL	SURFACE CONDITIONS: Grasses and dense brush and trees GROUNDWATER CONDITIONS: No free groundwater encountered APPROX. GROUND SURFACE ELEVATION (IN FEET) ▶ N/A	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	OTHER LAB TESTS SEE LOG LEGEND FOR ABBREVIATION DEFINITIONS
1					SM/SC	***Silty SAND/Clayey SAND:*** Red-brown, moist, medium dense, fine-to-medium grained			
2						***METAVOLCANIC ROCK:*** Orange-brown, yellow-brown, and red-brown, highly-to-moderately weathered, closely fractured, moderately-strong-to-strong			
3									
4									
5						*Test pit terminated at a depth of approximately 4-1/2 feet below existing site grade due to essential refusal on rock.*			
6									
7									
8									
9									
10									

BMI PROJECT NO. ▶ 02S-533

LOG OF EXPLORATORY TEST PIT
PROPOSED RESIDENTIAL SUBDIVISION
DEER CREEK MANOR
SHASTA LAKE, CALIFORNIA

PLATE 20

EXPLORATION DATE	LOGGED BY	TOTAL DEPTH
December 10, 2002	Matt Fowler	7 feet
EXPLORATION EQUIPMENT		**BACKFILL MATERIAL**
John Deere 310 backhoe equipped with a 24-inch-wide bucket		Excavated soil

TEST PIT NO. **TP-17**

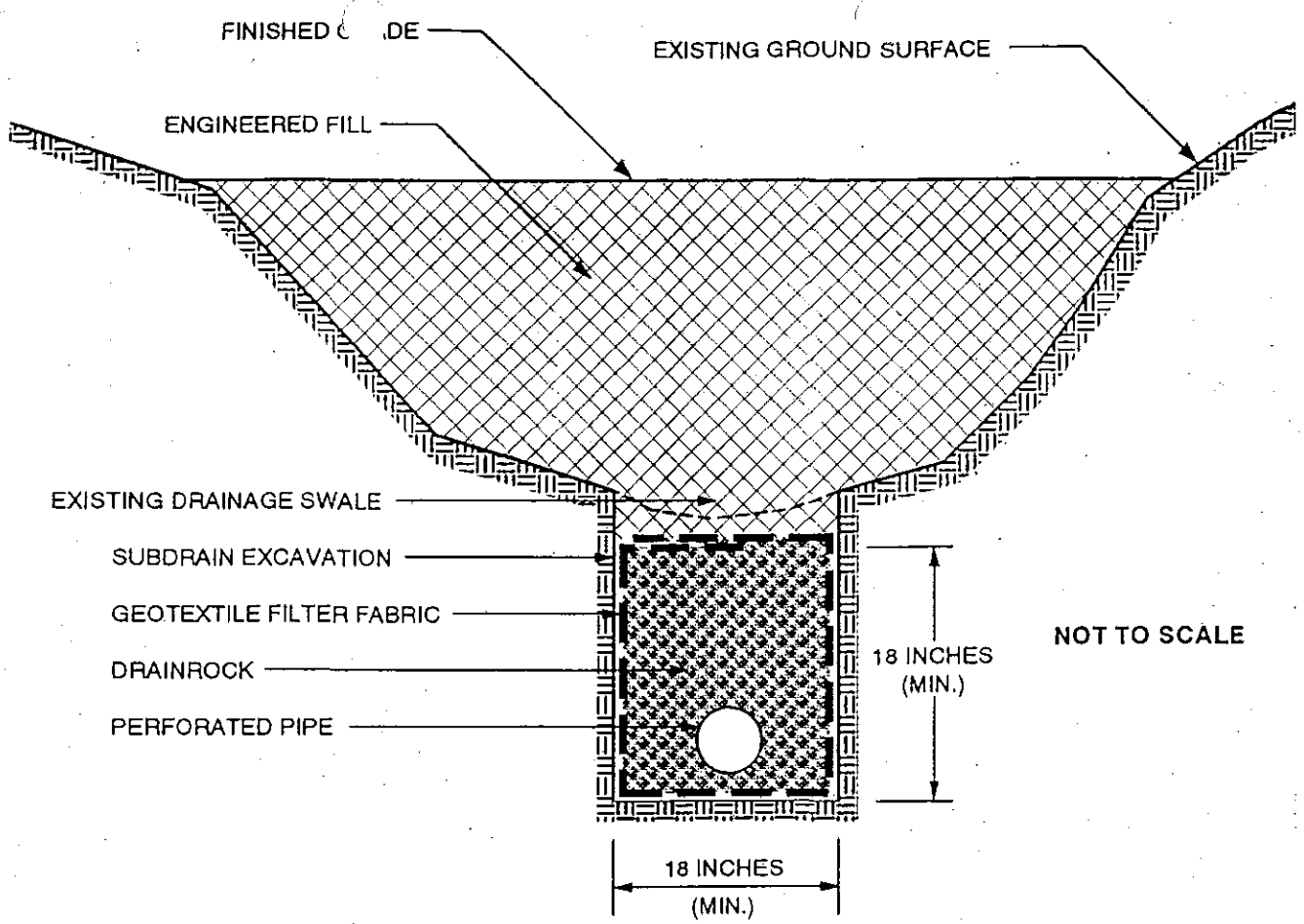
FIELD						DESCRIPTION	LABORATORY		
DEPTH (IN FEET)	SAMPLE TYPE	SAMPLE NO.	BLOWS/FOOT	UNCONFINED COMP. STRENGTH (TSF)	USCS LETTER SYMBOL	SURFACE CONDITIONS: Dense brush and trees GROUNDWATER CONDITIONS: No free groundwater encountered APPROX. GROUND SURFACE ELEVATION (IN FEET) ▶ N/A	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	OTHER LAB TESTS SEE LOG LEGEND FOR ABBREVIATION DEFINITIONS
1					SM/SC	***Silty SAND/Clayey SAND:*** Red-brown, moist, medium dense, fine-to-medium grained			
2									
3									
4						***METAVOLCANIC ROCK:*** Orange-brown, yellow-brown, and red-brown, highly weathered, closely fractured, weak			
5									
6						grades highly-to-moderately weathered, weak-to-moderately strong			
7									
8									
9									
10									

BMI

BMI PROJECT NO. ▶ 02S-533

LOG OF EXPLORATORY TEST PIT
PROPOSED RESIDENTIAL SUBDIVISION
DEER CREEK MANOR
SHASTA LAKE, CALIFORNIA

PLATE 21



NOTES:

1. Subdrain excavations should remove all loose, soft, and/or disturbed soil or rock as well as any organic material, vegetation, deleterious matter, sharp rocks, or other protuberances which could puncture or otherwise damage the geotextile fabric.
2. Subdrain dimensions indicated above are minimums. Actual dimensions may vary depending on conditions encountered in the field during construction. The project Geotechnical Engineer should review all subdrain excavations to verify subgrade conditions and dimensions.
3. Geotextile filter fabric should consist of Mirafi 140 NC, AMOCO 4546, or other equivalent fabric approved by the project Geotechnical Engineer.
4. Geotextile filter fabric should be stored, handled, and installed in accordance with the manufacturer's recommendations.
5. Perforated pipe should be at least 4 inches in diameter (for drains less than 200 feet in length), or 6 inches in diameter for drains in excess of 200 feet in length. In general, drains should not exceed 500 feet in length.
6. Pipe should consist of plastic or other corrosion resistant material. Specific pipe types and material specifications should be determined by the project Architect or Civil Engineer.
7. All pipe should be joined using methods recommended by the manufacturer for a water tight connection.
8. The bottom of all perforated pipes should be placed within 1 to 3 inches of the trench bottom. All perforated pipes should be centered (horizontally) within the trench, with perforations placed down (if applicable).
9. Drainrock should consist of poorly-graded, durable stone, sized such that 100 percent passes the 1-inch sieve and less than 5 percent passes the No. 4 sieve.
10. Perforated pipe and any solid conduit collector pipes should be sloped a minimum of one percent (1%) to drain.
11. Depending on project-related factors beyond the scope of this study, it may be advisable to install drain line cleanouts at regular intervals. The design and location of cleanouts should be determined by the project Architect or Civil Engineer. All cleanouts should be secured to prevent vandalism or tampering.
12. Water collected by the perforated pipe should be directed by solid conduit (of similar type to perforated) to a sump, ditch, storm drain, or other suitable area for disposal.

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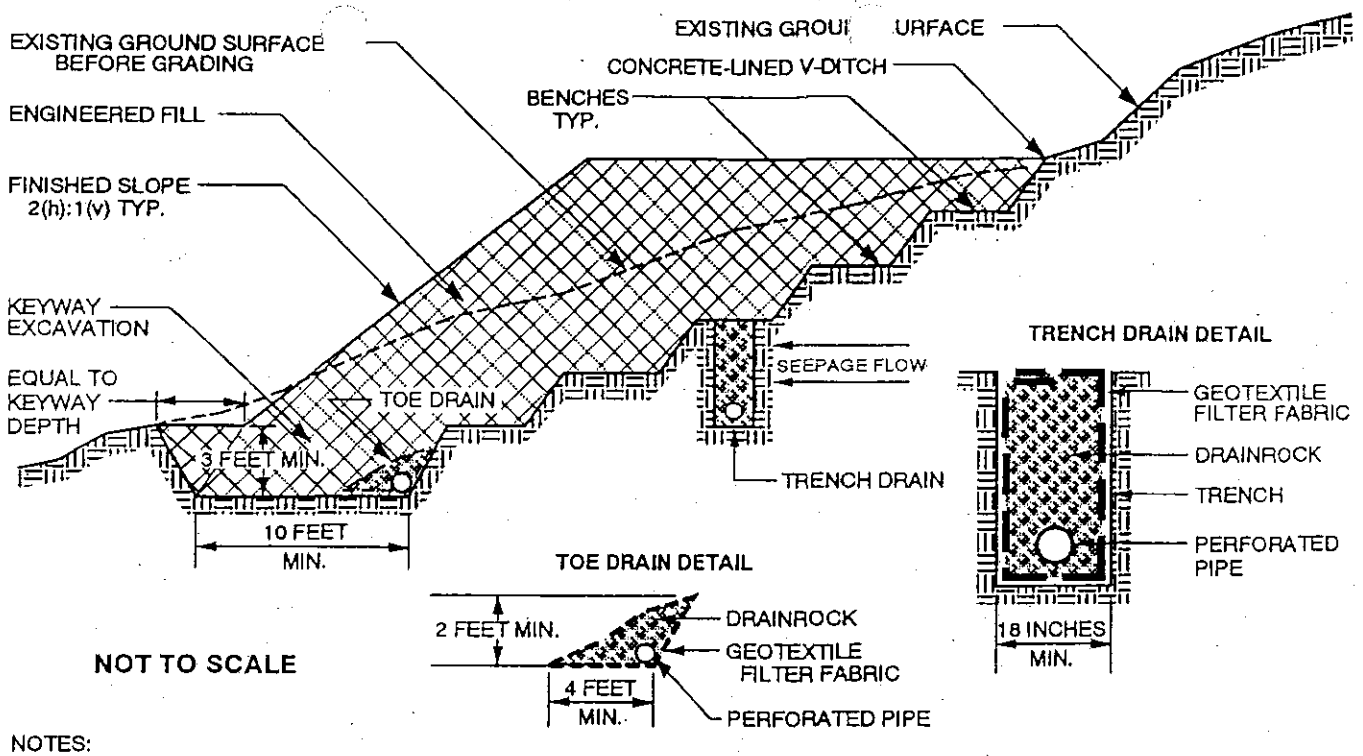
BMI PROJECT NO. ▶ 02S-533

TYPICAL SUBDRAIN DETAIL
PROPOSED RESIDENTIAL SUBDIVISION
DEER CREEK MANOR
SHASTA LAKE, CALIFORNIA

PLATE
22



NOTES:

1. Excavations for benches and keyway should remove all loose, soft, and/or disturbed soil or rock, as well as any organic material or vegetation.

2. Keyway depth indicated above is a minimum. Actual depth may vary depending on field conditions. Keyway depth may be reduced to less than 3 feet if hard rock is encountered.

3. In general, cut slopes between benches should be no steeper than 3/4(h):1(v) or flatter depending on the materials encountered and should meet all federal and state OSHA requirements. The maximum vertical offset between adjacent benches should be less than 5 feet. All benches should extend at least 2 feet (horizontally) into the slope.

4. The bottom of the keyway should be sloped downward at least 2 percent and towards the toe drain indicated above.

5. A toe drain should be placed at the bottom of the keyway at the location indicated above. This drain should extend the entire length of the keyway and be constructed in accordance with the detail above and requirements provided below.

6. If water, fractured rock, pervious soils, or other subsurface conditions are exposed during grading which would indicate the potential for future water seepage into the fill, trench drains should be installed at these locations in accordance with the detail above and requirements provided below.

   - Drain trench depth(s) will vary depending on the subsurface conditions encountered during construction. As a minimum, trench depth(s) should be at least as great as the height of the adjoining, downslope cut; actual depth(s) should be determined in the field by the project Geotechnical Engineer. The trench wall should be free of obstructions, sharp rocks, or other protuberances which could puncture or otherwise damage the geotextile filter fabric.

   - Geotextile filter fabric should consist of Mirafi 140 NC, AMOCO 4546, or other equivalent fabric approved by the project Geotechnical Engineer.

   - Geotextile filter fabric should be stored, handled, and installed in accordance with the manufacturer's recommendations.

   - Perforated pipe should be at least 4 inches in diameter (for drains less than 200 feet in length), or 6 inches in diameter for drains in excess of 200 feet in length. Pipe placed within a well-defined trench may consist of perforated, Type C, high density polyethylene (HDPE) pipe (such as manufactured by ADS) or equivalent. Pipe not placed within a well-defined trench (such as the "TOE DRAIN" indicated above) should consist of perforated or slotted high strength plastic or other similar material capable of sustaining the induced overburden pressure without noticeable deformations. The bottom of all perforated pipes should be placed within 1 to 3 inches of the trench bottom. All perforated pipes should be centered (horizontally) within the trench, with perforations placed down (if applicable).

   - Water collected by the perforated pipe(s) should be directed by solid conduit (of similar type to perforated) to a sump, ditch, storm drain, or other suitable location for disposal.

   - All pipe should be joined using methods recommended by the manufacturer for a water tight connection.

   - Drainrock should consist of poorly-graded, durable stone, sized such that 100 percent passes the 1-inch sieve and less than 5 percent passes the No. 4 sieve.

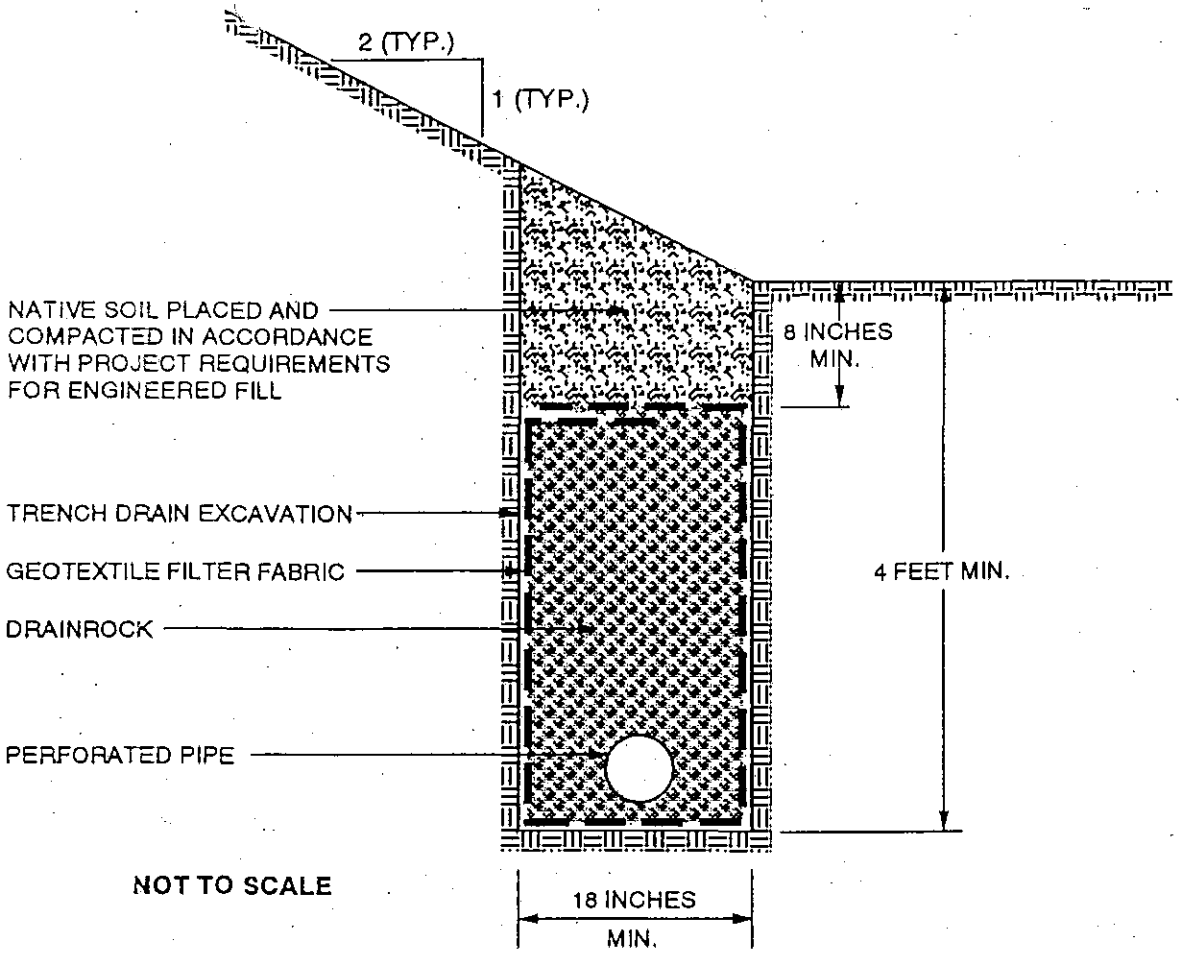
   - Perforated pipe and any solid conduit collector pipes should be sloped a minimum of one percent (1%) to drain.

   - Depending on project-related factors beyond the scope of this study, it may be advisable to install drain line cleanouts at regular intervals. The design and location of cleanouts should be determined by the project Architect or Civil Engineer. All cleanouts should be secured to prevent vandalism or tampering.

BMI PROJECT NO. ▶ 02S-533

TYPICAL KEY AND BENCH DETAIL
PROPOSED RESIDENTIAL SUBDIVISION
DEER CREEK MANOR
SHASTA LAKE, CALIFORNIA

PLATE 23



NOTES:

1. EXCAVATIONS FOR TRENCH DRAINS SHOULD EXTEND AT LEAST 6 INCHES INTO DENSE SOIL OR ROCK. THE PROJECT GEOTECHNICAL ENGINEER SHOULD VERIFY TRENCH DEPTHS AND BOTTOM CONDITIONS AT THE TIME OF CONSTRUCTION.
2. DRAIN DIMENSIONS INDICATED ABOVE ARE MINIMUMS. ACTUAL DIMENSIONS WILL VARY DEPENDING ON THE CONDITIONS ENCOUNTERED IN THE FIELD DURING CONSTRUCTION.
3. GEOTEXTILE FILTER FABRIC SHOULD CONSIST OF MIRAFI 140 NC, AMOCO 4546, OR OTHER EQUIVALENT FABRIC APPROVED BY THE PROJECT GEOTECHNICAL ENGINEER.
4. GEOTEXTILE FILTER FABRIC SHOULD BE STORED, HANDLED, AND INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
5. PERFORATED PIPE SHOULD BE AT LEAST 4 INCHES IN DIAMETER (FOR DRAINS LESS THAN 200 FEET IN LENGTH) OR 6 INCHES IN DIAMETER (FOR DRAINS IN EXCESS OF 200 FEET IN LENGTH). PIPE SHOULD CONSIST OF PERFORATED, TYPE C, HDPE PIPE SUCH AS MANUFACTURED BY ADS OR EQUIVALENT.
6. THE BOTTOM OF THE PERFORATED PIPE SHOULD BE PLACED WITHIN 1 TO 3 INCHES OF THE TRENCH BOTTOM. THE PIPE SHOULD BE CENTERED (HORIZONTALLY) WITHIN THE TRENCH.
7. DRAINROCK SHOULD CONSIST OF POORLY-GRADED, DURABLE STONE, SIZED SUCH THAT 100 PERCENT PASSES THE 1-INCH SIEVE AND LESS THAN 5 PERCENT PASSES THE NO. 4 SIEVE.
8. WATER COLLECTED BY THE PERFORATED PIPE SHOULD BE DIRECTED BY SOLID CONDUIT (OF SIMILAR TYPE TO PERFORATED) TO A SUMP, DITCH, STORM DRAIN, OR OTHER SUITABLE AREA FOR DISPOSAL.
9. ALL PERFORATED PIPE FITTINGS SHOULD BE OF THE TYPE TO BE SOIL TIGHT; COLLECTOR PIPE FITTINGS SHOULD BE OF THE TYPE TO BE WATER TIGHT.
10. PERFORATED PIPE AND ANY SOLID CONDUIT COLLECTOR PIPES SHOULD BE SLOPED A MINIMUM OF ONE PERCENT (1%) TO DRAIN.

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BMI PROJECT NO. ▶ 02S-533

TYPICAL TRENCH DRAIN DETAIL
PROPOSED RESIDENTIAL SUBDIVISION
DEER CREEK MANOR
SHASTA LAKE, CALIFORNIA

PLATE
24

Update to Geotechnical Report

CGI Technical Services, Inc., 2020

CGi Technical Services, Inc.

January 17, 2020
CGI: 10-2096.02

Mike Nadeker
CORNERSTONE DEVELOPMENT
P.O. Box 71101
Shasta Lake, California

Subject: **Update to Geotechnical Report**
Windsor Estates III
Shasta lake, California

Dear Mr. Nadeker:

CGI Technical Services, Inc.'s (CGI), is pleased to present this report to update an existing geotechnical report prepared by Brown & Mills, Inc. (BMI), for a proposed subdivision in Shasta Lake, California, as shown on Plate 1 – Site Location Map. The purpose of this letter is to review of the existing geotechnical report and provide complementary recommendations related to soils aspects of the project design and construction in accordance with requirements of portions of Chapter 16 and Chapter 18 of the 2018 International Building Code (IBC) and 2019 California Building Code (CBC). Our scope of work only includes items specifically addressed within this report.

1.1 PROJECT UNDERSTANDING

Based on the project preliminary site map, prepared by Sharrah Dunlap Sawyer, Inc. (SDS), the project civil engineer, we understand that the project consists of the design and construction of 74 residential units on a 8.4-acre site located west of the Deer Creek Manor Subdivision in the southern part of the City of Shasta Lake, as shown in Plate 1. Layout of proposed residential development is shown on Plate 2 – Project Elements.

At the present time, the sizes and types of structures have not been defined for the site but are anticipated to consist of up to two-story, stick-framed structures having slabs-on-grade. Foundation loads are unknown but anticipated to be relatively light, with continuous and isolated loads not exceeding 5 kips per lineal foot and 15 kips, respectively.

Associated with the lot construction are new roads within this phase and the extension of Chaucer Way and construction of two detention basins. Associated with the site development, it is assumed that the installation of buried utilities, sidewalks and hardscaping, landscaping, and other ancillary improvements will be performed.

Redding Office
1612 Insight Place
Redding, CA 96003
Ph: 530.244.6277
Fax: 530.244.6276

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1.2 PREVIOUS WORK PERFORMED

We know of one previous geotechnical study that has been performed by BMI at the project site. That study was performed in 2003 for a similar project part of the initial Deer Creek Manor Subdivision (BMI, 2003).

1.3 REVIEW OF REPORT

The review of the original geotechnical report (BMI, 2003) indicates that the information and recommendations remain generally applicable to the design and construction of the proposed project. However, we recommend once the design is finalized and prior or during grading operations to perform complementary testing to select cement type based on soil chemistry, design foundation based on plasticity index, and design road based on site specific R-values.

2.0 REVIEW OF PLANS AND SPECIFICATIONS

We recommend CGI conduct a general review of final plans and specifications to evaluate that geotechnical recommendations have been properly interpreted and implemented during design. In the event that CGI is not retained to perform this recommended review, we will assume no responsibility for misinterpretation of our recommendations.

3.0 LIMITATIONS

It is possible subsurface conditions could differ from surface exposures. If conditions are encountered during construction that differ from those described in the report, or if the scope or nature of the proposed construction changes, we should be notified immediately in order to review and, if deemed necessary, conduct additional studies and/or provide supplemental recommendations.

This report may be used only by our client and their agents and only for the purposes stated herein, within a reasonable time from its issuance. Land use, site conditions, and other factors may change over time that may require additional studies. In the event a significant period of time elapses between the issuance date of this report and construction, CGI shall be notified of such occurrence in order to review current conditions. Depending on that review, CGI may require that additional studies be conducted and that an updated or revised report is issued.

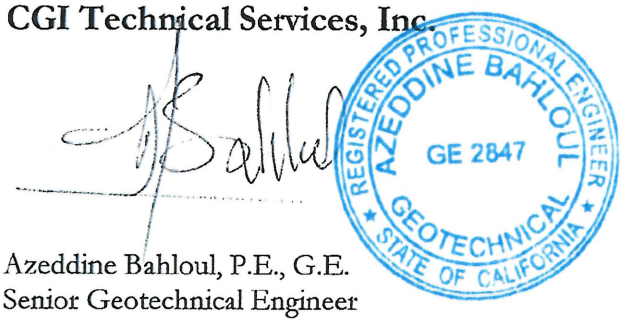
Any party other than our client who wishes to use all or any portion of this report shall notify CGI of such intended use. Based on the intended use as well as other site-related factors, CGI may require that additional studies be conducted and that an updated or revised report be issued. Failure to comply with any of the requirements outlined above by the client or any other party shall release CGI from any liability arising from the unauthorized use of this report.

We appreciate the opportunity to perform this study and assist you with this project. If

you have any questions pertaining to this report, or if we may be of further service, please contact us at (530) 244-6277 at your earliest convenience.

Regards,

CGI Technical Services, Inc.



Azeddine Bahloul, P.E., G.E.
Senior Geotechnical Engineer

Attachments: Plate 1 – Site Location Map
Plate 2 – Project Elements

Copies: PDF file delivered electronically

REFERENCES

BMI (2003), Geotechnical Investigation Report, Proposed Residential Subdivision, Deer Creek Manor, Pine Grove Avenue, Shasta Lake, California, Unpublished Consultant's Report, January 7, 23 pages & plates

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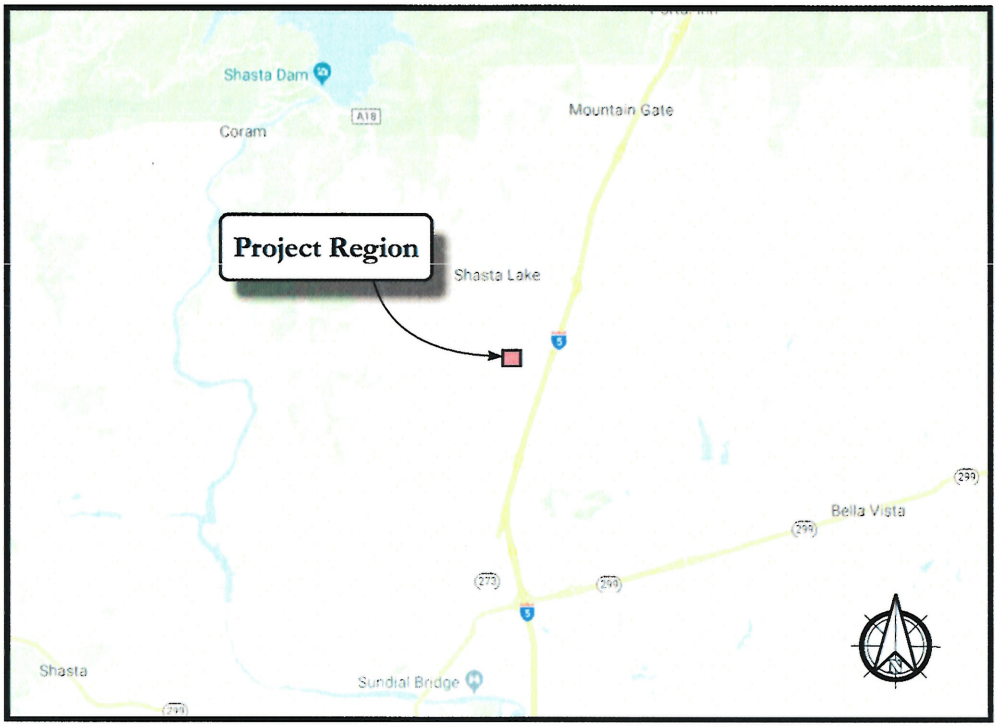
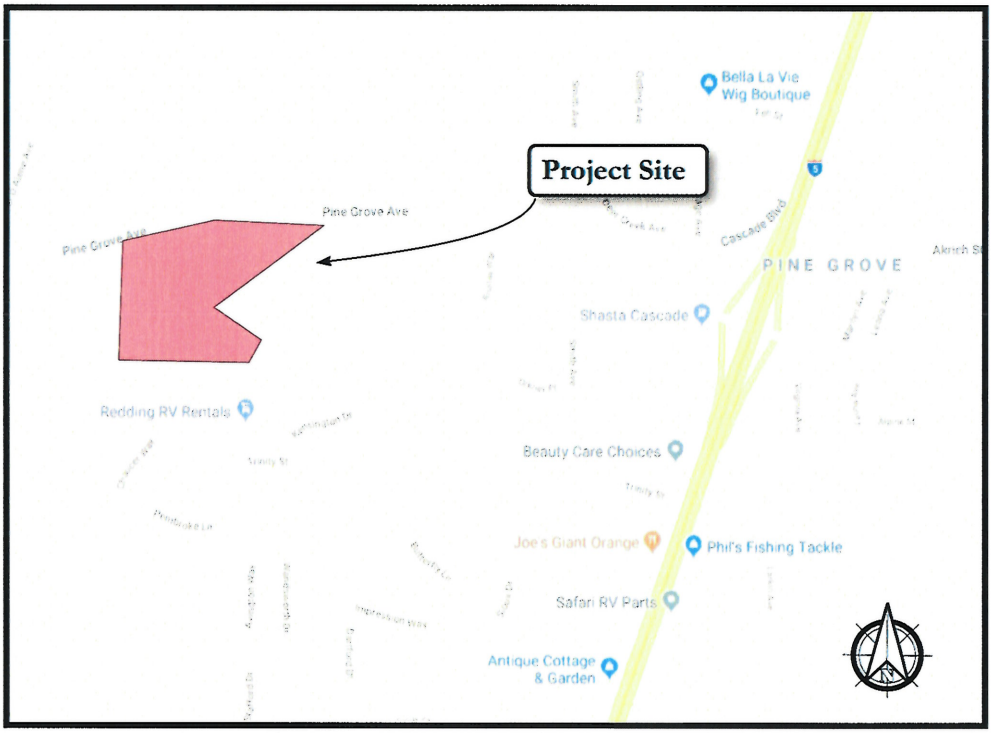




Base map from Google Earth (2018)

Scale not determined

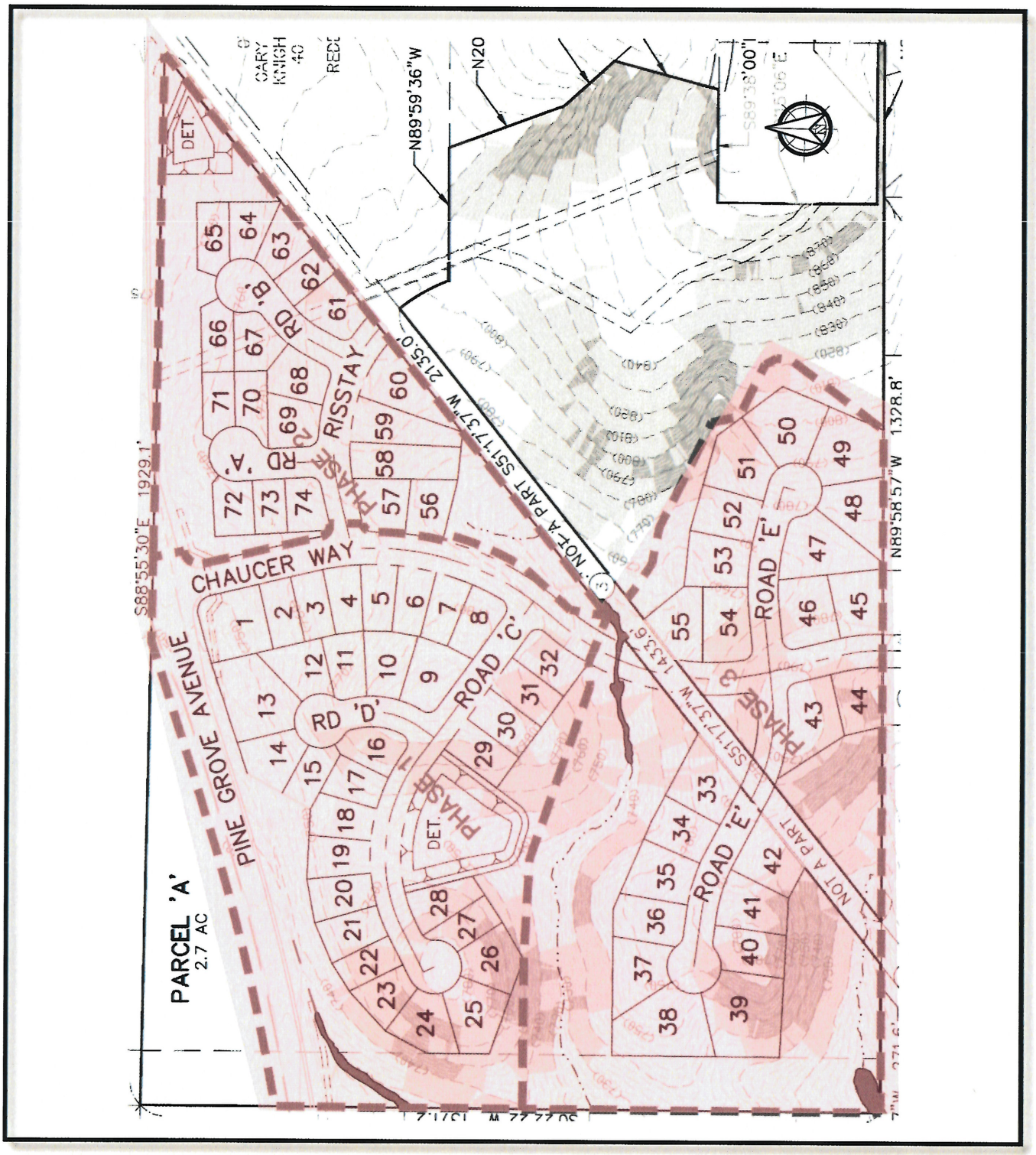
CGi Technical Services, Inc.

Project No.: 20-2096.02

SITE LOCATION MAP
WINDSOR ESTATES III
SHASTA LAKE, CALIFORNIA

Plate

1



Base map from SDS (2019)

Scale not determined

CGi Technical Services, Inc.

Project No.:20-2096.02

PROJECT ELEMENTS
WINDSOR ESTATES III
SHASTA LAKE, CALIFORNIA

Plate

2

APPENDIX E

Entitlement Level Storm Drainage Analysis
Sharrah Dunlap Sawyer, Inc., 2020

SITE LOCATION:

The proposed Windsor Estates 3 project is located within the limits of the City of Shasta Lake. Figure 1 – Vicinity Map shows the project on the south side of Pine Grove Avenue.

FIGURE 1 – VICINITY MAP

PROJECT DESCRIPTION:

The purpose of this Entitlement Level Storm Drain Analysis is to speculatively look at a reasonable scenario for future development and show how the stormwater can be managed to meet numerous regulatory requirements so that any significant environmental impacts associated with future stormwater management features can be anticipated and appropriate measures can then be taken at this early stage of development. Very detailed construction documents and this analysis will be updated and submitted with each future application for grading permits. The construction documents will provide a system with features that satisfy the local, state, and federal requirements that are in place at the time of development.

This conceptual analysis shows that runoff can be controlled with two new on-site above ground detention facilities and the use of the existing above ground detention basin located southwest of Windsor Estates 3 in previous Windsor Estates 2 – Unit 5.

DESIGN CRITERIA:

To meet City of Shasta Lake Engineering Division requirements for protection of floodplains and downstream drainage concerns, the design is required to maintain or reduce pre-development peak flows for the 10-, 25-, and 100-year design storm events. The HEC-1 Flood Hydrograph computer program was used to estimate the 10-, 25-, and 100-year runoff and the size of the

future detention facilities which will be designed in detail prior to approval of construction documents.

EXISTING CONDITIONS:

Most of Windsor Estates 3 project drains to Churn Creek and is within Basins 976(por), 978(por), 982, 984, 986(por), 980, 992(por), and 996(por). The northeast portion of the project is within Basin 4509F and drains to Salt Creek.

Runoff from the Windsor Estates project joins Churn Creek in three separate places. Basin 976 consists of a portion of Pine Grove Avenue and open oak. B976 drains southwesterly along the south side of Pine Grove Avenue where it joins with B978 and ultimately to Churn Creek. This point for the purposes of this report is called C968. B984 and B982 are a large portion of the Project and drain to an existing draw that runs westerly towards Churn Creek. Runoff from B984 and B982 join the undeveloped runoff from B986 and to Churn Creek, and for the purposes of this report will be called C980. B992 consists of a portion of the existing Windsor Estates Unit 2 and a small portion of the undeveloped Windsor Estates 3 and includes the existing detention basin that currently serves Windsor 2. B980 consists of a portion of the undeveloped Windsor Estates 3. B990 includes a portion of Windsor 2 that is tributary to the existing detention basin within B992. Runoff from B980, B992 and B990 are collected and conveyed to the existing detention facility within Windsor Estates Unit 2. The metered outflow from the existing pond combines with the undeveloped runoff from B996 to Churn Creek. This point for the purposed of this report is called C990.

For this report, the design information from the drainage letter by Hydmet entitled *Windsor Estates Phase 2 Detention Pond Analysis* dated October 1, 2002 along with the as-builts for Windsor Estates Unit 2 was used to model the existing detention facility. From the report the bottom of the existing pond is at elevation 731.0, the outlet is a 12-inch diameter pipe, the spillway elevation is at elevation 740.0, the spillway width is 6 feet, and the maximum pond berm elevation is 742.0. For the purposes of this report, the existing detention facility is S992.

B4509F drains northeasterly to Pine Grove Avenue and ultimately to Salt Creek.

The HEC-1 program was used to determine the pre-developed peak flow or the 10-, 25-, and 100-year storm evens for a 24-hour period.

PROPOSED DRAINAGE SYSTEM:

In the post-developed condition a portion of B976 is included in a new basin, B980B. B980B will route through a detention basin to be developed with the Project. There will be a manhole that will control outflow with a proposed orifice. The manhole will be a 48-inch diameter without the concentric cone top with a 48" cone grate that will act as the spillway. The top of the berm will have an elevation of 750. The lowest adjacent lot pad elevation will be set at 751.50. A proposed storm drain pipe will connect the facility to the existing drainage swale within B980A1. The orifice will meter flows from the facility that when combined with the undetained flow the peak flow rates will be equal to or less than pre-development flows for the 10-, 25-, and 100-year design storm events and will be designed in further detail with construction documents. B978 remains the same in the post-development condition. B980A1 and B980A2 will combine and run undetained into the existing swale within B980A1 and B980A2.

B990 will remain the same and B992 will consist of a small portion of Windsor Estate 3. The runoff from B990 and B992 will be detained in the existing Windsor Estates Unit 2 detention facility. The increased developed flow from Windsor 3 to the existing pond will raise the water surface elevation by no more than 2 inches. The metered flow from the existing facility will combine with the undeveloped flow from Basin 996 to Churn Creek. Table 1 compares the pre- and post-development peak flow from the existing Windsor Estate Unit 2 detention facility as well as the pre- and post-development water surface elevations from the 10-, 25-, and 100-year storm events.

Table 1: Existing Windsor Estates Unit 2 Detention Facility (S992)

S992	10-year		25-year		100-year	
	pre	post	pre	post	pre	post
Peak Flow (cfs)	9	9	9	9	11	11
Water Surface Elevation (ft)	736.41	736.49	737.15	737.26	738.68	738.81

As shown in Table 1 the peak flow from the existing detention facility will remain the same in the 10-, 25-, and 100-year events. There will be a slight increase to the water surface elevation, the largest increase during the 100-year event of 1.6 inches. The 100-year water surface elevation will be approximately 3 feet from the existing top of berm elevation.

Table 2 shows the stage-storage-discharge relationship and details of the proposed detention facility within B980B.

Table 2: Proposed Detention Facility Summary Table (S980B)

Low Level Orifice: 8" circle centered at elevation 740.33
Spillway: elevation 750.0 (lowest proposed pad elevation = 751.5)
Top of Berm = 750.0

Elevation, (ft)	Storage, (ac-ft)	Outflow, (cfs)
740	0.00	0.00
742	0.68	2.28
744	1.52	3.38
746	2.54	4.20
748	3.74	4.89
750	5.13	5.49

B4509F will develop into 100% residential with a proposed above ground detention facility. Runoff from this basin will be collected and conveyed to the proposed detention in the northeast corner of the basin. There will be a manhole that will control outflow with a proposed orifice. The manhole will be 48-inches in diameter with a 48" cone grate that will act as the spillway. The top of the berm will vary from elevation 747 to 752. The lowest adjacent lot pad elevation will be set at 770. A proposed storm drain pipe will connect the facility to the existing drainage swale that runs easterly along Pine Grove Avenue. The orifice will meter flows from the facility that will be equal to or less than pre-development flows for the 10-, 25-, and 100-year design storm events and will be designed in further detail with construction documents.

Table 3 shows the stage-storage-discharge relationship and details of the proposed detention facility within B4509F.

Table 3: Proposed Detention Facility Summary Table (S4509F)

Low Level Orifice: 7.5" circle centered at elevation 741.33
Spillway: elevation 745.9 (lowest proposed pad elevation = 770.0)
Top of Berm = 747.0

Elevation, (ft)	Storage, (ft^3)	Outflow, (cfs)
740.5	0.00	0.00
741.0	0.11	0.67
742.0	0.59	1.69
743.0	1.10	2.29
744.0	1.66	2.77
745.0	2.26	3.17
745.9	2.91	3.81

Table 4 compares the estimated post-development peak flows to the pre-development peak flows.

Table 4: Drainage Analysis

HEC-1 ID	10-year		25-year		100-year	
	Pre, cfs	Post, cfs	Pre, cfs	Post, cfs	Pre, cfs	Post, cfs
C968	2299	2298	2895	2894	4010	4008
C980	2306	2306	2904	2903	4022	4022
C990	2317	2317	2916	2915	4036	4036
4509F	6	6	8	7	12	12

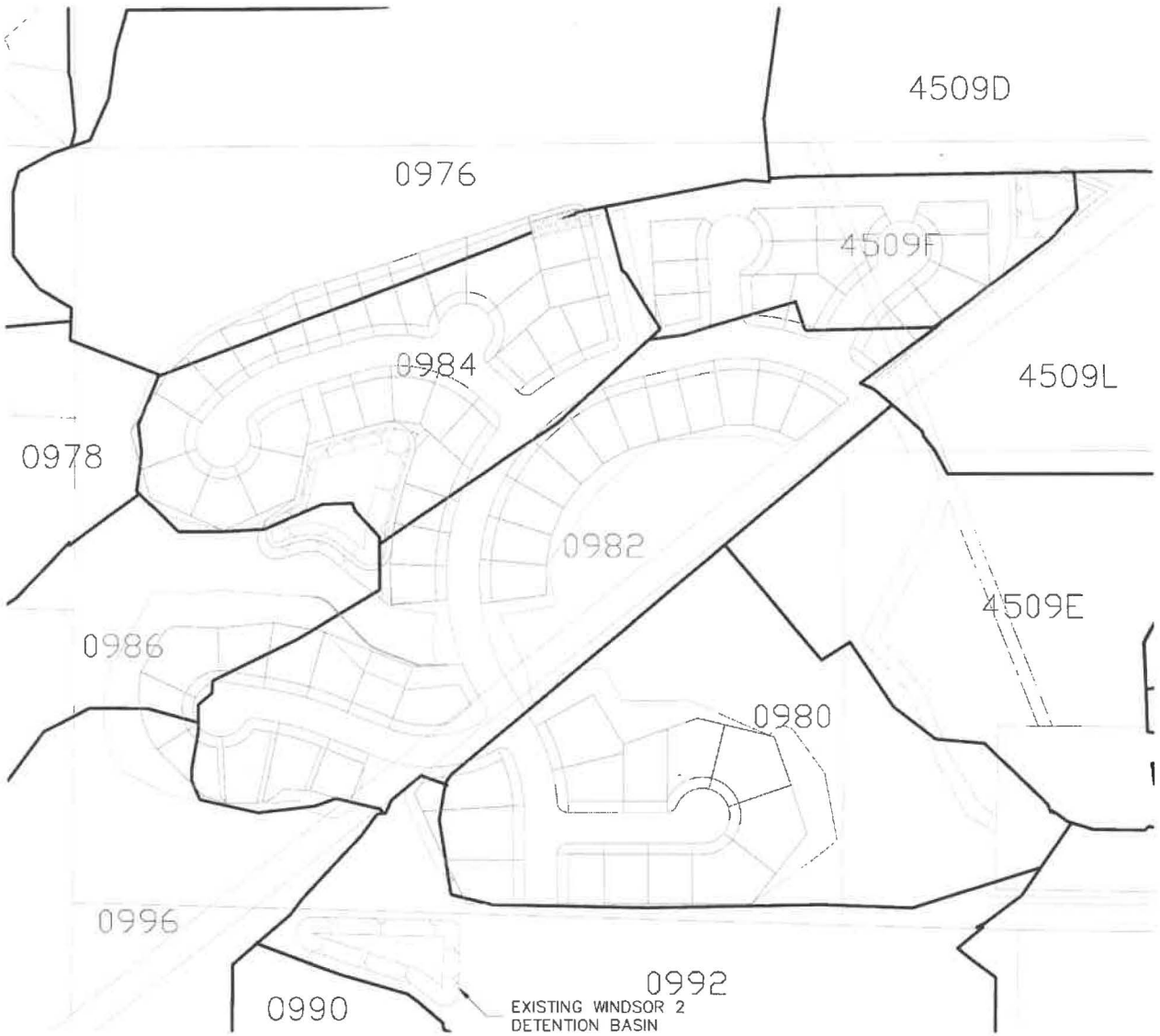
MS4 Permit Compliance:

The project will be designed to incorporate Low Impact Development (LID) Site design Measures and have Storm Water Treatment Measures incorporated into the storm drain system design in accordance with the City of Shasta Lake's Phase II MS4 Permit. The California Phase II LID Sizing Tool will be used to determine the required area of LID Best Management Practices (BMPs) to be implemented on the project. The appropriate LID BMPS will be incorporated into the project as the project conditions allow in order to comply with the City of Shasta Lake's MS4 requirements. The following Site Design Measures and Storm Water Treatment Measures will be considered for the project:

- Porous Pavement
- Amended Soil Strips
- Amended Soil Swales
- Capture and Use Storage
- Bioretention Cells
- Infiltration Basins
- Infiltration Galleries
- Infiltration Trenches
- Overland Flow (Preservation of Existing Vegetation)

CONCLUSION:

Runoff can be controlled on this site using two aboveground detention facilities; one tributary to Churn Creek and the other tributary to Salt Creek. The proposed future storm drainage system will be designed in detail at the time of grading permit application in accordance with City of Shasta Lake Engineering Division requirements for protection of floodplains and downstream drainage concerns.



PRE–DEVELOPMENT BASIN MAP

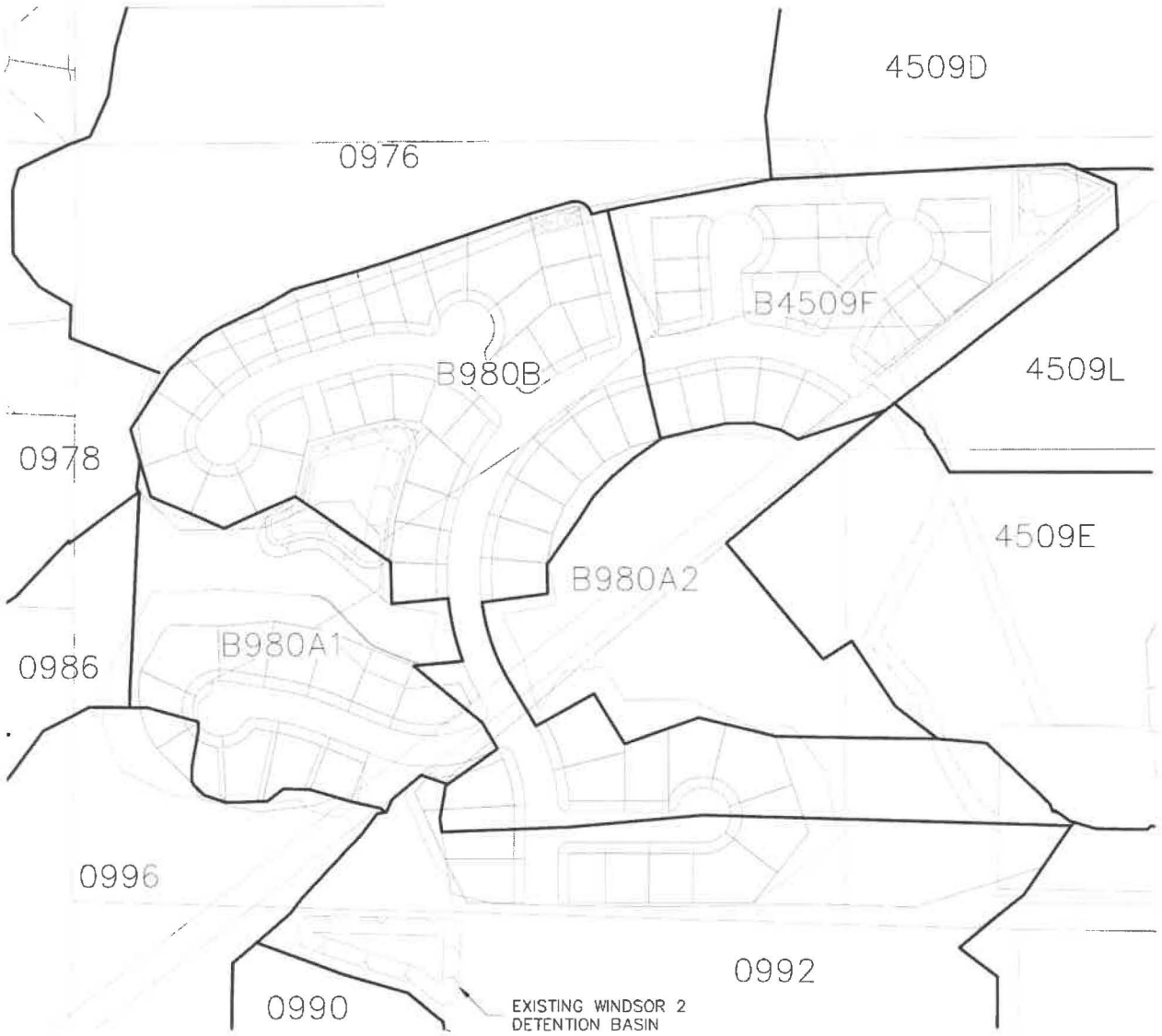
WINDSOR 3 SUBDIVISION

BY

SHARRAH DUNLAP SAWYER, INC.
Civil Engineering • Land Planning • Surveying & Mapping
Landscape Architecture • Presentation Graphics
6590 Lockheed Drive, Redding, CA 96002
530.221.1792 voice • 530.221.8369 fax • info@sdsengineering.com

TO BE USED AS A VISUAL AID ONLY. LINEWORK DOES NOT REPRESENT, NOR IS IT INTENDED TO REPLACE SURVEY OR RECORDED PROPERTY INFORMATION.

DATE: APRIL, 2020 SCALE: 1"=200' SHEET 1 OF 1



POST–DEVELOPMENT BASIN MAP

WINDSOR 3 SUBDIVISION

BY

SHARRAH DUNLAP SAWYER, INC.
Civil Engineering • Land Planning • Surveying & Mapping
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DATE: APRIL, 2020 SCALE: 1"=200' SHEET 1 OF 1

Job# 17.0133

APPENDIX F

Environmental Noise Assessment
Bollard Acoustical Consultants, 2006

Environmental Noise Assessment

Deer Creek Manor Residential Development

Shasta Lake, California

BAC Job # 2005-680

Prepared For:

Pine Grove Development, Inc.

915 Twin View Blvd.
Redding, CA 96003

Prepared By:

Bollard Acoustical Consultants, Inc.

Paul Bollard

Paul Bollard, President

January 31, 2006

INTRODUCTION

The proposed Deer Creek Manor Residential Development is located on the south side of Pine Grove Avenue, between Interstate 5 and Ashby Road, in the City of Shasta Lake, California. Traffic on Pine Grove Avenue is considered to be a potentially significant noise source which may affect the project design. The intent of this analysis is to review the potential noise impacts associated with traffic on Pine Grove Avenue and to ensure that appropriate noise mitigation measures are developed for this project to achieve satisfaction with the City of Shasta Lake noise standards.

CRITERIA FOR ACCEPTABLE NOISE EXPOSURE

The City of Shasta Lake General Plan Noise Element establishes acceptable noise sensitivity standards. Specifically, the Noise Element establishes a 60 dB L_{dn}[1] exterior noise level criterion as being acceptable for new residential uses affected by traffic noise sources. Where it is not possible to reduce noise in outdoor activity areas to 60 dB L_{dn} or less using a practical application of the best available noise reduction measures, an exterior noise level of up to 65 dB L_{dn} may be allowed provided that available exterior noise reduction measures have been implemented and interior noise levels are in compliance with a 45 dB L_{dn} interior noise level standard.

EVALUATION OF FUTURE TRAFFIC NOISE LEVELS AT THE PROJECT SITE

Traffic Noise Prediction Methodology:

Bollard Acoustical Consultants, Inc. (BAC) employs the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (FHWA RD-77-108) for the prediction of traffic noise levels. The model is based upon the CALVENO noise emission factors for automobiles, medium trucks, and heavy trucks, with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and the acoustical characteristics of the site. Although a more sophisticated version of the FHWA Model has recently been developed by the Federal Highway Administration, RD-77-108 remains an acceptable model for traffic noise prediction for this project.

Traffic Noise Prediction Model Calibration:

The FHWA Model provides reasonably accurate traffic noise predictions under "ideal" roadway conditions. Ideal conditions are generally considered to be long straight roadway segments with uniform vehicle speeds, a flat roadway surface, good pavement conditions, a statistically large volume of traffic, receivers fairly close to the roadway, and an unimpeded view of the roadway from the receiver location. However, ideal conditions are more the exception than the rule. As a result,

[1] Please refer to Appendix "A" for definitions of acoustic terminology.

it is often necessary to calibrate the FHWA Model through site-specific traffic noise level measurements and concurrent traffic counts.

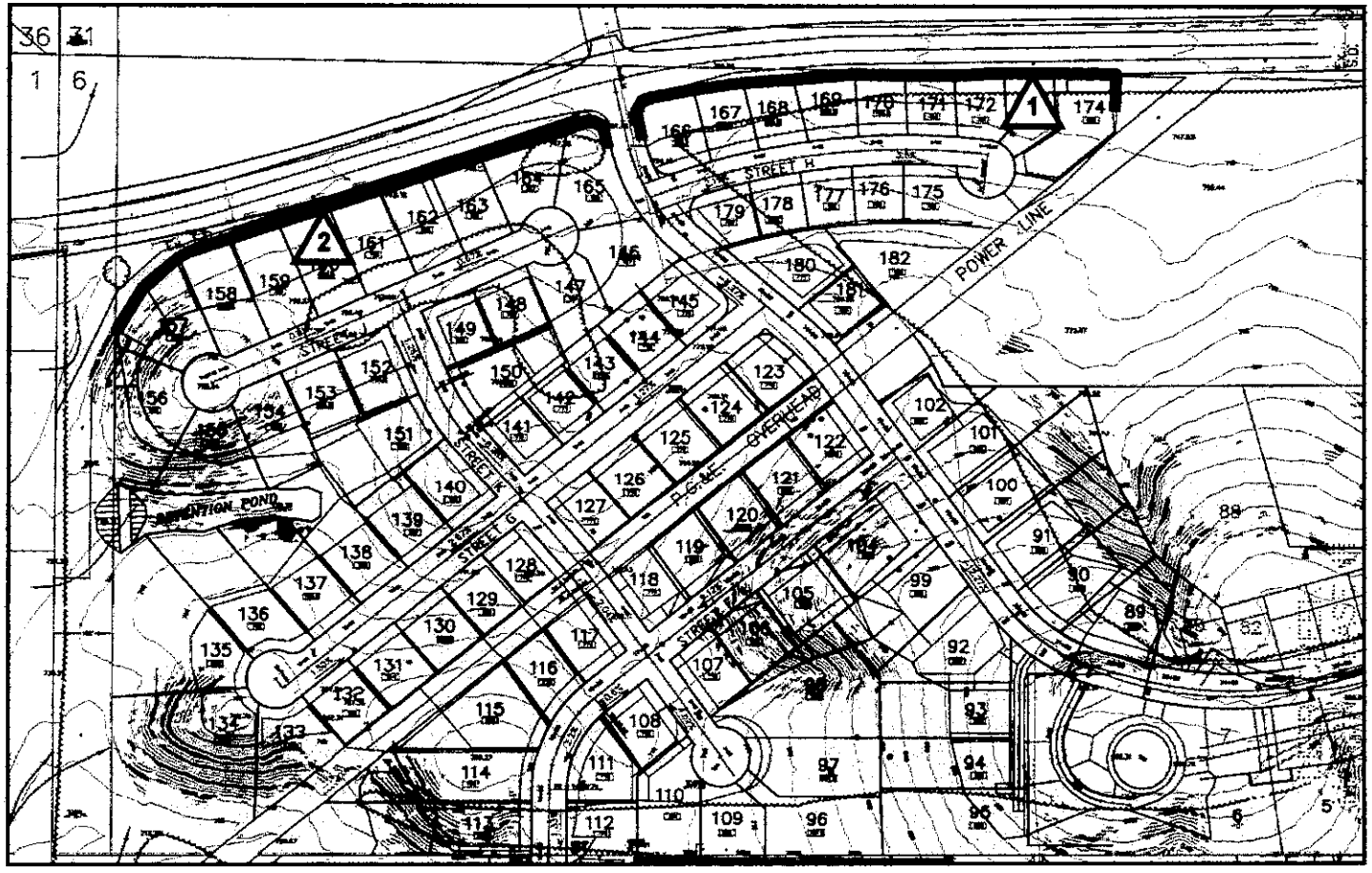
This calibration process was performed by BAC at two locations on the project site on December 29, 2005. Traffic noise measurement location 1was representative of Lots 166-174 and location 2 was representative of Lots 157-165. The traffic noise measurement locations are shown on Figure 1. The detailed results of the calibration procedure are provided in Appendix B.

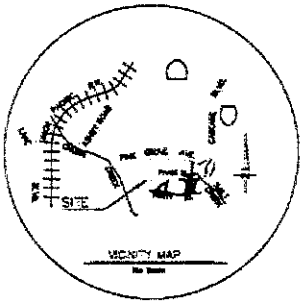
The results of the Model calibration indicate that for Pine Grove Avenue, east of the site access road shown in Figure 1(location 1), the FHWA Model accurately predicted traffic noise levels on the project site, and for Pine Grove Avenue west of the site access road (location 2) the Model slightly under-predicted traffic noise levels on the project site. The under-prediction by the FHWA Model at location 2 was attributed to topographical variation between the measurement location and the roadway. Based upon the results of the field calibrations, adjustments were made to the FHWA model for the prediction of Pine Grove Avenue traffic noise levels at the western portion of the project site to account for the existing site conditions.

Predicted Future Traffic Noise Levels at the Project Site:

To determine the future traffic noise levels on the project site, Bollard Acoustical Consultants, Inc. used Existing plus Cumulative plus Project traffic data contained in the traffic impact analysis completed by Whitlock & Weinberger Transportation, Inc. for the Deer Creek Manor Development, dated April 9, 2003. Peak hour traffic volumes for Pine Grove Avenue both east and west of the westerly site access road were multiplied by a factor of 10 to obtain average daily traffic (ADT) volumes, and a 2% annual growth rate for a total of 3 years was added to account for the slightly dated traffic data. Appendix B shows the inputs to the FHWA Noise Prediction Model. Table 1 shows the predicted future traffic noise levels at the project site.

Figure 1
Deer Creek Manor
Shasta Lake, California





N

100'

▬ : Potential Noise Barrier Locations

▲ (#) : Noise Monitoring Locations

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Table 1
Predicted Future Traffic Noise Levels
Deer Creek Manor Residential Development - City of Lake Shasta, California

Roadway	Receiver location	Distance to C/L	Predicted future Ldn, dB
Pine Grove Avenue	Backyards of Lots 166-174	60 feet	64
Pine Grove Avenue	Backyards of Lots 159-161	100 feet	61
Pine Grove Avenue	Backyards of Lots 161-165	75 feet	63

Note: A complete listing of FHWA Model inputs and results is provided in Appendix B.

The Table 1 data indicate that the predicted exterior noise levels will exceed the City of Lake Shasta 60 dB L_{dn} exterior noise level criterion. As a result, an analysis of future traffic noise levels at both exterior and interior locations is required.

Traffic Noise Compliance with the City of Lake Shasta Exterior Noise Standard:

Unmitigated Pine Grove Avenue traffic noise levels at backyard locations of the first row of lots within the development adjacent to the roadway are predicted to exceed the City of Shasta Lake 60 dB L_{dn} exterior noise level standard. However, solid noise barriers could be used to reduce predicted future noise levels at the proposed backyard areas. The effectiveness of a barrier is dependent upon blocking line-of-sight between the source and receiver, and is improved with increasing the distance the sound must travel to pass over the barrier as compared to a straight line from source to receiver. In general, if the line of sight from a noise source to a noise receiver is intercepted, noise levels at the receiver will be reduced by approximately 5 dB. Therefore, if noise barriers could be constructed to intercept line of sight, compliance with the City's exterior noise level limit will be achieved.

Traffic Noise Compliance with the City of Lake Shasta Interior Noise Standard:

According to Table 1, the predicted future L_{dn} at the nearest residential backyards to Pine Grove Avenue would range from approximately 61-64 dB Ldn at first floor facades. Due to reduced ground absorption of sound at elevated locations, traffic noise levels are expected to be approximately 2 dB higher at second floor facades (63-66 dB L_{dn}) than at unshielded first floor facades. Given future worst-case exterior noise levels of approximately 66 dB L_{dn}, a building facade noise reduction of 21 dB would be required at the unshielded second floor facades adjacent to Pine Grove Avenue to achieve an interior noise level of 45 dB L_{dn}.

Standard residential construction (wood siding, STC-26 windows, door weatherstripping, exterior wall insulation, composition plywood roof), results in an exterior to interior noise reduction of about 25 dB with windows closed, and approximately 15 dB with windows open. Therefore, standard construction would be acceptable at all first and second-floor facades, provided that mechanical ventilation (air conditioning) is included to allow occupants to close doors and windows to achieve the desired traffic noise isolation.

CONCLUSIONS AND RECOMMENDATIONS

A portion of the Deer Creek Manor project site will be exposed to future traffic noise levels in excess of the City of Lake Shasta 60 dB L_{dn} exterior noise standard for new residential developments. The following noise mitigation measures could be utilized to achieve compliance with the City's noise policies:

1. Air conditioning should be included for all residences in this development to allow the occupants to close doors and windows as desired to achieve additional acoustical isolation.

2. Sound walls should be constructed to a height sufficient to intercept line of sight from the roadway traffic to the outdoor activity areas of the residences located adjacent to the roadway. The ultimate height required will depend on the ultimate grading of the project site and barrier location. Figure 1 shows general barrier locations, although topographic constraints may make it necessary to move the barriers closer to the roadway or activity areas. Suitable materials for these barriers include masonry block, precast concrete panels, or other massive materials (surface density of 4 lbs / s.f.).

These conclusions are based on the site plan shown in Figure 1 and on the assumptions cited in this report. Changes to the site plan or deviations from the assumptions cited herein could cause future noise levels to differ from those predicted in this analysis.

Appendix A

Acoustical Terminology

Acoustics	The science of sound.
Ambient Noise	The distinctive acoustical characteristics of a given space consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.
Attenuation	The reduction of an acoustic signal.
A-Weighting	A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.
Decibel or dB	Fundamental unit of sound, A Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell.
CNEL	Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by a factor of three and nighttime hours weighted by a factor of 10 prior to averaging.
Frequency	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz.
Ldn	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
Leq	Equivalent or energy-averaged sound level.
Lmax	The highest root-mean-square (RMS) sound level measured over a given period of time.
Loudness	A subjective term for the sensation of the magnitude of sound.
Masking	The amount (or the process) by which the threshold of audibility is for one sound is raised by the presence of another (masking) sound.
Noise	Unwanted sound.
Peak Noise	The level corresponding to the highest (not RMS) sound pressure measured over a given period of time. This term is often confused with the "Maximum" level, which is the highest RMS level.
RT_{60}	The time it takes reverberant sound to decay by 60 dB once the source has been removed.
Sabin	The unit of sound absorption. One square foot of material absorbing 100% of incident sound has an absorption of 1 sabin.
SEL	A rating, in decibels, of a discrete event, such as an aircraft flyover or train passby, that compresses the total sound energy of the event into a 1-s time period.
Threshold of Hearing	The lowest sound that can be perceived by the human auditory system, generally considered to be 0 dB for persons with perfect hearing.
Threshold of Pain	Approximately 120 dB above the threshold of hearing.

Appendix B-1

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Calibration Worksheet

Project Information:	Job Number:	2005-680
	Project Name:	Deer Creek Manor
	Roadway Tested:	Pine Grove Ave. East of West Access Rd.
	Test Location:	1
	Test Date:	December 29, 2005
Weather Conditions:	Temperature (Fahrenheit):	64
	Relative Humidity:	Dry
	Wind Speed and Direction:	Calm
	Cloud Cover:	Partly Cloudy
Sound Level Meter:	Sound Level Meter:	LDL Model 820
	Calibrator:	LDL Model CA200
	Meter Calibrated:	Immediately before and after test
	Meter Settings:	A-weighted, slow response
Microphone:	Microphone Location:	On Project Site
	Distance to Centerline (feet):	60
	Microphone Height:	5 feet above ground
	Intervening Ground (Hard or Soft):	**Soft**
	Elevation Relative to Road (feet):	0
Roadway Condition:	Pavement Type	Asphalt
	Pavement Condition:	Good
	Number of Lanes:	2
	Posted Maximum Speed (mph):	45
Test Parameters:	Test Time:	12:30 PM
	Test Duration (minutes):	15
	Observed Number Automobiles:	53
	Observed Number Medium Trucks:	0
	Observed Number Heavy Trucks:	5
	Observed Average Speed (mph):	45
Model Calibration:	Measured Average Level (L_{eq}):	63.6
	Level Predicted by FHWA Model:	62.7
	Difference:	***-0.9 dB***

Conclusions:

Appendix B-2

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Calibration Worksheet

Project Information:

Job Number: 2005-680
Project Name: Deer Creek Manor
Roadway Tested: Pine Grove Ave. West of West Access Rd.
Test Location: 2
Test Date: December 29, 2005

Weather Conditions:

Temperature (Fahrenheit): 63
Relative Humidity: Dry
Wind Speed and Direction: Calm
Cloud Cover: Overcast

Sound Level Meter:

Sound Level Meter: LDL Model 820
Calibrator: LDL Model CA200
Meter Calibrated: Immediately before and after test
Meter Settings: A-weighted, slow response

Microphone:

Microphone Location: On Project Site
Distance to Centerline (feet): 75
Microphone Height: 5 feet above ground
Intervening Ground (Hard or Soft): **Soft**
Elevation Relative to Road (feet): 10

Roadway Condition:

Pavement Type Asphalt
Pavement Condition: Good
Number of Lanes: 2
Posted Maximum Speed (mph): 45

Test Parameters:

Test Time: 1:00 PM
Test Duration (minutes): 15
Observed Number Automobiles: 77
Observed Number Medium Trucks: 1
Observed Number Heavy Trucks: 2
Observed Average Speed (mph): 45

Model Calibration:

Measured Average Level (L_{eq}): 63.9
Level Predicted by FHWA Model: 60.4
Difference: ***-3.5 dB***

Conclusions:

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Appendix C-1

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Prediction Worksheet

Project Information:

Job Number: 2005-680
Project Name: Deer Creek Manor
Roadway Name: Pine Grove Ave. East of West Access Rd.

Traffic Data:

Year:	Future
Average Daily Traffic Volume:	7,560
Percent Daytime Traffic:	90
Percent Nighttime Traffic:	10
Percent Medium Trucks (2 axle):	2
Percent Heavy Trucks (3+ axle):	2
Assumed Vehicle Speed (mph):	45
Intervening Ground Type (hard/soft):	**Soft**

Traffic Noise Levels:

				L_{dn}, dB			
Lot(s):	Description	Distance	Offset (dB)	Autos	Medium Trucks	Heavy Trucks	Total
166-174	Backyard Areas	60	0	63	54	59	64

Traffic Noise Contours (No Calibration Offset):

L_{dn} Contour, dB	Distance from Centerline, (ft)
75	12
70	26
65	55
60	119

Notes:

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Appendix C-2

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Prediction Worksheet

Project Information:

Job Number: 2005-680
Project Name: Deer Creek Manor
Roadway Name: Pine Grove Ave. West of West Access Rd.

Traffic Data:

Year:	Future
Average Daily Traffic Volume:	4,530
Percent Daytime Traffic:	90
Percent Nighttime Traffic:	10
Percent Medium Trucks (2 axle):	2
Percent Heavy Trucks (3+ axle):	2
Assumed Vehicle Speed (mph):	45
Intervening Ground Type (hard/soft):	**Soft**

Traffic Noise Levels:

				L_{dn}, dB			
Lot(s):	Description	Distance	Offset (dB)	Autos	Medium Trucks	Heavy Trucks	Total
159-160	Backyard Areas	100	2	59	51	55	61
161-165	Backyard Areas	75	2	61	52	57	63

Traffic Noise Contours (No Calibration Offset):

L_{dn} Contour, dB	Distance from Centerline, (ft)
75	8
70	18
65	39
60	85

Notes:

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APPENDIX G

Traffic Impact Study
W-Trans, 2020

Traffic Impact Study for the Windsor Estates 3 Project

Prepared for the City of Shasta Lake

Submitted by
W-Trans

September 10, 2020

TRAFFIC ENGINEERING
TRANSPORTATION PLANNING
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Executive Summary

The third phase of Windsor Estates includes 80 single-family residences to be constructed on the south side of Pine Grove Avenue approximately one mile west of I-5 in the City of Shasta Lake. Based on standard ITE rates, the proposed project would be expected to result in 755 new daily trips on average, including 59 trips during the weekday a.m. peak hour and 79 trips during the p.m. peak hour.

Analysis indicates that all study intersections would operate acceptably per the applicable City or Caltrans standards under Existing, Baseline, and Future Conditions without and with project traffic, except for the northbound left-turn movement at Pine Grove Avenue/Cascade Boulevard East. While this movement would be expected to deteriorate from unacceptable LOS D under Existing Conditions to LOS F by the year 2040, the proposed project would not result in an adverse impact under General Plan policy since the project would be expected to improve operation of the intersection by diverting some of the existing trips on the northbound approach to the new project intersection. Peak hour signal warrants were evaluated for informational purposes, and it was determined that installation of a traffic signal would be warranted based on the Future volumes projected by the SRTA travel demand model.

As of the date of this analysis, the City of Shasta Lake has not yet established thresholds of significance related to VMT so the project was assessed based on 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*. Under this guidance and using data contained in the SRTA travel demand model, California Department of Finance population estimates, and the SRTA *2018 Regional Transportation Plan and Sustainable Communities Strategy*, the project is expected to have a less-than-significant transportation impact on VMT.

Bicycle and transit facilities are adequate to serve the project site given the location and anticipated demand. Although not specifically shown on the site plan, it is understood that all project streets would have sidewalks. It is also recommended that sidewalks be provided along the site's frontage with Pine Grove Avenue and a crosswalk be striped on the southern leg of the new intersection created by the project along with ADA-compliant curb ramps.

Sight lines on Pine Grove Avenue at the new project intersection are adequate to the west of the project street but are approximately 100 feet less than needed for the posted 50-mph speed limit when looking east. With the project, the existing TWLTL on Pine Grove Avenue should be retained to the west of the project intersection to provide a refuge for motorists turning left from the project street. Additionally, an advanced intersection waring sign should be installed on the westbound approach and any new signs or landscaping installed within the vision triangles at the project intersection should be either low-lying or clear between three and seven feet from street level to maximize the availability of existing sight lines.

The intersection that the project street forms with Pine Grove Avenue should include a left-turn lane on the westbound approach and the existing curb lines should be reconstructed without deceleration and acceleration tapers.

Introduction

This report presents an analysis of the potential traffic impacts that would be associated with the third phase of the Windsor Estates residential development project to be located on the south side of Pine Grove Avenue in the City of Shasta Lake. The traffic study was completed in accordance with the criteria established by the City of Shasta Lake, is consistent with standard traffic engineering techniques, and reflects a scope of work requested by City staff.

Prelude

The purpose of a traffic impact study is to provide City staff and policy makers with data that they can use to make an informed decision regarding the potential transportation impacts of a proposed project, and any associated improvements that would be required in order to mitigate these impacts to an acceptable level under CEQA, the City's General Plan, or other policies. Impacts relative to access for pedestrians, bicyclists, and to transit are addressed in the context of the CEQA criteria. Consistent with SB 743, the project's transportation impacts were analyzed using VMT. While no longer a part of the CEQA review process, vehicular traffic service levels at key intersections were evaluated for consistency with General Plan policies 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 anticipated travel patterns specific to the proposed project, then analyzing the impact the new traffic would be expected to have on the study intersections.

Project Profile

The proposed project includes 80 single family homes to be constructed on a currently vacant lot approximately one mile west of I-5 in the City of Shasta Lake. As proposed, the project access point would form a new intersection with Pine Grove Avenue at the location of an existing curb cut. The location of the project site is shown in Figure 1.

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Traffic Impact Study for the Windsor Estates 3 Project

Figure 1 – Study Area and Existing Lane Configurations

Transportation Setting

Operational Analysis

Study Area and Periods

The study area consists of the section of Pine Grove Avenue fronting the project site and the following intersections:

1. Pine Grove Avenue/Lake Boulevard
2. Pine Grove Avenue/Ashby Road
3. Pine Grove Avenue/Project Access Point
4. Pine Grove Avenue/Cascade Boulevard West
5. Pine Grove Avenue/Cascade Boulevard East
6. Pine Grove Avenue/I-5 Southbound Ramps
7. Pine Grove Avenue/I-5 Northbound Ramps
8. Pine Grove Avenue/Virginia Avenue-Twin View Boulevard

Operating conditions during the weekday 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 Roadway

Pine Grove Avenue is a three-lane roadway that predominantly runs east-west. The segment along the project frontage has two 12-foot travel lanes with a center two-way left-turn lane and posted speed limit of 50 miles per hour (mph). Based on count data collected in December 2018, the roadway has an average daily traffic (ADT) volume of approximately 5,200.

Study Intersections

Pine Grove Avenue/Lake Boulevard is a four-legged intersection stop-controlled on the eastbound Walker Mine Road and westbound Pine Grove Avenue approaches. Bike lanes are present on Lake Boulevard and Pine Grove Avenue.

Pine Grove Avenue/Ashby Road is a two-way stop-controlled intersection with stop controls on the northbound and southbound Ashby Road approaches. There is an acceleration taper for the northbound right-turn movement onto Pine Grove Avenue. Bicycle lanes are provided on all four approaches, with crosswalks on the north and south legs.

Pine Grove Avenue/Project Access Point would be a new intersection constructed with the proposed project approximately one-quarter mile east of Pine Grove Avenue/Coeur D'Alene Avenue. As proposed, the project access road would form the southern leg of the intersection and the northbound approach would be stop-controlled.

Pine Grove Avenue/Cascade Boulevard West is signalized tee-intersection with protected left-turn phasing provided on the southbound and eastbound approaches. Crosswalks and associated pedestrian signal heads are present on all three legs.

Pine Grove Avenue/Cascade Boulevard East is a four-legged intersection with stop controls on the northbound and southbound approaches. The north leg was previously Cascade Boulevard, but with the relocation of Cascade Boulevard approximately 325 feet to the west, the northern leg now terminates approximately 200 feet north of the intersection.

Pine Grove Avenue/I-5 South Ramps is a four-legged intersection with the southbound off-ramp approach stop-controlled. The south leg is an on-ramp to Interstate 5. Although not marked, the southbound approach has a flared right-turn area with storage space to accommodate approximately two vehicles.

Pine Grove Avenue/I-5 North Ramps is a four-legged intersection with the northbound off-ramp approach stop-controlled. Like Pine Grove Avenue/I-5 South Ramps, the off-ramp approach has a flared right-turn area with storage space to accommodate two vehicles.

Pine Grove Avenue/Virginia Avenue-Twin View Boulevard is a four-legged intersection with side-street stop controls on the Twin View Boulevard and Virginia Avenue approaches.

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 July 1, 2013 through June 30, 2018.

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 *2014 Collision Data on California State Highways*, California Department of Transportation (Caltrans). During the five-year study period, the intersections of Pine Grove Avenue/Lake Boulevard and Pine Grove Avenue/Ashby Road had higher collision rates than the statewide average for that type of facility; the remaining intersections had collision rates below the statewide average for similar facilities. The collision rate calculations are provided in Appendix A.

Table 1 – Collision Rates at the Study Intersections

Study Intersection	Number of Collisions (2013-2018)	Calculated Collision Rate (c/mve)	Statewide Average Collision Rate (c/mve)
1. Pine Grove Ave/Lake Blvd	5	**0.55**	0.23
2. Pine Grove Ave/Ashby Rd	3	**0.36**	0.23
3. Pine Grove Ave/Project Access Point	n/a	-	-
4. Pine Grove Ave/Cascade Blvd W	1	0.07	0.24
5. Pine Grove Ave/Cascade Blvd E	1	0.06	0.23
6. Pine Grove Ave/I-5 SB Ramps	0	0.00	0.23
7. Pine Grove Ave/I-5 NB Ramps	2	0.19	0.23
8. Pine Grove Ave/Virginia Ave-Twin View Blvd	0	0.00	0.23

Note: c/mve = collisions per million vehicles entering; **Bold** text = Collison rate is above the statewide average; n/a = not applicable

Because the intersections of Pine Grove Avenue with Lake Boulevard and Ashby Road had calculated collision rates above the statewide average, the individual collisions that occurred at these intersections were further reviewed. It was determined that all five of the collisions at Pine Grove Avenue/Lake Boulevard and all three of the collisions at Pine Grove Avenue/Ashby Road were classified as broadsides, many of which were attributed to right-of-way violations. Consideration was given to the need for a traffic signal; however, volumes at neither intersection are sufficient to meet the peak hour signal warrant. Because broadside crashes are generally due to high speeds on the intersection approaches with free flow, the City may wish to increase speed limit enforcement at these intersections.

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, there is a limited network of pedestrian facilities to provide access for pedestrians near the proposed project site. Pine Grove Avenue is a relatively high-speed rural road with a low expected pedestrian demand. However, according to the *GoShasta Regional Active Transportation Plan*, 2018, pedestrian facilities are planned along Pine Grove Avenue between Jorzack Way and Ashby Road. Potential pedestrian facilities along this segment of Pine Grove Avenue are identified as either widened paved shoulders, or if feasible, a separated pathway.

Bicycle Facilities

The *Highway Design Manual*, Caltrans, 2017, 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 Pine Grove Avenue between Lake Boulevard and Smith Avenue and along Ashby Road between Shasta Gateway Drive and Shasta Dam Boulevard. Bicyclists ride in the roadway and/or on sidewalks along all other streets within the project study area. According to the *GoShasta Regional Active Transportation Plan,* there is a planned multi-use path along Churn Creek between Oasis Road and Pine Grove Avenue. A multi-use path is also planned along Pine Grove Avenue between Williamson Road and Cascade Boulevard. Table 2 summarizes the existing and planned bicycle facilities in the project vicinity, as contained in the *GoShasta Regional Active Transportation Plan*.

Table 2 – Bicycle Facility Summary				
Status **Facility**	**Class**	**Length (miles)**	**Begin Point**	**End Point**
Existing				
Pine Grove Ave	II	1.85	Lake Blvd	Smith Ave
Ashby Rd	II	1.87	Shasta Gateway Dr	Shasta Dam Blvd
Planned				
Churn Creek Trail*	I	1.73	Oasis Rd	Pine Grove Ave
Pine Grove Ave*	I	2.33	Williamson Rd	Cascade Blvd

Notes: * All or portions of these bikeways are located within the County of Shasta
Source: *GoShasta Regional Active Transportation Plan*, Shasta Regional Transportation Agency, 2018

Transit Facilities

Transit service in the City of Shasta Lake and throughout Shasta County is provided by the Redding Area Bus Authority (RABA). There are no transit stops within one-quarter mile of the project site, which is generally considered an acceptable walking distance. Transit access is therefore not readily accessible from the project site.

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), 6th Edition, Transportation Research Board, 2018. 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 level of average delay in seconds per vehicle. Results are presented for individual movements together with the weighted overall average delay for the intersection.

The intersection of Pine Grove Avenue/Cascade Boulevard West, which is currently controlled by a traffic signal, was 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 optimized signal timing.

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

Table 3 – Intersection Level of Service Criteria		
LOS	**Two-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. 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 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 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 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 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 80 seconds. Vehicles may wait through more than one cycle to clear the intersection.

Reference: *Highway Capacity Manual*, 6th Edition, Transportation Research Board, 2018

Traffic Operation Standards

City of Shasta Lake

The *City of Shasta Lake General Plan* states that the City strives to maintain LOS C to the maximum degree feasible. This applies to the overall operation of the intersection at signalized locations and to the worst-case movement on the stop-controlled approach at unsignalized locations. It should be noted that the City's standard of significance is more conservative than many public agencies in California. It is understood that the City is in the process of updating the Circulation element of the General Plan, and it is recommended that the City consider modifying their level of service standard so that it will not lead to the installation of unwarranted traffic control devices.

Since the City of Shasta Lake does not have a defined project significance threshold, the following criteria used in the City of Redding were used for this study:

Roadways/Signalized intersections: The project is considered to have a significant impact if it would:

- *Result in a roadway or signalized intersection operating at an acceptable LOS under the base condition (no project) to deteriorate to an unacceptable LOS: or*
- *Increase the delay by more than 5 seconds at a signalized intersection that is/will operate at an unacceptable LOS without the project.*
- *Increases the VIC ratio by more than 0.05 on a roadway segment that is/will operate at an unacceptable LOS without the project.*

Unsignalized Intersections: The project is considered to have a significant impact if it would:

- *Result in an unsignalized intersection movement/approach operating at an acceptable LOS under the base condition (no project) to deteriorate to an unacceptable LOS, and also cause the intersection to meet the peak hour signal warrant: or*
- *For an unsignalized intersection that meets the signal warrant, increase the delay by more than five seconds at a movement/approach that is operating at an unacceptable LOS without the project.*

Caltrans

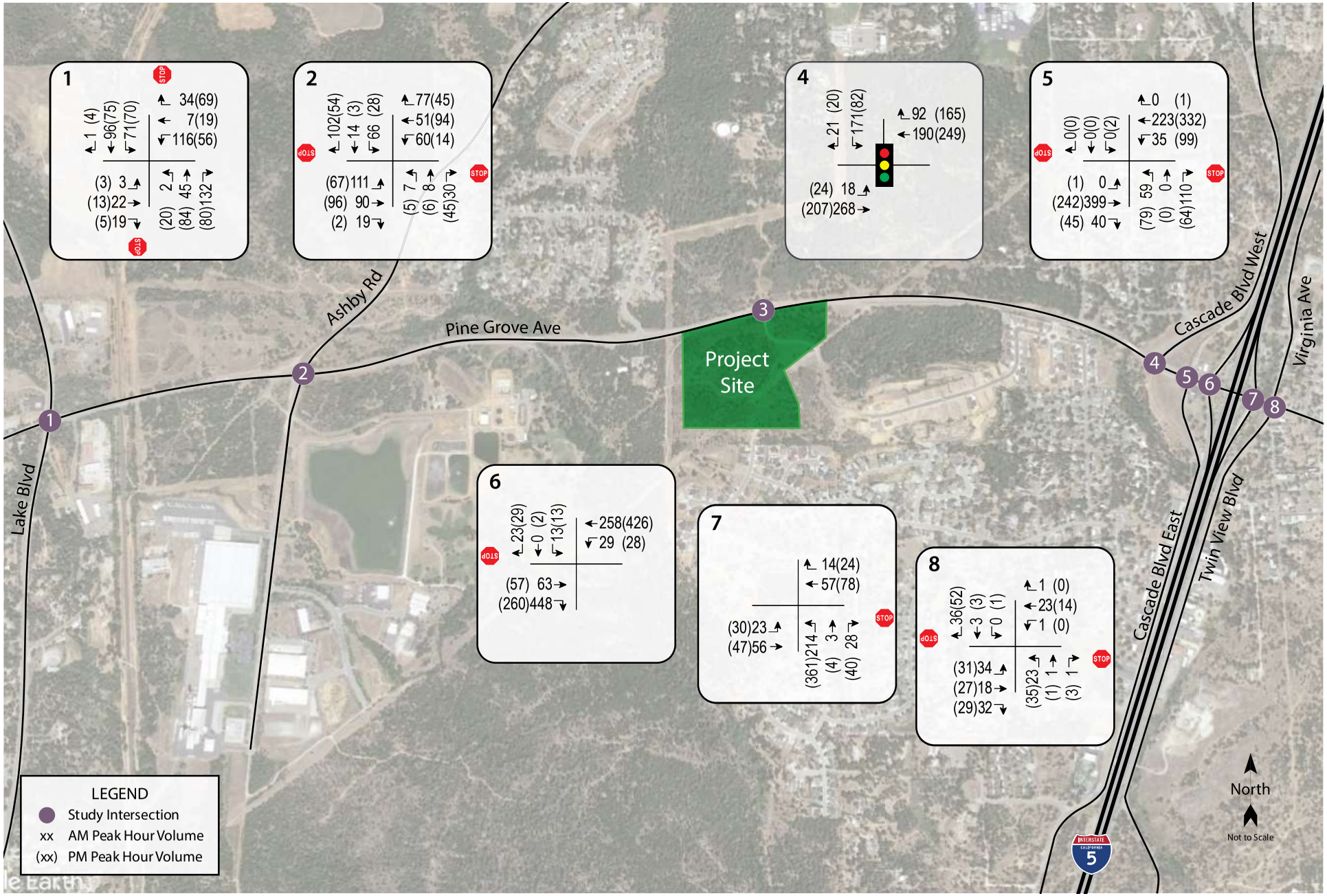
Caltrans has jurisdiction over any intersection located on a state route, so the Caltrans standard is applicable to the intersections of Pine Grove Avenue with I-5 North and South Ramps. In the *Guide for the Preparation of Traffic Impact Studies*, Caltrans indicates that they endeavor to maintain operation at the transition from LOS C to LOS D, which translates to an allowable delay of approximately 25 seconds at unsignalized intersections. Based on previous discussions with Caltrans staff, it is understood that the standard is to be applied to the overall average intersection delay, and *not* that associated with any single movement or approach. Under this approach, if one movement experiences very high delay and has moderate to high traffic volumes, the overall delay and level of service should reflect the critical nature of this condition. However, if one movement is expected to experience high delay, but has very low traffic volumes, the overall intersection operation will likely still meet Caltrans standards.

Existing Conditions

The Existing Conditions scenario provides an evaluation of current operation based on existing traffic volumes during the weekday a.m. and p.m. peak periods. This condition does not include project-generated traffic volumes. Volume data was collected on December 19, 2018 during clear weather and while local schools were in session. Peak hour factors (PHFs) were calculated based on the counts obtained and used in the analysis. Copies of the counts are provided in Appendix B.

Intersection Levels of Service

Under Existing Conditions, all study intersections are operating acceptably based on the applicable City or Caltrans standard with the exception of Pine Grove Avenue/Cascade Boulevard East for which the northbound left-turn movement is operating at LOS D during the p.m. peak hour. The Existing traffic volumes are shown in Figure 2. A summary of the intersection level of service calculations is contained in Table 4, and copies of the Level of Service calculations for all evaluated scenarios are provided in Appendix C.



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Traffic Impact Study for the Windsor Estates 3 Project

Figure 2 – Existing Traffic Volumes

W-Trans

Table 4 – Existing Peak Hour Intersection Levels of Service					
Study Intersection ***Movement***		**AM Peak**		**PM Peak**	
		Delay	**LOS**	**Delay**	**LOS**
1.	Pine Grove Ave/Lake Blvd	6.0	A	5.1	A
	EB (Walker Mine Rd) Approach LT	*13.3*	*B*	*13.7*	*B*
	WB (Pine Grove Ave) Approach LT	*14.6*	*B*	*12.5*	*B*
2.	Pine Grove Ave/Ashby Rd	7.0	A	4.5	A
	NB (Ashby Rd) Approach LT	*20.0*	*C*	*12.9*	*B*
	SB (Ashby Rd) Approach LT	*20.0*	*C*	*12.9*	*B*
3.	Pine Grove Ave/Project Access Point	-	-	-	-
	NB (Project Access Point) Approach	-	-	-	-
4.	Pine Grove Ave/Cascade Blvd West	7.3	A	6.6	A
5.	Pine Grove Ave/Cascade Blvd East	3.8	A	4.3	A
	NB (Cascade Blvd East) Approach LT	*24.9*	*C*	***27.4***	***D***
6.	Pine Grove Ave/I-5 South Ramps	0.9	A	1.0	A
	SB (I-5 South Ramps) Approach LT	*16.7*	*C*	*16.4*	*C*
7.	Pine Grove Ave/I-5 North Ramps	8.3	A	11.8	B
	NB (I-5 North Ramps) Approach LT	*12.7*	*B*	*16.6*	*C*
8.	Pine Grove Ave/Virginia Ave-Twin View Blvd	4.9	A	5.6	A
	NB (Twin View Blvd) Approach Through	*10.3*	*B*	*10.1*	*B*
	SB (Virginia Ave) Approach Through	*10.3*	*B*	*10.1*	*B*

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for worst-case movements on minor approaches to two-way stop-controlled intersections are indicated in *italics;* NB = Northbound, SB = Southbound, EB = Eastbound; WB = Westbound; LT = Left Turn Movement; **Bold** text denotes unacceptable operation

Baseline Conditions

The Baseline Conditions scenario provides an evaluation of operation with traffic from approved or pending projects in the study area that could be operational within the next two to three years. At the request of City staff, the following two projects were included in the Baseline Conditions analysis.

Mountain Gate at Shasta Lake is a mixed-use and commercial development proposed in the northernmost area of the City near I-5. The project is planned to be constructed in two Phases. Phase I would include approximately 273 residential units, 2,500 square feet of office space, and 5,000 square feet of retail space and was supposed to be completed in 2010; however, the project has not been completed yet so for the purposes of a Baseline Conditions analysis, only traffic associated with Phase I was included as Phase II would likely not be completed for at least another few years after completion of Phase I, and beyond the horizon of the Baseline scenario. As contained in the *Mountain Gate at Shasta Lake Traffic Impact Analysis Report* prepared by Omni·Means, Phase I would be anticipated to generate 3,329 new trips daily, with 219 trips during the a.m. peak hour and 398 trips during the p.m. peak hour. The same trip generation and distribution used in the traffic impact study prepared for the project were used in this analysis.

Mountain Properties Subdivision includes 168 single-family dwelling units to be built west of Lake Boulevard and south of Flanagan Road. As contained in the *Traffic Impact Study for the Mountain Properties Residential Development* prepared by Dew Traffic, the project would be expected to generate 1,608 new daily trips, with 126 trips during the morning peak hour and 169 during the evening peak hour. The same trip generation and distribution used in the traffic impact study prepared for the project were used in this analysis.

It should be noted that in both traffic impact studies prepared for these approved projects, the intersections of Pine Grove Avenue/Cascade Boulevard West and Pine Grove Avenue/Cascade Boulevard East were still conjoined as one four-legged intersection, so Baseline volumes were redistributed by movement for this analysis.

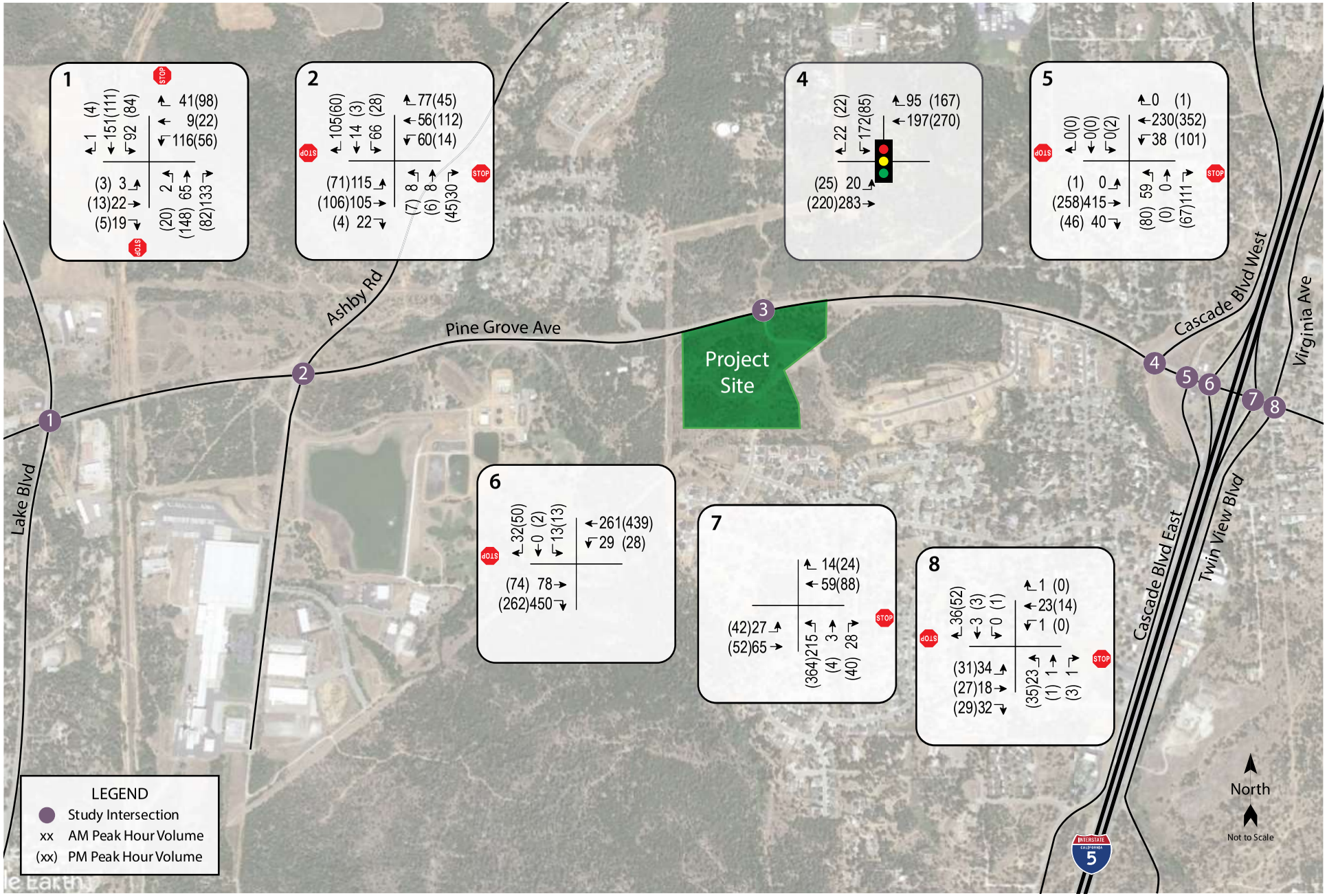
Intersection Levels of Service

Upon the addition of traffic associated approved projects in the study area to Existing volumes, all the study intersections would be expected to continue operating acceptably at LOS C or better, except for Pine Grove Avenue/Cascade Boulevard East which would operate at LOS D for the northbound left-turn movement during both peak hours. These results are summarized in Table 5 and Baseline volumes are shown in Figure 3.

Table 5 – Baseline Peak Hour Intersection Levels of Service

Study Intersection ***Movement***	AM Peak		PM Peak	
	Delay	**LOS**	**Delay**	**LOS**
1. Pine Grove Ave/Lake Blvd	6.5	A	5.0	A
EB (Walker Mine Rd) Approach LT	*16.0*	*C*	*17.0*	*C*
WB (Pine Grove Ave) Approach LT	*18.8*	*C*	*14.7*	*B*
2. Pine Grove Ave/Ashby Rd	7.0	A	4.4	A
NB (Ashby Rd) Approach LT	*21.2*	*C*	*13.6*	*B*
SB (Ashby Rd) Approach LT	*21.3*	*C*	*13.5*	*B*
3. Pine Grove Ave/Project Access Point	-	-	-	-
NB (Project Access Point) Approach	-	-	-	-
4. Pine Grove Ave/Cascade Blvd West	7.3	A	6.7	A
5. Pine Grove Ave/Cascade Blvd East	3.9	A	4.4	A
NB (Cascade Blvd East) Approach LT	***26.6***	***D***	***30.2***	***D***
6. Pine Grove Ave/I-5 South Ramps	0.9	A	1.2	A
SB (I-5 South Ramps) Approach LT	*17.2*	*C*	*17.3*	*C*
7. Pine Grove Ave/I-5 North Ramps	8.3	A	13.0	B
NB (I-5 North Ramps) Approach LT	*13.3*	*B*	*19.0*	*C*
8. Pine Grove Ave/Virginia Ave-Twin View Blvd	4.9	A	5.6	A
NB (Twin View Blvd) Approach Through	*10.3*	*B*	*10.1*	*B*
SB (Virginia Ave) Approach Through	*10.3*	*B*	*10.1*	*B*

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for worst-case movements on minor approaches to two-way stop-controlled intersections are indicated in *italics;* NB = Northbound, SB = Southbound, EB = Eastbound; WB = Westbound; LT = Left Turn Movement; **Bold** text denotes unacceptable operation



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Traffic Impact Study for the Windsor Estates 3 Project

Figure 3 – Baseline Traffic Volumes

W-Trans

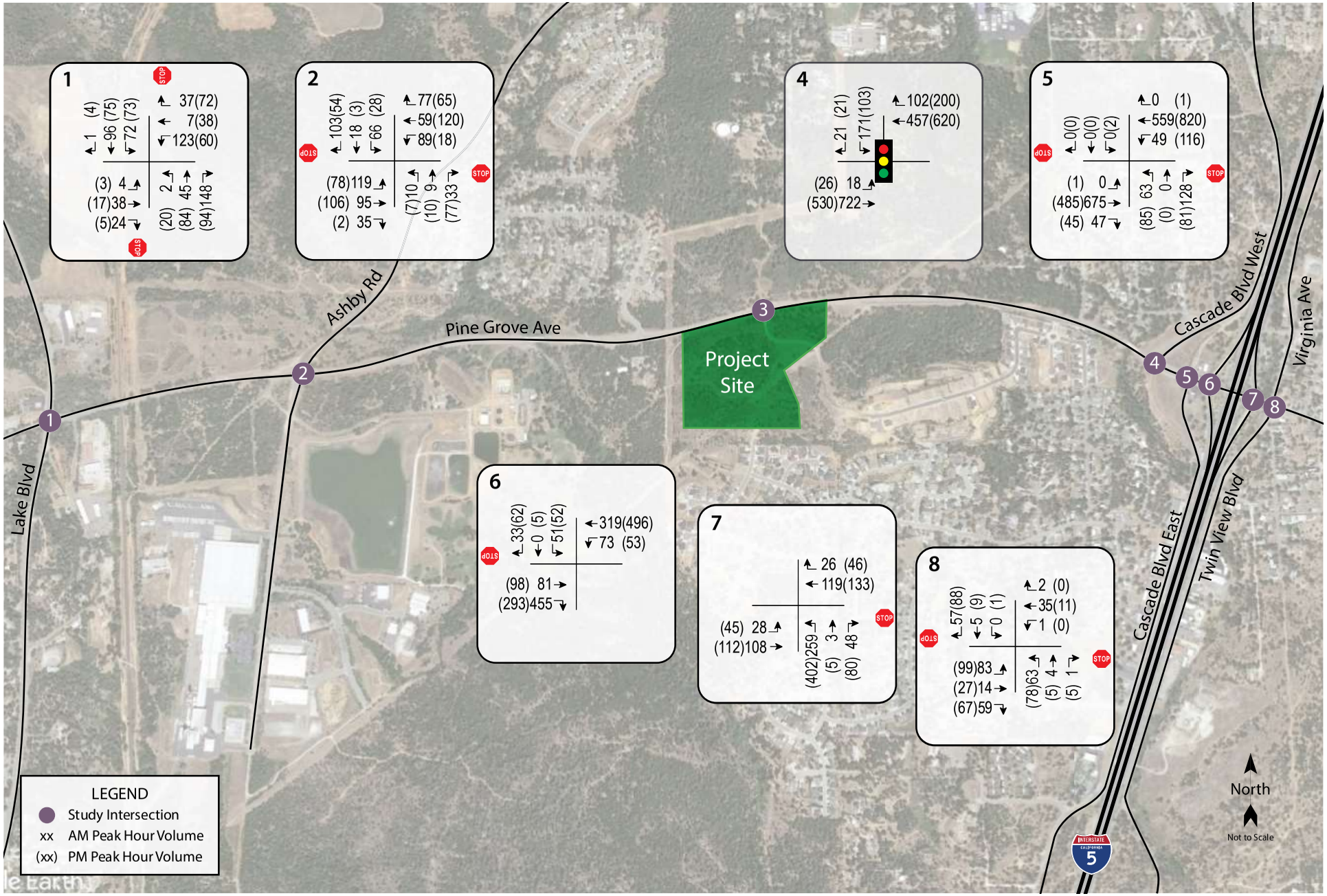
Future Conditions

Segment volumes for the horizon year 2040, as contained in the Shasta Regional Transportation Agency (SRTA) activity-based travel demand model, were obtained through communication with DKS Associates as they maintain the model. The segment volumes were then translated to weekday a.m. and p.m. peak hour turning movement volumes at each of the study intersections using the "Furness" method, which is an iterative process that employs existing turning movement data, base year link volumes, and future link volumes to project likely future turning movement volumes at intersections.

The *ShastaSIM 1.2 Activity Based Travel Demand Model Development Report*, DKS Associates, 2018 was reviewed to determine if the Baseline projects were included in the land use assumptions that were used to develop the 2040 model scenario. The future year 2040 scenario included 726 additional housing units in the City of Shasta Lake over the base year 2015 scenario, while the two Baseline projects account for 441 housing units combined so it is reasonable to conclude that the Baseline projects have been accounted for in the Countywide travel demand model and the resulting Future Conditions analysis in this report.

Intersection Levels of Service

Under the anticipated Future volumes, the study intersections are expected to operate acceptably except for Pine Grove Avenue/Cascade Boulevard East which would be expected to operate at LOS F during both peak hours for the northbound left-turn movement. It is noted that while the worst case movement at Pine Grove Avenue/I-5 North Ramps would operate at LOS D during the p.m. peak hour, which is considered unacceptable per City standards, the intersection would operate at LOS C overall which is considered acceptable under the Caltrans standards applied. Future volumes are shown in Figure 4 and operating conditions are summarized in Table 6.



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Traffic Impact Study for the Windsor Estates 3 Project

Figure 4 – Future Traffic Volumes

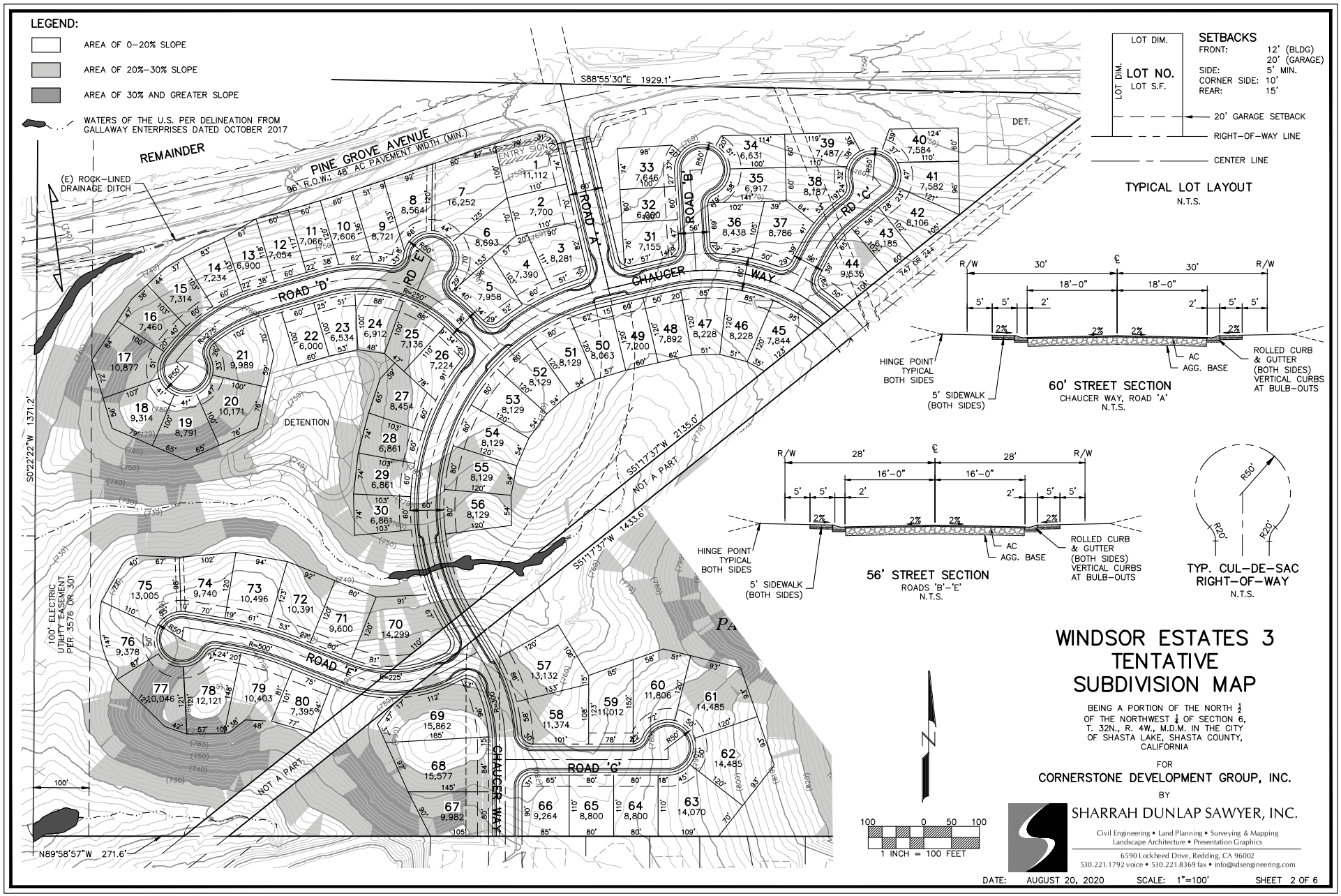
Table 6 – Future Peak Hour Intersection Levels of Service					
Study Intersection ***Movement***		**AM Peak**		**PM Peak**	
		Delay	**LOS**	**Delay**	**LOS**
1.	Pine Grove Ave/Lake Blvd	5.7	A	5.4	A
	EB (Walker Mine Rd) Approach LT	*12.3*	*B*	*13.6*	*B*
	WB (Pine Grove Ave) Approach LT	*13.0*	*B*	*12.4*	*B*
2.	Pine Grove Ave/Ashby Rd	6.6	A	4.6	A
	NB (Ashby Rd) Approach LT	*18.4*	*C*	*13.3*	*B*
	SB (Ashby Rd) Approach LT	*17.9*	*C*	*13.8*	*B*
3.	Pine Grove Ave/Project Access Point	-	-	-	-
	NB (Project Access Point) Approach	-	-	-	-
4.	Pine Grove Ave/Cascade Blvd West	6.6	A	6.6	A
5.	Pine Grove Ave/Cascade Blvd East	4.3	A	11.5	B
	NB (Cascade Blvd East) Approach LT	***63.2***	***F***	***195.5***	***F***
6.	Pine Grove Ave/I-5 South Ramps	2.0	A	2.3	A
	SB (I-5 South Ramps) Approach LT	*18.8*	*C*	*20.1*	*C*
7.	Pine Grove Ave/I-5 North Ramps	7.7	A	16.4	C
	NB (I-5 North Ramps) Approach LT	*14.3*	*B*	*27.4*	*D*
8.	Pine Grove Ave/Virginia Ave-Twin View Blvd	6.1	A	6.9	A
	NB (Twin View Blvd) Approach Through	*11.6*	*B*	*12.2*	*B*
	SB (Virginia Ave) Approach Through	*11.2*	*B*	*11.6*	*B*

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for worst-case movements on minor approaches to two-way stop-controlled intersections are indicated in *italics;* NB = Northbound, SB = Southbound, EB = Eastbound; WB = Westbound; LT = Left Turn Movement; **Bold** text denotes unacceptable operation

Due to high delays calculated at Pine Grove Avenue/Cascade Boulevard East, a signal warrant analysis was performed to determine potential need for a traffic signal. Chapter 4C of the *California Manual on Uniform Traffic Control Devices* (CA-MUTCD) provides guidance on when a traffic signal should be considered based on nine different warrants, or criteria. For the purposes of this study, Warrant 3, the Peak Hour volume warrant, which determines the need for traffic control based on the highest volume hour of the day, was used as an initial indication of traffic control needs. The use of this signal warrant is common practice for planning studies. Based on the anticipated Future volumes, installation of a traffic signal would be warranted at Pine Grove Avenue/ Cascade Boulevard East during both peak hours. Copies of the signal warrants analysis sheets are provided in Appendix D.

Project Description

The proposed project is the third phase of the Windsor Estates subdivision and includes development of 80 single-family residences on a currently vacant lot located on the south side of Pine Grove Avenue. There is an existing curb cut approximately one-quarter mile east of Coeur D'Alene Avenue that would become the project access point. A new public street would connect to Pine Grove Avenue at this location and provide access within the site as well as connect to Chaucer Way at the southern end of the site. The project site plan is shown in Figure 5.



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Traffic Impact Study for the Windsor Estates 3 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 "Single Family Detached Housing" (ITE LU#210). The site is currently vacant so no trip credits for existing uses were given. Based on application of standard ITE rates, the proposed project is expected to generate an average of 699 trips per day, including 55 trips during the a.m. peak hour and 73 during the p.m. peak hour. The expected trip generation potential for the proposed project is indicated 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
Proposed											
Single Family Housing	80 du	9.44	755	0.74	59	15	44	0.99	79	50	29

Note: du = dwelling unit

Trip Distribution

The pattern used to allocate new project trips to the street network was determined based on familiarity with the area and likely origins and destinations for residents of the subdivision. The applied distribution assumptions were selected with input from City and Caltrans staff and are shown in Table 8.

Table 8 – Trip Distribution Assumptions

Route	Percent
To/from North via I-5	10%
To/from South via I-5	40%
To/from North via Cascade Blvd	10%
To/from South via Cascade Blvd	5%
To/from North via Ashby Rd	15%
To/from North on Lake Blvd	5%
To/from South on Lake Blvd	10%
To/from East via Virginia Ave	5%
TOTAL	**100%**

Intersection Operation

Redistribution of Existing Volumes under Project Conditions

As proposed, the project would provide a connection to Chaucer Way, which would create a more direct path to Pine Grove Avenue for a portion of the existing neighborhood to the south of the project site, especially for trips to/from the west toward Lake Boulevard and Ashby Road. To estimate the redistribution of trips, it was assumed that 30 percent of total existing trips generated by the residences located west of Buckingham Drive and north of Impression Way would redirect from Pine Grove Avenue/Cascade Boulevard East to the proposed project

intersection with Pine Grove Avenue for trips to/from destinations to the west. The "plus Project" scenarios include the expected rerouting of existing trips from the identified residences. A spreadsheet indicating the assumed redistribution of existing trip volumes is provided in Appendix E.

Existing plus Project Conditions

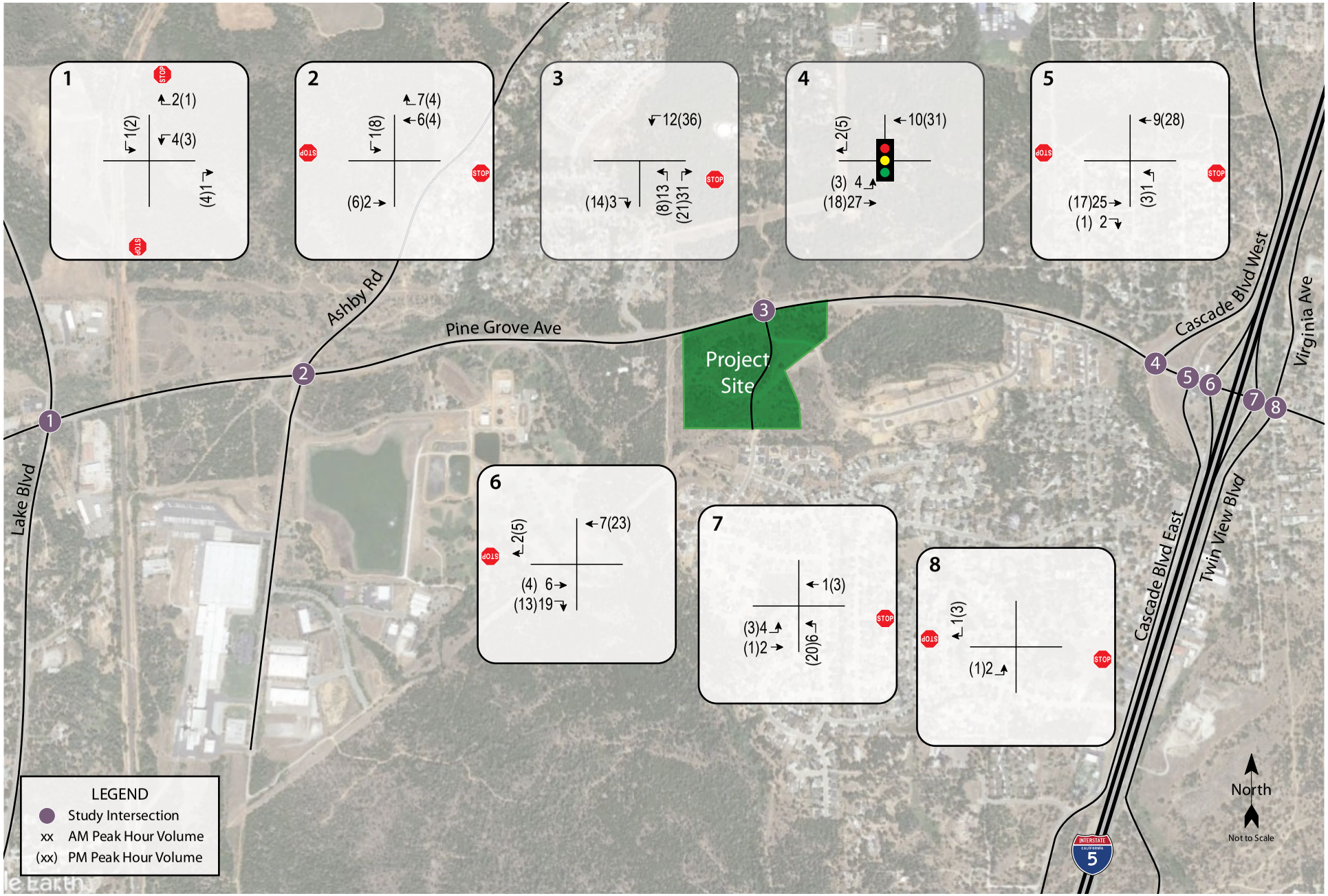
Upon the addition of project-related traffic to Existing volumes together with redistribution of existing trips, the study intersections are expected to continue operating acceptably at LOS C or better with the exception of the northbound left-turn movement at Pine Grove Boulevard/Cascade Boulevard East which would continue to operate at LOS D during the p.m. peak hour. These results are summarized in Table 9 and Project traffic volumes are shown in Figure 6.

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

	Study Intersection ***Movement***	**Existing Conditions**				**Existing plus Project**			
		AM Peak		**PM Peak**		**AM Peak**		**PM Peak**	
		Delay	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**
1.	Pine Grove Ave/Lake Blvd	6.0	A	5.1	A	6.1	A	5.2	A
	EB (Walker Mine Rd) Approach LT	13.3	B	13.7	B	*13.4*	*B*	*13.8*	*B*
	WB (Pine Grove Ave) Approach LT	14.6	B	12.5	B	*14.8*	*B*	*12.7*	*B*
2.	Pine Grove Ave/Ashby Rd	7.0	A	4.5	A	6.9	A	4.6	A
	NB (Ashby Rd) Approach LT	20.0	C	12.9	B	*20.4*	*C*	*13.1*	*B*
	SB (Ashby Rd) Approach LT	20.0	C	12.9	B	*20.4*	*C*	*13.3*	*B*
3.	Pine Grove Ave/Project Access Point	-	-	-	-	2.0	A	1.7	A
	NB (Project Access Point) Approach LT	-	-	-	-	*13.9*	*B*	*12.6*	*B*
4.	Pine Grove Ave/Cascade Blvd West	7.3	A	6.6	A	7.2	A	6.8	A
5.	Pine Grove Ave/Cascade Blvd East	3.8	A	4.3	A	2.9	A	3.6	A
	NB (Cascade Blvd East) Approach LT	24.9	C	**27.4**	**D**	*22.5*	*C*	***26.3***	***D***
6.	Pine Grove Ave/I-5 South Ramps	0.9	A	1.0	A	0.9	A	1.0	A
	SB (I-5 South Ramps) Approach LT	16.7	C	16.4	C	*17.2*	*C*	*17.2*	*C*
7.	Pine Grove Ave/I-5 North Ramps	8.3	A	11.8	B	8.5	A	12.9	B
	NB (I-5 North Ramps) Approach LT	12.7	B	16.6	C	*13.2*	*B*	*18.1*	*C*
8.	Pine Grove Ave/Virginia Ave-Twin View Blvd	4.9	A	5.6	A	5.0	A	5.7	A
	NB (Twin View Blvd) Approach Through	10.3	B	10.1	B	*10.3*	*B*	*10.1*	*B*
	SB (Virginia Ave) Approach Through	10.3	B	10.1	B	*10.4*	*B*	*10.2*	*B*

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for worst-case movements on minor approaches to two-way stop-controlled intersections are indicated in *italics;* NB = Northbound, SB = Southbound, EB = Eastbound; WB = Westbound; LT = Left Turn Movement; **Bold** text denotes unacceptable operation

It should be noted that with the addition of project-related traffic volumes, average delays at the intersections of Pine Grove Avenue/Ashby Road, Pine Grove Avenue/Cascade Boulevard West, and Pine Grove Avenue/I-5 South Ramps decrease slightly during the a.m. peak hour. While this is counter-intuitive, this condition occurs when a project adds trips to movements that are currently underutilized or have delays that are below the intersection



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Traffic Impact Study for the Windsor Estates 3 Project

Figure 6 – Project Traffic Volumes

average, resulting in a better balance between approaches and lower overall average delay. At these locations, the project adds trips predominantly to the through and right-turn movements during the a.m. peak hour, which have delays that are lower than the overall intersection average resulting in a slight reduction in average delay. The conclusion could incorrectly be drawn that the project improves operation based on this data alone; however, it is more appropriate to conclude that the project trips are expected to make use of excess capacity, so drivers will experience little, if any, change in conditions because of the project.

Additionally, it should be noted that overall delays and those on the northbound approach at Pine Grove Avenue/Cascade Boulevard East decrease during both peak hours. This is due to the redistribution of trips to/from the neighborhood south of the project site using the new project intersection to access Pine Grove Avenue rather than Cascade Boulevard East. At this location, the project would be expected to improve operation due to the reduced overall volumes through the intersection, even with the addition of project trips.

Although an operational analysis was not conducted at the intersection of Pine Grove Avenue/Coeur D'Alene, the potential for project trips to impact the intersection was assessed qualitatively. Based on the number of homes served by Coeur D'Alene Avenue, the volumes are likely substantially lower than the two-way stop-controlled (TWSC) intersections of either Pine Grove Avenue/Lake Boulevard and Pine Grove Avenue/Ashby Road both of which were documented as operating acceptably under Existing and Existing plus Project Conditions even for the worst-case movements. Also, an estimated 30 percent of the project traffic (17 a.m. trips and 22 p.m. trips) was projected to be destined to/from the west through the Pine Grove Avenue/Coeur D'Alene Avenue intersection. This level of traffic increase would likely only result in less than a second of additional delay to the side street movements from Coeur D'Alene Avenue similar to the Ashby Road and Lake Boulevard intersections. Therefore, it would be reasonable to presume that the intersection of Pine Grove Avenue/Coeur D'Alene Avenue would also operate acceptably and not result in any impacts or need for mitigation as the intersection already has turn lanes on Pine Grove Avenue.

Finding – Upon the addition of project-generated trips the Existing volumes, the study intersections are expected to continue operating acceptably at the same levels of service as without project trips, except for Pine Grove Avenue/Cascade Boulevard East which would operate at LOS D for the northbound left-turn movement during the p.m. peak hour. While this operation is considered unacceptable per General Plan policy, the project is expected to reduce delays and improve operation at this location so would not result in an adverse effect.

Baseline plus Project Conditions

With project-related traffic added to Baseline volumes, the study intersections and approaches are expected to operate acceptably during both peak periods, except for Pine Grove Avenue/Cascade Boulevard East. However, the project would reduce delays at this location so would not result in an adverse impact and in fact would improve operation for the northbound left-turn movement to an acceptable level during the a.m. peak hour. These results are summarized in Table 10.

Table 10 – Baseline and Baseline plus Project Peak Hour Intersection Levels of Service									
Study Intersection ***Movement***		**Baseline Conditions**				**Baseline plus Project**			
		AM Peak		**PM Peak**		**AM Peak**		**PM Peak**	
		Delay	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**
1.	Pine Grove Ave/Lake Blvd	6.5	A	5.0	A	6.6	A	5.1	A
	EB (Walker Mine Rd) Approach LT	16.0	C	17.0	C	*16.1*	*C*	*17.2*	*C*
	WB (Pine Grove Ave) Approach LT	18.8	C	14.7	B	*19.1*	*C*	*14.9*	*B*
2.	Pine Grove Ave/Ashby Rd	7.0	A	4.4	A	6.9	A	4.5	A
	NB (Ashby Rd) Approach LT	21.2	C	13.6	B	*21.7*	*C*	*13.8*	*B*
	SB (Ashby Rd) Approach LT	21.3	C	13.5	B	*21.8*	*C*	*13.9*	*B*
3.	Pine Grove Ave/Project Access Point	-	-	-	-	2.0	A	1.6	A
	NB (Project Access Point) Approach LT	-	-	-	-	*14.3*	*B*	*13.5*	*B*
4.	Pine Grove Ave/Cascade Blvd West	7.3	A	6.7	A	7.2	A	6.9	A
5.	Pine Grove Ave/Cascade Blvd East	3.9	A	4.4	A	2.9	A	3.7	A
	NB (Cascade Blvd East) Approach LT	**26.6**	**D**	**30.2**	**D**	*23.8*	*C*	***28.7***	***D***
6.	Pine Grove Ave/I-5 South Ramps	0.9	A	1.2	A	0.9	A	1.3	A
	SB (I-5 South Ramps) Approach LT	17.2	C	17.3	C	*17.7*	*C*	*18.1*	*C*
7.	Pine Grove Ave/I-5 North Ramps	8.3	A	13.0	B	8.6	A	14.5	B
	NB (I-5 North Ramps) Approach LT	13.3	B	19.0	C	*13.7*	*B*	*20.9*	*C*
8.	Pine Grove Ave/Virginia Ave-Twin View Blvd	4.9	A	5.6	A	5.0	A	5.7	A
	NB (Twin View Blvd) Approach Through	10.3	B	10.1	B	*10.3*	*B*	*10.1*	*B*
	SB (Virginia Ave) Approach Through	10.3	B	10.1	B	*10.4*	*B*	*10.2*	*B*

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for worst-case movements on minor approaches to two-way stop-controlled intersections are indicated in *italics;* NB = Northbound, SB = Southbound, EB = Eastbound; WB = Westbound; LT = Left Turn Movement; **Bold** text denotes unacceptable operation

Finding – All but one of the study intersections are expected to continue operating acceptably with minor increases in delay and at the same levels of service upon the addition of project-generated traffic to Baseline volumes. While Pine Grove Avenue/Cascade Boulevard East would operate unacceptably for the northbound left-turn movement during the p.m. peak hour, the project would pull trips away from the northbound approach so would improve operation over conditions without the project.

Future plus Project Conditions

Upon the addition of project-generated traffic to the anticipated Future volumes, the study intersections are expected to operate at the same levels of service as without project trips, except at Pine Grove Avenue/Cascade Boulevard East where service levels are expected to improve overall and on the northbound approach due to the redistribution of trips from this intersection to the project intersection. Future plus Project operating conditions are summarized in Table 11.

Table 11 – Future and Future plus Project Peak Hour Levels of Service

Study Intersection *Movement*	Future Conditions				Future plus Project			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1. Pine Grove Ave/Lake Blvd	5.7	A	5.4	A	5.8	A	5.4	A
EB (Walker Mine Rd) Approach LT	12.3	B	13.6	B	*12.4*	*B*	*13.7*	*B*
WB (Pine Grove Ave) Approach LT	13.0	B	12.4	B	*13.1*	*B*	*12.5*	*B*
2. Pine Grove Ave/Ashby Rd	6.6	A	4.6	A	6.5	A	4.6	A
NB (Ashby Rd) Approach LT	18.4	C	13.3	B	*18.7*	*C*	*13.5*	*B*
SB (Ashby Rd) Approach LT	17.9	C	13.8	B	*18.2*	*C*	*14.2*	*B*
3. Pine Grove Ave/Project Access Point	-	-	-	-	2.4	A	1.7	A
NB (Project Access Point) Approach LT	-	-	-	-	*10.9*	*B*	*11.8*	*B*
4. Pine Grove Ave/Cascade Blvd West	6.6	A	6.6	A	6.5	A	6.8	A
5. Pine Grove Ave/Cascade Blvd East	4.3	A	11.5	B	2.7	A	7.5	A
NB (Cascade Blvd East) Approach LT	**63.2**	**F**	**195.5**	**F**	***47.7***	***E***	***150.8***	***F***
6. Pine Grove Ave/I-5 South Ramps	2.0	A	2.3	A	2.0	A	2.3	A
SB (I-5 South Ramps) Approach LT	18.8	C	20.1	C	*19.4*	*C*	*21.0*	*C*
7. Pine Grove Ave/I-5 North Ramps	7.7	A	16.4	C	8.0	A	19.1	C
NB (I-5 North Ramps) Approach LT	14.3	B	27.4	D	*14.8*	*B*	*31.7*	*D*
8. Pine Grove Ave/Virginia Ave-Twin View Blvd	6.1	A	6.9	A	6.1	A	7.0	A
NB (Twin View Blvd) Approach Through	11.6	B	12.2	B	*11.6*	*B*	*12.2*	*B*
SB (Virginia Ave) Approach Through	11.2	B	11.6	B	*11.3*	*B*	*11.6*	*B*

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for worst-case movements on minor approaches to two-way stop-controlled intersections are indicated in *italics;* NB = Northbound, SB = Southbound, EB = Eastbound; WB = Westbound; LT = Left Turn Movement; **Bold** text denotes unacceptable operation

While Pine Grove Avenue/Cascade Boulevard East is expected to operate unacceptably for the northbound left-turn movement, and volumes meet the signal warrants threshold, the project would be expected to reduce delays overall and on the northbound approach due to the redistribution of existing traffic due to the project connection to Chaucer Way.

Finding – Upon the addition of project-related traffic to Future volumes, the study intersections would continue to operate acceptably or in the case that the intersection is expected to operate unacceptably without project traffic, would experience reduced delays so the project would not result in an adverse effect to the transportation network.

Vehicle Miles Traveled

Background and Threshold of Significance

Senate Bill (SB) 743 established a change in the metric to be applied for determining transportation impacts associated with development projects. Rather than the delay-based criteria associated with a Level of Service (LOS) analysis, the increase in Vehicle Miles Traveled (VMT) as a result of a project is now the basis for determining California Environmental Quality Act (CEQA) impacts with respect to transportation and traffic. As of the date of this analysis, the City of Shasta Lake has not yet established thresholds of significance related to VMT. As a result, the project-related VMT impacts were assessed based on 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. Under this guidance, residential developments that have a VMT that is 15 percent or more below the existing countywide residential VMT per capita would have a less-than-significant transportation impact.

Though the Shasta Regional Transportation Agency (SRTA) is in the process of conducting a countywide VMT baseline analysis and updating the travel demand model to include readily available commercial and residential VMT information per capita, this information is not expected to be available for another year. Therefore, information contained in a variety of sources was reviewed and used to assess the project, including the SRTA travel demand model, California Department of Finance population estimates, and the SRTA *2018 Regional Transportation Plan and Sustainable Communities Strategy*.

Project Impact

The SRTA ShastaSIM model includes hundreds of traffic analysis zones (TAZs) within the region that contain information for scenario years between 2015 and 2040. The model has aggregate travel data for factors such as trips and distances traveled. For TAZ 831, which is the zone in which the proposed project is located, along with other residential areas north of Autumn Harvest Drive and west of Cascade Boulevard, the projected average distance traveled in 2020 is be 5.77 miles per trip. The proposed project would be expected to generate 755 new daily trips on average and would therefore be expected to result in a total of 4,356 vehicle miles traveled per day. To arrive at a VMT per capita, data published by the California Department of Finance was used to estimate the total number of residents that the project would accommodate. The Department of Finance estimates that households in the city of Shasta Lake have an average of 2.56 persons per dwelling. At 80 units, the project would be expected to house 205 residents and result in a daily VMT per capita of 21.3

As contained in the *2018 Regional Transportation Plan and Sustainable Communities Strategy*, it is estimated that Shasta County has a countywide per capita VMT of 26.8 miles per day in 2020. Applying OPR's guidance, a residential project generating a VMT that is 15 percent or more below this value, or 22.8 miles per capita per day or less, would have a less-than-significant VMT impact. The proposed project is expected to have a daily VMT per capita of 21.3, which is approximately 21 percent below the countywide average. Since this is more than 15 percent below the countywide average value, the project would have a less-than-significant transportation impact on VMT based on OPR's guidance. This information is summarized in Table 12.

Table 12 – Vehicle Miles Traveled Analysis Summary				
VMT Metric	**Countywide Baseline 2020 VMT Rate**	**Significance Threshold**	**Project VMT Rate**	**Resulting Significance**
VMT per Capita	26.8	22.8	21.3	Less than Significant

Note: VMT Rate is measured in VMT/Capita, or the number of daily miles driven per resident

Finding – Based on OPR guidance, the project would be expected to have a less-than-significant transportation impact on VMT.

Alternative Modes

Pedestrian Facilities

Given the rural location of the site, pedestrian trips are expected to be limited; however, as contained in the *GoShasta Regional Active Transportation Plan*, pedestrian facilities are planned along Pine Grove Avenue between Jorzack Way and Ashby Road, so the project should include a connected sidewalk network along its frontage. At the western end of the site, the project sidewalk should connect to the existing sidewalk that terminates approximately 200 feet east of Coeur D'Alene Avenue. Additionally, sidewalks should be provided along all project streets within the site and a marked crosswalk with ADA compliant curb ramps should be provided on the southern leg of the new project intersection with Pine Grove Avenue.

Finding – The project site plan is still preliminary and as such does not identify the provision of any pedestrian facilities, though sidewalks are included on the proposed street cross sections and it is understood that all project streets would be public and would therefore include sidewalks per City standards.

Recommendation – As planned, sidewalks should be provided along all streets within the site. Additionally, sidewalks should be provided along the site's frontage with Pine Grove Avenue and the project intersection with Pine Grove Avenue should include a crosswalk with ADA-compliant curb ramps on the southern leg.

Bicycle Facilities

Existing bicycle facilities, including bike lanes on Pine Grove Avenue, together with shared use of minor streets provide adequate access for bicyclists.

Bicycle Storage

All proposed dwellings would have private garages, so no additional bike parking would be necessary.

Finding – Existing bicycle facilities serving the project site are adequate.

Transit

The lack of existing transit service within acceptable walking distance of the project site is typical for its rural location. Should a resident need to use transit, they could bike to either end of Pine Grove Avenue where there are transit stops for RABA Route 1 on Cascade Boulevard and Lake Boulevard.

Finding – The lack of transit facilities serving the project does not result in an impact given the rural location and expected demand.

Access and Circulation

Site Access

As proposed, access to the site would be provided via a new intersection on Pine Grove Avenue. The main project street would run in a north-south direction and would connect Pine Grove Avenue to Chaucer Way. There are multiple cul-de-sacs proposed within the project site that would be accessed from the main street. At the new project intersection, Pine Grove Avenue has one lane in each direction and a center two-way left-turn lane (TWLTL) to help facilitate turning movements. The existing roadway was built with room to accommodate a right-turn taper and eastbound acceleration taper at the access point.

Sight Distance

At unsignalized intersections a substantially clear line of sight should be maintained between the driver of a vehicle waiting at the crossroad and the driver of an approaching vehicle. Adequate time should be provided for the waiting vehicle to either cross, turn left, or turn right, without requiring the through traffic to radically alter their speed. Sight distance should be measured from a 3.5-foot height at the location of the driver on the minor road to a 4.25-foot object height in the center of the approaching lane of the major road. Set-back for the driver on the crossroad shall be a minimum of 15 feet, measured from the edge of the traveled way.

Sight distances along Pine Grove Avenue at the proposed project intersection were evaluated based on sight distance criteria contained in the *Highway Design Manual* published by Caltrans. The recommended sight distance at intersections of public streets is based on corner sight distances, with approach travel speed used as the basis for determining the recommended sight distance.

For the posted speed limit of 50 mph on Pine Grove Avenue, the minimum corner sight distance needed is 550 feet. Based on a review of field conditions, at the position of a driver waiting on the northbound approach sight lines extend more than 700 feet to the west but are limited to approximately 450 feet to the east due to the presence of horizontal and vertical curves in the roadway. Although sight lines are inadequate to the east for the posted speed limit, this condition was considered acceptable since a TWLTL is present to the west of the intersection which allows motorists turning left onto Pine Grove Avenue from the project street space to complete a left-turn and accelerate before merging with westbound through traffic. Since sight lines are limited for westbound traffic approaching the intersection, it is recommended that an advanced intersection warning sign be placed on the westbound approach. The final type and location of the sign should be coordinated with City staff.

Finding – Sight lines on Pine Grove Avenue are adequate to the west of the project street but are approximately 100 feet less than needed for the posted 50-mph speed limit when looking east.

Recommendation – As part of the project, an advanced intersection warning sign should be placed on the westbound approach to the project intersection. Additionally, any new signage or landscaping to be located near the intersection should be placed outside of the vision triangle of a driver waiting on the minor street.

Access Analysis

Left-Turn Lane

A center TWLTL is currently provided on Pine Grove Avenue at the project intersection. As mentioned in the sight distance section, it is recommended that the TWLTL be retained to the west of the intersection so that motorists can make two stage left turns onto westbound Pine Grove Avenue from the project street. To facilitate westbound

left turns into the project site, it is recommended that a portion of the existing TWLTL to the east of the intersection be restriped as a westbound left turn lane.

Intersection Geometrics

The section of Pine Grove Avenue that is adjacent to the project site was constructed with a combination of rural and urban design features. The approach and departure tapers present at many intersections along the corridor, including the project access point, were designed using similar rural highway principals to those shown in Figure 405.7 of the Caltrans *Highway Design Manual*. As volumes have increased and the surrounding vicinity has become more urbanized, the rural design features are no longer considered appropriate since they promote higher vehicle speeds, result in excessively long crosswalks, introduce additional conflict points for bicyclists, and can be confusing to drivers. Further, the length of the departure flares are not long enough to allow motorists to accelerate to an adequate merging speed and are too long to simply be a right-turn merge area. As part of the project, it is recommended that the existing curb lines at the project intersection be reconstructed to meet current City design standards and the approach and departure tapers be eliminated.

Recommendations – The project intersection should be reconfigured to include the following features:

- A left-turn lane on the westbound approach;
- A TWLTL to the west of the intersection;
- A crosswalk with ADA-compliant curb ramps on the south leg; and
- The curb lines should be reconstructed to eliminate the deceleration and acceleration tapers.

Conclusions and Recommendations

Conclusions

- The project, as proposed, includes construction of 80 single-family residences. Based on standard ITE rates, the project would be expected to generate an average of 755 trips per day, including 59 trips during the morning peak hour and 79 trips during the evening peak hour.

- All study intersections except for Pine Grove Avenue/Cascade Boulevard East are currently operating acceptably under Existing Conditions per City or Caltrans LOS standards and are anticipated to continue operating at the same Levels of Service with minor increases in delay upon the addition of project-generated trips. While the northbound left-turn movement at Pine Grove Avenue/Cascade Boulevard East operates at unacceptable LOS D under Existing Conditions, the project connection would pull trips away from the northbound approach so would be expected to reduce delays and would therefore not result in an adverse effect.

- Upon the addition of traffic associated with other projects in the development process, all study intersections but one are expected to continue operating acceptably during both peak periods, without or with the addition of project-generated trips. Pine Grove Avenue/Cascade Boulevard East would operate at LOS D for the northbound left-turn movement, but since the project would reduce delays from conditions without the project it would not result in an adverse effect to the transportation network.

- Upon the addition of project-related traffic to Future volumes, the study intersections would continue to operate acceptably or in the case that the intersection is expected to operate unacceptably without project traffic, would experience reduced delays so the project would not result in an adverse effect to the transportation network.

- With the increase in traffic projected by the SRTA model by the year 2040, installation of a traffic signal would be warranted at Pine Grove Avenue/Cascade Boulevard East without or with the proposed project; however, the project would improve operation of the intersection overall and on the northbound approach as the proposed connection to Chaucer Way would pull existing trips away from this location to the new intersection created by the project.

- Based on OPR guidance, the project would be expected to have a less-than-significant transportation impact on VMT.

- Bicycle and transit access would be expected to operate acceptably and although not specifically shown on the site plan, all project streets would include sidewalks.

- Sight lines on Pine Grove Avenue at the project intersection are adequate to the west of the project street but are approximately 100 feet less than needed for the posted 50-mph speed limit when looking east.

Recommendations

- As currently planned, sidewalks should be provided along the site's frontage with Pine Grove Avenue and along all streets within the site. The project intersection with Pine Grove Avenue should include a crosswalk on the southern leg along with ADA-compliant curb ramps.

- An advanced intersection warning sign should be placed on the westbound approach to the project intersection. The sign detail and location should be coordinated with City staff.

- Any new signs or landscaping installed within the vision triangles at the project intersection should be either low-lying or clear between three and seven feet from street level.

- The existing TWLTL should be retained to the west of the project intersection and a portion of the TWLTL should be restriped into a dedicated left-turn lane on the westbound approach.

- The existing curb line for the project access point should be reconstructed to meet current City design standards and the acceleration and deceleration tapers should be eliminated.

Study Participants and References

Study Participants

Principal in Charge	Steve Weinberger, PE, PTOE
Assistant Engineer	Cameron Nye, EIT
Assistant Planner	Julia Walker
Graphics	Katia Wolfe
Editing/Formatting	Alex Scrobonia, Hannah Yung-Boxdell
Quality Control	Dalene J. Whitlock, PE, PTOE

References

2014 Collision Data on California State Highways, California Department of Transportation, 2017

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Traffic Impact Study for the Mountain Properties Residential Development, DEW TRAFFIC, 2006

Trip Generation Manual, 10th Edition, Institute of Transportation Engineers, 2017

Communications

Email with PDF screenshots of County's 2015 and 2040 segment volumes for the study area; David Tokarski to Julia Walker; February 19, 2019

Email with direction of what projects to include in Baseline scenario; Peter Bird to Cameron Nye; January 31, 2019

SLA010

Appendix A

Collision Rate Calculations

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Intersection Collision Rate Calculations

Windsor Estates 3 Project

Intersection # 1: Pine Grove Avenue & Lake Boulevard

Date of Count: Wednesday, December 19, 2018

Number of Collisions: 5
Number of Injuries: 3
Number of Fatalities: 0
ADT: 5000
Start Date: June 30, 2013
End Date: June 30, 2018
Number of Years: 5

Intersection Type: Four-Legged
Control Type: Stop & Yield Controls
Area: Rural

$$\text{collision rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x 365 Days per Year x Number of Years}}$$

$$\text{collision rate} = \frac{5 \times 1{,}000{,}000}{5{,}000 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.55 c/mve**	**0.0%**	**60.0%**
Statewide Average*	**0.23 c/mve**	**2.0%**	**40.4%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2013 Collision Data on California State Highways, Caltrans

Intersection # 2: Pine Grove Avenue & Ashby Road

Date of Count: Wednesday, December 19, 2018

Number of Collisions: 3
Number of Injuries: 1
Number of Fatalities: 0
ADT: 4600
Start Date: June 30, 2013
End Date: June 30, 2018
Number of Years: 5

Intersection Type: Four-Legged
Control Type: Stop & Yield Controls
Area: Rural

$$\text{collision rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x 365 Days per Year x Number of Years}}$$

$$\text{collision rate} = \frac{3 \times 1{,}000{,}000}{4{,}600 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.36 c/mve**	**0.0%**	**33.3%**
Statewide Average*	**0.23 c/mve**	**2.0%**	**40.4%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2013 Collision Data on California State Highways, Caltrans

Intersection Collision Rate Calculaions

Windsor Estates 3 Project

Intersection # 3: Pine Grove & Project Driveway

Date of Count: Wednesday, December 19, 2018

Number of Collisions: 0
Number of Injuries: 0
Number of Fatalities: 0
ADT: 4500
Start Date: June 30, 2013
End Date: June 30, 2018
Number of Years: 5

Intersection Type: Tee
Control Type: Stop & Yield Controls
Area: Rural

$$\text{collision rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x 365 Days per Year x Number of Years}}$$

$$\text{collision rate} = \frac{0 \times 1{,}000{,}000}{4{,}500 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.00 c/mve**	**0.0%**	**0.0%**
Statewide Average*	**0.16 c/mve**	**1.7%**	**39.2%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2013 Collision Data on California State Highways, Caltrans

Intersection # 4: Pine Grove Avenue & Cascade Boulevard West

Date of Count: Wednesday, December 19, 2018

Number of Collisions: 1
Number of Injuries: 0
Number of Fatalities: 0
ADT: 7500
Start Date: June 30, 2013
End Date: June 30, 2018
Number of Years: 5

Intersection Type: Tee
Control Type: Signals
Area: Rural

$$\text{collision rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x 365 Days per Year x Number of Years}}$$

$$\text{collision rate} = \frac{1 \times 1{,}000{,}000}{7{,}500 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.07 c/mve**	**0.0%**	**0.0%**
Statewide Average*	**0.24 c/mve**	**0.6%**	**40.7%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2013 Collision Data on California State Highways, Caltrans

Intersection Collision Rate Calculaions

Windsor Estates 3 Project

Intersection # 5: Pine Grove Avenue & Cascade Boulevard East

Date of Count: Wednesday, December 19, 2018

Number of Collisions: 1
Number of Injuries: 1
Number of Fatalities: 0
ADT: 8700
Start Date: June 30, 2013
End Date: June 30, 2018
Number of Years: 5

Intersection Type: Four-Legged
Control Type: Stop & Yield Controls
Area: Rural

$$\text{collision rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x 365 Days per Year x Number of Years}}$$

$$\text{collision rate} = \frac{1 \times 1{,}000{,}000}{8{,}700 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.06 c/mve**	**0.0%**	**100.0%**
Statewide Average*	**0.23 c/mve**	**2.0%**	**40.4%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2013 Collision Data on California State Highways, Caltrans

Intersection # 6: Pine Grove Avenue & I-5 Southbound Ramps

Date of Count: Wednesday, December 19, 2018

Number of Collisions: 0
Number of Injuries: 0
Number of Fatalities: 0
ADT: 8300
Start Date: June 30, 2013
End Date: June 30, 2018
Number of Years: 5

Intersection Type: Four-Legged
Control Type: Stop & Yield Controls
Area: Rural

$$\text{collision rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x 365 Days per Year x Number of Years}}$$

$$\text{collision rate} = \frac{0 \times 1{,}000{,}000}{8{,}300 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.00 c/mve**	**0.0%**	**0.0%**
Statewide Average*	**0.23 c/mve**	**2.0%**	**40.4%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2013 Collision Data on California State Highways, Caltrans

Intersection Collision Rate Calculaions

Windsor Estates 3 Project

Intersection # 7: Pine Grove Avenue & I-5 Northbound Ramps
Date of Count: Wednesday, December 19, 2018

Number of Collisions: 2
Number of Injuries: 1
Number of Fatalities: 0
ADT: 5800
Start Date: June 30, 2013
End Date: June 30, 2018
Number of Years: 5

Intersection Type: Four-Legged
Control Type: Stop & Yield Controls
Area: Rural

$$\text{collision rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x 365 Days per Year x Number of Years}}$$

$$\text{collision rate} = \frac{2 \times 1{,}000{,}000}{5{,}800 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.19 c/mve**	**0.0%**	**50.0%**
Statewide Average*	**0.23 c/mve**	**2.0%**	**40.4%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2013 Collision Data on California State Highways, Caltrans

Intersection # 8: Pine Grove Avenue & Virginia Avenue-Twin View Boulevard
Date of Count: Wednesday, December 19, 2018

Number of Collisions: 0
Number of Injuries: 0
Number of Fatalities: 0
ADT: 2000
Start Date: June 30, 2013
End Date: June 30, 2018
Number of Years: 5

Intersection Type: Four-Legged
Control Type: Stop & Yield Controls
Area: Rural

$$\text{collision rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x 365 Days per Year x Number of Years}}$$

$$\text{collision rate} = \frac{0 \times 1{,}000{,}000}{2{,}000 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.00 c/mve**	**0.0%**	**0.0%**
Statewide Average*	**0.23 c/mve**	**2.0%**	**40.4%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2013 Collision Data on California State Highways, Caltrans

Appendix B

Count Data

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Prepared by National Data & Surveying Services

Lake Blvd & Pine Grove Ave

Peak Hour Turning Movement Count

ID: 18-08675-001
City: Redding

Day: Wednesday
Date: 12/19/2018

PEAK HOURS

AM: 07:15 AM - 08:15 AM
NOON: NONE
PM: 04:30 PM - 05:30 PM

COUNT PERIODS

AM: 07:00 AM - 09:00 AM
NOON: NONE
PM: 04:00 PM - 06:00 PM

Lake Blvd — SOUTHBOUND

AM	1	96	71	0	82	AM
NOON	0	0	0	0	0	NOON
PM	4	75	70	0	156	PM

Pine Grove Ave — EASTBOUND

AM	NOON	PM	
10	0	43	⇦
0	0	0	↶ 0
3	0	3	↱ 0
22	0	13	→ 0
19	0	5	↴ 0
AM	NOON	PM	

Pine Grove Ave — WESTBOUND

PM	NOON	AM	
69	0	34	0 ↰
19	0	7	0 ←
56	0	116	0 ↩
0	0	0	0 ↲
163	0	225	⇨
PM	NOON	AM	

CONTROL

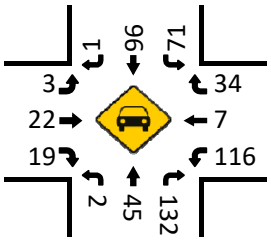
0

TEV	548	0	498
	AM	NOON	PM
PHF	0.80		0.86

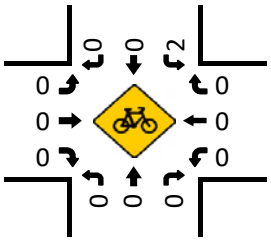
Lake Blvd — NORTHBOUND

PM	136	0	20	84	80	PM
NOON	0	0	0	0	0	NOON
AM	231	0	2	45	132	AM

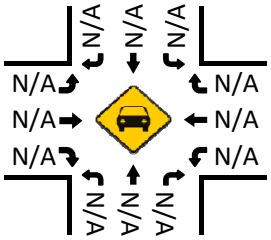
Total Vehicles (AM)



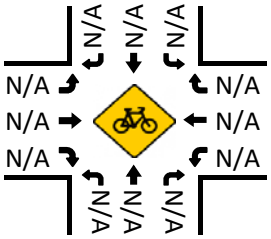
Bikes (AM)



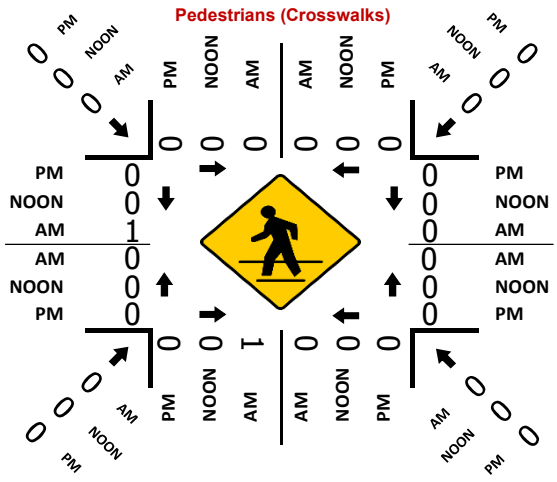
Total Vehicles (NOON)



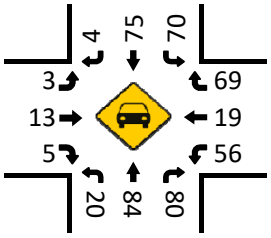
Bikes (NOON)



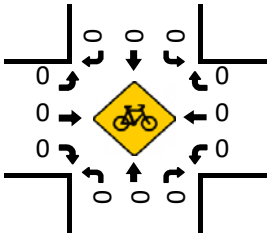
Pedestrians (Crosswalks)



Total Vehicles (PM)



Bikes (PM)



Prepared by National Data & Surveying Services

Ashby Rd & Pine Grove Ave

Peak Hour Turning Movement Count

ID: 18-08675-002
City: Shasta Lake

Day: Wednesday
Date: 12/19/2018

PEAK HOURS

AM: 07:00 AM - 08:00 AM
NOON: NONE
PM: 04:15 PM - 05:15 PM

COUNT PERIODS

AM: 07:00 AM - 09:00 AM
NOON: NONE
PM: 04:00 PM - 06:00 PM

Ashby Rd — SOUTHBOUND

AM	102	14	66	0	196	AM
NOON	0	0	0	0	0	NOON
PM	54	3	28	0	118	PM

Pine Grove Ave — EASTBOUND

AM	NOON	PM	
160	0	153	⇦
0	0	0	↶ 0
111	0	67	↱ 0
90	0	96	→ 0
19	0	2	↴ 0
AM	NOON	PM	

Pine Grove Ave — WESTBOUND

PM	NOON	AM	
45	0	77	0 ↰
94	0	51	0 ←
14	0	60	0 ↙
0	0	0	0 ↶
169	0	186	⇨
PM	NOON	AM	

CONTROL

0

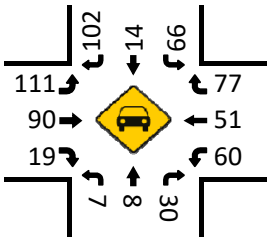
TEV	635	0	459
	AM	NOON	PM
PHF	0.79		0.91

Ashby Rd — NORTHBOUND

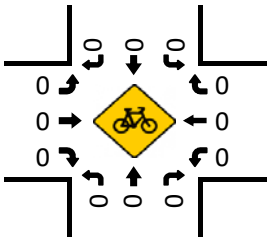
PM	19	0	5	6	45	PM
NOON	0	0	0	0	0	NOON
AM	93	0	7	8	30	AM

Ashby Rd

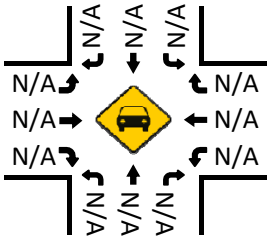
Total Vehicles (AM)



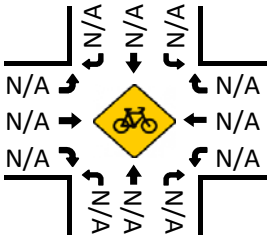
Bikes (AM)



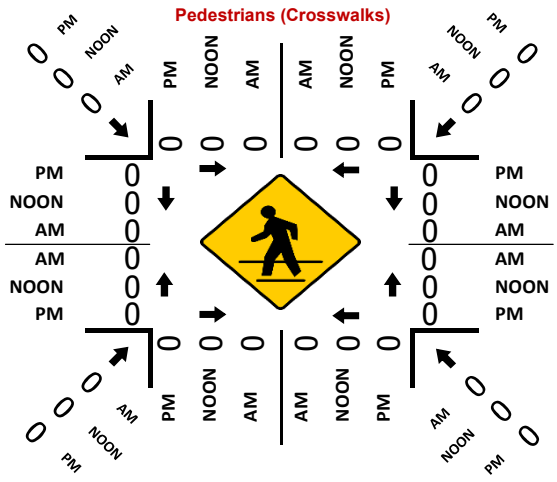
Total Vehicles (Noon)



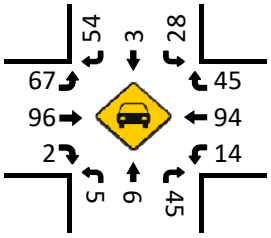
Bikes (NOON)



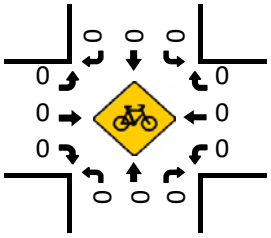
Pedestrians (Crosswalks)



Total Vehicles (PM)



Bikes (PM)



Prepared by NDS/ATD

VOLUME

Pine Grove Ave E/O Project Access

Day: Wednesday
Date: 12/19/2018

City: Shasta Lake
Project #: CA18_8651_001

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	2,544	2,644	5,188

AM Period	NB	SB	EB		WB		TOTAL		PM Period	NB	SB	EB		WB		TOTAL	
0:00			3		8		11		12:00			41		42		83	
0:15			2		8		10		12:15			35		56		91	
0:30			3		3		6		12:30			62		46		108	
0:45			2	10	1	20	3	30	12:45			42	180	50	194	92	374
1:00			1		3		4		13:00			45		50		95	
1:15			4		2		6		13:15			38		35		73	
1:30			2		1		3		13:30			43		44		87	
1:45			6	13	4	10	10	23	13:45			29	155	55	184	84	339
2:00			3		4		7		14:00			46		46		92	
2:15			1		3		4		14:15			46		60		106	
2:30			4		7		11		14:30			58		47		105	
2:45			0	8	5	19	5	27	14:45			49	199	50	203	99	402
3:00			10		2		12		15:00			45		60		105	
3:15			7		1		8		15:15			41		45		86	
3:30			1		0		1		15:30			71		42		113	
3:45			2	20	1	4	3	24	15:45			37	194	56	203	93	397
4:00			1		1		2		16:00			61		48		109	
4:15			4		5		9		16:15			47		61		108	
4:30			7		3		10		16:30			59		50		109	
4:45			14	26	8	17	22	43	16:45			45	212	61	220	106	432
5:00			6		5		11		17:00			55		56		111	
5:15			20		4		24		17:15			47		57		104	
5:30			10		11		21		17:30			52		56		108	
5:45			21	57	16	36	37	93	17:45			44	198	49	218	93	416
6:00			7		13		20		18:00			37		27		64	
6:15			20		42		62		18:15			22		45		67	
6:30			33		51		84		18:30			25		46		71	
6:45			31	91	52	158	83	249	18:45			23	107	53	171	76	278
7:00			45		29		74		19:00			39		31		70	
7:15			49		55		104		19:15			21		18		39	
7:30			89		64		153		19:30			16		20		36	
7:45			70	253	68	216	138	469	19:45			9	85	23	92	32	177
8:00			42		27		69		20:00			16		14		30	
8:15			33		47		80		20:15			11		21		32	
8:30			40		31		71		20:30			8		20		28	
8:45			57	172	34	139	91	311	20:45			10	45	17	72	27	117
9:00			33		25		58		21:00			16		13		29	
9:15			34		24		58		21:15			8		13		21	
9:30			31		25		56		21:30			8		9		17	
9:45			56	154	27	101	83	255	21:45			8	40	9	44	17	84
10:00			33		38		71		22:00			5		16		21	
10:15			36		24		60		22:15			9		5		14	
10:30			38		33		71		22:30			5		6		11	
10:45			27	134	30	125	57	259	22:45			2	21	5	32	7	53
11:00			41		40		81		23:00			1		9		10	
11:15			42		43		85		23:15			7		6		13	
11:30			43		29		72		23:30			4		7		11	
11:45			29	155	27	139	56	294	23:45			3	15	5	27	8	42
TOTALS				1093		984		**2077**	**TOTALS**				1451		1660		**3111**
SPLIT %				52.6%		47.4%		**40.0%**	**SPLIT %**				46.6%		53.4%		**60.0%**

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	2,544	2,644	5,188

AM Peak Hour				7:00	7:00	**7:00**		**PM Peak Hour**				15:30	16:45	**16:15**
AM Pk Volume				253	216	**469**		**PM Pk Volume**				216	230	**434**
Pk Hr Factor				0.711	0.794	**0.766**		**Pk Hr Factor**				0.761	0.943	**0.977**
7 - 9 Volume	0	0		425	355	**780**		**4 - 6 Volume**	0	0		410	438	**848**
7 - 9 Peak Hour				7:00	7:00	**7:00**		**4 - 6 Peak Hour**				16:00	16:45	**16:15**
7 - 9 Pk Volume	0	0		253	216	**469**		**4 - 6 Pk Volume**	0	0		212	230	**434**
Pk Hr Factor	0.000	0.000		0.711	0.794	**0.766**		**Pk Hr Factor**	0.000	0.000		0.869	0.943	**0.977**

Prepared by National Data & Surveying Services

Cascade Blvd W & Pine Grove Ave

Peak Hour Turning Movement Count

ID: 18-08675-003
City: Shasta Lake

Day: Wednesday
Date: 12/19/2018

PEAK HOURS

AM	07:15 AM - 08:15 AM
NOON	NONE
PM	04:45 PM - 05:45 PM

COUNT PERIODS

AM	07:00 AM - 09:00 AM
NOON	NONE
PM	04:00 PM - 06:00 PM

Cascade Blvd W — SOUTHBOUND

AM	21	0	171	0	110	AM
NOON	0	0	0	0	0	NOON
PM	20	0	82	0	189	PM

Pine Grove Ave — EASTBOUND

AM	NOON	PM	
211	0	269	
0	0	0	0
18	0	24	0
268	0	207	0
0	0	0	0
AM	NOON	PM	

Pine Grove Ave — WESTBOUND

PM	NOON	AM	
165	0	92	0
249	0	190	0
0	0	0	0
0	0	0	0
289	0	439	
PM	NOON	AM	

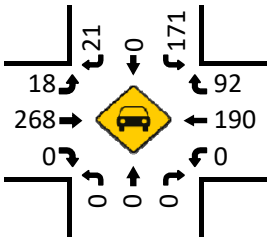
CONTROL: 0

TEV	760 AM	0 NOON	747 PM
PHF	0.74		0.98

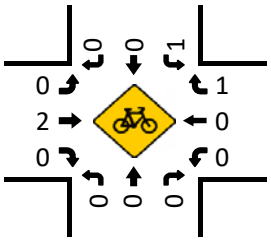
Cascade Blvd W — NORTHBOUND

PM	0	0	0	0	0	PM
NOON	0	0	0	0	0	NOON
AM	0	0	0	0	0	AM

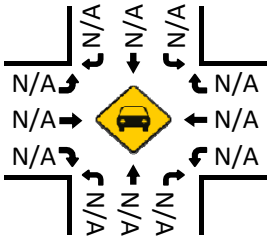
Total Vehicles (AM)



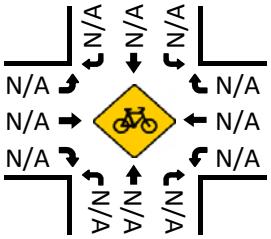
Bikes (AM)



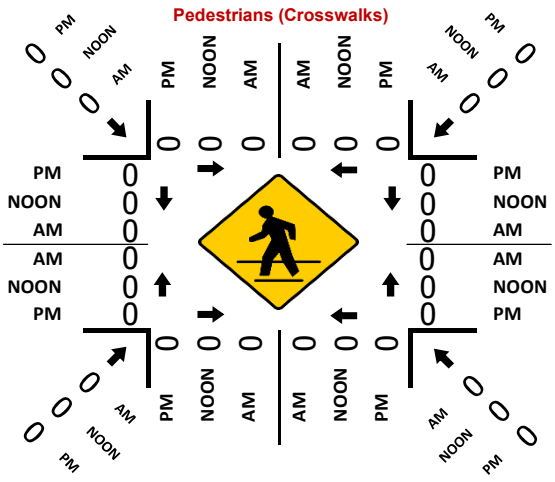
Total Vehicles (Noon)



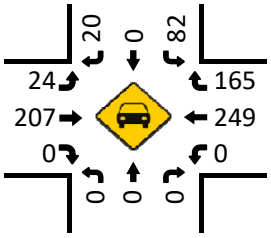
Bikes (NOON)



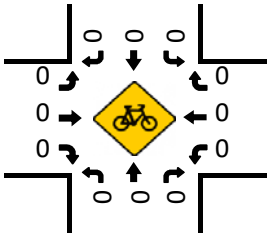
Pedestrians (Crosswalks)



Total Vehicles (PM)



Bikes (PM)



Prepared by National Data & Surveying Services

Cascade Blvd E & Pine Grove Ave

Peak Hour Turning Movement Count

ID: 18-08675-004
City: Shasta Lake

Day: Wednesday
Date: 12/19/2018

PEAK HOURS

AM: 07:15 AM - 08:15 AM
NOON: NONE
PM: 04:45 PM - 05:45 PM

COUNT PERIODS

AM: 07:00 AM - 09:00 AM
NOON: NONE
PM: 04:00 PM - 06:00 PM

Cascade Blvd E — SOUTHBOUND

AM	0	0	0	0	0	AM
NOON	0	0	0	0	0	NOON
PM	0	0	2	0	2	PM

Pine Grove Ave — EASTBOUND

AM	NOON	PM	
282	0	411	
0	0	0	0
0	0	1	0
399	0	242	0
40	0	45	0
AM	NOON	PM	

Pine Grove Ave — WESTBOUND

PM	NOON	AM	
1	0	0	0
332	0	223	0
99	0	35	0
0	0	0	0
308	0	509	
PM	NOON	AM	

CONTROL

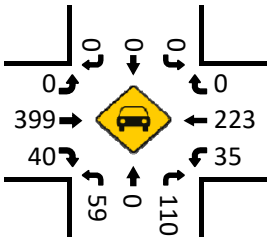
0

TEV	866	0	865
	AM	NOON	PM
PHF	0.76		0.94

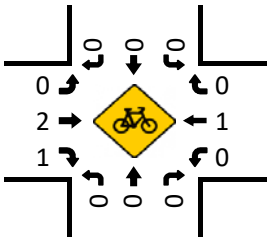
Cascade Blvd E — NORTHBOUND

PM	144	0	79	0	64	PM
NOON	0	0	0	0	0	NOON
AM	75	0	59	0	110	AM

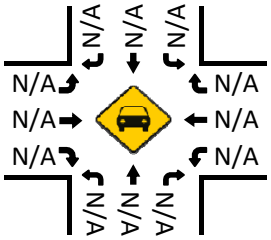
Total Vehicles (AM)



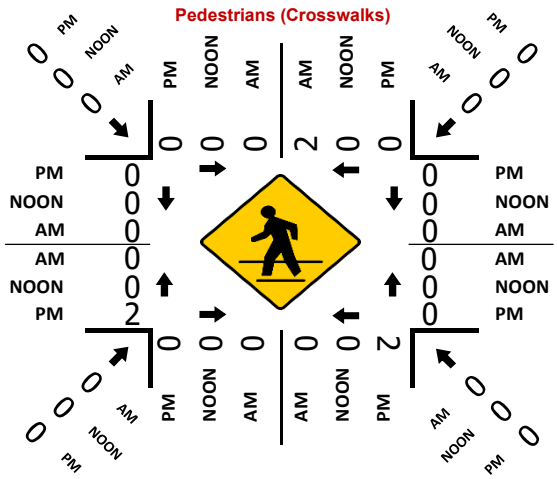
Bikes (AM)



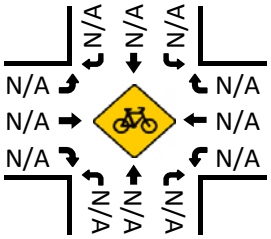
Total Vehicles (NOON)



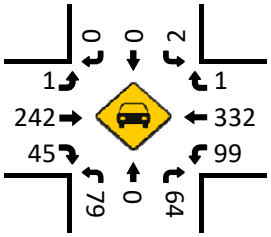
Pedestrians (Crosswalks)



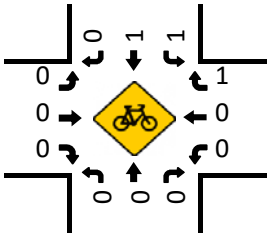
Bikes (NOON)



Total Vehicles (PM)



Bikes (PM)



Prepared by National Data & Surveying Services

I-5 SB Ramps & Pine Grove Ave

Peak Hour Turning Movement Count

ID: 18-08675-005
City: Shasta Lake

Day: Wednesday
Date: 12/19/2018

PEAK HOURS

AM: 07:15 AM - 08:15 AM
NOON: NONE
PM: 04:45 PM - 05:45 PM

COUNT PERIODS

AM: 07:00 AM - 09:00 AM
NOON: NONE
PM: 04:00 PM - 06:00 PM

I-5 SB Ramps — SOUTHBOUND

AM	23	0	13	0	0	AM
NOON	0	0	0	0	0	NOON
PM	39	2	13	0	0	PM

EASTBOUND — Pine Grove Ave

AM	NOON	PM	
281	0	465	⇦
0	0	0	↶ 0
0	0	0	↱ 0
63	0	57	→ 0
448	0	260	↴ 0
AM	NOON	PM	

WESTBOUND — Pine Grove Ave

PM	NOON	AM	
0	0	0	0 ↰
426	0	258	0 ←
28	0	29	0 ↙
0	0	0	0 ↶
			⇨
70	0	76	
PM	NOON	AM	

CONTROL

0

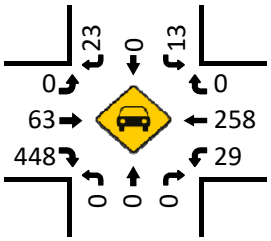
TEV	834	0	825
	AM	NOON	PM
PHF	0.78		0.91

NORTHBOUND — I-5 SB Ramps

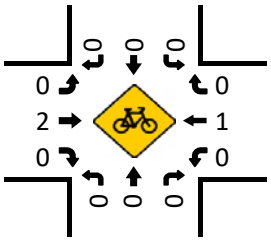
PM	290	0	0	0	0	PM
NOON	0	0	0	0	0	NOON
AM	477	0	0	0	0	AM

0 0 0 0 (↶ ↰ ↑ ↱)

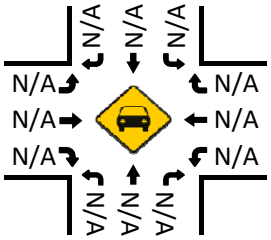
Total Vehicles (AM)



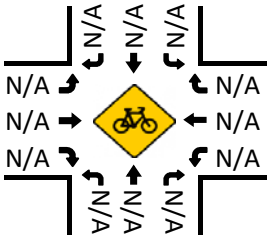
Bikes (AM)



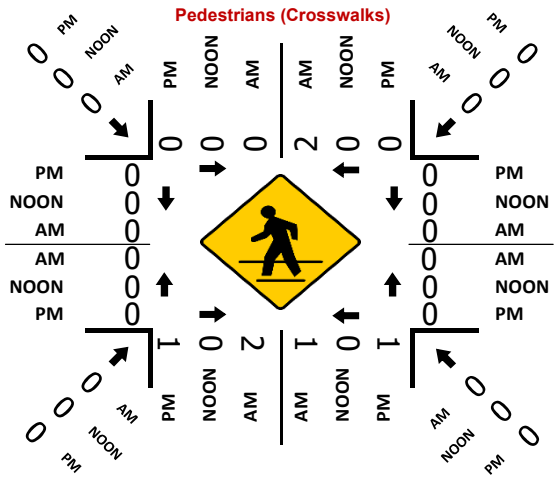
Total Vehicles (Noon)



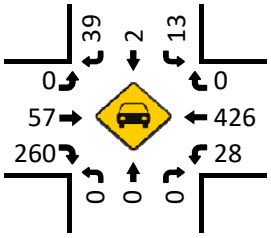
Bikes (NOON)



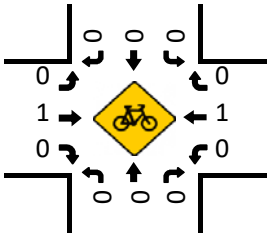
Pedestrians (Crosswalks)



Total Vehicles (PM)



Bikes (PM)



Prepared by National Data & Surveying Services

I-5 NB Ramps & Pine Grove Ave

Peak Hour Turning Movement Count

ID: 18-08675-006
City: Shasta Lake

Day: Wednesday
Date: 12/19/2018

PEAK HOURS

AM: 07:30 AM - 08:30 AM
NOON: NONE
PM: 04:30 PM - 05:30 PM

COUNT PERIODS

AM: 07:00 AM - 09:00 AM
NOON: NONE
PM: 04:00 PM - 06:00 PM

I-5 NB Ramps — SOUTHBOUND

AM	0	0	0	0	40	AM
NOON	0	0	0	0	0	NOON
PM	0	0	0	0	58	PM

Pine Grove Ave — EASTBOUND

AM	NOON	PM	
271	0	439	⇦
0	0	0	↶ 0
23	0	30	↱ 0
56	0	47	→ 0
0	0	0	↴ 0
AM	NOON	PM	

CONTROL

0

TEV	395 AM	0 NOON	584 PM
PHF	0.85		0.94

Pine Grove Ave — WESTBOUND

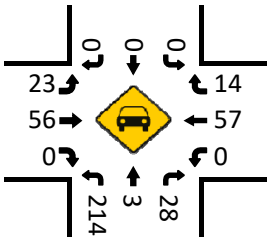
PM	NOON	AM	
0	0	0	0 ↰
24	0	14	0 ↱
78	0	57	0 ←
0	0	0	0 ↶
0	0	0	0 ↴
87	0	84	⇨
PM	NOON	AM	

I-5 NB Ramps — NORTHBOUND

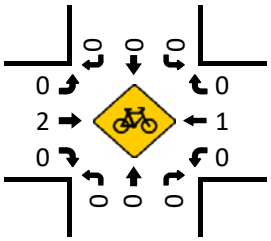
PM	0	0	361	4	40	PM
NOON	0	0	0	0	0	NOON
AM	0	0	214	3	28	AM

I-5 NB Ramps

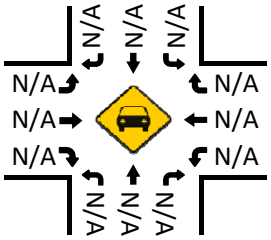
Total Vehicles (AM)



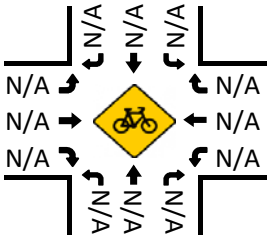
Bikes (AM)



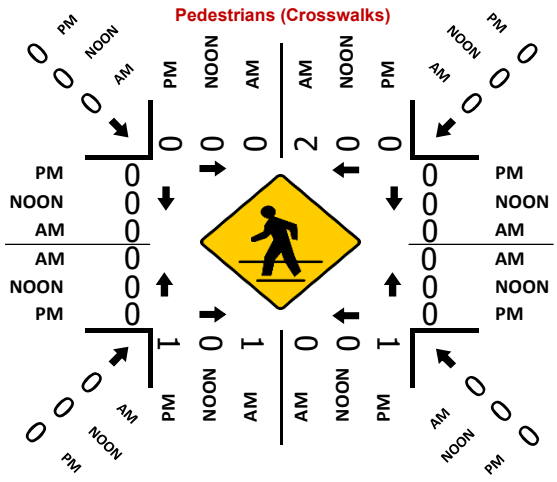
Total Vehicles (Noon)



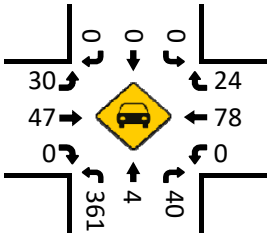
Bikes (NOON)



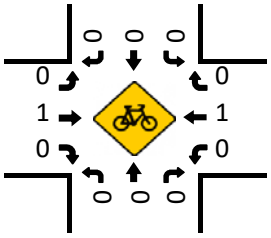
Pedestrians (Crosswalks)



Total Vehicles (PM)



Bikes (PM)



Prepared by National Data & Surveying Services

Virginia Ave/Twin View Blvd & Pine Grove Ave

Peak Hour Turning Movement Count

ID: 18-08675-007
City: Shasta Lake

Day: Wednesday
Date: 12/19/2018

PEAK HOURS

AM	07:45 AM - 08:45 AM
NOON	NONE
PM	04:30 PM - 05:30 PM

COUNT PERIODS

AM	07:00 AM - 09:00 AM
NOON	NONE
PM	04:00 PM - 06:00 PM

Virginia Ave/Twin View Blvd — SOUTHBOUND

AM	36	3	0	0	35	AM
NOON	0	0	0	0	0	NOON
PM	52	3	1	0	32	PM

Pine Grove Ave — EASTBOUND

AM	NOON	PM	
83	0	101	⇦
1	0	0	↶ 0
33	0	31	↱ 0
18	0	27	→ 0
32	0	29	↷ 0
AM	NOON	PM	

WESTBOUND — Pine Grove Ave

PM	NOON	AM	
0	0	1	0 ↶
14	0	23	0 ←
0	0	1	0 ↰
0	0	0	0 ↷
31	0	19	⇨
PM	NOON	AM	

CONTROL

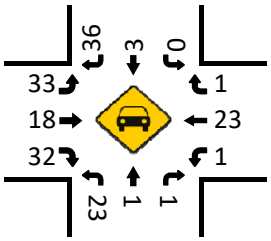
0

TEV	173	0	196
	AM	NOON	PM
PHF	0.80		0.84

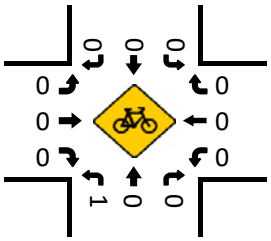
Virginia Ave/Twin View Blvd — NORTHBOUND

PM	32	0	35	1	3	PM
NOON	0	0	0	0	0	NOON
AM	36	0	23	1	1	AM

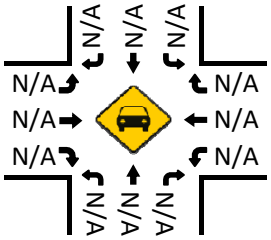
Total Vehicles (AM)



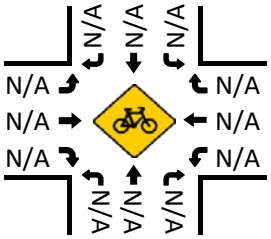
Bikes (AM)



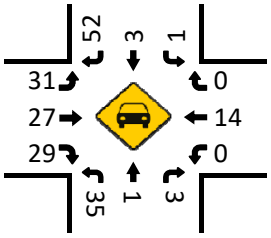
Total Vehicles (NOON)



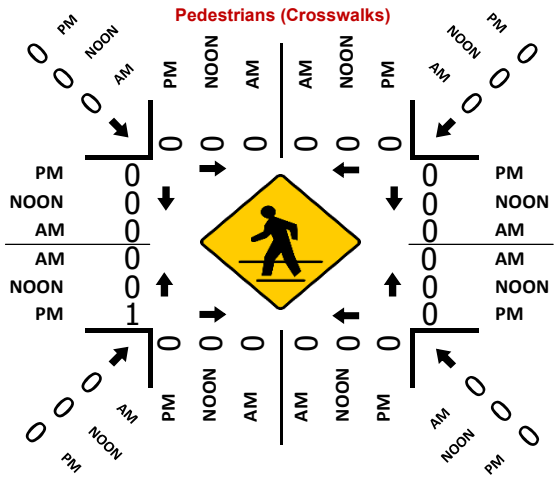
Bikes (NOON)



Total Vehicles (PM)



Pedestrians (Crosswalks)


PM
NOON
AM
0
0
0
0
0
0
0
0

Appendix C

Intersection Level of Service Calculations

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Intersection Level Of Service Report
Intersection 1: Pine Grove Ave/Lake Blvd

Control Type:	Two-way stop	Delay (sec / veh):	14.6
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.289

Intersection Setup

Name	Lake Blvd			Lake Blvd			Walker Mine Rd			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	1	0	1	0	0	0	0	0	0
Pocket Length [ft]	60.00	100.00	82.00	40.00	100.00	88.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Lake Blvd			Lake Blvd			Walker Mine Rd			Pine Grove Ave		
Base Volume Input [veh/h]	2	45	132	71	96	1	3	22	19	116	7	34
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2	45	132	71	96	1	3	22	19	116	7	34
Peak Hour Factor	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	14	41	22	30	0	1	7	6	36	2	11
Total Analysis Volume [veh/h]	3	56	165	89	120	1	4	28	24	145	9	43
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Free		Free		Stop		Stop	
Flared Lane					Yes		Yes	
Storage Area [veh]	0		0		1		2	
Two-Stage Gap Acceptance					No		No	
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.07	0.00	0.00	0.01	0.07	0.03	0.29	0.02	0.04
d_M, Delay for Movement [s/veh]	7.46	0.00	0.00	7.86	0.00	0.00	13.34	13.83	9.25	14.61	14.27	11.00
Movement LOS	A	A	A	A	A	A	B	B	A	B	B	B
95th-Percentile Queue Length [veh/ln]	0.01	0.00	0.00	0.21	0.00	0.00	0.24	0.24	0.24	1.29	1.29	1.29
95th-Percentile Queue Length [ft/ln]	0.15	0.00	0.00	5.29	0.00	0.00	6.02	6.02	6.02	32.29	32.29	32.29
d_A, Approach Delay [s/veh]	0.10			3.33			11.83			13.81		
Approach LOS	A			A			B			B		
d_I, Intersection Delay [s/veh]	5.97											
Intersection LOS	B											

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Intersection Level Of Service Report
Intersection 2: Pine Grove Ave/Ashby Rd

Control Type:	Two-way stop	Delay (sec / veh):	20.0
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.036

Intersection Setup

Name	Ashby Rd			Ashby Rd			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	1	0	0	1	0	1
Pocket Length [ft]	130.00	100.00	100.00	73.00	100.00	100.00	114.00	100.00	100.00	341.00	100.00	88.00
Speed [mph]	35.00			35.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Ashby Rd			Ashby Rd			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	7	8	30	66	14	102	111	90	19	60	51	77
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	7	8	30	66	14	102	111	90	19	60	51	77
Peak Hour Factor	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	3	9	21	4	32	35	28	6	19	16	24
Total Analysis Volume [veh/h]	9	10	38	83	18	128	139	113	24	75	64	96
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop		Free		Free	
Flared Lane	No		No					
Storage Area [veh]	0		0		0		0	
Two-Stage Gap Acceptance	No		No					
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.03	0.04	0.26	0.05	0.13	0.10	0.00	0.00	0.05	0.00	0.00
d_M, Delay for Movement [s/veh]	20.03	17.22	9.33	20.00	16.53	9.58	7.81	0.00	0.00	7.62	0.00	0.00
Movement LOS	C	C	A	C	C	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.11	0.24	0.24	1.01	0.66	0.66	0.33	0.00	0.00	0.16	0.00	0.00
95th-Percentile Queue Length [ft/ln]	2.81	5.96	5.96	25.16	16.41	16.41	8.13	0.00	0.00	4.10	0.00	0.00
d_A, Approach Delay [s/veh]	12.40			13.90			3.93			2.43		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	6.96											
Intersection LOS	C											

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Intersection Level Of Service Report
Intersection 4: Pine Grove Ave/Cascade Blvd West

Control Type:	Signalized	Delay (sec / veh):	7.3
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.260

Intersection Setup

Name	Cascade Blvd W		Pine Grove Ave		Pine Grove Ave	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	1	0	1
Pocket Length [ft]	100.00	110.00	275.00	51.00	100.00	255.00
Speed [mph]	40.00		40.00		40.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Cascade Blvd W		Pine Grove Ave		Pine Grove Ave	
Base Volume Input [veh/h]	171	21	18	268	190	92
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	171	21	18	268	190	92
Peak Hour Factor	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	53	7	6	84	59	29
Total Analysis Volume [veh/h]	214	26	23	335	238	115
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

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Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Protected	Permissive	Permissive	Permissive
Signal Group	7	0	5	2	6	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	Lead	-	-	-
Minimum Green [s]	5	0	5	5	5	0
Maximum Green [s]	30	0	30	30	30	0
Amber [s]	3.0	0.0	3.0	3.0	3.0	0.0
All red [s]	1.0	0.0	1.0	1.0	1.0	0.0
Split [s]	34	0	20	56	36	0
Vehicle Extension [s]	3.0	0.0	3.0	3.0	3.0	0.0
Walk [s]	5	0	0	5	5	0
Pedestrian Clearance [s]	25	0	0	10	24	0
Rest In Walk	No			No	No	
I1, Start-Up Lost Time [s]	2.0	0.0	2.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	0.0	2.0	2.0	2.0	0.0
Minimum Recall	No		No	No	No	
Maximum Recall	No		No	No	No	
Pedestrian Recall	No		No	No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

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Lane Group Calculations

Lane Group	L	R	L	C	C	R
C, Cycle Length [s]	21	21	21	21	21	21
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	4	4	1	9	5	5
g / C, Green / Cycle	0.18	0.18	0.03	0.44	0.22	0.22
(v / s)_i Volume / Saturation Flow Rate	0.12	0.02	0.01	0.09	0.13	0.07
s, saturation flow rate [veh/h]	1781	1589	1781	3560	1870	1589
c, Capacity [veh/h]	328	293	57	1571	415	353
d1, Uniform Delay [s]	8.08	7.23	10.14	3.68	7.41	6.97
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	2.20	0.13	4.51	0.07	1.25	0.53
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.65	0.09	0.40	0.21	0.57	0.33
d, Delay for Lane Group [s/veh]	10.28	7.36	14.65	3.75	8.66	7.50
Lane Group LOS	B	A	B	A	A	A
Critical Lane Group	Yes	No	Yes	No	Yes	No
50th-Percentile Queue Length [veh/ln]	0.56	0.05	0.13	0.01	0.49	0.21
50th-Percentile Queue Length [ft/ln]	13.96	1.24	3.17	0.37	12.15	5.19
95th-Percentile Queue Length [veh/ln]	1.01	0.09	0.23	0.03	0.87	0.37
95th-Percentile Queue Length [ft/ln]	25.13	2.23	5.70	0.66	21.87	9.34

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	10.28	7.36	14.65	3.75	8.66	7.50
Movement LOS	B	A	B	A	A	A
d_A, Approach Delay [s/veh]	9.96		4.45		8.28	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	7.26					
Intersection LOS	A					
Intersection V/C	0.260					

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	36.45	36.45	36.45
I_p,int, Pedestrian LOS Score for Intersection	2.106	2.335	2.426
Crosswalk LOS	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	0	0	0
d_b, Bicycle Delay [s]	45.00	45.00	45.00
I_b,int, Bicycle LOS Score for Intersection	4.132	4.428	4.715
Bicycle LOS	D	E	E

Sequence

Ring 1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Intersection Level Of Service Report
Intersection 5: Pine Grove Ave/Cascade Blvd East

Control Type:	Two-way stop	Delay (sec / veh):	24.8
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.291

Intersection Setup

Name	Cascade Blvd E						Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	54.00	100.00	100.00	100.00	100.00	100.00	100.00	82.00	100.00	100.00
Speed [mph]	40.00			25.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Cascade Blvd E						Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	59	0	110	0	0	0	0	399	40	35	223	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	59	0	110	0	0	0	0	399	40	35	223	0
Peak Hour Factor	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	18	0	34	0	0	0	0	125	13	11	70	0
Total Analysis Volume [veh/h]	74	0	138	0	0	0	0	499	50	44	279	0
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop			Stop			Free			Free		
Flared Lane	No			No								
Storage Area [veh]	0			0			0			0		
Two-Stage Gap Acceptance	No			No								
Number of Storage Spaces in Median	0			0			0			0		

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.29	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00
d_M, Delay for Movement [s/veh]	24.85	20.51	13.66	23.85	18.82	9.74	7.80	0.00	0.00	8.69	0.00	0.00
Movement LOS	C	C	B	C	C	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	1.17	0.98	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.00
95th-Percentile Queue Length [ft/ln]	29.24	24.47	24.47	0.00	0.00	0.00	0.00	0.00	0.00	3.38	0.00	0.00
d_A, Approach Delay [s/veh]	17.56			17.47			0.00			1.18		
Approach LOS	C			C			A			A		
d_I, Intersection Delay [s/veh]	3.79											
Intersection LOS	C											

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Intersection Level Of Service Report

Intersection 6: Pine Grove Ave/I-5 Southbound Ramps

Control Type:	Two-way stop	Delay (sec / veh):	16.7
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.051

Intersection Setup

Name	I-5 SB Ramp			I-5 SB Ramp			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	1	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	84.00	152.00	100.00	100.00
Speed [mph]	50.00			50.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	I-5 SB Ramp			I-5 SB Ramp			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	0	0	0	13	0	23	0	63	448	29	258	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	13	0	23	0	63	448	29	258	0
Peak Hour Factor	1.0000	1.0000	1.0000	0.8000	0.8000	0.8000	1.0000	0.8000	0.8000	0.8000	0.8000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	4	0	7	0	20	140	9	81	0
Total Analysis Volume [veh/h]	0	0	0	16	0	29	0	79	560	36	323	0
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop			Stop			Free			Free		
Flared Lane				Yes								
Storage Area [veh]	1			1			0			0		
Two-Stage Gap Acceptance				No								
Number of Storage Spaces in Median	0			0			0			0		

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.05	0.00	0.04	0.00	0.00	0.01	0.04	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	16.72	21.34	10.23	0.00	0.00	0.00	8.96	0.00	0.00
Movement LOS				C	C	B		A	A	A	A	
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.16	0.16	0.16	0.00	0.00	0.00	0.12	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	4.03	4.03	4.03	0.00	0.00	0.00	2.97	0.00	0.00
d_A, Approach Delay [s/veh]	0.00			12.54			0.00			0.90		
Approach LOS	A			B			A			A		
d_I, Intersection Delay [s/veh]	0.85											
Intersection LOS	C											

Windsor Estates 3 TIS
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Intersection Level Of Service Report
Intersection 7: Pine Grove Ave/I-5 Northbound Ramps

Control Type:	Two-way stop	Delay (sec / veh):	13.2
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.006

Intersection Setup

Name	I-5 NB Ramp			I-5 NB Ramp			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	112.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			30.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	I-5 NB Ramp			I-5 NB Ramp			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	214	3	28	0	0	0	23	56	0	0	57	14
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	214	3	28	0	0	0	23	56	0	0	57	14
Peak Hour Factor	0.8000	0.8000	0.8000	1.0000	1.0000	1.0000	0.8000	0.8000	1.0000	1.0000	0.8000	0.8000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	67	1	9	0	0	0	7	18	0	0	18	4
Total Analysis Volume [veh/h]	268	4	35	0	0	0	29	70	0	0	71	18
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop		Free		Free	
Flared Lane	Yes							
Storage Area [veh]	1		0		0		0	
Two-Stage Gap Acceptance	No							
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.36	0.01	0.04	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	12.74	13.23	11.47	0.00	0.00	0.00	7.44	0.00	0.00	0.00	0.00	0.00
Movement LOS	B	B	B				A	A			A	A
95th-Percentile Queue Length [veh/ln]	1.84	1.84	1.84	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	46.04	46.04	46.04	0.00	0.00	0.00	1.47	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	12.60			0.00			2.18			0.00		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	8.25											
Intersection LOS	B											

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Intersection Level Of Service Report
Intersection 8: Pine Grove Ave/Virginia Ave-Twin View Blvd

Control Type:	Two-way stop	Delay (sec / veh):	10.3
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.006

Intersection Setup

Name	Twin View Blvd			Virginia Ave			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	35.00			25.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Twin View Blvd			Virginia Ave			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	23	1	1	0	3	36	34	18	32	1	23	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	23	1	1	0	3	36	34	18	32	1	23	1
Peak Hour Factor	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	0	0	0	1	11	11	6	10	0	7	0
Total Analysis Volume [veh/h]	29	1	1	0	4	45	43	23	40	1	29	1
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop		Free		Free	
Flared Lane	Yes		Yes					
Storage Area [veh]	1		1		0		0	
Two-Stage Gap Acceptance	No		No					
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.00	0.00	0.00	0.01	0.04	0.03	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.19	10.28	8.71	9.73	10.34	8.59	7.34	0.00	0.00	7.34	0.00	0.00
Movement LOS	B	B	A	A	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.13	0.13	0.13	0.13	0.13	0.13	0.08	0.08	0.08	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	3.24	3.24	3.24	3.37	3.37	3.37	2.09	2.09	2.09	0.05	0.05	0.05
d_A, Approach Delay [s/veh]	10.14			8.73			2.98			0.24		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	4.91											
Intersection LOS	B											

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Intersection Level Of Service Report
Intersection 1: Pine Grove Ave/Lake Blvd

Control Type:	Two-way stop	Delay (sec / veh):	13.7
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.007

Intersection Setup

Name	Lake Blvd			Lake Blvd			Walker Mine Rd			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	1	0	1	0	0	0	0	0	0
Pocket Length [ft]	60.00	100.00	82.00	40.00	100.00	88.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Lake Blvd			Lake Blvd			Walker Mine Rd			Pine Grove Ave		
Base Volume Input [veh/h]	20	84	80	70	75	4	3	13	5	56	19	69
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	20	84	80	70	75	4	3	13	5	56	19	69
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	6	23	22	19	21	1	1	4	1	16	5	19
Total Analysis Volume [veh/h]	22	93	89	78	83	4	3	14	6	62	21	77
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Free			Free			Stop			Stop		
Flared Lane							Yes			Yes		
Storage Area [veh]	0			0			1			2		
Two-Stage Gap Acceptance							No			No		
Number of Storage Spaces in Median	0			0			0			0		

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.06	0.00	0.00	0.01	0.03	0.01	0.12	0.04	0.08
d_M, Delay for Movement [s/veh]	7.42	0.00	0.00	7.74	0.00	0.00	13.69	13.05	8.91	12.54	12.68	9.41
Movement LOS	A	A	A	A	A	A	B	B	A	B	B	A
95th-Percentile Queue Length [veh/ln]	0.04	0.00	0.00	0.18	0.00	0.00	0.12	0.12	0.12	0.56	0.56	0.56
95th-Percentile Queue Length [ft/ln]	1.11	0.00	0.00	4.44	0.00	0.00	2.91	2.91	2.91	14.11	14.11	14.11
d_A, Approach Delay [s/veh]	0.80			3.66			12.05			11.05		
Approach LOS	A			A			B			B		
d_I, Intersection Delay [s/veh]	5.09											
Intersection LOS	B											

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Intersection Level Of Service Report
Intersection 2: Pine Grove Ave/Ashby Rd

Control Type:	Two-way stop	Delay (sec / veh):	12.9
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.064

Intersection Setup

Name	Ashby Rd			Ashby Rd			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	1	0	0	1	0	1
Pocket Length [ft]	130.00	100.00	100.00	73.00	100.00	100.00	114.00	100.00	100.00	341.00	100.00	88.00
Speed [mph]	35.00			35.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Ashby Rd			Ashby Rd			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	5	6	45	28	3	54	67	96	2	14	94	45
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	5	6	45	28	3	54	67	96	2	14	94	45
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	2	13	8	1	15	19	27	1	4	26	13
Total Analysis Volume [veh/h]	6	7	50	31	3	60	74	107	2	16	104	50
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.01	0.05	0.06	0.01	0.06	0.05	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	12.89	12.84	9.11	12.93	12.36	9.08	7.66	0.00	0.00	7.46	0.00	0.00
Movement LOS	B	B	A	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.04	0.22	0.22	0.20	0.22	0.22	0.16	0.00	0.00	0.03	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.99	5.42	5.42	5.11	5.55	5.55	4.10	0.00	0.00	0.82	0.00	0.00
d_A, Approach Delay [s/veh]	9.89			10.45			3.10			0.70		
Approach LOS	A			B			A			A		
d_I, Intersection Delay [s/veh]	4.49											
Intersection LOS	B											

Intersection Level Of Service Report
Intersection 4: Pine Grove Ave/Cascade Blvd West

Control Type:	Signalized	Delay (sec / veh):	6.6
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.214

Intersection Setup

Name	Cascade Blvd W		Pine Grove Ave		Pine Grove Ave	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	1	0	1
Pocket Length [ft]	100.00	110.00	275.00	51.00	100.00	255.00
Speed [mph]	40.00		40.00		40.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Cascade Blvd W		Pine Grove Ave		Pine Grove Ave	
Base Volume Input [veh/h]	82	20	24	207	249	165
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	82	20	24	207	249	165
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	23	6	7	58	69	46
Total Analysis Volume [veh/h]	91	22	27	230	277	183
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

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Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Protected	Permissive	Permissive	Permissive
Signal Group	7	0	5	2	6	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	Lead	-	-	-
Minimum Green [s]	5	0	5	5	5	0
Maximum Green [s]	30	0	30	30	30	0
Amber [s]	3.0	0.0	3.0	3.0	3.0	0.0
All red [s]	1.0	0.0	1.0	1.0	1.0	0.0
Split [s]	34	0	23	56	33	0
Vehicle Extension [s]	3.0	0.0	3.0	3.0	3.0	0.0
Walk [s]	5	0	0	5	5	0
Pedestrian Clearance [s]	25	0	0	10	24	0
Rest In Walk	No			No	No	
l1, Start-Up Lost Time [s]	2.0	0.0	2.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	2.0	0.0	2.0	2.0	2.0	0.0
Minimum Recall	No		No	No	No	
Maximum Recall	No		No	No	No	
Pedestrian Recall	No		No	No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

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Lane Group Calculations

Lane Group	L	R	L	C	C	R
C, Cycle Length [s]	21	21	21	21	21	21
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	2	2	1	10	5	5
g / C, Green / Cycle	0.12	0.12	0.04	0.49	0.26	0.26
(v / s)_i Volume / Saturation Flow Rate	0.05	0.01	0.02	0.06	0.15	0.12
s, saturation flow rate [veh/h]	1781	1589	1781	3560	1870	1589
c, Capacity [veh/h]	213	190	66	1759	493	419
d1, Uniform Delay [s]	8.45	8.13	9.75	2.83	6.59	6.34
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	1.35	0.27	4.06	0.03	1.01	0.72
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.43	0.12	0.41	0.13	0.56	0.44
d, Delay for Lane Group [s/veh]	9.81	8.40	13.80	2.87	7.59	7.06
Lane Group LOS	A	A	B	A	A	A
Critical Lane Group	Yes	No	Yes	No	Yes	No
50th-Percentile Queue Length [veh/ln]	0.24	0.05	0.13	0.01	0.42	0.26
50th-Percentile Queue Length [ft/ln]	6.08	1.30	3.34	0.20	10.57	6.62
95th-Percentile Queue Length [veh/ln]	0.44	0.09	0.24	0.01	0.76	0.48
95th-Percentile Queue Length [ft/ln]	10.94	2.34	6.01	0.37	19.03	11.92

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Movement, Approach, & Intersection Results

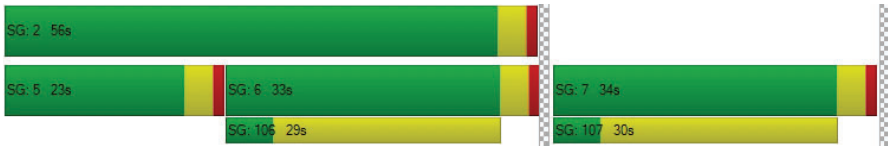
d_M, Delay for Movement [s/veh]	9.81	8.40	13.80	2.87	7.59	7.06
Movement LOS	A	A	B	A	A	A
d_A, Approach Delay [s/veh]	9.53		4.02		7.38	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	6.63					
Intersection LOS	A					
Intersection V/C	0.214					

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	36.45	36.45	36.45
I_p,int, Pedestrian LOS Score for Intersection	2.082	2.313	2.386
Crosswalk LOS	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	0	0	0
d_b, Bicycle Delay [s]	45.00	45.00	45.00
I_b,int, Bicycle LOS Score for Intersection	4.132	4.344	4.891
Bicycle LOS	D	E	E

Sequence

Ring 1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



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Intersection Level Of Service Report

Intersection 5: Pine Grove Ave/Cascade Blvd East

Control Type:	Two-way stop	Delay (sec / veh):	27.4
Analysis Method:	HCM 6th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.356

Intersection Setup

Name	Cascade Blvd E						Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	54.00	100.00	100.00	100.00	100.00	100.00	100.00	82.00	100.00	100.00
Speed [mph]	40.00			25.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Cascade Blvd E						Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	79	0	64	2	0	0	1	242	45	99	332	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	79	0	64	2	0	0	1	242	45	99	332	1
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	22	0	18	1	0	0	0	67	13	28	92	0
Total Analysis Volume [veh/h]	88	0	71	2	0	0	1	269	50	110	369	1
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop		Free		Free	
Flared Lane	No		No					
Storage Area [veh]	0		0		0		0	
Two-Stage Gap Acceptance	No		No					
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.36	0.00	0.10	0.01	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00
d_M, Delay for Movement [s/veh]	27.40	19.45	10.34	21.24	19.56	10.47	8.03	0.00	0.00	8.18	0.00	0.00
Movement LOS	D	C	B	C	C	B	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	1.54	0.31	0.31	0.03	0.03	0.03	0.00	0.00	0.00	0.29	0.00	0.00
95th-Percentile Queue Length [ft/ln]	38.48	7.87	7.87	0.68	0.68	0.68	0.06	0.00	0.00	7.28	0.00	0.00
d_A, Approach Delay [s/veh]	19.78			21.24			0.03			1.88		
Approach LOS	C			C			A			A		
d_I, Intersection Delay [s/veh]	4.26											
Intersection LOS	D											

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Intersection Level Of Service Report

Intersection 6: Pine Grove Ave/I-5 Southbound Ramps

Control Type:	Two-way stop	Delay (sec / veh):	18.3
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.007

Intersection Setup

Name	I-5 SB Ramp			I-5 SB Ramp			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	1	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	84.00	152.00	100.00	100.00
Speed [mph]	50.00			50.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	I-5 SB Ramp			I-5 SB Ramp			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	0	0	0	13	2	29	0	57	260	28	426	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	13	2	29	0	57	260	28	426	0
Peak Hour Factor	1.0000	1.0000	1.0000	0.9000	0.9000	0.9000	1.0000	0.9000	0.9000	0.9000	0.9000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	4	1	8	0	16	72	8	118	0
Total Analysis Volume [veh/h]	0	0	0	14	2	32	0	63	289	31	473	0
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop			Stop			Free			Free		
Flared Lane				Yes								
Storage Area [veh]	1			1			0			0		
Two-Stage Gap Acceptance				No								
Number of Storage Spaces in Median	0			0			0			0		

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.04	0.01	0.05	0.00	0.00	0.00	0.03	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	16.38	18.28	11.32	0.00	0.00	0.00	8.06	0.00	0.00
Movement LOS				C	C	B		A	A	A	A	
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.17	0.17	0.17	0.00	0.00	0.00	0.08	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	4.28	4.28	4.28	0.00	0.00	0.00	1.98	0.00	0.00
d_A, Approach Delay [s/veh]	0.00			13.09			0.00			0.50		
Approach LOS	A			B			A			A		
d_I, Intersection Delay [s/veh]	0.97											
Intersection LOS	C											

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Intersection Level Of Service Report
Intersection 7: Pine Grove Ave/I-5 Northbound Ramps

Control Type:	Two-way stop	Delay (sec / veh):	17.1
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.006

Intersection Setup

Name	I-5 NB Ramp			I-5 NB Ramp			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	112.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			30.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	I-5 NB Ramp			I-5 NB Ramp			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	361	4	40	0	0	0	30	47	0	0	78	24
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	361	4	40	0	0	0	30	47	0	0	78	24
Peak Hour Factor	0.9000	0.9000	0.9000	1.0000	1.0000	1.0000	0.9000	0.9000	1.0000	1.0000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	100	1	11	0	0	0	8	13	0	0	22	7
Total Analysis Volume [veh/h]	401	4	44	0	0	0	33	52	0	0	87	27
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop		Free		Free	
Flared Lane	Yes							
Storage Area [veh]	1		0		0		0	
Two-Stage Gap Acceptance	No							
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.56	0.01	0.04	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	16.58	17.10	15.13	0.00	0.00	0.00	7.50	0.00	0.00	0.00	0.00	0.00
Movement LOS	C	C	C				A	A			A	A
95th-Percentile Queue Length [veh/ln]	3.93	3.93	3.93	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	98.17	98.17	98.17	0.00	0.00	0.00	1.72	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	16.44			0.00			2.91			0.00		
Approach LOS	C			A			A			A		
d_I, Intersection Delay [s/veh]	11.77											
Intersection LOS	C											

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Intersection Level Of Service Report
Intersection 8: Pine Grove Ave/Virginia Ave-Twin View Blvd

Control Type:	Two-way stop	Delay (sec / veh):	10.1
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.004

Intersection Setup

Name	Twin View Blvd			Virginia Ave			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	35.00			25.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Twin View Blvd			Virginia Ave			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	35	1	3	1	3	52	31	27	29	0	14	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	35	1	3	1	3	52	31	27	29	0	14	0
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	10	0	1	0	1	14	9	8	8	0	4	0
Total Analysis Volume [veh/h]	39	1	3	1	3	58	34	30	32	0	16	0
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop		Free		Free	
Flared Lane	Yes		Yes					
Storage Area [veh]	1		1		0		0	
Two-Stage Gap Acceptance	No		No					
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.05	0.00	0.00	0.00	0.00	0.05	0.02	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.08	10.09	8.77	9.56	10.12	8.57	7.30	0.00	0.00	7.34	0.00	0.00
Movement LOS	B	B	A	A	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.17	0.17	0.17	0.17	0.17	0.17	0.07	0.07	0.07	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	4.24	4.24	4.24	4.32	4.32	4.32	1.63	1.63	1.63	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	9.99			8.66			2.58			0.00		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	5.60											
Intersection LOS	B											

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Intersection Level Of Service Report
Intersection 1: Pine Grove Ave/Lake Blvd

Control Type:	Two-way stop	Delay (sec / veh):	18.8
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.373

Intersection Setup

Name	Lake Blvd			Lake Blvd			Walker Mine Rd			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	1	0	1	0	0	0	0	0	0
Pocket Length [ft]	60.00	100.00	82.00	40.00	100.00	88.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Lake Blvd			Lake Blvd			Walker Mine Rd			Pine Grove Ave		
Base Volume Input [veh/h]	2	65	133	92	151	1	3	22	19	116	9	41
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2	65	133	92	151	1	3	22	19	116	9	41
Peak Hour Factor	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	20	42	29	47	0	1	7	6	36	3	13
Total Analysis Volume [veh/h]	3	81	166	115	189	1	4	28	24	145	11	51
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Free		Free		Stop		Stop	
Flared Lane					Yes		Yes	
Storage Area [veh]	0		0		1		2	
Two-Stage Gap Acceptance					No		No	
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.09	0.00	0.00	0.01	0.08	0.03	0.37	0.03	0.05
d_M, Delay for Movement [s/veh]	7.61	0.00	0.00	7.99	0.00	0.00	16.00	16.09	9.83	18.77	17.95	13.19
Movement LOS	A	A	A	A	A	A	C	C	A	C	C	B
95th-Percentile Queue Length [veh/ln]	0.01	0.00	0.00	0.29	0.00	0.00	0.31	0.31	0.31	1.89	1.89	1.89
95th-Percentile Queue Length [ft/ln]	0.16	0.00	0.00	7.15	0.00	0.00	7.66	7.66	7.66	47.37	47.37	47.37
d_A, Approach Delay [s/veh]	0.09			3.01			13.40			17.35		
Approach LOS	A			A			B			C		
d_I, Intersection Delay [s/veh]	6.46											
Intersection LOS	C											

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Intersection Level Of Service Report

Intersection 2: Pine Grove Ave/Ashby Rd

Control Type:	Two-way stop	Delay (sec / veh):	21.3
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.274

Intersection Setup

Name	Ashby Rd			Ashby Rd			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	1	0	0	1	0	1
Pocket Length [ft]	130.00	100.00	100.00	73.00	100.00	100.00	114.00	100.00	100.00	341.00	100.00	88.00
Speed [mph]	35.00			35.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Ashby Rd			Ashby Rd			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	8	8	30	66	14	105	115	105	22	60	56	77
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	8	8	30	66	14	105	115	105	22	60	56	77
Peak Hour Factor	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	3	9	21	4	33	36	33	7	19	18	24
Total Analysis Volume [veh/h]	10	10	38	83	18	131	144	131	28	75	70	96
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop		Free		Free	
Flared Lane	No		No					
Storage Area [veh]	0		0		0		0	
Two-Stage Gap Acceptance	No		No					
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.03	0.04	0.27	0.06	0.13	0.10	0.00	0.00	0.05	0.00	0.00
d_M, Delay for Movement [s/veh]	21.22	17.91	9.47	21.31	17.19	9.67	7.84	0.00	0.00	7.68	0.00	0.00
Movement LOS	C	C	A	C	C	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.13	0.25	0.25	1.09	0.69	0.69	0.34	0.00	0.00	0.17	0.00	0.00
95th-Percentile Queue Length [ft/ln]	3.36	6.20	6.20	27.22	17.18	17.18	8.50	0.00	0.00	4.18	0.00	0.00
d_A, Approach Delay [s/veh]	12.95			14.42			3.73			2.39		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	6.95											
Intersection LOS	C											

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Intersection Level Of Service Report
Intersection 4: Pine Grove Ave/Cascade Blvd West

Control Type:	Signalized	Delay (sec / veh):	7.3
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.266

Intersection Setup

Name	Cascade Blvd W		Pine Grove Ave		Pine Grove Ave	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	1	0	1
Pocket Length [ft]	100.00	110.00	275.00	51.00	100.00	255.00
Speed [mph]	40.00		40.00		40.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Cascade Blvd W		Pine Grove Ave		Pine Grove Ave	
Base Volume Input [veh/h]	172	22	20	283	197	95
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	172	22	20	283	197	95
Peak Hour Factor	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	54	7	6	88	62	30
Total Analysis Volume [veh/h]	215	28	25	354	246	119
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing major stree	0		0		0	
v_di, Inbound Pedestrian Volume crossing major street [	0		0		0	
v_co, Outbound Pedestrian Volume crossing minor stree	0		0		0	
v_ci, Inbound Pedestrian Volume crossing minor street [	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

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Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Protected	Permissive	Permissive	Permissive
Signal Group	7	0	5	2	6	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	Lead	-	-	-
Minimum Green [s]	5	0	5	5	5	0
Maximum Green [s]	30	0	30	30	30	0
Amber [s]	3.0	0.0	3.0	3.0	3.0	0.0
All red [s]	1.0	0.0	1.0	1.0	1.0	0.0
Split [s]	34	0	20	56	36	0
Vehicle Extension [s]	3.0	0.0	3.0	3.0	3.0	0.0
Walk [s]	5	0	0	5	5	0
Pedestrian Clearance [s]	25	0	0	10	24	0
Rest In Walk	No			No	No	
I1, Start-Up Lost Time [s]	2.0	0.0	2.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	0.0	2.0	2.0	2.0	0.0
Minimum Recall	No		No	No	No	
Maximum Recall	No		No	No	No	
Pedestrian Recall	No		No	No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

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Lane Group Calculations

Lane Group	L	R	L	C	C	R
C, Cycle Length [s]	21	21	21	21	21	21
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	4	4	1	10	5	5
g / C, Green / Cycle	0.18	0.18	0.03	0.44	0.22	0.22
(v / s)_i Volume / Saturation Flow Rate	0.12	0.02	0.01	0.10	0.13	0.07
s, saturation flow rate [veh/h]	1781	1589	1781	3560	1870	1589
c, Capacity [veh/h]	325	290	60	1586	422	359
d1, Uniform Delay [s]	8.17	7.31	10.18	3.67	7.42	6.97
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	2.31	0.14	4.55	0.07	1.28	0.54
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.66	0.10	0.42	0.22	0.58	0.33
d, Delay for Lane Group [s/veh]	10.48	7.46	14.73	3.74	8.70	7.50
Lane Group LOS	B	A	B	A	A	A
Critical Lane Group	Yes	No	Yes	No	Yes	No
50th-Percentile Queue Length [veh/ln]	0.58	0.06	0.14	0.02	0.51	0.22
50th-Percentile Queue Length [ft/ln]	14.53	1.38	3.42	0.39	12.73	5.42
95th-Percentile Queue Length [veh/ln]	1.05	0.10	0.25	0.03	0.92	0.39
95th-Percentile Queue Length [ft/ln]	26.15	2.48	6.15	0.70	22.92	9.75

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Movement, Approach, & Intersection Results

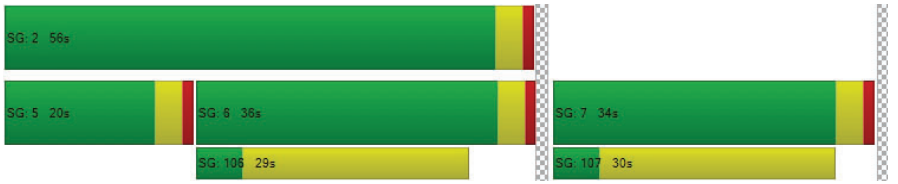
d_M, Delay for Movement [s/veh]	10.48	7.46	14.73	3.74	8.70	7.50
Movement LOS	B	A	B	A	A	A
d_A, Approach Delay [s/veh]	10.13		4.47		8.31	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	7.28					
Intersection LOS	A					
Intersection V/C	0.266					

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	36.45	36.45	36.45
I_p,int, Pedestrian LOS Score for Intersection	2.109	2.345	2.436
Crosswalk LOS	B	B	B
s_b, Saturation Flow Rate of the bicycle lane [bicycles/h]	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	0	0	0
d_b, Bicycle Delay [s]	45.00	45.00	45.00
I_b,int, Bicycle LOS Score for Intersection	4.132	4.445	4.735
Bicycle LOS	D	E	E

Sequence

Ring 1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



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Intersection Level Of Service Report
Intersection 5: Pine Grove Ave/Cascade Blvd East

Control Type:	Two-way stop	Delay (sec / veh):	26.6
Analysis Method:	HCM 6th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.309

Intersection Setup

Name	Cascade Blvd E						Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	54.00	100.00	100.00	100.00	100.00	100.00	100.00	82.00	100.00	100.00
Speed [mph]	40.00			25.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Cascade Blvd E						Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	59	0	111	0	0	0	0	415	40	38	230	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	59	0	111	0	0	0	0	415	40	38	230	0
Peak Hour Factor	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	18	0	35	0	0	0	0	130	13	12	72	0
Total Analysis Volume [veh/h]	74	0	139	0	0	0	0	519	50	48	288	0
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop		Free	Free
Flared Lane	No		No			
Storage Area [veh]	0		0		0	0
Two-Stage Gap Acceptance	No		No			
Number of Storage Spaces in Median	0		0		0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.31	0.00	0.26	0.00	0.00	0.00	0.00	0.01	0.00	0.05	0.00	0.00
d_M, Delay for Movement [s/veh]	26.64	21.42	13.98	25.27	19.59	9.79	7.83	0.00	0.00	8.77	0.00	0.00
Movement LOS	D	C	B	D	C	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	1.27	1.02	1.02	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00
95th-Percentile Queue Length [ft/ln]	31.64	25.54	25.54	0.00	0.00	0.00	0.00	0.00	0.00	3.76	0.00	0.00
d_A, Approach Delay [s/veh]	18.38			18.22			0.00			1.25		
Approach LOS	C			C			A			A		
d_I, Intersection Delay [s/veh]	3.88											
Intersection LOS	D											

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Intersection Level Of Service Report
Intersection 6: Pine Grove Ave/I-5 Southbound Ramps

Control Type:	Two-way stop	Delay (sec / veh):	17.1
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.053

Intersection Setup

Name	I-5 SB Ramp			I-5 SB Ramp			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	1	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	84.00	152.00	100.00	100.00
Speed [mph]	50.00			50.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	I-5 SB Ramp			I-5 SB Ramp			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	0	0	0	13	0	32	0	78	450	29	261	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	13	0	32	0	78	450	29	261	0
Peak Hour Factor	1.0000	1.0000	1.0000	0.8000	0.8000	0.8000	1.0000	0.8000	0.8000	0.8000	0.8000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	4	0	10	0	24	141	9	82	0
Total Analysis Volume [veh/h]	0	0	0	16	0	40	0	98	563	36	326	0
Pedestrian Volume [ped/h]	0			0			0			0		

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Version 7.00-06

Intersection Settings

Priority Scheme	Stop			Stop			Free			Free		
Flared Lane				Yes								
Storage Area [veh]	1			1			0			0		
Two-Stage Gap Acceptance				No								
Number of Storage Spaces in Median	0			0			0			0		

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.05	0.00	0.06	0.00	0.00	0.01	0.04	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	17.15	21.90	10.25	0.00	0.00	0.00	9.04	0.00	0.00
Movement LOS				C	C	B		A	A	A	A	
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.18	0.18	0.18	0.00	0.00	0.00	0.12	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	4.44	4.44	4.44	0.00	0.00	0.00	3.03	0.00	0.00
d_A, Approach Delay [s/veh]	0.00			12.22			0.00			0.90		
Approach LOS	A			B			A			A		
d_I, Intersection Delay [s/veh]	0.94											
Intersection LOS	C											

Windsor Estates 3 TIS
AM Baseline
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Intersection Level Of Service Report
Intersection 7: Pine Grove Ave/I-5 Northbound Ramps

Control Type:	Two-way stop	Delay (sec / veh):	13.7
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.006

Intersection Setup

Name	I-5 NB Ramp			I-5 NB Ramp			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	112.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			30.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	I-5 NB Ramp			I-5 NB Ramp			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	215	3	28	0	0	0	27	65	0	0	59	14
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	215	3	28	0	0	0	27	65	0	0	59	14
Peak Hour Factor	0.8000	0.8000	0.8000	1.0000	1.0000	1.0000	0.8000	0.8000	1.0000	1.0000	0.8000	0.8000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	67	1	9	0	0	0	8	20	0	0	18	4
Total Analysis Volume [veh/h]	269	4	35	0	0	0	34	81	0	0	74	18
Pedestrian Volume [ped/h]	0			0			0			0		

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Version 7.00-06

Intersection Settings

Priority Scheme	Stop			Stop			Free			Free		
Flared Lane	Yes											
Storage Area [veh]	1			0			0			0		
Two-Stage Gap Acceptance	No											
Number of Storage Spaces in Median	0			0			0			0		

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.38	0.01	0.04	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	13.26	13.74	11.84	0.00	0.00	0.00	7.45	0.00	0.00	0.00	0.00	0.00
Movement LOS	B	B	B				A	A			A	A
95th-Percentile Queue Length [veh/ln]	1.97	1.97	1.97	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	49.15	49.15	49.15	0.00	0.00	0.00	1.74	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	13.11			0.00			2.20			0.00		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	8.33											
Intersection LOS	B											

Windsor Estates 3 TIS
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Intersection Level Of Service Report
Intersection 8: Pine Grove Ave/Virginia Ave-Twin View Blvd

Control Type:	Two-way stop	Delay (sec / veh):	10.3
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.006

Intersection Setup

Name	Twin View Blvd			Virginia Ave			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	35.00			25.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Twin View Blvd			Virginia Ave			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	23	1	1	0	3	36	34	18	32	1	23	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	23	1	1	0	3	36	34	18	32	1	23	1
Peak Hour Factor	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	0	0	0	1	11	11	6	10	0	7	0
Total Analysis Volume [veh/h]	29	1	1	0	4	45	43	23	40	1	29	1
Pedestrian Volume [ped/h]	0			0			0			0		

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Version 7.00-06

Intersection Settings

Priority Scheme	Stop		Stop		Free		Free	
Flared Lane	Yes		Yes					
Storage Area [veh]	1		1		0		0	
Two-Stage Gap Acceptance	No		No					
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.00	0.00	0.00	0.01	0.04	0.03	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.19	10.28	8.71	9.73	10.34	8.59	7.34	0.00	0.00	7.34	0.00	0.00
Movement LOS	B	B	A	A	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.13	0.13	0.13	0.13	0.13	0.13	0.08	0.08	0.08	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	3.24	3.24	3.24	3.37	3.37	3.37	2.09	2.09	2.09	0.05	0.05	0.05
d_A, Approach Delay [s/veh]	10.14			8.73			2.98			0.24		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	4.91											
Intersection LOS	B											

Windsor Estates 3 TIS
AM Baseline
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8/28/2020

Intersection Level Of Service Report
Intersection 1: Pine Grove Ave/Lake Blvd

Control Type:	Two-way stop	Delay (sec / veh):	17.0
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.010

Intersection Setup

Name	Lake Blvd			Lake Blvd			Walker Mine Rd			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	1	0	1	0	0	0	0	0	0
Pocket Length [ft]	60.00	100.00	82.00	40.00	100.00	88.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Lake Blvd			Lake Blvd			Walker Mine Rd			Pine Grove Ave		
Base Volume Input [veh/h]	20	148	82	84	111	4	3	13	5	56	22	98
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	20	148	82	84	111	4	3	13	5	56	22	98
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	6	41	23	23	31	1	1	4	1	16	6	27
Total Analysis Volume [veh/h]	22	164	91	93	123	4	3	14	6	62	24	109
Pedestrian Volume [ped/h]	0			0			0			0		

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Version 7.00-06

Intersection Settings

Priority Scheme	Free			Free			Stop			Stop		
Flared Lane							Yes			Yes		
Storage Area [veh]	0			0			1			2		
Two-Stage Gap Acceptance							No			No		
Number of Storage Spaces in Median	0			0			0			0		

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.00	0.00	0.07	0.00	0.00	0.01	0.04	0.01	0.15	0.06	0.12
d_M, Delay for Movement [s/veh]	7.50	0.00	0.00	7.96	0.00	0.00	16.99	14.95	9.24	14.65	14.54	10.07
Movement LOS	A	A	A	A	A	A	C	B	A	B	B	B
95th-Percentile Queue Length [veh/ln]	0.05	0.00	0.00	0.23	0.00	0.00	0.15	0.15	0.15	0.77	0.77	0.77
95th-Percentile Queue Length [ft/ln]	1.15	0.00	0.00	5.72	0.00	0.00	3.69	3.69	3.69	19.33	19.33	19.33
d_A, Approach Delay [s/veh]	0.60			3.36			13.73			12.08		
Approach LOS	A			A			B			B		
d_I, Intersection Delay [s/veh]	5.00											
Intersection LOS	C											

Windsor Estates 3 TIS
PM Baseline
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9/1/2020

Intersection Level Of Service Report
Intersection 2: Pine Grove Ave/Ashby Rd

Control Type:	Two-way stop	Delay (sec / veh):	13.6
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.019

Intersection Setup

Name	Ashby Rd			Ashby Rd			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	1	0	0	1	0	1
Pocket Length [ft]	130.00	100.00	100.00	73.00	100.00	100.00	114.00	100.00	100.00	341.00	100.00	88.00
Speed [mph]	35.00			35.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Ashby Rd			Ashby Rd			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	7	6	45	28	3	60	71	106	4	14	112	45
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	7	6	45	28	3	60	71	106	4	14	112	45
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	2	13	8	1	17	20	29	1	4	31	13
Total Analysis Volume [veh/h]	8	7	50	31	3	67	79	118	4	16	124	50
Pedestrian Volume [ped/h]	0			0			0			0		

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Version 7.00-06

Intersection Settings

Priority Scheme	Stop			Stop			Free			Free		
Flared Lane	No			No								
Storage Area [veh]	0			0			0			0		
Two-Stage Gap Acceptance	No			No								
Number of Storage Spaces in Median	0			0			0			0		

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.02	0.05	0.07	0.01	0.07	0.06	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	13.62	13.32	9.19	13.54	12.85	9.23	7.72	0.00	0.00	7.48	0.00	0.00
Movement LOS	B	B	A	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.06	0.22	0.22	0.22	0.26	0.26	0.18	0.00	0.00	0.03	0.00	0.00
95th-Percentile Queue Length [ft/ln]	1.44	5.56	5.56	5.50	6.38	6.38	4.47	0.00	0.00	0.83	0.00	0.00
d_A, Approach Delay [s/veh]	10.18			10.66			3.03			0.63		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	4.43											
Intersection LOS	B											

Windsor Estates 3 TIS
PM Baseline
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Intersection Level Of Service Report
Intersection 4: Pine Grove Ave/Cascade Blvd West

Control Type:	Signalized	Delay (sec / veh):	6.7
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.229

Intersection Setup

Name	Cascade Blvd W		Pine Grove Ave		Pine Grove Ave	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	1	0	1
Pocket Length [ft]	100.00	110.00	275.00	51.00	100.00	255.00
Speed [mph]	40.00		40.00		40.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Cascade Blvd W		Pine Grove Ave		Pine Grove Ave	
Base Volume Input [veh/h]	85	22	25	220	270	167
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	85	22	25	220	270	167
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	24	6	7	61	75	46
Total Analysis Volume [veh/h]	94	24	28	244	300	186
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing major stree	0		0		0	
v_di, Inbound Pedestrian Volume crossing major street [	0		0		0	
v_co, Outbound Pedestrian Volume crossing minor stree	0		0		0	
v_ci, Inbound Pedestrian Volume crossing minor street [	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

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Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Protected	Permissive	Permissive	Permissive
Signal Group	7	0	5	2	6	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	Lead	-	-	-
Minimum Green [s]	5	0	5	5	5	0
Maximum Green [s]	30	0	30	30	30	0
Amber [s]	3.0	0.0	3.0	3.0	3.0	0.0
All red [s]	1.0	0.0	1.0	1.0	1.0	0.0
Split [s]	34	0	23	56	33	0
Vehicle Extension [s]	3.0	0.0	3.0	3.0	3.0	0.0
Walk [s]	5	0	0	5	5	0
Pedestrian Clearance [s]	25	0	0	10	24	0
Rest In Walk	No			No	No	
I1, Start-Up Lost Time [s]	2.0	0.0	2.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	0.0	2.0	2.0	2.0	0.0
Minimum Recall	No		No	No	No	
Maximum Recall	No		No	No	No	
Pedestrian Recall	No		No	No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

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Lane Group Calculations

Lane Group	L	R	L	C	C	R
C, Cycle Length [s]	21	21	21	21	21	21
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	3	3	1	11	6	6
g / C, Green / Cycle	0.12	0.12	0.04	0.50	0.27	0.27
(v / s)_i Volume / Saturation Flow Rate	0.05	0.02	0.02	0.07	0.16	0.12
s, saturation flow rate [veh/h]	1781	1589	1781	3560	1870	1589
c, Capacity [veh/h]	217	194	68	1788	517	439
d1, Uniform Delay [s]	8.67	8.33	10.01	2.83	6.64	6.31
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	1.36	0.28	3.98	0.03	1.03	0.65
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.43	0.12	0.41	0.14	0.58	0.42
d, Delay for Lane Group [s/veh]	10.02	8.62	14.00	2.87	7.67	6.96
Lane Group LOS	B	A	B	A	A	A
Critical Lane Group	Yes	No	Yes	No	Yes	No
50th-Percentile Queue Length [veh/ln]	0.26	0.06	0.14	0.01	0.48	0.27
50th-Percentile Queue Length [ft/ln]	6.58	1.50	3.53	0.21	11.97	6.84
95th-Percentile Queue Length [veh/ln]	0.47	0.11	0.25	0.02	0.86	0.49
95th-Percentile Queue Length [ft/ln]	11.85	2.69	6.35	0.38	21.55	12.32

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	10.02	8.62	14.00	2.87	7.67	6.96
Movement LOS	B	A	B	A	A	A
d_A, Approach Delay [s/veh]	9.73		4.01		7.40	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	6.66					
Intersection LOS	A					
Intersection V/C	0.229					

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	36.45	36.45	36.45
I_p,int, Pedestrian LOS Score for Intersection	2.086	2.326	2.400
Crosswalk LOS	B	B	B
s_b, Saturation Flow Rate of the bicycle lane [bicycles/h]	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	0	0	0
d_b, Bicycle Delay [s]	45.00	45.00	45.00
I_b,int, Bicycle LOS Score for Intersection	4.132	4.357	4.934
Bicycle LOS	D	E	E

Sequence

Ring 1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Intersection Level Of Service Report
Intersection 5: Pine Grove Ave/Cascade Blvd East

Control Type:	Two-way stop	Delay (sec / veh):	30.2
Analysis Method:	HCM 6th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.387

Intersection Setup

Name	Cascade Blvd E						Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	54.00	100.00	100.00	100.00	100.00	100.00	100.00	82.00	100.00	100.00
Speed [mph]	40.00			25.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Cascade Blvd E						Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	80	0	67	2	0	0	1	258	46	101	352	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	80	0	67	2	0	0	1	258	46	101	352	1
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	22	0	19	1	0	0	0	72	13	28	98	0
Total Analysis Volume [veh/h]	89	0	74	2	0	0	1	287	51	112	391	1
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop			Stop			Free			Free		
Flared Lane	No			No								
Storage Area [veh]	0			0			0			0		
Two-Stage Gap Acceptance	No			No								
Number of Storage Spaces in Median	0			0			0			0		

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.39	0.00	0.10	0.01	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00
d_M, Delay for Movement [s/veh]	30.19	20.41	10.51	22.59	20.54	10.65	8.09	0.00	0.00	8.25	0.00	0.00
Movement LOS	D	C	B	C	C	B	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	1.72	0.34	0.34	0.03	0.03	0.03	0.00	0.00	0.00	0.30	0.00	0.00
95th-Percentile Queue Length [ft/ln]	43.11	8.45	8.45	0.73	0.73	0.73	0.06	0.00	0.00	7.56	0.00	0.00
d_A, Approach Delay [s/veh]	21.26			22.59			0.02			1.83		
Approach LOS	C			C			A			A		
d_I, Intersection Delay [s/veh]	4.41											
Intersection LOS	D											

Intersection Level Of Service Report
Intersection 6: Pine Grove Ave/I-5 Southbound Ramps

Control Type:	Two-way stop	Delay (sec / veh):	19.2
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.008

Intersection Setup

Name	I-5 SB Ramp			I-5 SB Ramp			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	1	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	84.00	152.00	100.00	100.00
Speed [mph]	50.00			50.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	I-5 SB Ramp			I-5 SB Ramp			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	0	0	0	13	2	50	0	74	262	28	439	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	13	2	50	0	74	262	28	439	0
Peak Hour Factor	1.0000	1.0000	1.0000	0.9000	0.9000	0.9000	1.0000	0.9000	0.9000	0.9000	0.9000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	4	1	14	0	21	73	8	122	0
Total Analysis Volume [veh/h]	0	0	0	14	2	56	0	82	291	31	488	0
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop			Stop			Free			Free		
Flared Lane				Yes								
Storage Area [veh]	1			1			0			0		
Two-Stage Gap Acceptance				No								
Number of Storage Spaces in Median	0			0			0			0		

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.05	0.01	0.10	0.00	0.00	0.00	0.03	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	17.29	19.22	11.72	0.00	0.00	0.00	8.12	0.00	0.00
Movement LOS				C	C	B		A	A	A	A	
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.32	0.32	0.32	0.00	0.00	0.00	0.08	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	7.99	7.99	7.99	0.00	0.00	0.00	2.01	0.00	0.00
d_A, Approach Delay [s/veh]	0.00			13.02			0.00			0.48		
Approach LOS	A			B			A			A		
d_I, Intersection Delay [s/veh]	1.23											
Intersection LOS	C											

Intersection Level Of Service Report
Intersection 7: Pine Grove Ave/I-5 Northbound Ramps

Control Type:	Two-way stop	Delay (sec / veh):	19.5
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.007

Intersection Setup

Name	I-5 NB Ramp			I-5 NB Ramp			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	112.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			30.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	I-5 NB Ramp			I-5 NB Ramp			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	364	4	40	0	0	0	42	52	0	0	88	24
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	364	4	40	0	0	0	42	52	0	0	88	24
Peak Hour Factor	0.9000	0.9000	0.9000	1.0000	1.0000	1.0000	0.9000	0.9000	1.0000	1.0000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	101	1	11	0	0	0	12	14	0	0	24	7
Total Analysis Volume [veh/h]	404	4	44	0	0	0	47	58	0	0	98	27
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop		Free		Free	
Flared Lane	Yes							
Storage Area [veh]	1		0		0		0	
Two-Stage Gap Acceptance	No							
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.61	0.01	0.04	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	19.03	19.53	17.20	0.00	0.00	0.00	7.54	0.00	0.00	0.00	0.00	0.00
Movement LOS	C	C	C				A	A			A	A
95th-Percentile Queue Length [veh/ln]	4.66	4.66	4.66	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	116.53	116.53	116.53	0.00	0.00	0.00	2.49	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	18.86			0.00			3.38			0.00		
Approach LOS	C			A			A			A		
d_I, Intersection Delay [s/veh]	13.02											
Intersection LOS	C											

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Intersection Level Of Service Report
Intersection 8: Pine Grove Ave/Virginia Ave-Twin View Blvd

Control Type:	Two-way stop	Delay (sec / veh):	10.1
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.004

Intersection Setup

Name	Twin View Blvd			Virginia Ave			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	35.00			25.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Twin View Blvd			Virginia Ave			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	35	1	3	1	3	52	31	27	29	0	14	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	35	1	3	1	3	52	31	27	29	0	14	0
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	10	0	1	0	1	14	9	8	8	0	4	0
Total Analysis Volume [veh/h]	39	1	3	1	3	58	34	30	32	0	16	0
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop		Free		Free	
Flared Lane	Yes		Yes					
Storage Area [veh]	1		1		0		0	
Two-Stage Gap Acceptance	No		No					
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.05	0.00	0.00	0.00	0.00	0.05	0.02	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.08	10.09	8.77	9.56	10.12	8.57	7.30	0.00	0.00	7.34	0.00	0.00
Movement LOS	B	B	A	A	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.17	0.17	0.17	0.17	0.17	0.17	0.07	0.07	0.07	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	4.24	4.24	4.24	4.32	4.32	4.32	1.63	1.63	1.63	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	9.99			8.66			2.58			0.00		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	5.60											
Intersection LOS	B											

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Intersection Level Of Service Report
Intersection 1: Pine Grove Ave/Lake Blvd

Control Type:	Two-way stop	Delay (sec / veh):	13.0
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.221

Intersection Setup

Name	Lake Blvd			Lake Blvd			Walker Mine Rd			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	1	0	1	0	0	0	0	0	0
Pocket Length [ft]	60.00	100.00	82.00	40.00	100.00	88.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Lake Blvd			Lake Blvd			Walker Mine Rd			Pine Grove Ave		
Base Volume Input [veh/h]	2	45	148	72	96	1	4	38	24	123	7	37
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2	45	148	72	96	1	4	38	24	123	7	37
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	11	37	18	24	0	1	10	6	31	2	9
Total Analysis Volume [veh/h]	2	45	148	72	96	1	4	38	24	123	7	37
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Free		Free		Stop		Stop	
Flared Lane					Yes		Yes	
Storage Area [veh]	0		0		1		2	
Two-Stage Gap Acceptance					No		No	
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.05	0.00	0.00	0.01	0.08	0.02	0.22	0.01	0.04
d_M, Delay for Movement [s/veh]	7.41	0.00	0.00	7.75	0.00	0.00	12.29	12.85	9.19	12.99	12.65	10.03
Movement LOS	A	A	A	A	A	A	B	B	A	B	B	B
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.16	0.00	0.00	0.28	0.28	0.28	0.90	0.90	0.90
95th-Percentile Queue Length [ft/ln]	0.10	0.00	0.00	4.12	0.00	0.00	7.02	7.02	7.02	22.49	22.49	22.49
d_A, Approach Delay [s/veh]	0.08			3.30			11.49			12.32		
Approach LOS	A			A			B			B		
d_I, Intersection Delay [s/veh]	5.68											
Intersection LOS	B											

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Intersection Level Of Service Report

Intersection 2: Pine Grove Ave/Ashby Rd

Control Type:	Two-way stop	Delay (sec / veh):	18.4
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.036

Intersection Setup

Name	Ashby Rd			Ashby Rd			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	1	0	0	1	0	1
Pocket Length [ft]	130.00	100.00	100.00	73.00	100.00	100.00	114.00	100.00	100.00	341.00	100.00	88.00
Speed [mph]	35.00			35.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Ashby Rd			Ashby Rd			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	10	9	33	66	18	103	119	95	35	89	59	77
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	10	9	33	66	18	103	119	95	35	89	59	77
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	2	8	17	5	26	30	24	9	22	15	19
Total Analysis Volume [veh/h]	10	9	33	66	18	103	119	95	35	89	59	77
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.03	0.04	0.19	0.05	0.10	0.08	0.00	0.00	0.06	0.00	0.00
d_M, Delay for Movement [s/veh]	18.38	16.33	9.18	17.92	15.96	9.40	7.71	0.00	0.00	7.63	0.00	0.00
Movement LOS	C	C	A	C	C	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.11	0.20	0.20	0.70	0.54	0.54	0.27	0.00	0.00	0.20	0.00	0.00
95th-Percentile Queue Length [ft/ln]	2.78	4.99	4.99	17.44	13.46	13.46	6.70	0.00	0.00	4.88	0.00	0.00
d_A, Approach Delay [s/veh]	12.19			13.04			3.68			3.02		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	6.55											
Intersection LOS	C											

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Intersection Level Of Service Report
Intersection 4: Pine Grove Ave/Cascade Blvd West

Control Type:	Signalized	Delay (sec / veh):	6.6
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.351

Intersection Setup

Name	Cascade Blvd W		Pine Grove Ave		Pine Grove Ave	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	1	0	1
Pocket Length [ft]	100.00	110.00	275.00	51.00	100.00	255.00
Speed [mph]	40.00		40.00		40.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Cascade Blvd W		Pine Grove Ave		Pine Grove Ave	
Base Volume Input [veh/h]	171	21	18	722	457	102
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	171	21	18	722	457	102
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	43	5	5	181	114	26
Total Analysis Volume [veh/h]	171	21	18	722	457	102
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing major stree	0		0		0	
v_di, Inbound Pedestrian Volume crossing major street [	0		0		0	
v_co, Outbound Pedestrian Volume crossing minor stree	0		0		0	
v_ci, Inbound Pedestrian Volume crossing minor street [	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

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Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Protected	Permissive	Permissive	Permissive
Signal Group	7	0	5	2	6	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	Lead	-	-	-
Minimum Green [s]	5	0	5	5	5	0
Maximum Green [s]	30	0	30	30	30	0
Amber [s]	3.0	0.0	3.0	3.0	3.0	0.0
All red [s]	1.0	0.0	1.0	1.0	1.0	0.0
Split [s]	34	0	20	56	36	0
Vehicle Extension [s]	3.0	0.0	3.0	3.0	3.0	0.0
Walk [s]	5	0	0	5	5	0
Pedestrian Clearance [s]	25	0	0	10	24	0
Rest In Walk	No			No	No	
I1, Start-Up Lost Time [s]	2.0	0.0	2.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	0.0	2.0	2.0	2.0	0.0
Minimum Recall	No		No	No	No	
Maximum Recall	No		No	No	No	
Pedestrian Recall	No		No	No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

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Lane Group Calculations

Lane Group	L	R	L	C	C	R
C, Cycle Length [s]	25	25	25	25	25	25
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	4	4	1	13	8	8
g / C, Green / Cycle	0.15	0.15	0.02	0.53	0.34	0.34
(v / s)_i Volume / Saturation Flow Rate	0.10	0.01	0.01	0.20	0.24	0.06
s, saturation flow rate [veh/h]	1781	1589	1781	3560	1870	1589
c, Capacity [veh/h]	268	239	44	1882	643	546
d1, Uniform Delay [s]	9.95	9.12	11.98	3.47	7.11	5.74
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	2.53	0.16	6.09	0.13	1.47	0.16
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.64	0.09	0.41	0.38	0.71	0.19
d, Delay for Lane Group [s/veh]	12.48	9.27	18.06	3.60	8.58	5.90
Lane Group LOS	B	A	B	A	A	A
Critical Lane Group	Yes	No	Yes	No	Yes	No
50th-Percentile Queue Length [veh/ln]	0.66	0.06	0.14	0.03	0.98	0.15
50th-Percentile Queue Length [ft/ln]	16.62	1.60	3.39	0.84	24.62	3.87
95th-Percentile Queue Length [veh/ln]	1.20	0.12	0.24	0.06	1.77	0.28
95th-Percentile Queue Length [ft/ln]	29.91	2.88	6.10	1.51	44.31	6.97

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Movement, Approach, & Intersection Results

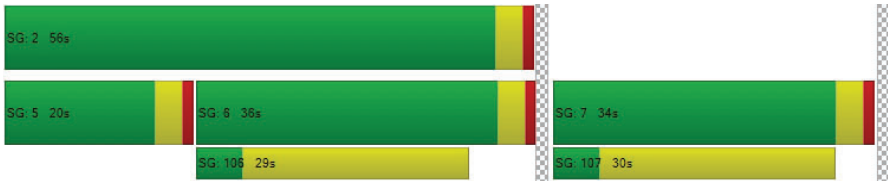
d_M, Delay for Movement [s/veh]	12.48	9.27	18.06	3.60	8.58	5.90
Movement LOS	B	A	B	A	A	A
d_A, Approach Delay [s/veh]	12.13		3.95		8.09	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	6.56					
Intersection LOS	A					
Intersection V/C	0.351					

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	36.45	36.45	36.45
I_p,int, Pedestrian LOS Score for Intersection	2.077	2.528	2.604
Crosswalk LOS	B	B	B
s_b, Saturation Flow Rate of the bicycle lane [bicycles/h]	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	0	0	0
d_b, Bicycle Delay [s]	45.00	45.00	45.00
I_b,int, Bicycle LOS Score for Intersection	4.132	4.743	5.055
Bicycle LOS	D	E	F

Sequence

Ring 1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



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Intersection Level Of Service Report
Intersection 5: Pine Grove Ave/Cascade Blvd East

Control Type:	Two-way stop	Delay (sec / veh):	63.2
Analysis Method:	HCM 6th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.520

Intersection Setup

Name	Cascade Blvd E						Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	54.00	100.00	100.00	100.00	100.00	100.00	100.00	82.00	100.00	100.00
Speed [mph]	40.00			25.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Cascade Blvd E						Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	63	0	128	0	0	0	0	675	47	49	559	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	63	0	128	0	0	0	0	675	47	49	559	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	16	0	32	0	0	0	0	169	12	12	140	0
Total Analysis Volume [veh/h]	63	0	128	0	0	0	0	675	47	49	559	0
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop			Stop			Free			Free		
Flared Lane	No			No								
Storage Area [veh]	0			0			0			0		
Two-Stage Gap Acceptance	No			No								
Number of Storage Spaces in Median	0			0			0			0		

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.52	0.00	0.29	0.00	0.00	0.00	0.00	0.01	0.00	0.06	0.01	0.00
d_M, Delay for Movement [s/veh]	63.20	33.86	16.50	46.92	31.39	11.81	8.56	0.00	0.00	9.33	0.00	0.00
Movement LOS	F	D	C	E	D	B	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	2.44	1.19	1.19	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.00
95th-Percentile Queue Length [ft/ln]	60.90	29.84	29.84	0.00	0.00	0.00	0.00	0.00	0.00	4.41	0.00	0.00
d_A, Approach Delay [s/veh]	31.90			30.04			0.00			0.75		
Approach LOS	D			D			A			A		
d_I, Intersection Delay [s/veh]	4.31											
Intersection LOS	F											

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Intersection Level Of Service Report
Intersection 6: Pine Grove Ave/I-5 Southbound Ramps

Control Type:	Two-way stop	Delay (sec / veh):	18.8
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.174

Intersection Setup

Name	I-5 SB Ramp			I-5 SB Ramp			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	1	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	84.00	152.00	100.00	100.00
Speed [mph]	50.00			50.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	I-5 SB Ramp			I-5 SB Ramp			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	0	0	0	51	0	33	0	81	455	73	319	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	51	0	33	0	81	455	73	319	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	13	0	8	0	20	114	18	80	0
Total Analysis Volume [veh/h]	0	0	0	51	0	33	0	81	455	73	319	0
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop			Stop			Free			Free		
Flared Lane				Yes								
Storage Area [veh]	1			1			0			0		
Two-Stage Gap Acceptance				No								
Number of Storage Spaces in Median	0			0			0			0		

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.17	0.00	0.05	0.00	0.00	0.00	0.07	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	18.83	22.52	11.55	0.00	0.00	0.00	8.75	0.00	0.00
Movement LOS				C	C	B		A	A	A	A	
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.62	0.62	0.62	0.00	0.00	0.00	0.23	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	15.58	15.58	15.58	0.00	0.00	0.00	5.70	0.00	0.00
d_A, Approach Delay [s/veh]	0.00			15.97			0.00			1.63		
Approach LOS	A			C			A			A		
d_I, Intersection Delay [s/veh]	1.96											
Intersection LOS	C											

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Intersection Level Of Service Report
Intersection 7: Pine Grove Ave/I-5 Northbound Ramps

Control Type:	Two-way stop	Delay (sec / veh):	14.8
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.005

Intersection Setup

Name	I-5 NB Ramp			I-5 NB Ramp			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	112.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			30.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	I-5 NB Ramp			I-5 NB Ramp			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	259	3	48	0	0	0	28	108	0	0	119	26
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	259	3	48	0	0	0	28	108	0	0	119	26
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	65	1	12	0	0	0	7	27	0	0	30	7
Total Analysis Volume [veh/h]	259	3	48	0	0	0	28	108	0	0	119	26
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop		Free		Free	
Flared Lane	Yes							
Storage Area [veh]	1		0		0		0	
Two-Stage Gap Acceptance	No							
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.40	0.01	0.05	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	14.34	14.81	12.55	0.00	0.00	0.00	7.55	0.00	0.00	0.00	0.00	0.00
Movement LOS	B	B	B				A	A			A	A
95th-Percentile Queue Length [veh/ln]	2.18	2.18	2.18	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	54.58	54.58	54.58	0.00	0.00	0.00	1.49	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	14.07			0.00			1.56			0.00		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	7.74											
Intersection LOS	B											

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Intersection Level Of Service Report
Intersection 8: Pine Grove Ave/Virginia Ave-Twin View Blvd

Control Type:	Two-way stop	Delay (sec / veh):	11.7
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.104

Intersection Setup

Name	Twin View Blvd			Virginia Ave			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	35.00			25.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Twin View Blvd			Virginia Ave			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	63	4	1	0	5	57	83	14	59	1	35	2
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	63	4	1	0	5	57	83	14	59	1	35	2
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	16	1	0	0	1	14	21	4	15	0	9	1
Total Analysis Volume [veh/h]	63	4	1	0	5	57	83	14	59	1	35	2
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop		Free		Free	
Flared Lane	Yes		Yes					
Storage Area [veh]	1		1		0		0	
Two-Stage Gap Acceptance	No		No					
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.10	0.01	0.00	0.00	0.01	0.05	0.05	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	11.67	11.56	9.23	10.56	11.23	8.66	7.42	0.00	0.00	7.36	0.00	0.00
Movement LOS	B	B	A	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.37	0.37	0.37	0.17	0.17	0.17	0.17	0.17	0.17	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	9.27	9.27	9.27	4.36	4.36	4.36	4.17	4.17	4.17	0.05	0.05	0.05
d_A, Approach Delay [s/veh]	11.63			8.87			3.95			0.19		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	6.06											
Intersection LOS	B											

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Intersection Level Of Service Report
Intersection 1: Pine Grove Ave/Lake Blvd

Control Type:	Two-way stop	Delay (sec / veh):	13.6
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.007

Intersection Setup

Name	Lake Blvd			Lake Blvd			Walker Mine Rd			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	1	0	1	0	0	0	0	0	0
Pocket Length [ft]	60.00	100.00	82.00	40.00	100.00	88.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Lake Blvd			Lake Blvd			Walker Mine Rd			Pine Grove Ave		
Base Volume Input [veh/h]	20	84	94	73	75	4	3	17	5	60	38	72
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	20	84	94	73	75	4	3	17	5	60	38	72
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	21	24	18	19	1	1	4	1	15	10	18
Total Analysis Volume [veh/h]	20	84	94	73	75	4	3	17	5	60	38	72
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Free		Free		Stop		Stop	
Flared Lane					Yes		Yes	
Storage Area [veh]	0		0		1		2	
Two-Stage Gap Acceptance					No		No	
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.05	0.00	0.00	0.01	0.04	0.01	0.11	0.07	0.07
d_M, Delay for Movement [s/veh]	7.40	0.00	0.00	7.72	0.00	0.00	13.55	12.79	8.92	12.38	12.53	9.52
Movement LOS	A	A	A	A	A	A	B	B	A	B	B	A
95th-Percentile Queue Length [veh/ln]	0.04	0.00	0.00	0.17	0.00	0.00	0.13	0.13	0.13	0.65	0.65	0.65
95th-Percentile Queue Length [ft/ln]	1.00	0.00	0.00	4.13	0.00	0.00	3.32	3.32	3.32	16.33	16.33	16.33
d_A, Approach Delay [s/veh]	0.75			3.71			12.11			11.20		
Approach LOS	A			A			B			B		
d_I, Intersection Delay [s/veh]	5.36											
Intersection LOS	B											

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Intersection Level Of Service Report

Intersection 2: Pine Grove Ave/Ashby Rd

Control Type:	Two-way stop	Delay (sec / veh):	13.8
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.064

Intersection Setup

Name	Ashby Rd			Ashby Rd			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	1	0	0	1	0	1
Pocket Length [ft]	130.00	100.00	100.00	73.00	100.00	100.00	114.00	100.00	100.00	341.00	100.00	88.00
Speed [mph]	35.00			35.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Ashby Rd			Ashby Rd			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	7	10	77	28	3	54	78	106	2	18	120	65
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	7	10	77	28	3	54	78	106	2	18	120	65
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	3	19	7	1	14	20	27	1	5	30	16
Total Analysis Volume [veh/h]	7	10	77	28	3	54	78	106	2	18	120	65
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop		Free		Free	
Flared Lane	No		No					
Storage Area [veh]	0		0		0		0	
Two-Stage Gap Acceptance	No		No					
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.02	0.08	0.06	0.01	0.06	0.06	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	13.29	13.49	9.30	13.81	12.64	9.14	7.74	0.00	0.00	7.46	0.00	0.00
Movement LOS	B	B	A	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.05	0.35	0.35	0.20	0.21	0.21	0.18	0.00	0.00	0.04	0.00	0.00
95th-Percentile Queue Length [ft/ln]	1.21	8.63	8.63	5.12	5.13	5.13	4.46	0.00	0.00	0.92	0.00	0.00
d_A, Approach Delay [s/veh]	10.04			10.80			3.25			0.66		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	4.58											
Intersection LOS	B											

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Intersection Level Of Service Report
Intersection 4: Pine Grove Ave/Cascade Blvd West

Control Type:	Signalized	Delay (sec / veh):	6.6
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.404

Intersection Setup

Name	Cascade Blvd W		Pine Grove Ave		Pine Grove Ave	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	1	0	1
Pocket Length [ft]	100.00	110.00	275.00	51.00	100.00	255.00
Speed [mph]	40.00		40.00		40.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Cascade Blvd W		Pine Grove Ave		Pine Grove Ave	
Base Volume Input [veh/h]	103	21	26	530	620	200
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	103	21	26	530	620	200
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	26	5	7	133	155	50
Total Analysis Volume [veh/h]	103	21	26	530	620	200
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing major stree	0		0		0	
v_di, Inbound Pedestrian Volume crossing major street [	0		0		0	
v_co, Outbound Pedestrian Volume crossing minor stree	0		0		0	
v_ci, Inbound Pedestrian Volume crossing minor street [	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

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Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Protected	Permissive	Permissive	Permissive
Signal Group	7	0	5	2	6	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	Lead	-	-	-
Minimum Green [s]	5	0	5	5	5	0
Maximum Green [s]	30	0	30	30	30	0
Amber [s]	3.0	0.0	3.0	3.0	3.0	0.0
All red [s]	1.0	0.0	1.0	1.0	1.0	0.0
Split [s]	34	0	23	56	33	0
Vehicle Extension [s]	3.0	0.0	3.0	3.0	3.0	0.0
Walk [s]	5	0	0	5	5	0
Pedestrian Clearance [s]	25	0	0	10	24	0
Rest In Walk	No			No	No	
I1, Start-Up Lost Time [s]	2.0	0.0	2.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	0.0	2.0	2.0	2.0	0.0
Minimum Recall	No		No	No	No	
Maximum Recall	No		No	No	No	
Pedestrian Recall	No		No	No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

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Lane Group Calculations

Lane Group	L	R	L	C	C	R
C, Cycle Length [s]	28	28	28	28	28	28
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	3	3	1	17	12	12
g / C, Green / Cycle	0.11	0.11	0.03	0.60	0.43	0.43
(v / s)_i Volume / Saturation Flow Rate	0.06	0.01	0.01	0.15	0.33	0.13
s, saturation flow rate [veh/h]	1781	1589	1781	3560	1870	1589
c, Capacity [veh/h]	200	178	60	2157	806	685
d1, Uniform Delay [s]	11.86	11.33	13.43	2.59	6.87	5.25
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	2.06	0.29	4.81	0.06	1.59	0.23
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.52	0.12	0.43	0.25	0.77	0.29
d, Delay for Lane Group [s/veh]	13.92	11.62	18.24	2.65	8.46	5.49
Lane Group LOS	B	B	B	A	A	A
Critical Lane Group	Yes	No	Yes	No	Yes	No
50th-Percentile Queue Length [veh/ln]	0.51	0.09	0.19	0.02	1.40	0.30
50th-Percentile Queue Length [ft/ln]	12.76	2.29	4.81	0.44	35.12	7.59
95th-Percentile Queue Length [veh/ln]	0.92	0.16	0.35	0.03	2.53	0.55
95th-Percentile Queue Length [ft/ln]	22.98	4.12	8.66	0.79	63.22	13.66

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	13.92	11.62	18.24	2.65	8.46	5.49
Movement LOS	B	B	B	A	A	A
d_A, Approach Delay [s/veh]	13.53		3.38		7.73	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	6.60					
Intersection LOS	A					
Intersection V/C	0.404					

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	36.45	36.45	36.45
I_p,int, Pedestrian LOS Score for Intersection	2.093	2.522	2.605
Crosswalk LOS	B	B	B
s_b, Saturation Flow Rate of the bicycle lane [bicycles/h]	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	0	0	0
d_b, Bicycle Delay [s]	45.00	45.00	45.00
I_b,int, Bicycle LOS Score for Intersection	4.132	4.591	5.485
Bicycle LOS	D	E	F

Sequence

Ring 1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Intersection Level Of Service Report
Intersection 5: Pine Grove Ave/Cascade Blvd East

Control Type:	Two-way stop	Delay (sec / veh):	195.5
Analysis Method:	HCM 6th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.025

Intersection Setup

Name	Cascade Blvd E						Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	54.00	100.00	100.00	100.00	100.00	100.00	100.00	82.00	100.00	100.00
Speed [mph]	40.00			25.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Cascade Blvd E						Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	85	0	81	2	0	0	1	485	45	116	820	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	85	0	81	2	0	0	1	485	45	116	820	1
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	21	0	20	1	0	0	0	121	11	29	205	0
Total Analysis Volume [veh/h]	85	0	81	2	0	0	1	485	45	116	820	1
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	1.02	0.00	0.14	0.03	0.00	0.00	0.00	0.00	0.00	0.11	0.01	0.00
d_M, Delay for Movement [s/veh]	195.47	42.40	12.43	57.11	43.95	16.07	9.46	0.00	0.00	8.91	0.00	0.00
Movement LOS	F	E	B	F	E	C	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	5.77	0.50	0.50	0.09	0.09	0.09	0.00	0.00	0.00	0.38	0.00	0.00
95th-Percentile Queue Length [ft/ln]	144.36	12.44	12.44	2.15	2.15	2.15	0.09	0.00	0.00	9.41	0.00	0.00
d_A, Approach Delay [s/veh]	106.15			57.11			0.02			1.10		
Approach LOS	F			F			A			A		
d_I, Intersection Delay [s/veh]	11.48											
Intersection LOS	F											

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Intersection Level Of Service Report
Intersection 6: Pine Grove Ave/I-5 Southbound Ramps

Control Type:	Two-way stop	Delay (sec / veh):	22.1
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.021

Intersection Setup

Name	I-5 SB Ramp			I-5 SB Ramp			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	1	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	84.00	152.00	100.00	100.00
Speed [mph]	50.00			50.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	I-5 SB Ramp			I-5 SB Ramp			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	0	0	0	52	5	62	0	98	293	53	496	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	52	5	62	0	98	293	53	496	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	13	1	16	0	25	73	13	124	0
Total Analysis Volume [veh/h]	0	0	0	52	5	62	0	98	293	53	496	0
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop			Stop			Free			Free		
Flared Lane				Yes								
Storage Area [veh]	1			1			0			0		
Two-Stage Gap Acceptance				No								
Number of Storage Spaces in Median	0			0			0			0		

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.19	0.02	0.11	0.00	0.00	0.00	0.05	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	20.14	22.13	13.04	0.00	0.00	0.00	8.23	0.00	0.00
Movement LOS				C	C	B		A	A	A	A	
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.81	0.81	0.81	0.00	0.00	0.00	0.14	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	20.18	20.18	20.18	0.00	0.00	0.00	3.56	0.00	0.00
d_A, Approach Delay [s/veh]	0.00			16.52			0.00			0.79		
Approach LOS	A			C			A			A		
d_I, Intersection Delay [s/veh]	2.27											
Intersection LOS	C											

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Intersection Level Of Service Report

Intersection 7: Pine Grove Ave/I-5 Northbound Ramps

Control Type:	Two-way stop	Delay (sec / veh):	27.9
Analysis Method:	HCM 6th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.009

Intersection Setup

Name	I-5 NB Ramp			I-5 NB Ramp			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	112.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			30.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	I-5 NB Ramp			I-5 NB Ramp			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	402	5	80	0	0	0	45	112	0	0	133	46
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	402	5	80	0	0	0	45	112	0	0	133	46
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	101	1	20	0	0	0	11	28	0	0	33	12
Total Analysis Volume [veh/h]	402	5	80	0	0	0	45	112	0	0	133	46
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop			Stop			Free			Free		
Flared Lane	Yes											
Storage Area [veh]	1			0			0			0		
Two-Stage Gap Acceptance	No											
Number of Storage Spaces in Median	0			0			0			0		

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.70	0.01	0.09	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	27.36	27.88	24.96	0.00	0.00	0.00	7.66	0.00	0.00	0.00	0.00	0.00
Movement LOS	D	D	C				A	A			A	A
95th-Percentile Queue Length [veh/ln]	7.12	7.12	7.12	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	177.96	177.96	177.96	0.00	0.00	0.00	2.50	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	26.97			0.00			2.20			0.00		
Approach LOS	D			A			A			A		
d_I, Intersection Delay [s/veh]	16.38											
Intersection LOS	D											

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Intersection Level Of Service Report
Intersection 8: Pine Grove Ave/Virginia Ave-Twin View Blvd

Control Type:	Two-way stop	Delay (sec / veh):	12.7
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.143

Intersection Setup

Name	Twin View Blvd			Virginia Ave			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	35.00			25.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Twin View Blvd			Virginia Ave			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	78	5	5	1	9	88	99	27	67	0	11	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	78	5	5	1	9	88	99	27	67	0	11	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	20	1	1	0	2	22	25	7	17	0	3	0
Total Analysis Volume [veh/h]	78	5	5	1	9	88	99	27	67	0	11	0
Pedestrian Volume [ped/h]	0			0			0			0		

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Version 7.00-06

Intersection Settings

Priority Scheme	Stop		Stop		Free		Free	
Flared Lane	Yes		Yes					
Storage Area [veh]	1		1		0		0	
Two-Stage Gap Acceptance	No		No					
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.14	0.01	0.00	0.00	0.02	0.08	0.06	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	12.68	12.15	9.68	10.92	11.59	8.64	7.39	0.00	0.00	7.40	0.00	0.00
Movement LOS	B	B	A	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.53	0.53	0.53	0.27	0.27	0.27	0.20	0.20	0.20	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	13.23	13.23	13.23	6.71	6.71	6.71	4.91	4.91	4.91	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	12.48			8.93			3.79			0.00		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	6.93											
Intersection LOS	B											

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Intersection Level Of Service Report
Intersection 1: Pine Grove Ave/Lake Blvd

Control Type:	Two-way stop	Delay (sec / veh):	14.8
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.300

Intersection Setup

Name	Lake Blvd			Lake Blvd			Walker Mine Rd			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	1	0	1	0	0	0	0	0	0
Pocket Length [ft]	60.00	100.00	82.00	40.00	100.00	88.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Lake Blvd			Lake Blvd			Walker Mine Rd			Pine Grove Ave		
Base Volume Input [veh/h]	2	45	132	71	96	1	3	22	19	116	7	34
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	1	1	0	0	0	0	0	4	0	2
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2	45	133	72	96	1	3	22	19	120	7	36
Peak Hour Factor	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	14	42	23	30	0	1	7	6	38	2	11
Total Analysis Volume [veh/h]	3	56	166	90	120	1	4	28	24	150	9	45
Pedestrian Volume [ped/h]	0			0			0			0		

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Version 7.00-06

Intersection Settings

Priority Scheme	Free			Free			Stop			Stop		
Flared Lane							Yes			Yes		
Storage Area [veh]	0			0			1			2		
Two-Stage Gap Acceptance							No			No		
Number of Storage Spaces in Median	0			0			0			0		

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.07	0.00	0.00	0.01	0.07	0.03	0.30	0.02	0.04
d_M, Delay for Movement [s/veh]	7.46	0.00	0.00	7.86	0.00	0.00	13.41	13.87	9.25	14.77	14.42	11.14
Movement LOS	A	A	A	A	A	A	B	B	A	B	B	B
95th-Percentile Queue Length [veh/ln]	0.01	0.00	0.00	0.21	0.00	0.00	0.24	0.24	0.24	1.36	1.36	1.36
95th-Percentile Queue Length [ft/ln]	0.15	0.00	0.00	5.36	0.00	0.00	6.05	6.05	6.05	33.97	33.97	33.97
d_A, Approach Delay [s/veh]	0.10			3.35			11.86			13.95		
Approach LOS	A			A			B			B		
d_I, Intersection Delay [s/veh]	6.09											
Intersection LOS	B											

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Intersection Level Of Service Report
Intersection 2: Pine Grove Ave/Ashby Rd

Control Type:	Two-way stop	Delay (sec / veh):	20.4
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.037

Intersection Setup

Name	Ashby Rd			Ashby Rd			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	1	0	0	1	0	1
Pocket Length [ft]	130.00	100.00	100.00	73.00	100.00	100.00	114.00	100.00	100.00	341.00	100.00	88.00
Speed [mph]	35.00			35.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Ashby Rd			Ashby Rd			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	7	8	30	66	14	102	111	90	19	60	51	77
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	1	0	0	0	2	0	0	6	7
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	7	8	30	67	14	102	111	92	19	60	57	84
Peak Hour Factor	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	3	9	21	4	32	35	29	6	19	18	26
Total Analysis Volume [veh/h]	9	10	38	84	18	128	139	115	24	75	71	105
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop		Free		Free	
Flared Lane	No		No					
Storage Area [veh]	0		0		0		0	
Two-Stage Gap Acceptance	No		No					
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.03	0.04	0.26	0.05	0.13	0.10	0.00	0.00	0.05	0.00	0.00
d_M, Delay for Movement [s/veh]	20.41	17.54	9.35	20.38	16.69	9.63	7.85	0.00	0.00	7.63	0.00	0.00
Movement LOS	C	C	A	C	C	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.12	0.24	0.24	1.04	0.66	0.66	0.33	0.00	0.00	0.16	0.00	0.00
95th-Percentile Queue Length [ft/ln]	2.88	6.04	6.04	26.07	16.61	16.61	8.25	0.00	0.00	4.10	0.00	0.00
d_A, Approach Delay [s/veh]	12.53			14.11			3.93			2.28		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	6.89											
Intersection LOS	C											

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Intersection Level Of Service Report
Intersection 3: Pine Grove Ave/Project Driveway

Control Type:	Two-way stop	Delay (sec / veh):	13.9
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.118

Intersection Setup

Name	Project Access Point		Pine Grove Ave		Pine Grove Ave	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Project Access Point		Pine Grove Ave		Pine Grove Ave	
Base Volume Input [veh/h]	32	0	242	11	0	184
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	13	31	0	3	12	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	45	31	242	14	12	184
Peak Hour Factor	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	14	10	76	4	4	58
Total Analysis Volume [veh/h]	56	39	303	18	15	230
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

Priority Scheme	Stop		Free		Free	
Flared Lane	No					
Storage Area [veh]	0		0		0	
Two-Stage Gap Acceptance	No					
Number of Storage Spaces in Median	0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.12	0.05	0.00	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	13.92	11.28	0.00	0.00	7.94	0.00
Movement LOS	B	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.61	0.61	0.00	0.00	0.04	0.04
95th-Percentile Queue Length [ft/ln]	15.36	15.36	0.00	0.00	0.92	0.92
d_A, Approach Delay [s/veh]	12.84		0.00		0.49	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	2.03					
Intersection LOS	B					

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Intersection Level Of Service Report
Intersection 4: Pine Grove Ave/Cascade Blvd West

Control Type:	Signalized	Delay (sec / veh):	7.2
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.248

Intersection Setup

Name	Cascade Blvd W		Pine Grove Ave		Pine Grove Ave	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	1	0	1
Pocket Length [ft]	100.00	110.00	275.00	51.00	100.00	255.00
Speed [mph]	40.00		40.00		40.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Cascade Blvd W		Pine Grove Ave		Pine Grove Ave	
Base Volume Input [veh/h]	171	21	18	257	158	92
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	2	4	27	10	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	171	23	22	284	168	92
Peak Hour Factor	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	53	7	7	89	53	29
Total Analysis Volume [veh/h]	214	29	28	355	210	115
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

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Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Protected	Permissive	Permissive	Permissive
Signal Group	7	0	5	2	6	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	Lead	-	-	-
Minimum Green [s]	5	0	5	5	5	0
Maximum Green [s]	30	0	30	30	30	0
Amber [s]	3.0	0.0	3.0	3.0	3.0	0.0
All red [s]	1.0	0.0	1.0	1.0	1.0	0.0
Split [s]	34	0	20	56	36	0
Vehicle Extension [s]	3.0	0.0	3.0	3.0	3.0	0.0
Walk [s]	5	0	0	5	5	0
Pedestrian Clearance [s]	25	0	0	10	24	0
Rest In Walk	No			No	No	
I1, Start-Up Lost Time [s]	2.0	0.0	2.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	0.0	2.0	2.0	2.0	0.0
Minimum Recall	No		No	No	No	
Maximum Recall	No		No	No	No	
Pedestrian Recall	No		No	No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

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Lane Group Calculations

Lane Group	L	R	L	C	C	R
C, Cycle Length [s]	21	21	21	21	21	21
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	4	4	1	9	4	4
g / C, Green / Cycle	0.18	0.18	0.04	0.43	0.21	0.21
(v / s)_i Volume / Saturation Flow Rate	0.12	0.02	0.02	0.10	0.11	0.07
s, saturation flow rate [veh/h]	1781	1589	1781	3560	1870	1589
c, Capacity [veh/h]	331	295	68	1548	387	329
d1, Uniform Delay [s]	7.94	7.12	9.91	3.74	7.47	7.15
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	2.12	0.14	3.93	0.07	1.19	0.64
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.65	0.10	0.41	0.23	0.54	0.35
d, Delay for Lane Group [s/veh]	10.06	7.26	13.83	3.82	8.66	7.79
Lane Group LOS	B	A	B	A	A	A
Critical Lane Group	Yes	No	Yes	No	Yes	No
50th-Percentile Queue Length [veh/ln]	0.54	0.05	0.14	0.02	0.43	0.22
50th-Percentile Queue Length [ft/ln]	13.44	1.33	3.47	0.40	10.79	5.43
95th-Percentile Queue Length [veh/ln]	0.97	0.10	0.25	0.03	0.78	0.39
95th-Percentile Queue Length [ft/ln]	24.20	2.40	6.24	0.72	19.42	9.77

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	10.06	7.26	13.83	3.82	8.66	7.79
Movement LOS	B	A	B	A	A	A
d_A, Approach Delay [s/veh]	9.73		4.55		8.35	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	7.17					
Intersection LOS	A					
Intersection V/C	0.248					

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	36.45	36.45	36.45
I_p,int, Pedestrian LOS Score for Intersection	2.109	2.335	2.423
Crosswalk LOS	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	0	0	0
d_b, Bicycle Delay [s]	45.00	45.00	45.00
I_b,int, Bicycle LOS Score for Intersection	4.132	4.448	4.669
Bicycle LOS	D	E	E

Sequence

Ring 1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Intersection Level Of Service Report

Intersection 5: Pine Grove Ave/Cascade Blvd East

Control Type:	Two-way stop	Delay (sec / veh):	22.5
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.146

Intersection Setup

Name	Cascade Blvd E						Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	54.00	100.00	100.00	100.00	100.00	100.00	100.00	82.00	100.00	100.00
Speed [mph]	40.00			25.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Cascade Blvd E						Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	27	0	110	0	0	0	0	399	29	35	223	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	1	0	0	0	0	0	0	25	2	0	9	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	28	0	110	0	0	0	0	424	31	35	232	0
Peak Hour Factor	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	9	0	34	0	0	0	0	133	10	11	73	0
Total Analysis Volume [veh/h]	35	0	138	0	0	0	0	530	39	44	290	0
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop		Free		Free	
Flared Lane	No		No					
Storage Area [veh]	0		0		0		0	
Two-Stage Gap Acceptance	No		No					
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.15	0.00	0.26	0.00	0.00	0.00	0.00	0.01	0.00	0.04	0.00	0.00
d_M, Delay for Movement [s/veh]	22.53	21.36	14.05	25.19	19.42	9.81	7.83	0.00	0.00	8.75	0.00	0.00
Movement LOS	C	C	B	D	C	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.50	1.02	1.02	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.00
95th-Percentile Queue Length [ft/ln]	12.55	25.54	25.54	0.00	0.00	0.00	0.00	0.00	0.00	3.44	0.00	0.00
d_A, Approach Delay [s/veh]	15.76			18.14			0.00			1.15		
Approach LOS	C			C			A			A		
d_I, Intersection Delay [s/veh]	2.89											
Intersection LOS	C											

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Intersection Level Of Service Report
Intersection 6: Pine Grove Ave/I-5 Southbound Ramps

Control Type:	Two-way stop	Delay (sec / veh):	17.2
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.053

Intersection Setup

Name	I-5 SB Ramp			I-5 SB Ramp			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	1	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	84.00	152.00	100.00	100.00
Speed [mph]	50.00			50.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	I-5 SB Ramp			I-5 SB Ramp			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	0	0	0	13	0	23	0	63	448	29	258	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	2	0	6	19	0	7	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	13	0	25	0	69	467	29	265	0
Peak Hour Factor	1.0000	1.0000	1.0000	0.8000	0.8000	0.8000	1.0000	0.8000	0.8000	0.8000	0.8000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	4	0	8	0	22	146	9	83	0
Total Analysis Volume [veh/h]	0	0	0	16	0	31	0	86	584	36	331	0
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop			Stop			Free			Free		
Flared Lane				Yes								
Storage Area [veh]	1			1			0			0		
Two-Stage Gap Acceptance				No								
Number of Storage Spaces in Median	0			0			0			0		

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.05	0.00	0.04	0.00	0.00	0.01	0.04	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	17.23	22.25	10.30	0.00	0.00	0.00	9.07	0.00	0.00
Movement LOS				C	C	B		A	A	A	A	
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.17	0.17	0.17	0.00	0.00	0.00	0.12	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	4.22	4.22	4.22	0.00	0.00	0.00	3.05	0.00	0.00
d_A, Approach Delay [s/veh]	0.00			12.66			0.00			0.89		
Approach LOS	A			B			A			A		
d_I, Intersection Delay [s/veh]	0.85											
Intersection LOS	C											

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Intersection Level Of Service Report
Intersection 7: Pine Grove Ave/I-5 Northbound Ramps

Control Type:	Two-way stop	Delay (sec / veh):	13.7
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.006

Intersection Setup

Name	I-5 NB Ramp			I-5 NB Ramp			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	112.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			30.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	I-5 NB Ramp			I-5 NB Ramp			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	214	3	28	0	0	0	23	56	0	0	57	14
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	6	0	0	0	0	0	4	2	0	0	1	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	220	3	28	0	0	0	27	58	0	0	58	14
Peak Hour Factor	0.8000	0.8000	0.8000	1.0000	1.0000	1.0000	0.8000	0.8000	1.0000	1.0000	0.8000	0.8000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	69	1	9	0	0	0	8	18	0	0	18	4
Total Analysis Volume [veh/h]	275	4	35	0	0	0	34	73	0	0	73	18
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop		Free		Free	
Flared Lane	Yes							
Storage Area [veh]	1		0		0		0	
Two-Stage Gap Acceptance	No							
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.38	0.01	0.04	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	13.19	13.68	11.81	0.00	0.00	0.00	7.45	0.00	0.00	0.00	0.00	0.00
Movement LOS	B	B	B				A	A			A	A
95th-Percentile Queue Length [veh/ln]	1.99	1.99	1.99	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	49.76	49.76	49.76	0.00	0.00	0.00	1.73	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	13.04			0.00			2.37			0.00		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	8.49											
Intersection LOS	B											

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Intersection Level Of Service Report
Intersection 8: Pine Grove Ave/Virginia Ave-Twin View Blvd

Control Type:	Two-way stop	Delay (sec / veh):	10.4
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.006

Intersection Setup

Name	Twin View Blvd			Virginia Ave			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	35.00			25.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Twin View Blvd			Virginia Ave			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	23	1	1	0	3	36	34	18	32	1	23	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	1	2	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	23	1	1	0	3	37	36	18	32	1	23	1
Peak Hour Factor	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	0	0	0	1	12	11	6	10	0	7	0
Total Analysis Volume [veh/h]	29	1	1	0	4	46	45	23	40	1	29	1
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop		Free		Free	
Flared Lane	Yes		Yes					
Storage Area [veh]	1		1		0		0	
Two-Stage Gap Acceptance	No		No					
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.00	0.00	0.00	0.01	0.04	0.03	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.24	10.31	8.72	9.77	10.38	8.59	7.34	0.00	0.00	7.34	0.00	0.00
Movement LOS	B	B	A	A	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.13	0.13	0.13	0.14	0.14	0.14	0.09	0.09	0.09	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	3.27	3.27	3.27	3.45	3.45	3.45	2.19	2.19	2.19	0.05	0.05	0.05
d_A, Approach Delay [s/veh]	10.19			8.73			3.06			0.24		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	4.96											
Intersection LOS	B											

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Intersection Level Of Service Report
Intersection 1: Pine Grove Ave/Lake Blvd

Control Type:	Two-way stop	Delay (sec / veh):	13.8
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.007

Intersection Setup

Name	Lake Blvd			Lake Blvd			Walker Mine Rd			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	1	0	1	0	0	0	0	0	0
Pocket Length [ft]	60.00	100.00	82.00	40.00	100.00	88.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Lake Blvd			Lake Blvd			Walker Mine Rd			Pine Grove Ave		
Base Volume Input [veh/h]	20	84	80	70	75	4	3	13	5	56	19	69
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	4	2	0	0	0	0	0	3	0	1
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	20	84	84	72	75	4	3	13	5	59	19	70
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	6	23	23	20	21	1	1	4	1	16	5	19
Total Analysis Volume [veh/h]	22	93	93	80	83	4	3	14	6	66	21	78
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Free			Free			Stop			Stop		
Flared Lane							Yes			Yes		
Storage Area [veh]	0			0			1			2		
Two-Stage Gap Acceptance							No			No		
Number of Storage Spaces in Median	0			0			0			0		

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.06	0.00	0.00	0.01	0.03	0.01	0.13	0.04	0.08
d_M, Delay for Movement [s/veh]	7.42	0.00	0.00	7.75	0.00	0.00	13.80	13.15	8.92	12.65	12.79	9.47
Movement LOS	A	A	A	A	A	A	B	B	A	B	B	A
95th-Percentile Queue Length [veh/ln]	0.04	0.00	0.00	0.18	0.00	0.00	0.12	0.12	0.12	0.60	0.60	0.60
95th-Percentile Queue Length [ft/ln]	1.11	0.00	0.00	4.58	0.00	0.00	2.95	2.95	2.95	15.05	15.05	15.05
d_A, Approach Delay [s/veh]	0.78			3.71			12.13			11.17		
Approach LOS	A			A			B			B		
d_I, Intersection Delay [s/veh]	5.16											
Intersection LOS	B											

Intersection Level Of Service Report
Intersection 2: Pine Grove Ave/Ashby Rd

Control Type:	Two-way stop	Delay (sec / veh):	13.3
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.084

Intersection Setup

Name	Ashby Rd			Ashby Rd			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	1	0	0	1	0	1
Pocket Length [ft]	130.00	100.00	100.00	73.00	100.00	100.00	114.00	100.00	100.00	341.00	100.00	88.00
Speed [mph]	35.00			35.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Ashby Rd			Ashby Rd			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	5	6	45	28	3	54	67	96	2	14	94	45
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	8	0	0	0	6	0	0	4	4
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	5	6	45	36	3	54	67	102	2	14	98	49
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	2	13	10	1	15	19	28	1	4	27	14
Total Analysis Volume [veh/h]	6	7	50	40	3	60	74	113	2	16	109	54
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop		Free		Free	
Flared Lane	No		No					
Storage Area [veh]	0		0		0		0	
Two-Stage Gap Acceptance	No		No					
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.01	0.05	0.08	0.01	0.06	0.05	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	13.05	13.00	9.15	13.25	12.47	9.11	7.68	0.00	0.00	7.47	0.00	0.00
Movement LOS	B	B	A	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.04	0.22	0.22	0.27	0.22	0.22	0.17	0.00	0.00	0.03	0.00	0.00
95th-Percentile Queue Length [ft/ln]	1.01	5.48	5.48	6.84	5.59	5.59	4.13	0.00	0.00	0.82	0.00	0.00
d_A, Approach Delay [s/veh]	9.95			10.82			3.01			0.67		
Approach LOS	A			B			A			A		
d_I, Intersection Delay [s/veh]	4.55											
Intersection LOS	B											

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Intersection Level Of Service Report
Intersection 3: Pine Grove Ave/Project Driveway

Control Type:	Two-way stop	Delay (sec / veh):	12.6
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.062

Intersection Setup

Name	Project Access Point		Pine Grove Ave		Pine Grove Ave	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Project Access Point		Pine Grove Ave		Pine Grove Ave	
Base Volume Input [veh/h]	21	0	144	36	0	209
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	8	21	0	14	36	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	29	21	144	50	36	209
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	8	6	40	14	10	58
Total Analysis Volume [veh/h]	32	23	160	56	40	232
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

Priority Scheme	Stop		Free		Free	
Flared Lane	No					
Storage Area [veh]	0		0		0	
Two-Stage Gap Acceptance	No					
Number of Storage Spaces in Median	0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.06	0.03	0.00	0.00	0.03	0.00
d_M, Delay for Movement [s/veh]	12.60	9.79	0.00	0.00	7.74	0.00
Movement LOS	B	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.29	0.29	0.00	0.00	0.09	0.09
95th-Percentile Queue Length [ft/ln]	7.33	7.33	0.00	0.00	2.28	2.28
d_A, Approach Delay [s/veh]	11.42		0.00		1.14	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	1.73					
Intersection LOS	B					

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Intersection Level Of Service Report
Intersection 4: Pine Grove Ave/Cascade Blvd West

Control Type:	Signalized	Delay (sec / veh):	6.8
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.222

Intersection Setup

Name	Cascade Blvd W		Pine Grove Ave		Pine Grove Ave	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	1	0	1
Pocket Length [ft]	100.00	110.00	275.00	51.00	100.00	255.00
Speed [mph]	40.00		40.00		40.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Cascade Blvd W		Pine Grove Ave		Pine Grove Ave	
Base Volume Input [veh/h]	82	20	24	171	228	165
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	5	3	18	31	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	82	25	27	189	259	165
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	23	7	8	53	72	46
Total Analysis Volume [veh/h]	91	28	30	210	288	183
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

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Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Protected	Permissive	Permissive	Permissive
Signal Group	7	0	5	2	6	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	Lead	-	-	-
Minimum Green [s]	5	0	5	5	5	0
Maximum Green [s]	30	0	30	30	30	0
Amber [s]	3.0	0.0	3.0	3.0	3.0	0.0
All red [s]	1.0	0.0	1.0	1.0	1.0	0.0
Split [s]	34	0	23	56	33	0
Vehicle Extension [s]	3.0	0.0	3.0	3.0	3.0	0.0
Walk [s]	5	0	0	5	5	0
Pedestrian Clearance [s]	25	0	0	10	24	0
Rest In Walk	No			No	No	
I1, Start-Up Lost Time [s]	2.0	0.0	2.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	0.0	2.0	2.0	2.0	0.0
Minimum Recall	No		No	No	No	
Maximum Recall	No		No	No	No	
Pedestrian Recall	No		No	No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

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Lane Group Calculations

Lane Group	L	R	L	C	C	R
C, Cycle Length [s]	21	21	21	21	21	21
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	3	3	1	10	6	6
g / C, Green / Cycle	0.12	0.12	0.04	0.50	0.27	0.27
(v / s)_i Volume / Saturation Flow Rate	0.05	0.02	0.02	0.06	0.15	0.12
s, saturation flow rate [veh/h]	1781	1589	1781	3560	1870	1589
c, Capacity [veh/h]	219	196	72	1775	503	428
d1, Uniform Delay [s]	8.57	8.28	9.90	2.82	6.68	6.39
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	1.25	0.33	3.79	0.03	1.03	0.68
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.42	0.14	0.42	0.12	0.57	0.43
d, Delay for Lane Group [s/veh]	9.82	8.61	13.69	2.85	7.71	7.06
Lane Group LOS	A	A	B	A	A	A
Critical Lane Group	Yes	No	Yes	No	Yes	No
50th-Percentile Queue Length [veh/ln]	0.25	0.07	0.15	0.01	0.46	0.27
50th-Percentile Queue Length [ft/ln]	6.19	1.72	3.63	0.18	11.58	6.86
95th-Percentile Queue Length [veh/ln]	0.45	0.12	0.26	0.01	0.83	0.49
95th-Percentile Queue Length [ft/ln]	11.15	3.10	6.53	0.33	20.84	12.35

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Movement, Approach, & Intersection Results

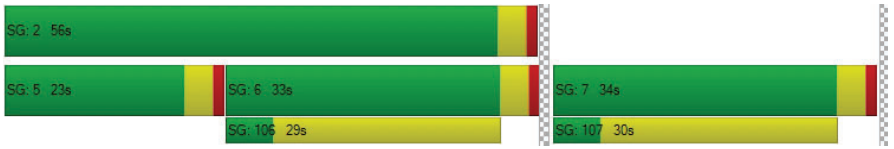
d_M, Delay for Movement [s/veh]	9.82	8.61	13.69	2.85	7.71	7.06
Movement LOS	A	A	B	A	A	A
d_A, Approach Delay [s/veh]	9.54		4.21		7.46	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	6.82					
Intersection LOS	A					
Intersection V/C	0.222					

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	36.45	36.45	36.45
I_p,int, Pedestrian LOS Score for Intersection	2.086	2.313	2.383
Crosswalk LOS	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	0	0	0
d_b, Bicycle Delay [s]	45.00	45.00	45.00
I_b,int, Bicycle LOS Score for Intersection	4.132	4.330	4.910
Bicycle LOS	D	E	E

Sequence

Ring 1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



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Intersection Level Of Service Report

Intersection 5: Pine Grove Ave/Cascade Blvd East

Control Type:	Two-way stop	Delay (sec / veh):	26.3
Analysis Method:	HCM 6th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.288

Intersection Setup

Name	Cascade Blvd E						Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	54.00	100.00	100.00	100.00	100.00	100.00	100.00	82.00	100.00	100.00
Speed [mph]	40.00			25.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Cascade Blvd E						Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	58	0	64	2	0	0	1	242	9	99	332	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	3	0	0	0	0	0	0	17	1	0	28	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	61	0	64	2	0	0	1	259	10	99	360	1
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	17	0	18	1	0	0	0	72	3	28	100	0
Total Analysis Volume [veh/h]	68	0	71	2	0	0	1	288	11	110	400	1
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.29	0.00	0.10	0.01	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00
d_M, Delay for Movement [s/veh]	26.31	20.01	10.33	22.02	19.76	10.70	8.11	0.00	0.00	8.12	0.00	0.00
Movement LOS	D	C	B	C	C	B	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	1.15	0.31	0.31	0.03	0.03	0.03	0.00	0.00	0.00	0.29	0.00	0.00
95th-Percentile Queue Length [ft/ln]	28.78	7.86	7.86	0.71	0.71	0.71	0.06	0.00	0.00	7.15	0.00	0.00
d_A, Approach Delay [s/veh]	18.15			22.02			0.03			1.75		
Approach LOS	C			C			A			A		
d_I, Intersection Delay [s/veh]	3.64											
Intersection LOS	D											

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Intersection Level Of Service Report

Intersection 6: Pine Grove Ave/I-5 Southbound Ramps

Control Type:	Two-way stop	Delay (sec / veh):	19.2
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.008

Intersection Setup

Name	I-5 SB Ramp			I-5 SB Ramp			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	1	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	84.00	152.00	100.00	100.00
Speed [mph]	50.00			50.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	I-5 SB Ramp			I-5 SB Ramp			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	0	0	0	13	2	29	0	57	260	28	426	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	5	0	4	13	0	23	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	13	2	34	0	61	273	28	449	0
Peak Hour Factor	1.0000	1.0000	1.0000	0.9000	0.9000	0.9000	1.0000	0.9000	0.9000	0.9000	0.9000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	4	1	9	0	17	76	8	125	0
Total Analysis Volume [veh/h]	0	0	0	14	2	38	0	68	303	31	499	0
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane		Yes		
Storage Area [veh]	1	1	0	0
Two-Stage Gap Acceptance		No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.05	0.01	0.07	0.00	0.00	0.00	0.03	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	17.15	19.19	11.61	0.00	0.00	0.00	8.11	0.00	0.00
Movement LOS				C	C	B		A	A	A	A	
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.21	0.21	0.21	0.00	0.00	0.00	0.08	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	5.33	5.33	5.33	0.00	0.00	0.00	2.01	0.00	0.00
d_A, Approach Delay [s/veh]	0.00			13.33			0.00			0.47		
Approach LOS	A			B			A			A		
d_I, Intersection Delay [s/veh]	1.02											
Intersection LOS	C											

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Intersection Level Of Service Report
Intersection 7: Pine Grove Ave/I-5 Northbound Ramps

Control Type:	Two-way stop	Delay (sec / veh):	18.6
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.006

Intersection Setup

Name	I-5 NB Ramp			I-5 NB Ramp			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	112.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			30.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	I-5 NB Ramp			I-5 NB Ramp			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	361	4	40	0	0	0	30	47	0	0	78	24
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	20	0	0	0	0	0	3	1	0	0	3	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	381	4	40	0	0	0	33	48	0	0	81	24
Peak Hour Factor	0.9000	0.9000	0.9000	1.0000	1.0000	1.0000	0.9000	0.9000	1.0000	1.0000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	106	1	11	0	0	0	9	13	0	0	23	7
Total Analysis Volume [veh/h]	423	4	44	0	0	0	37	53	0	0	90	27
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop			Free			Free		
Flared Lane	Yes										
Storage Area [veh]	1		0			0			0		
Two-Stage Gap Acceptance	No										
Number of Storage Spaces in Median	0		0			0			0		

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.60	0.01	0.04	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	18.08	18.59	16.53	0.00	0.00	0.00	7.51	0.00	0.00	0.00	0.00	0.00
Movement LOS	C	C	C				A	A			A	A
95th-Percentile Queue Length [veh/ln]	4.57	4.57	4.57	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	114.27	114.27	114.27	0.00	0.00	0.00	1.93	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	17.94			0.00			3.09			0.00		
Approach LOS	C			A			A			A		
d_I, Intersection Delay [s/veh]	12.87											
Intersection LOS	C											

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Intersection Level Of Service Report
Intersection 8: Pine Grove Ave/Virginia Ave-Twin View Blvd

Control Type:	Two-way stop	Delay (sec / veh):	10.2
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.004

Intersection Setup

Name	Twin View Blvd			Virginia Ave			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	35.00			25.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Twin View Blvd			Virginia Ave			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	35	1	3	1	3	52	31	27	29	0	14	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	3	1	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	35	1	3	1	3	55	32	27	29	0	14	0
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	10	0	1	0	1	15	9	8	8	0	4	0
Total Analysis Volume [veh/h]	39	1	3	1	3	61	36	30	32	0	16	0
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop		Free		Free	
Flared Lane	Yes		Yes					
Storage Area [veh]	1		1		0		0	
Two-Stage Gap Acceptance	No		No					
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.05	0.00	0.00	0.00	0.00	0.06	0.02	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.15	10.13	8.78	9.60	10.16	8.58	7.30	0.00	0.00	7.34	0.00	0.00
Movement LOS	B	B	A	A	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.17	0.17	0.17	0.18	0.18	0.18	0.07	0.07	0.07	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	4.30	4.30	4.30	4.56	4.56	4.56	1.72	1.72	1.72	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	10.05			8.67			2.68			0.00		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	5.67											
Intersection LOS	B											

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Intersection Level Of Service Report
Intersection 1: Pine Grove Ave/Lake Blvd

Control Type:	Two-way stop	Delay (sec / veh):	19.1
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.387

Intersection Setup

Name	Lake Blvd			Lake Blvd			Walker Mine Rd			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	1	0	1	0	0	0	0	0	0
Pocket Length [ft]	60.00	100.00	82.00	40.00	100.00	88.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Lake Blvd			Lake Blvd			Walker Mine Rd			Pine Grove Ave		
Base Volume Input [veh/h]	2	65	133	92	151	1	3	22	19	116	9	41
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	1	1	0	0	0	0	0	4	0	2
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2	65	134	93	151	1	3	22	19	120	9	43
Peak Hour Factor	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	20	42	29	47	0	1	7	6	38	3	13
Total Analysis Volume [veh/h]	3	81	168	116	189	1	4	28	24	150	11	54
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Free			Free			Stop			Stop		
Flared Lane							Yes			Yes		
Storage Area [veh]	0			0			1			2		
Two-Stage Gap Acceptance							No			No		
Number of Storage Spaces in Median	0			0			0			0		

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.09	0.00	0.00	0.01	0.08	0.03	0.39	0.03	0.06
d_M, Delay for Movement [s/veh]	7.61	0.00	0.00	8.00	0.00	0.00	16.12	16.17	9.84	19.07	18.25	13.46
Movement LOS	A	A	A	A	A	A	C	C	A	C	C	B
95th-Percentile Queue Length [veh/ln]	0.01	0.00	0.00	0.29	0.00	0.00	0.31	0.31	0.31	2.01	2.01	2.01
95th-Percentile Queue Length [ft/ln]	0.16	0.00	0.00	7.23	0.00	0.00	7.72	7.72	7.72	50.13	50.13	50.13
d_A, Approach Delay [s/veh]	0.09			3.03			13.45			17.62		
Approach LOS	A			A			B			C		
d_I, Intersection Delay [s/veh]	6.62											
Intersection LOS	C											

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Intersection Level Of Service Report
Intersection 2: Pine Grove Ave/Ashby Rd

Control Type:	Two-way stop	Delay (sec / veh):	21.8
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.283

Intersection Setup

Name	Ashby Rd			Ashby Rd			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	1	0	0	1	0	1
Pocket Length [ft]	130.00	100.00	100.00	73.00	100.00	100.00	114.00	100.00	100.00	341.00	100.00	88.00
Speed [mph]	35.00			35.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Ashby Rd			Ashby Rd			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	8	8	30	66	14	105	115	105	22	60	56	77
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	1	0	0	0	2	0	0	6	7
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	8	8	30	67	14	105	115	107	22	60	62	84
Peak Hour Factor	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	3	9	21	4	33	36	33	7	19	19	26
Total Analysis Volume [veh/h]	10	10	38	84	18	131	144	134	28	75	78	105
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop		Free		Free	
Flared Lane	No		No					
Storage Area [veh]	0		0		0		0	
Two-Stage Gap Acceptance	No		No					
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.04	0.04	0.28	0.06	0.13	0.10	0.00	0.00	0.05	0.00	0.00
d_M, Delay for Movement [s/veh]	21.70	18.28	9.50	21.82	17.41	9.74	7.88	0.00	0.00	7.68	0.00	0.00
Movement LOS	C	C	A	C	C	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.14	0.25	0.25	1.13	0.70	0.70	0.35	0.00	0.00	0.17	0.00	0.00
95th-Percentile Queue Length [ft/ln]	3.46	6.30	6.30	28.34	17.44	17.44	8.63	0.00	0.00	4.19	0.00	0.00
d_A, Approach Delay [s/veh]	13.11			14.68			3.71			2.23		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	6.89											
Intersection LOS	C											

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Intersection Level Of Service Report
Intersection 3: Pine Grove Ave/Project Driveway

Control Type:	Two-way stop	Delay (sec / veh):	14.3
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.122

Intersection Setup

Name	Project Access Point		Pine Grove Ave		Pine Grove Ave	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Project Access Point		Pine Grove Ave		Pine Grove Ave	
Base Volume Input [veh/h]	32	0	257	11	0	191
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	13	31	0	3	12	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	45	31	257	14	12	191
Peak Hour Factor	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	14	10	80	4	4	60
Total Analysis Volume [veh/h]	56	39	321	18	15	239
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

Priority Scheme	Stop		Free		Free	
Flared Lane	No					
Storage Area [veh]	0		0		0	
Two-Stage Gap Acceptance	No					
Number of Storage Spaces in Median	0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.12	0.05	0.00	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	14.30	11.50	0.00	0.00	7.99	0.00
Movement LOS	B	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.64	0.64	0.00	0.00	0.04	0.04
95th-Percentile Queue Length [ft/ln]	15.96	15.96	0.00	0.00	0.93	0.93
d_A, Approach Delay [s/veh]	13.15		0.00		0.47	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	1.99					
Intersection LOS	B					

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Intersection Level Of Service Report
Intersection 4: Pine Grove Ave/Cascade Blvd West

Control Type:	Signalized	Delay (sec / veh):	7.2
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.255

Intersection Setup

Name	Cascade Blvd W		Pine Grove Ave		Pine Grove Ave	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	1	0	1
Pocket Length [ft]	100.00	110.00	275.00	51.00	100.00	255.00
Speed [mph]	40.00		40.00		40.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Cascade Blvd W		Pine Grove Ave		Pine Grove Ave	
Base Volume Input [veh/h]	172	22	20	272	165	95
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	2	4	27	10	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	172	24	24	299	175	95
Peak Hour Factor	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	54	8	8	93	55	30
Total Analysis Volume [veh/h]	215	30	30	374	219	119
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

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Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Protected	Permissive	Permissive	Permissive
Signal Group	7	0	5	2	6	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	Lead	-	-	-
Minimum Green [s]	5	0	5	5	5	0
Maximum Green [s]	30	0	30	30	30	0
Amber [s]	3.0	0.0	3.0	3.0	3.0	0.0
All red [s]	1.0	0.0	1.0	1.0	1.0	0.0
Split [s]	34	0	20	56	36	0
Vehicle Extension [s]	3.0	0.0	3.0	3.0	3.0	0.0
Walk [s]	5	0	0	5	5	0
Pedestrian Clearance [s]	25	0	0	10	24	0
Rest In Walk	No			No	No	
I1, Start-Up Lost Time [s]	2.0	0.0	2.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	0.0	2.0	2.0	2.0	0.0
Minimum Recall	No		No	No	No	
Maximum Recall	No		No	No	No	
Pedestrian Recall	No		No	No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

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Lane Group Calculations

Lane Group	L	R	L	C	C	R
C, Cycle Length [s]	21	21	21	21	21	21
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	4	4	1	9	4	4
g / C, Green / Cycle	0.18	0.18	0.04	0.44	0.21	0.21
(v / s)_i Volume / Saturation Flow Rate	0.12	0.02	0.02	0.11	0.12	0.07
s, saturation flow rate [veh/h]	1781	1589	1781	3560	1870	1589
c, Capacity [veh/h]	331	296	73	1562	393	334
d1, Uniform Delay [s]	8.03	7.20	9.98	3.75	7.53	7.19
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	2.14	0.15	3.72	0.08	1.24	0.64
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.65	0.10	0.41	0.24	0.56	0.36
d, Delay for Lane Group [s/veh]	10.17	7.34	13.69	3.83	8.77	7.83
Lane Group LOS	B	A	B	A	A	A
Critical Lane Group	Yes	No	Yes	No	Yes	No
50th-Percentile Queue Length [veh/ln]	0.55	0.06	0.15	0.02	0.46	0.23
50th-Percentile Queue Length [ft/ln]	13.80	1.41	3.63	0.43	11.51	5.71
95th-Percentile Queue Length [veh/ln]	0.99	0.10	0.26	0.03	0.83	0.41
95th-Percentile Queue Length [ft/ln]	24.83	2.55	6.53	0.77	20.73	10.28

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	10.17	7.34	13.69	3.83	8.77	7.83
Movement LOS	B	A	B	A	A	A
d_A, Approach Delay [s/veh]	9.82		4.56		8.44	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	7.20					
Intersection LOS	A					
Intersection V/C	0.255					

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	36.45	36.45	36.45
I_p,int, Pedestrian LOS Score for Intersection	2.112	2.345	2.434
Crosswalk LOS	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	0	0	0
d_b, Bicycle Delay [s]	45.00	45.00	45.00
I_b,int, Bicycle LOS Score for Intersection	4.132	4.466	4.690
Bicycle LOS	D	E	E

Sequence

Ring 1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Intersection Level Of Service Report
Intersection 5: Pine Grove Ave/Cascade Blvd East

Control Type:	Two-way stop	Delay (sec / veh):	23.8
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.155

Intersection Setup

Name	Cascade Blvd E						Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	54.00	100.00	100.00	100.00	100.00	100.00	100.00	82.00	100.00	100.00
Speed [mph]	40.00			25.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Cascade Blvd E						Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	27	0	111	0	0	0	0	415	29	38	230	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	1	0	0	0	0	0	0	25	2	0	9	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	28	0	111	0	0	0	0	440	31	38	239	0
Peak Hour Factor	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	9	0	35	0	0	0	0	138	10	12	75	0
Total Analysis Volume [veh/h]	35	0	139	0	0	0	0	550	39	48	299	0
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop		Free		Free	
Flared Lane	No		No					
Storage Area [veh]	0		0		0		0	
Two-Stage Gap Acceptance	No		No					
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.15	0.00	0.27	0.00	0.00	0.00	0.00	0.01	0.00	0.05	0.00	0.00
d_M, Delay for Movement [s/veh]	23.84	22.33	14.40	26.74	20.23	9.86	7.85	0.00	0.00	8.84	0.00	0.00
Movement LOS	C	C	B	D	C	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.54	1.07	1.07	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00
95th-Percentile Queue Length [ft/ln]	13.45	26.67	26.67	0.00	0.00	0.00	0.00	0.00	0.00	3.83	0.00	0.00
d_A, Approach Delay [s/veh]	16.30			18.94			0.00			1.22		
Approach LOS	C			C			A			A		
d_I, Intersection Delay [s/veh]	2.94											
Intersection LOS	C											

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Intersection Level Of Service Report

Intersection 6: Pine Grove Ave/I-5 Southbound Ramps

Control Type:	Two-way stop	Delay (sec / veh):	17.7
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.055

Intersection Setup

Name	I-5 SB Ramp			I-5 SB Ramp			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	1	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	84.00	152.00	100.00	100.00
Speed [mph]	50.00			50.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	I-5 SB Ramp			I-5 SB Ramp			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	0	0	0	13	0	32	0	78	450	29	261	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	2	0	6	19	0	7	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	13	0	34	0	84	469	29	268	0
Peak Hour Factor	1.0000	1.0000	1.0000	0.8000	0.8000	0.8000	1.0000	0.8000	0.8000	0.8000	0.8000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	4	0	11	0	26	147	9	84	0
Total Analysis Volume [veh/h]	0	0	0	16	0	43	0	105	586	36	335	0
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop			Stop			Free			Free		
Flared Lane				Yes								
Storage Area [veh]	1			1			0			0		
Two-Stage Gap Acceptance				No								
Number of Storage Spaces in Median	0			0			0			0		

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.06	0.00	0.06	0.00	0.00	0.01	0.04	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	17.71	22.86	10.33	0.00	0.00	0.00	9.15	0.00	0.00
Movement LOS				C	C	B		A	A	A	A	
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.19	0.19	0.19	0.00	0.00	0.00	0.12	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.00	3.11	0.00	0.00
d_A, Approach Delay [s/veh]	0.00			12.33			0.00			0.89		
Approach LOS	A			B			A			A		
d_I, Intersection Delay [s/veh]	0.94											
Intersection LOS	C											

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Intersection Level Of Service Report
Intersection 7: Pine Grove Ave/I-5 Northbound Ramps

Control Type:	Two-way stop	Delay (sec / veh):	14.2
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.006

Intersection Setup

Name	I-5 NB Ramp			I-5 NB Ramp			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	112.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			30.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	I-5 NB Ramp			I-5 NB Ramp			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	215	3	28	0	0	0	27	65	0	0	59	14
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	6	0	0	0	0	0	4	2	0	0	1	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	221	3	28	0	0	0	31	67	0	0	60	14
Peak Hour Factor	0.8000	0.8000	0.8000	1.0000	1.0000	1.0000	0.8000	0.8000	1.0000	1.0000	0.8000	0.8000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	69	1	9	0	0	0	10	21	0	0	19	4
Total Analysis Volume [veh/h]	276	4	35	0	0	0	39	84	0	0	75	18
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop			Free			Free		
Flared Lane	Yes										
Storage Area [veh]	1		0			0			0		
Two-Stage Gap Acceptance	No										
Number of Storage Spaces in Median	0		0			0			0		

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.40	0.01	0.04	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	13.74	14.21	12.21	0.00	0.00	0.00	7.46	0.00	0.00	0.00	0.00	0.00
Movement LOS	B	B	B				A	A			A	A
95th-Percentile Queue Length [veh/ln]	2.12	2.12	2.12	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	53.08	53.08	53.08	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	13.58			0.00			2.37			0.00		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	8.60											
Intersection LOS	B											

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Intersection Level Of Service Report

Intersection 8: Pine Grove Ave/Virginia Ave-Twin View Blvd

Control Type:	Two-way stop	Delay (sec / veh):	10.4
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.006

Intersection Setup

Name	Twin View Blvd			Virginia Ave			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	35.00			25.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Twin View Blvd			Virginia Ave			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	23	1	1	0	3	36	34	18	32	1	23	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	1	2	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	23	1	1	0	3	37	36	18	32	1	23	1
Peak Hour Factor	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	0	0	0	1	12	11	6	10	0	7	0
Total Analysis Volume [veh/h]	29	1	1	0	4	46	45	23	40	1	29	1
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop		Free		Free	
Flared Lane	Yes		Yes					
Storage Area [veh]	1		1		0		0	
Two-Stage Gap Acceptance	No		No					
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.00	0.00	0.00	0.01	0.04	0.03	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.24	10.31	8.72	9.77	10.38	8.59	7.34	0.00	0.00	7.34	0.00	0.00
Movement LOS	B	B	A	A	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.13	0.13	0.13	0.14	0.14	0.14	0.09	0.09	0.09	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	3.27	3.27	3.27	3.45	3.45	3.45	2.19	2.19	2.19	0.05	0.05	0.05
d_A, Approach Delay [s/veh]	10.19			8.73			3.06			0.24		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	4.96											
Intersection LOS	B											

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Intersection Level Of Service Report
Intersection 1: Pine Grove Ave/Lake Blvd

Control Type:	Two-way stop	Delay (sec / veh):	17.2
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.010

Intersection Setup

Name	Lake Blvd			Lake Blvd			Walker Mine Rd			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	1	0	1	0	0	0	0	0	0
Pocket Length [ft]	60.00	100.00	82.00	40.00	100.00	88.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Lake Blvd			Lake Blvd			Walker Mine Rd			Pine Grove Ave		
Base Volume Input [veh/h]	20	148	82	84	111	4	3	13	5	56	22	98
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	4	2	0	0	0	0	0	3	0	1
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	20	148	86	86	111	4	3	13	5	59	22	99
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	6	41	24	24	31	1	1	4	1	16	6	28
Total Analysis Volume [veh/h]	22	164	96	96	123	4	3	14	6	66	24	110
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Free			Free			Stop			Stop		
Flared Lane							Yes			Yes		
Storage Area [veh]	0			0			1			2		
Two-Stage Gap Acceptance							No			No		
Number of Storage Spaces in Median	0			0			0			0		

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.00	0.00	0.07	0.00	0.00	0.01	0.04	0.01	0.16	0.06	0.12
d_M, Delay for Movement [s/veh]	7.50	0.00	0.00	7.98	0.00	0.00	17.21	15.13	9.25	14.86	14.74	10.18
Movement LOS	A	A	A	A	A	A	C	C	A	B	B	B
95th-Percentile Queue Length [veh/ln]	0.05	0.00	0.00	0.24	0.00	0.00	0.15	0.15	0.15	0.83	0.83	0.83
95th-Percentile Queue Length [ft/ln]	1.15	0.00	0.00	5.95	0.00	0.00	3.76	3.76	3.76	20.76	20.76	20.76
d_A, Approach Delay [s/veh]	0.59			3.43			13.87			12.27		
Approach LOS	A			A			B			B		
d_I, Intersection Delay [s/veh]	5.09											
Intersection LOS	C											

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Intersection Level Of Service Report

Intersection 2: Pine Grove Ave/Ashby Rd

Control Type:	Two-way stop	Delay (sec / veh):	13.9
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.090

Intersection Setup

Name	Ashby Rd			Ashby Rd			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	1	0	0	1	0	1
Pocket Length [ft]	130.00	100.00	100.00	73.00	100.00	100.00	114.00	100.00	100.00	341.00	100.00	88.00
Speed [mph]	35.00			35.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Ashby Rd			Ashby Rd			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	7	6	45	28	3	60	71	106	4	14	112	45
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	8	0	0	0	6	0	0	4	4
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	7	6	45	36	3	60	71	112	4	14	116	49
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	2	13	10	1	17	20	31	1	4	32	14
Total Analysis Volume [veh/h]	8	7	50	40	3	67	79	124	4	16	129	54
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop		Free		Free	
Flared Lane	No		No					
Storage Area [veh]	0		0		0		0	
Two-Stage Gap Acceptance	No		No					
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.02	0.05	0.09	0.01	0.07	0.06	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	13.81	13.49	9.23	13.90	12.97	9.26	7.74	0.00	0.00	7.50	0.00	0.00
Movement LOS	B	B	A	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.06	0.23	0.23	0.30	0.26	0.26	0.18	0.00	0.00	0.03	0.00	0.00
95th-Percentile Queue Length [ft/ln]	1.47	5.63	5.63	7.38	6.43	6.43	4.51	0.00	0.00	0.83	0.00	0.00
d_A, Approach Delay [s/veh]	10.25			11.05			2.95			0.60		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	4.50											
Intersection LOS	B											

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Intersection Level Of Service Report
Intersection 3: Pine Grove Ave/Project Driveway

Control Type:	Two-way stop	Delay (sec / veh):	13.5
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.069

Intersection Setup

Name	Project Access Point		Pine Grove Ave		Pine Grove Ave	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Project Access Point		Pine Grove Ave		Pine Grove Ave	
Base Volume Input [veh/h]	21	0	190	36	0	230
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	8	21	0	14	36	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	29	21	190	50	36	230
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	8	6	53	14	10	64
Total Analysis Volume [veh/h]	32	23	211	56	40	256
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

Priority Scheme	Stop		Free		Free	
Flared Lane	No					
Storage Area [veh]	0		0		0	
Two-Stage Gap Acceptance	No					
Number of Storage Spaces in Median	0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.03	0.00	0.00	0.03	0.00
d_M, Delay for Movement [s/veh]	13.48	10.20	0.00	0.00	7.86	0.00
Movement LOS	B	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.32	0.32	0.00	0.00	0.10	0.10
95th-Percentile Queue Length [ft/ln]	8.10	8.10	0.00	0.00	2.39	2.39
d_A, Approach Delay [s/veh]	12.11		0.00		1.06	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	1.59					
Intersection LOS	B					

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Intersection Level Of Service Report
Intersection 4: Pine Grove Ave/Cascade Blvd West

Control Type:	Signalized	Delay (sec / veh):	6.9
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.236

Intersection Setup

Name	Cascade Blvd W		Pine Grove Ave		Pine Grove Ave	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	1	0	1
Pocket Length [ft]	100.00	110.00	275.00	51.00	100.00	255.00
Speed [mph]	40.00		40.00		40.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Cascade Blvd W		Pine Grove Ave		Pine Grove Ave	
Base Volume Input [veh/h]	85	22	25	184	249	167
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	5	3	18	31	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	85	27	28	202	280	167
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	24	8	8	56	78	46
Total Analysis Volume [veh/h]	94	30	31	224	311	186
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

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Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Protected	Permissive	Permissive	Permissive
Signal Group	7	0	5	2	6	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	Lead	-	-	-
Minimum Green [s]	5	0	5	5	5	0
Maximum Green [s]	30	0	30	30	30	0
Amber [s]	3.0	0.0	3.0	3.0	3.0	0.0
All red [s]	1.0	0.0	1.0	1.0	1.0	0.0
Split [s]	34	0	23	56	33	0
Vehicle Extension [s]	3.0	0.0	3.0	3.0	3.0	0.0
Walk [s]	5	0	0	5	5	0
Pedestrian Clearance [s]	25	0	0	10	24	0
Rest In Walk	No			No	No	
I1, Start-Up Lost Time [s]	2.0	0.0	2.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	0.0	2.0	2.0	2.0	0.0
Minimum Recall	No		No	No	No	
Maximum Recall	No		No	No	No	
Pedestrian Recall	No		No	No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

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Lane Group Calculations

Lane Group	L	R	L	C	C	R
C, Cycle Length [s]	22	22	22	22	22	22
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	3	3	1	11	6	6
g / C, Green / Cycle	0.12	0.12	0.04	0.51	0.28	0.28
(v / s)_i Volume / Saturation Flow Rate	0.05	0.02	0.02	0.06	0.17	0.12
s, saturation flow rate [veh/h]	1781	1589	1781	3560	1870	1589
c, Capacity [veh/h]	223	199	74	1805	526	447
d1, Uniform Delay [s]	8.79	8.48	10.17	2.82	6.73	6.36
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	1.26	0.35	3.73	0.03	1.06	0.62
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.42	0.15	0.42	0.12	0.59	0.42
d, Delay for Lane Group [s/veh]	10.05	8.83	13.90	2.85	7.80	6.98
Lane Group LOS	B	A	B	A	A	A
Critical Lane Group	Yes	No	Yes	No	Yes	No
50th-Percentile Queue Length [veh/ln]	0.27	0.08	0.15	0.01	0.52	0.28
50th-Percentile Queue Length [ft/ln]	6.72	1.95	3.83	0.19	13.06	7.10
95th-Percentile Queue Length [veh/ln]	0.48	0.14	0.28	0.01	0.94	0.51
95th-Percentile Queue Length [ft/ln]	12.10	3.50	6.89	0.34	23.50	12.78

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Movement, Approach, & Intersection Results

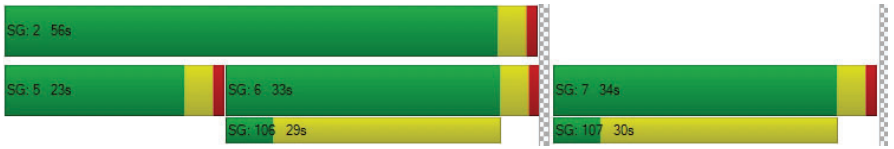
d_M, Delay for Movement [s/veh]	10.05	8.83	13.90	2.85	7.80	6.98
Movement LOS	B	A	B	A	A	A
d_A, Approach Delay [s/veh]	9.75		4.20		7.49	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	6.85					
Intersection LOS	A					
Intersection V/C	0.236					

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	36.45	36.45	36.45
I_p,int, Pedestrian LOS Score for Intersection	2.089	2.326	2.397
Crosswalk LOS	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	0	0	0
d_b, Bicycle Delay [s]	45.00	45.00	45.00
I_b,int, Bicycle LOS Score for Intersection	4.132	4.343	4.952
Bicycle LOS	D	E	E

Sequence

Ring 1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



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Intersection Level Of Service Report
Intersection 5: Pine Grove Ave/Cascade Blvd East

Control Type:	Two-way stop	Delay (sec / veh):	28.7
Analysis Method:	HCM 6th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.314

Intersection Setup

Name	Cascade Blvd E						Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	54.00	100.00	100.00	100.00	100.00	100.00	100.00	82.00	100.00	100.00
Speed [mph]	40.00			25.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Cascade Blvd E						Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	59	0	67	2	0	0	1	258	10	101	352	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	3	0	0	0	0	0	0	17	1	0	28	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	62	0	67	2	0	0	1	275	11	101	380	1
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	17	0	19	1	0	0	0	76	3	28	106	0
Total Analysis Volume [veh/h]	69	0	74	2	0	0	1	306	12	112	422	1
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop		Free		Free	
Flared Lane	No		No					
Storage Area [veh]	0		0		0		0	
Two-Stage Gap Acceptance	No		No					
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.31	0.00	0.10	0.01	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00
d_M, Delay for Movement [s/veh]	28.73	21.01	10.50	23.43	20.76	10.89	8.17	0.00	0.00	8.19	0.00	0.00
Movement LOS	D	C	B	C	C	B	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	1.29	0.34	0.34	0.03	0.03	0.03	0.00	0.00	0.00	0.30	0.00	0.00
95th-Percentile Queue Length [ft/ln]	32.16	8.45	8.45	0.77	0.77	0.77	0.07	0.00	0.00	7.42	0.00	0.00
d_A, Approach Delay [s/veh]	19.30			23.43			0.03			1.71		
Approach LOS	C			C			A			A		
d_I, Intersection Delay [s/veh]	3.74											
Intersection LOS	D											

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Intersection Level Of Service Report

Intersection 6: Pine Grove Ave/I-5 Southbound Ramps

Control Type:	Two-way stop	Delay (sec / veh):	20.2
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.008

Intersection Setup

Name	I-5 SB Ramp			I-5 SB Ramp			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	1	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	84.00	152.00	100.00	100.00
Speed [mph]	50.00			50.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	I-5 SB Ramp			I-5 SB Ramp			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	0	0	0	13	2	50	0	74	262	28	439	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	5	0	4	13	0	23	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	13	2	55	0	78	275	28	462	0
Peak Hour Factor	1.0000	1.0000	1.0000	0.9000	0.9000	0.9000	1.0000	0.9000	0.9000	0.9000	0.9000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	4	1	15	0	22	76	8	128	0
Total Analysis Volume [veh/h]	0	0	0	14	2	61	0	87	306	31	513	0
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop			Stop			Free			Free		
Flared Lane				Yes								
Storage Area [veh]	1			1			0			0		
Two-Stage Gap Acceptance				No								
Number of Storage Spaces in Median	0			0			0			0		

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.05	0.01	0.11	0.00	0.00	0.00	0.03	0.01	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	18.11	20.19	12.03	0.00	0.00	0.00	8.17	0.00	0.00
Movement LOS				C	C	B		A	A	A	A	
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.36	0.36	0.36	0.00	0.00	0.00	0.08	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	9.10	9.10	9.10	0.00	0.00	0.00	2.05	0.00	0.00
d_A, Approach Delay [s/veh]	0.00			13.35			0.00			0.47		
Approach LOS	A			B			A			A		
d_I, Intersection Delay [s/veh]	1.26											
Intersection LOS	C											

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Intersection Level Of Service Report
Intersection 7: Pine Grove Ave/I-5 Northbound Ramps

Control Type:	Two-way stop	Delay (sec / veh):	21.6
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.007

Intersection Setup

Name	I-5 NB Ramp			I-5 NB Ramp			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	112.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			30.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	I-5 NB Ramp			I-5 NB Ramp			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	364	4	40	0	0	0	42	52	0	0	88	24
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	20	0	0	0	0	0	3	1	0	0	3	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	384	4	40	0	0	0	45	53	0	0	91	24
Peak Hour Factor	0.9000	0.9000	0.9000	1.0000	1.0000	1.0000	0.9000	0.9000	1.0000	1.0000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	107	1	11	0	0	0	13	15	0	0	25	7
Total Analysis Volume [veh/h]	427	4	44	0	0	0	50	59	0	0	101	27
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop			Free			Free		
Flared Lane	Yes										
Storage Area [veh]	1		0			0			0		
Two-Stage Gap Acceptance	No										
Number of Storage Spaces in Median	0		0			0			0		

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.65	0.01	0.04	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	21.08	21.58	19.17	0.00	0.00	0.00	7.56	0.00	0.00	0.00	0.00	0.00
Movement LOS	C	C	C				A	A			A	A
95th-Percentile Queue Length [veh/ln]	5.47	5.47	5.47	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	136.64	136.64	136.64	0.00	0.00	0.00	2.66	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	20.91			0.00			3.47			0.00		
Approach LOS	C			A			A			A		
d_I, Intersection Delay [s/veh]	14.48											
Intersection LOS	C											

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Intersection Level Of Service Report
Intersection 8: Pine Grove Ave/Virginia Ave-Twin View Blvd

Control Type:	Two-way stop	Delay (sec / veh):	10.2
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.004

Intersection Setup

Name	Twin View Blvd			Virginia Ave			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	35.00			25.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Twin View Blvd			Virginia Ave			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	35	1	3	1	3	52	31	27	29	0	14	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	3	1	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	35	1	3	1	3	55	32	27	29	0	14	0
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	10	0	1	0	1	15	9	8	8	0	4	0
Total Analysis Volume [veh/h]	39	1	3	1	3	61	36	30	32	0	16	0
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop		Free		Free	
Flared Lane	Yes		Yes					
Storage Area [veh]	1		1		0		0	
Two-Stage Gap Acceptance	No		No					
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.05	0.00	0.00	0.00	0.00	0.06	0.02	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.15	10.13	8.78	9.60	10.16	8.58	7.30	0.00	0.00	7.34	0.00	0.00
Movement LOS	B	B	A	A	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.17	0.17	0.17	0.18	0.18	0.18	0.07	0.07	0.07	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	4.30	4.30	4.30	4.56	4.56	4.56	1.72	1.72	1.72	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	10.05			8.67			2.68			0.00		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	5.67											
Intersection LOS	B											

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Intersection Level Of Service Report
Intersection 1: Pine Grove Ave/Lake Blvd

Control Type:	Two-way stop	Delay (sec / veh):	13.1
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.229

Intersection Setup

Name	Lake Blvd			Lake Blvd			Walker Mine Rd			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	1	0	1	0	0	0	0	0	0
Pocket Length [ft]	60.00	100.00	82.00	40.00	100.00	88.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Lake Blvd			Lake Blvd			Walker Mine Rd			Pine Grove Ave		
Base Volume Input [veh/h]	2	45	148	72	96	1	4	38	24	123	7	37
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	1	1	0	0	0	0	0	4	0	2
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2	45	149	73	96	1	4	38	24	127	7	39
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	11	37	18	24	0	1	10	6	32	2	10
Total Analysis Volume [veh/h]	2	45	149	73	96	1	4	38	24	127	7	39
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Free		Free		Stop		Stop	
Flared Lane					Yes		Yes	
Storage Area [veh]	0		0		1		2	
Two-Stage Gap Acceptance					No		No	
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.05	0.00	0.00	0.01	0.08	0.02	0.23	0.01	0.04
d_M, Delay for Movement [s/veh]	7.41	0.00	0.00	7.76	0.00	0.00	12.35	12.89	9.19	13.08	12.74	10.10
Movement LOS	A	A	A	A	A	A	B	B	A	B	B	B
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.17	0.00	0.00	0.28	0.28	0.28	0.94	0.94	0.94
95th-Percentile Queue Length [ft/ln]	0.10	0.00	0.00	4.19	0.00	0.00	7.06	7.06	7.06	23.51	23.51	23.51
d_A, Approach Delay [s/veh]	0.08			3.33			11.51			12.40		
Approach LOS	A			A			B			B		
d_I, Intersection Delay [s/veh]	5.76											
Intersection LOS	B											

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Intersection Level Of Service Report
Intersection 2: Pine Grove Ave/Ashby Rd

Control Type:	Two-way stop	Delay (sec / veh):	18.7
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.037

Intersection Setup

Name	Ashby Rd			Ashby Rd			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	1	0	0	1	0	1
Pocket Length [ft]	130.00	100.00	100.00	73.00	100.00	100.00	114.00	100.00	100.00	341.00	100.00	88.00
Speed [mph]	35.00			35.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Ashby Rd			Ashby Rd			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	10	9	33	66	18	103	119	95	35	89	59	77
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	1	0	0	0	2	0	0	6	7
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	10	9	33	67	18	103	119	97	35	89	65	84
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	2	8	17	5	26	30	24	9	22	16	21
Total Analysis Volume [veh/h]	10	9	33	67	18	103	119	97	35	89	65	84
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop		Free		Free	
Flared Lane	No		No					
Storage Area [veh]	0		0		0		0	
Two-Stage Gap Acceptance	No		No					
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.03	0.04	0.20	0.05	0.10	0.08	0.00	0.00	0.06	0.00	0.00
d_M, Delay for Movement [s/veh]	18.66	16.57	9.20	18.19	16.10	9.44	7.74	0.00	0.00	7.64	0.00	0.00
Movement LOS	C	C	A	C	C	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.11	0.20	0.20	0.72	0.54	0.54	0.27	0.00	0.00	0.20	0.00	0.00
95th-Percentile Queue Length [ft/ln]	2.84	5.05	5.05	18.05	13.60	13.60	6.78	0.00	0.00	4.89	0.00	0.00
d_A, Approach Delay [s/veh]	12.30			13.19			3.67			2.86		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	6.48											
Intersection LOS	C											

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Intersection Level Of Service Report
Intersection 3: Pine Grove Ave/Project Driveway

Control Type:	Two-way stop	Delay (sec / veh):	10.9
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.066

Intersection Setup

Name	Project Access Point		Pine Grove Ave		Pine Grove Ave	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Project Access Point		Pine Grove Ave		Pine Grove Ave	
Base Volume Input [veh/h]	32	0	211	11	0	66
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	13	31	0	3	12	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	45	31	211	14	12	66
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	11	8	53	4	3	17
Total Analysis Volume [veh/h]	45	31	211	14	12	66
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

Priority Scheme	Stop		Free		Free	
Flared Lane	No					
Storage Area [veh]	0		0		0	
Two-Stage Gap Acceptance	No					
Number of Storage Spaces in Median	0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.04	0.00	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	10.88	9.95	0.00	0.00	7.70	0.00
Movement LOS	B	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.35	0.35	0.00	0.00	0.03	0.03
95th-Percentile Queue Length [ft/ln]	8.68	8.68	0.00	0.00	0.68	0.68
d_A, Approach Delay [s/veh]	10.50		0.00		1.19	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	2.35					
Intersection LOS	B					

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Intersection Level Of Service Report
Intersection 4: Pine Grove Ave/Cascade Blvd West

Control Type:	Signalized	Delay (sec / veh):	6.5
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.341

Intersection Setup

Name	Cascade Blvd W		Pine Grove Ave		Pine Grove Ave	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	1	0	1
Pocket Length [ft]	100.00	110.00	275.00	51.00	100.00	255.00
Speed [mph]	40.00		40.00		40.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Cascade Blvd W		Pine Grove Ave		Pine Grove Ave	
Base Volume Input [veh/h]	171	21	18	711	425	102
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	2	4	27	10	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	171	23	22	738	435	102
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	43	6	6	185	109	26
Total Analysis Volume [veh/h]	171	23	22	738	435	102
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

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Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Protected	Permissive	Permissive	Permissive
Signal Group	7	0	5	2	6	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	Lead	-	-	-
Minimum Green [s]	5	0	5	5	5	0
Maximum Green [s]	30	0	30	30	30	0
Amber [s]	3.0	0.0	3.0	3.0	3.0	0.0
All red [s]	1.0	0.0	1.0	1.0	1.0	0.0
Split [s]	34	0	20	56	36	0
Vehicle Extension [s]	3.0	0.0	3.0	3.0	3.0	0.0
Walk [s]	5	0	0	5	5	0
Pedestrian Clearance [s]	25	0	0	10	24	0
Rest In Walk	No			No	No	
I1, Start-Up Lost Time [s]	2.0	0.0	2.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	0.0	2.0	2.0	2.0	0.0
Minimum Recall	No		No	No	No	
Maximum Recall	No		No	No	No	
Pedestrian Recall	No		No	No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

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Lane Group Calculations

Lane Group	L	R	L	C	C	R
C, Cycle Length [s]	25	25	25	25	25	25
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	4	4	1	13	8	8
g / C, Green / Cycle	0.15	0.15	0.03	0.52	0.33	0.33
(v / s)_i Volume / Saturation Flow Rate	0.10	0.01	0.01	0.21	0.23	0.06
s, saturation flow rate [veh/h]	1781	1589	1781	3560	1870	1589
c, Capacity [veh/h]	271	241	53	1864	620	527
d1, Uniform Delay [s]	9.80	8.99	11.75	3.53	7.17	5.88
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	2.43	0.17	5.21	0.14	1.46	0.18
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.63	0.10	0.42	0.40	0.70	0.19
d, Delay for Lane Group [s/veh]	12.24	9.16	16.96	3.67	8.63	6.06
Lane Group LOS	B	A	B	A	A	A
Critical Lane Group	Yes	No	Yes	No	Yes	No
50th-Percentile Queue Length [veh/ln]	0.65	0.07	0.15	0.04	0.95	0.16
50th-Percentile Queue Length [ft/ln]	16.13	1.71	3.73	0.88	23.63	3.98
95th-Percentile Queue Length [veh/ln]	1.16	0.12	0.27	0.06	1.70	0.29
95th-Percentile Queue Length [ft/ln]	29.03	3.08	6.71	1.59	42.53	7.17

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	12.24	9.16	16.96	3.67	8.63	6.06
Movement LOS	B	A	B	A	A	A
d_A, Approach Delay [s/veh]	11.87		4.05		8.14	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	6.54					
Intersection LOS	A					
Intersection V/C	0.341					

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	36.45	36.45	36.45
I_p,int, Pedestrian LOS Score for Intersection	2.080	2.528	2.603
Crosswalk LOS	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	0	0	0
d_b, Bicycle Delay [s]	45.00	45.00	45.00
I_b,int, Bicycle LOS Score for Intersection	4.132	4.759	5.018
Bicycle LOS	D	E	F

Sequence

Ring 1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Intersection Level Of Service Report
Intersection 5: Pine Grove Ave/Cascade Blvd East

Control Type:	Two-way stop	Delay (sec / veh):	47.7
Analysis Method:	HCM 6th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.277

Intersection Setup

Name	Cascade Blvd E						Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	54.00	100.00	100.00	100.00	100.00	100.00	100.00	82.00	100.00	100.00
Speed [mph]	40.00			25.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Cascade Blvd E						Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	31	0	128	0	0	0	0	675	36	49	559	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	1	0	0	0	0	0	0	25	2	0	9	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	32	0	128	0	0	0	0	700	38	49	568	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	8	0	32	0	0	0	0	175	10	12	142	0
Total Analysis Volume [veh/h]	32	0	128	0	0	0	0	700	38	49	568	0
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop			Stop			Free			Free		
Flared Lane	No			No								
Storage Area [veh]	0			0			0			0		
Two-Stage Gap Acceptance	No			No								
Number of Storage Spaces in Median	0			0			0			0		

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.28	0.00	0.30	0.00	0.00	0.00	0.00	0.01	0.00	0.06	0.01	0.00
d_M, Delay for Movement [s/veh]	47.72	35.17	16.94	49.46	32.34	11.89	8.59	0.00	0.00	9.40	0.00	0.00
Movement LOS	E	E	C	E	D	B	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	1.05	1.24	1.24	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.00
95th-Percentile Queue Length [ft/ln]	26.14	30.93	30.93	0.00	0.00	0.00	0.00	0.00	0.00	4.48	0.00	0.00
d_A, Approach Delay [s/veh]	23.10			31.23			0.00			0.75		
Approach LOS	C			D			A			A		
d_I, Intersection Delay [s/veh]	2.74											
Intersection LOS	E											

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Intersection Level Of Service Report

Intersection 6: Pine Grove Ave/I-5 Southbound Ramps

Control Type:	Two-way stop	Delay (sec / veh):	19.4
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.180

Intersection Setup

Name	I-5 SB Ramp			I-5 SB Ramp			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	1	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	84.00	152.00	100.00	100.00
Speed [mph]	50.00			50.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	I-5 SB Ramp			I-5 SB Ramp			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	0	0	0	51	0	33	0	81	455	73	319	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	2	0	6	19	0	7	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	51	0	35	0	87	474	73	326	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	13	0	9	0	22	119	18	82	0
Total Analysis Volume [veh/h]	0	0	0	51	0	35	0	87	474	73	326	0
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop			Stop			Free			Free		
Flared Lane				Yes								
Storage Area [veh]	1			1			0			0		
Two-Stage Gap Acceptance				No								
Number of Storage Spaces in Median	0			0			0			0		

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.18	0.00	0.05	0.00	0.00	0.00	0.07	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	19.37	23.34	11.69	0.00	0.00	0.00	8.84	0.00	0.00
Movement LOS				C	C	B		A	A	A	A	
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.65	0.65	0.65	0.00	0.00	0.00	0.23	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	16.27	16.27	16.27	0.00	0.00	0.00	5.83	0.00	0.00
d_A, Approach Delay [s/veh]	0.00			16.24			0.00			1.62		
Approach LOS	A			C			A			A		
d_I, Intersection Delay [s/veh]	1.95											
Intersection LOS	C											

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Intersection Level Of Service Report
Intersection 7: Pine Grove Ave/I-5 Northbound Ramps

Control Type:	Two-way stop	Delay (sec / veh):	15.3
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.005

Intersection Setup

Name	I-5 NB Ramp			I-5 NB Ramp			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	112.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			30.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	I-5 NB Ramp			I-5 NB Ramp			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	259	3	48	0	0	0	28	108	0	0	119	26
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	6	0	0	0	0	0	4	2	0	0	1	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	265	3	48	0	0	0	32	110	0	0	120	26
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	66	1	12	0	0	0	8	28	0	0	30	7
Total Analysis Volume [veh/h]	265	3	48	0	0	0	32	110	0	0	120	26
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop		Free		Free	
Flared Lane	Yes							
Storage Area [veh]	1		0		0		0	
Two-Stage Gap Acceptance	No							
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.42	0.01	0.05	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	14.81	15.27	12.92	0.00	0.00	0.00	7.56	0.00	0.00	0.00	0.00	0.00
Movement LOS	B	C	B				A	A			A	A
95th-Percentile Queue Length [veh/ln]	2.33	2.33	2.33	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	58.33	58.33	58.33	0.00	0.00	0.00	1.71	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	14.53			0.00			1.70			0.00		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	8.00											
Intersection LOS	C											

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Intersection Level Of Service Report
Intersection 8: Pine Grove Ave/Virginia Ave-Twin View Blvd

Control Type:	Two-way stop	Delay (sec / veh):	11.7
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.105

Intersection Setup

Name	Twin View Blvd			Virginia Ave			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	35.00			25.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Twin View Blvd			Virginia Ave			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	63	4	1	0	5	57	83	14	59	1	35	2
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	1	2	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	63	4	1	0	5	58	85	14	59	1	35	2
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	16	1	0	0	1	15	21	4	15	0	9	1
Total Analysis Volume [veh/h]	63	4	1	0	5	58	85	14	59	1	35	2
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop		Free		Free	
Flared Lane	Yes		Yes					
Storage Area [veh]	1		1		0		0	
Two-Stage Gap Acceptance	No		No					
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.10	0.01	0.00	0.00	0.01	0.06	0.05	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	11.74	11.61	9.25	10.61	11.28	8.66	7.42	0.00	0.00	7.36	0.00	0.00
Movement LOS	B	B	A	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.37	0.37	0.37	0.18	0.18	0.18	0.17	0.17	0.17	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	9.36	9.36	9.36	4.44	4.44	4.44	4.28	4.28	4.28	0.05	0.05	0.05
d_A, Approach Delay [s/veh]	11.69			8.87			3.99			0.19		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	6.09											
Intersection LOS	B											

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Intersection Level Of Service Report

Intersection 1: Pine Grove Ave/Lake Blvd

Control Type:	Two-way stop	Delay (sec / veh):	13.7
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.007

Intersection Setup

Name	Lake Blvd			Lake Blvd			Walker Mine Rd			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	1	0	1	0	0	0	0	0	0
Pocket Length [ft]	60.00	100.00	82.00	40.00	100.00	88.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Lake Blvd			Lake Blvd			Walker Mine Rd			Pine Grove Ave		
Base Volume Input [veh/h]	20	84	94	73	75	4	3	17	5	60	38	72
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	4	2	0	0	0	0	0	3	0	1
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	20	84	98	75	75	4	3	17	5	63	38	73
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	21	25	19	19	1	1	4	1	16	10	18
Total Analysis Volume [veh/h]	20	84	98	75	75	4	3	17	5	63	38	73
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Free		Free		Stop		Stop	
Flared Lane					Yes		Yes	
Storage Area [veh]	0		0		1		2	
Two-Stage Gap Acceptance					No		No	
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.05	0.00	0.00	0.01	0.04	0.01	0.12	0.07	0.07
d_M, Delay for Movement [s/veh]	7.40	0.00	0.00	7.73	0.00	0.00	13.66	12.89	8.93	12.48	12.62	9.58
Movement LOS	A	A	A	A	A	A	B	B	A	B	B	A
95th-Percentile Queue Length [veh/ln]	0.04	0.00	0.00	0.17	0.00	0.00	0.13	0.13	0.13	0.68	0.68	0.68
95th-Percentile Queue Length [ft/ln]	1.00	0.00	0.00	4.26	0.00	0.00	3.36	3.36	3.36	17.08	17.08	17.08
d_A, Approach Delay [s/veh]	0.73			3.77			12.19			11.29		
Approach LOS	A			A			B			B		
d_I, Intersection Delay [s/veh]	5.40											
Intersection LOS	B											

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Intersection Level Of Service Report
Intersection 2: Pine Grove Ave/Ashby Rd

Control Type:	Two-way stop	Delay (sec / veh):	14.2
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.084

Intersection Setup

Name	Ashby Rd			Ashby Rd			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	1	0	0	1	0	1
Pocket Length [ft]	130.00	100.00	100.00	73.00	100.00	100.00	114.00	100.00	100.00	341.00	100.00	88.00
Speed [mph]	35.00			35.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Ashby Rd			Ashby Rd			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	7	10	77	28	3	54	78	106	2	18	120	65
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	8	0	0	0	6	0	0	4	4
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	7	10	77	36	3	54	78	112	2	18	124	69
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	3	19	9	1	14	20	28	1	5	31	17
Total Analysis Volume [veh/h]	7	10	77	36	3	54	78	112	2	18	124	69
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop		Free		Free	
Flared Lane	No		No					
Storage Area [veh]	0		0		0		0	
Two-Stage Gap Acceptance	No		No					
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.02	0.08	0.08	0.01	0.06	0.06	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	13.45	13.66	9.34	14.15	12.74	9.17	7.76	0.00	0.00	7.47	0.00	0.00
Movement LOS	B	B	A	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.05	0.35	0.35	0.27	0.21	0.21	0.18	0.00	0.00	0.04	0.00	0.00
95th-Percentile Queue Length [ft/ln]	1.23	8.73	8.73	6.83	5.16	5.16	4.49	0.00	0.00	0.93	0.00	0.00
d_A, Approach Delay [s/veh]	10.10			11.21			3.15			0.64		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	4.63											
Intersection LOS	B											

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Intersection Level Of Service Report
Intersection 3: Pine Grove Ave/Project Driveway

Control Type:	Two-way stop	Delay (sec / veh):	11.8
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.051

Intersection Setup

Name	Project Access Point		Pine Grove Ave		Pine Grove Ave	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Project Access Point		Pine Grove Ave		Pine Grove Ave	
Base Volume Input [veh/h]	21	0	102	36	0	227
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	8	21	0	14	36	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	29	21	102	50	36	227
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	5	26	13	9	57
Total Analysis Volume [veh/h]	29	21	102	50	36	227
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

Priority Scheme	Stop		Free		Free	
Flared Lane	No					
Storage Area [veh]	0		0		0	
Two-Stage Gap Acceptance	No					
Number of Storage Spaces in Median	0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.05	0.02	0.00	0.00	0.03	0.00
d_M, Delay for Movement [s/veh]	11.76	9.32	0.00	0.00	7.58	0.00
Movement LOS	B	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.24	0.24	0.00	0.00	0.08	0.08
95th-Percentile Queue Length [ft/ln]	5.96	5.96	0.00	0.00	1.94	1.94
d_A, Approach Delay [s/veh]	10.73		0.00		1.04	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	1.74					
Intersection LOS	B					

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Intersection Level Of Service Report
Intersection 4: Pine Grove Ave/Cascade Blvd West

Control Type:	Signalized	Delay (sec / veh):	6.8
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.411

Intersection Setup

Name	Cascade Blvd W		Pine Grove Ave		Pine Grove Ave	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	1	0	1
Pocket Length [ft]	100.00	110.00	275.00	51.00	100.00	255.00
Speed [mph]	40.00		40.00		40.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Cascade Blvd W		Pine Grove Ave		Pine Grove Ave	
Base Volume Input [veh/h]	103	21	26	494	599	200
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	5	3	18	31	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	103	26	29	512	630	200
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	26	7	7	128	158	50
Total Analysis Volume [veh/h]	103	26	29	512	630	200
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

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Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Protected	Permissive	Permissive	Permissive
Signal Group	7	0	5	2	6	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	Lead	-	-	-
Minimum Green [s]	5	0	5	5	5	0
Maximum Green [s]	30	0	30	30	30	0
Amber [s]	3.0	0.0	3.0	3.0	3.0	0.0
All red [s]	1.0	0.0	1.0	1.0	1.0	0.0
Split [s]	34	0	23	56	33	0
Vehicle Extension [s]	3.0	0.0	3.0	3.0	3.0	0.0
Walk [s]	5	0	0	5	5	0
Pedestrian Clearance [s]	25	0	0	10	24	0
Rest In Walk	No			No	No	
I1, Start-Up Lost Time [s]	2.0	0.0	2.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	0.0	2.0	2.0	2.0	0.0
Minimum Recall	No		No	No	No	
Maximum Recall	No		No	No	No	
Pedestrian Recall	No		No	No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

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Lane Group Calculations

Lane Group	L	R	L	C	C	R
C, Cycle Length [s]	29	29	29	29	29	29
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	3	3	1	17	12	12
g / C, Green / Cycle	0.11	0.11	0.04	0.61	0.43	0.43
(v / s)_i Volume / Saturation Flow Rate	0.06	0.02	0.02	0.14	0.34	0.13
s, saturation flow rate [veh/h]	1781	1589	1781	3560	1870	1589
c, Capacity [veh/h]	201	180	65	2168	810	689
d1, Uniform Delay [s]	12.02	11.51	13.58	2.57	6.97	5.29
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	2.00	0.37	4.65	0.06	1.65	0.23
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.51	0.14	0.44	0.24	0.78	0.29
d, Delay for Lane Group [s/veh]	14.02	11.87	18.23	2.63	8.62	5.52
Lane Group LOS	B	B	B	A	A	A
Critical Lane Group	Yes	No	Yes	No	Yes	No
50th-Percentile Queue Length [veh/ln]	0.52	0.12	0.21	0.02	1.50	0.32
50th-Percentile Queue Length [ft/ln]	13.01	2.92	5.31	0.42	37.44	7.88
95th-Percentile Queue Length [veh/ln]	0.94	0.21	0.38	0.03	2.70	0.57
95th-Percentile Queue Length [ft/ln]	23.41	5.26	9.56	0.75	67.40	14.19

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Movement, Approach, & Intersection Results

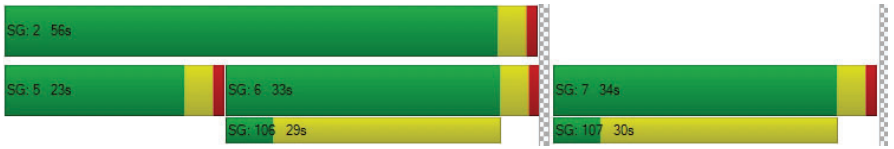
d_M, Delay for Movement [s/veh]	14.02	11.87	18.23	2.63	8.62	5.52
Movement LOS	B	B	B	A	A	A
d_A, Approach Delay [s/veh]	13.58		3.46		7.87	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	6.77					
Intersection LOS	A					
Intersection V/C	0.411					

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	36.45	36.45	36.45
I_p,int, Pedestrian LOS Score for Intersection	2.097	2.522	2.602
Crosswalk LOS	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	0	0	0
d_b, Bicycle Delay [s]	45.00	45.00	45.00
I_b,int, Bicycle LOS Score for Intersection	4.132	4.579	5.502
Bicycle LOS	D	E	F

Sequence

Ring 1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



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Intersection Level Of Service Report
Intersection 5: Pine Grove Ave/Cascade Blvd East

Control Type:	Two-way stop	Delay (sec / veh):	150.7
Analysis Method:	HCM 6th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.843

Intersection Setup

Name	Cascade Blvd E						Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	54.00	100.00	100.00	100.00	100.00	100.00	100.00	82.00	100.00	100.00
Speed [mph]	40.00			25.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Cascade Blvd E						Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	64	0	81	2	0	0	1	485	9	116	820	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	3	0	0	0	0	0	0	17	1	0	28	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	67	0	81	2	0	0	1	502	10	116	848	1
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	17	0	20	1	0	0	0	126	3	29	212	0
Total Analysis Volume [veh/h]	67	0	81	2	0	0	1	502	10	116	848	1
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop			Stop			Free			Free		
Flared Lane	No			No								
Storage Area [veh]	0			0			0			0		
Two-Stage Gap Acceptance	No			No								
Number of Storage Spaces in Median	0			0			0			0		

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.84	0.00	0.14	0.03	0.00	0.00	0.00	0.01	0.00	0.11	0.01	0.00
d_M, Delay for Movement [s/veh]	150.75	43.77	12.43	59.46	44.54	16.57	9.57	0.00	0.00	8.84	0.00	0.00
Movement LOS	F	E	B	F	E	C	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	4.29	0.50	0.50	0.09	0.09	0.09	0.00	0.00	0.00	0.37	0.00	0.00
95th-Percentile Queue Length [ft/ln]	107.33	12.43	12.43	2.25	2.25	2.25	0.10	0.00	0.00	9.25	0.00	0.00
d_A, Approach Delay [s/veh]	75.04			59.46			0.02			1.06		
Approach LOS	F			F			A			A		
d_I, Intersection Delay [s/veh]	7.53											
Intersection LOS	F											

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Intersection Level Of Service Report
Intersection 6: Pine Grove Ave/I-5 Southbound Ramps

Control Type:	Two-way stop	Delay (sec / veh):	23.1
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.023

Intersection Setup

Name	I-5 SB Ramp			I-5 SB Ramp			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	1	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	84.00	152.00	100.00	100.00
Speed [mph]	50.00			50.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	I-5 SB Ramp			I-5 SB Ramp			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	0	0	0	52	5	62	0	98	293	53	496	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	5	0	4	13	0	23	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	52	5	67	0	102	306	53	519	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	13	1	17	0	26	77	13	130	0
Total Analysis Volume [veh/h]	0	0	0	52	5	67	0	102	306	53	519	0
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop			Stop			Free			Free		
Flared Lane				Yes								
Storage Area [veh]	1			1			0			0		
Two-Stage Gap Acceptance				No								
Number of Storage Spaces in Median	0			0			0			0		

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.20	0.02	0.12	0.00	0.00	0.00	0.05	0.01	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	21.01	23.14	13.37	0.00	0.00	0.00	8.28	0.00	0.00
Movement LOS				C	C	B		A	A	A	A	
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.86	0.86	0.86	0.00	0.00	0.00	0.14	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	21.57	21.57	21.57	0.00	0.00	0.00	3.62	0.00	0.00
d_A, Approach Delay [s/veh]	0.00			16.97			0.00			0.77		
Approach LOS	A			C			A			A		
d_I, Intersection Delay [s/veh]	2.30											
Intersection LOS	C											

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Intersection Level Of Service Report

Intersection 7: Pine Grove Ave/I-5 Northbound Ramps

Control Type:	Two-way stop	Delay (sec / veh):	32.2
Analysis Method:	HCM 6th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.010

Intersection Setup

Name	I-5 NB Ramp			I-5 NB Ramp			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	112.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	50.00			30.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	I-5 NB Ramp			I-5 NB Ramp			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	402	5	80	0	0	0	45	112	0	0	133	46
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	20	0	0	0	0	0	3	1	0	0	3	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	422	5	80	0	0	0	48	113	0	0	136	46
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	106	1	20	0	0	0	12	28	0	0	34	12
Total Analysis Volume [veh/h]	422	5	80	0	0	0	48	113	0	0	136	46
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop		Free		Free	
Flared Lane	Yes							
Storage Area [veh]	1		0		0		0	
Two-Stage Gap Acceptance	No							
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.74	0.01	0.09	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	31.73	32.24	29.22	0.00	0.00	0.00	7.68	0.00	0.00	0.00	0.00	0.00
Movement LOS	D	D	D				A	A			A	A
95th-Percentile Queue Length [veh/ln]	8.34	8.34	8.34	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	208.59	208.59	208.59	0.00	0.00	0.00	2.67	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	31.34			0.00			2.29			0.00		
Approach LOS	D			A			A			A		
d_I, Intersection Delay [s/veh]	19.13											
Intersection LOS	D											

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Intersection Level Of Service Report

Intersection 8: Pine Grove Ave/Virginia Ave-Twin View Blvd

Control Type:	Two-way stop	Delay (sec / veh):	12.8
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.144

Intersection Setup

Name	Twin View Blvd			Virginia Ave			Pine Grove Ave			Pine Grove Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	35.00			25.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Twin View Blvd			Virginia Ave			Pine Grove Ave			Pine Grove Ave		
Base Volume Input [veh/h]	78	5	5	1	9	88	99	27	67	0	11	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	3	1	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	78	5	5	1	9	91	100	27	67	0	11	0
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	20	1	1	0	2	23	25	7	17	0	3	0
Total Analysis Volume [veh/h]	78	5	5	1	9	91	100	27	67	0	11	0
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop		Free		Free	
Flared Lane	Yes		Yes					
Storage Area [veh]	1		1		0		0	
Two-Stage Gap Acceptance	No		No					
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.14	0.01	0.00	0.00	0.02	0.09	0.06	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	12.76	12.19	9.70	10.96	11.62	8.65	7.39	0.00	0.00	7.40	0.00	0.00
Movement LOS	B	B	A	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.53	0.53	0.53	0.28	0.28	0.28	0.20	0.20	0.20	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	13.36	13.36	13.36	6.96	6.96	6.96	4.97	4.97	4.97	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	12.55			8.93			3.81			0.00		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	6.97											
Intersection LOS	B											

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Appendix D

Signal Warrants Analysis Sheets

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Warrant 3: Peak-Hour Volumes and Delay

Pine Grove Avenue & Cascade Boulevard East
City of Shasta Lake

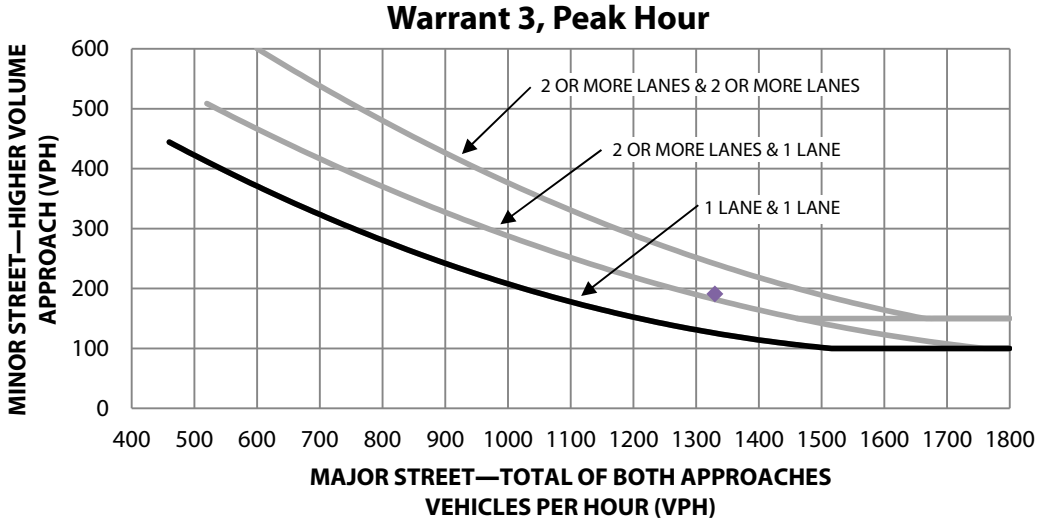
Project Name: Traffic Impact Study for the Windsor Estates 3 Project

Intersection: 5

	Major Street	Minor Street
Street Name	Pine Grove Avenue	Cascade Boulevard East
Direction	E-W	N-S
Number of Lanes	1	1
Approach Speed	40	40

Population less than 10,000? No
Date of Count: Tuesday, June 19, 2018
Scenario: AM Future

Warrant 3 Met?: Met when either Condition A or B is met	**Yes**
Condition A: Met when conditions A1, A2, and A3 are met	Not Met
Condition A1	Not Met
The total delay experienced by traffic on one minor street approach (one direction only) controlled by a STOP sign equals or exceeds four vehicle-hours for a one lane approach, or five vehicle-hours for a two-lane approach	
Minor Approach Delay: 1.69 vehicle-hours	
Condition A2	Met
The volume on the same minor street approach (one direction only) equals or exceeds 100 vph for one moving lane of traffic of 150 vph for two moving lanes	
Minor Approach Volume: 191 vph	
Condition A3	Met
The total entering volume serviced during the hour equals or exceeds 800 vph for intersections with four or more appraches or 650 vph for intersections with three approaches	
Total Entering Volume: 1521 vph	
Condition B	Met
The plotted point falls above the curve	



Warrant 3: Peak-Hour Volumes and Delay

Pine Grove Avenue & Cascade Boulevard East
City of Shasta Lake

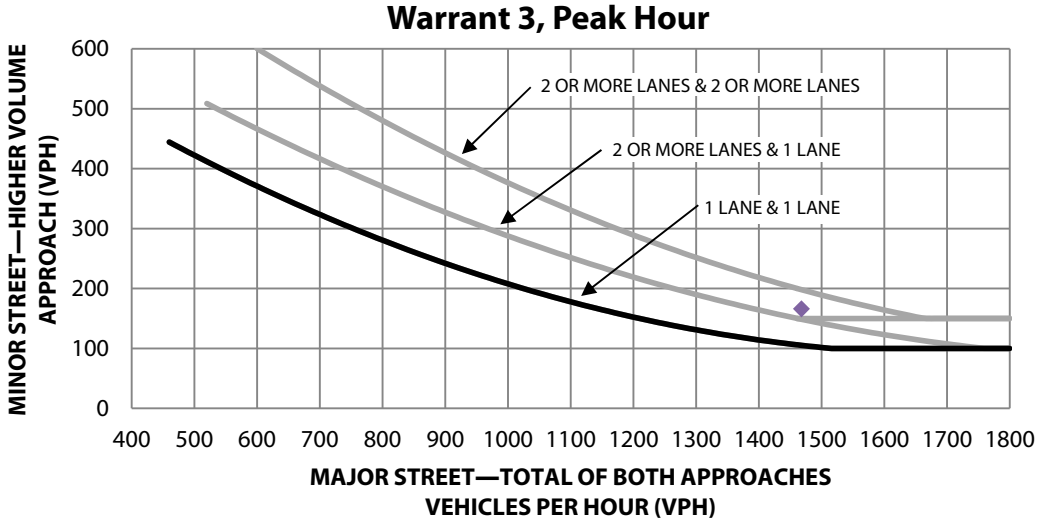
Project Name: Traffic Impact Study for the Windsor Estates 3 Project

Intersection: 5

	Major Street	Minor Street
Street Name	Pine Grove Avenue	Cascade Boulevard East
Direction	E-W	N-S
Number of Lanes	1	1
Approach Speed	40	40

Population less than 10,000? No
Date of Count: Tuesday, June 19, 2018
Scenario: PM Future

Warrant 3 Met?: Met when either Condition A or B is met	**Yes**
Condition A: Met when conditions A1, A2, and A3 are met	Met
Condition A1	Met
The total delay experienced by traffic on one minor street approach (one direction only) controlled by a STOP sign equals or exceeds four vehicle-hours for a one lane approach, or five vehicle-hours for a two-lane approach	
Minor Approach Delay: 4.89 vehicle-hours	
Condition A2	Met
The volume on the same minor street approach (one direction only) equals or exceeds 100 vph for one moving lane of traffic of 150 vph for two moving lanes	
Minor Approach Volume: 166 vph	
Condition A3	Met
The total entering volume serviced during the hour equals or exceeds 800 vph for intersections with four or more appraches or 650 vph for intersections with three approaches	
Total Entering Volume: 1636 vph	
Condition B	Met
The plotted point falls above the curve	



Warrant 3: Peak-Hour Volumes and Delay

Pine Grove Avenue & Cascade Boulevard East
City of Shasta Lake

Project Name: Traffic Impact Study for the Windsor Estates 3 Project

Intersection: 5

	Major Street	Minor Street
Street Name	Pine Grove Avenue	Cascade Boulevard East
Direction	E-W	N-S
Number of Lanes	1	1
Approach Speed	40	40

Population less than 10,000? No
Date of Count: Tuesday, June 19, 2018
Scenario: AM Future plus Project

Warrant 3 Met?: Met when either Condition A or B is met — **Yes**

Condition A: Met when conditions A1, A2, and A3 are met — Not Met

Condition A1 — Not Met

The total delay experienced by traffic on one minor street approach (one direction only) controlled by a STOP sign equals or exceeds four vehicle-hours for a one lane approach, or five vehicle-hours for a two-lane approach

Minor Approach Delay: 1.02 vehicle-hours

Condition A2 — Met

The volume on the same minor street approach (one direction only) equals or exceeds 100 vph for one moving lane of traffic of 150 vph for two moving lanes

Minor Approach Volume: 160 vph

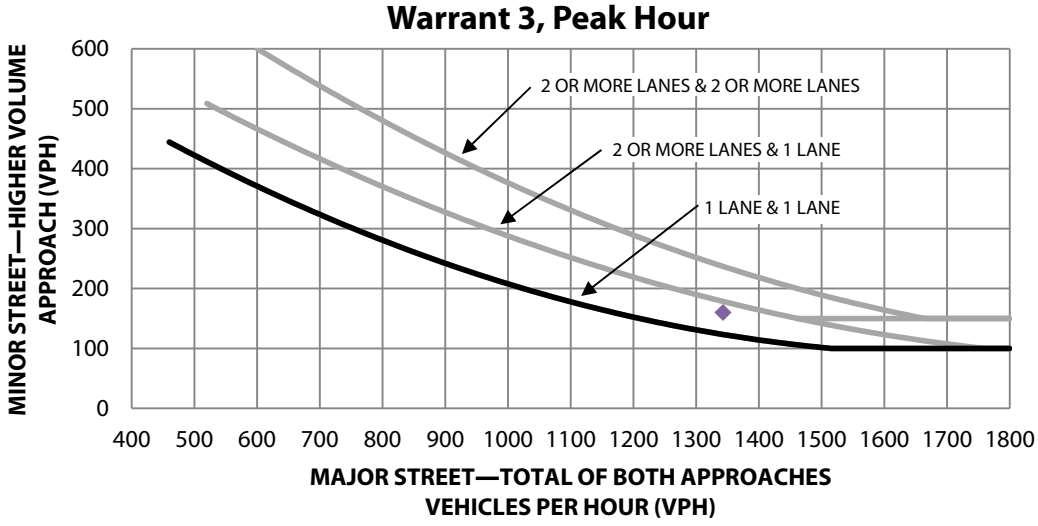
Condition A3 — Met

The total entering volume serviced during the hour equals or exceeds 800 vph for intersections with four or more appraches or 650 vph for intersections with three approaches

Total Entering Volume: 1503 vph

Condition B — Met

The plotted point falls above the curve



Warrant 3: Peak-Hour Volumes and Delay

Pine Grove Avenue & Cascade Boulevard East
City of Shasta Lake

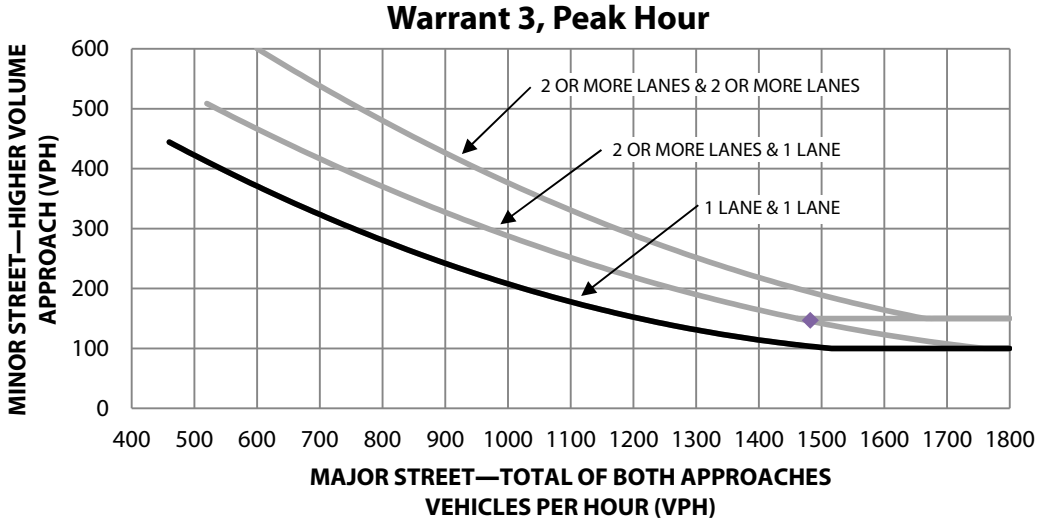
Project Name: Traffic Impact Study for the Windsor Estates 3 Project

Intersection: 5

	Major Street	Minor Street
Street Name	Pine Grove Avenue	Cascade Boulevard East
Direction	E-W	N-S
Number of Lanes	1	1
Approach Speed	40	40

Population less than 10,000? No
Date of Count: Tuesday, June 19, 2018
Scenario: PM Future plus Project

Warrant 3 Met?: Met when either Condition A or B is met	**Yes**
Condition A: Met when conditions A1, A2, and A3 are met	Not Met
Condition A1	Not Met
The total delay experienced by traffic on one minor street approach (one direction only) controlled by a STOP sign equals or exceeds four vehicle-hours for a one lane approach, or five vehicle-hours for a two-lane approach	
Minor Approach Delay: 2.94 vehicle-hours	
Condition A2	Met
The volume on the same minor street approach (one direction only) equals or exceeds 100 vph for one moving lane of traffic of 150 vph for two moving lanes	
Minor Approach Volume: 147 vph	
Condition A3	Met
The total entering volume serviced during the hour equals or exceeds 800 vph for intersections with four or more appraches or 650 vph for intersections with three approaches	
Total Entering Volume: 1631 vph	
Condition B	Met
The plotted point falls above the curve	



Appendix E

Redistribution of Existing Trips with Project Conditions

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Trip Generation: **10th Edition**

Categories	Number of Units	Units	Land Use Number	Use No./T	Sample Size Notes	Setting/Location	Daily (Weekday) Trip Rate per Unit	Daily (Weekday) Total Trips	AM PEAK On a Weekday Trip Rate per Unit	AM Number of Trips	AM In (%)	AM In (Rate)	AM In (Trips)	AM Out (%)	AM Out (Rate)	AM Out (Trips)	PM PEAK On a Weekday Trip Rate per Unit	PM Number of Trips	PM In (%)	PM In (Rate)	PM In (Trips)	PM Out (%)	PM Out (Rate)	PM Out (Trips)
	192	Dwelling units	210	Single Family Detached Ho		General Urban/	9.44	1812	0.74	142	25	0.19	36	75	0.56	106	0.99	190	63	0.62	120	37	0.37	70
	192	Dwelling units	210 (F)	Single Family Detached Ho		General Urban/	9.87	1895	0.74	141	25	0.18	35	75	0.55	106	0.99	190	63	0.62	120	37	0.37	70

Trip Redirection			TOTAL (+ OR -) IN (30%)		TOTAL (+ OR -) OUT (30%)	
AM	E Cascade	Northbound Left			31.8	**-32**
AM	E Cascade	Eastbound Right	10.8	**-11**		
PM	E Cascade	Northbound Left			21	**-21**
PM	E Cascade	Eastbound Right	36	**-36**		
AM	W Cascade	Westbound Through			31.8	**-32**
AM	W Cascade	Eastbound Through	10.8	**-11**		
PM	W Cascade	Westbound Through			21	**-21**
PM	W Cascade	Eastbound Through	36	**-36**		
AM	Project Driveway	Northbound Left			31.8	**+32**
AM	Project Driveway	Eastbound Right	10.8	**+11**		
PM	Project Driveway	Northbound Left			21	**+21**
PM	Project Driveway	Eastbound Right	36	**+36**		
AM	Pine Grove @ Driveway	Westbound Through			31.8	**-32**
AM	Pine Grove @ Driveway	Eastbound Through	10.8	**-11**		
PM	Pine Grove @ Driveway	Westbound Through			21	**-21**
PM	Pine Grove @ Driveway	Eastbound Through	36	**-36**