ENVIRONMENTAL ASSESSMENT

Shingle Springs Band of Miwok Indians
295.7-Acre Fee-to-Trust Project

El Dorado County, California | October 2025

Lead Agency:

Bureau of Indian Affairs
Pacific Regional Office
2800 Cottage Way
Sacramento, CA 95825

ENVIRONMENTAL ASSESSMENT

Shingle Springs Band of Miwok Indians
295.7-Acre Fee-to-Trust Project

El Dorado County, California | October 2025

Lead Agency:

Bureau of Indian Affairs
Pacific Regional Office
2800 Cottage Way
Sacramento, CA 95825
916.978.6000

Prepared By:

Acorn Environmental
5170 Golden Foothill Parkway
El Dorado Hills, CA 95762
916.235.8224
www.acorn-env.com

Table of Contents

Section 1 | Introduction 1
1.1 Introduction 1
1.2 Location and Setting 1
1.3 Purpose and Need for the Proposed Action 5
1.4 Regulatory Requirements and Approvals 5
Section 2 | Proposed Project and Alternatives 6
2.1 Alternative A – Proposed Project 6
2.1.1 Proposed Land Uses 6
2.1.2 Water Supply and Wastewater Treatment and Disposal 9
2.1.3 Grading and Drainage 10
2.1.4 Construction and Development Standards 10
2.2 Alternative B – Reduced Intensity Alternative 14
2.3 Alternative C – No Action Alternative 15
2.4 Comparison of the Proposed Action and Alternatives 15
2.4.1 Alternative A – Proposed Project 15
2.4.2 Alternative B – Reduced-Intensity Alternative 15
2.4.3 Alternative C – No Action Alternative 15
2.4.4 Summary 15
Section 3 | Affected Environment and Environmental Consequences 16
3.1 Land Resources 16
3.1.1 Environmental Setting 16
3.1.2 Impacts 17
3.2 Water Resources 18
3.2.1 Environmental Setting 18
3.2.2 Impacts 19
3.3 Air Quality 21
3.3.1 Regulatory Setting 21
3.3.2 Environmental Setting 21
3.3.3 Impacts 23
3.4 Biological Resources 26
3.4.1 Regulatory Setting 26
3.4.2 Environmental Setting 26
3.4.3 Impacts 29
3.5 Cultural Resources 31
3.5.1 Regulatory Setting 31
3.5.2 Environmental Setting 31
3.5.3 Impacts 33
3.6 Socioeconomic Conditions 33
3.6.1 Environmental Setting 33
3.6.2 Impacts 34
3.7 Transportation and Ciruclation 35
3.7.1 Environmental Setting 35
3.7.2 Impacts 36

3.8 Land Use and Agriculture 38
3.8.1 Regulatory Setting 38
3.8.2 Environmental Setting 38
3.8.3 Impacts 39
3.9 Public Services 40
3.9.1 Environmental Setting 40
3.9.2 Impacts 42
3.10 Noise 46
3.10.1 Regulatory Setting 46
3.10.2 Environmental Setting 46
3.10.3 Impacts 47
3.11 Hazardous Materials 50
3.11.1 Environmental Setting 50
3.11.2 Impacts 50
3.12 Visual Resources 51
3.12.1 Regulatory Setting 51
3.12.2 Environmental Setting 51
3.12.3 Impacts 51
3.13 Growth-Inducing and Cumulative Impacts 53
3.13.1 Growth-Inducing Impacts 53
3.13.2 Cumulative Impacts 54
Section 4 | Mitigation 60
Section 5 | Consultation and Coordination 64
Section 6 | References 66
Section 7 | Preparers 69

Tables

Table 1-1: Project Parcel Details 1
Table 3-1: Estimated Construction Emissions – Alternative A 24
Table 3-2: Estimated Operation Emissions – Alternative A 24
Table 3-3: Estimated Greenhouse Gas Emissions – Alternative A 26
Table 3-4: Current and Projected Water Demands 43
Table 3-5: Projected Wastewater Flows 44
Table 3-6: Existing Ambient Noise Levels Using Continuous 24-Hour Measurements (dBA) 47
Table 3-7: Vibration Levels for Various Construction Equipment 48
Table 3-8: Predicted Traffic Noise Level And Project-Related Traffic Noise Level Increases 49

Figures

Figure 1-1: Regional Location 3
Figure 1-2: Project Parcels 4
Figure 2-1: Alternative A – Site Plan Overview 7

Appendices

Appendix A Environmental Assessment Figures
Appendix B Expanded Settings
Appendix C Air Quality Modeling Files
Appendix D Biological Assessment
Appendix E Cultural Resources Reports
Appendix F Traffic Impact Study
Appendix G Farmland Conversion Impact Rating Form
Appendix H Water and Wastewater Feasibility Study
Appendix I Environmental Noise Assessment

Section 1 | Introduction

1.1 INTRODUCTION

The Bureau of Indian Affairs (BIA), Pacific Region has received a discretionary acquisition application from the Shingle Springs Band of Miwok Indians (Tribe) for twenty-nine parcels, comprising approximately 295.7 acres, contiguous to the existing Shingle Springs Rancheria. The BIA is the lead agency to review and approve tribal applications to take land into federal trust status (Proposed Action). Following the acquisition of the project site into federal trust, the Tribe proposes to develop Tribal housing, an arena, other general commercial uses, a multipurpose emergency shelter, a maintenance operations building, parking garages, and associated infrastructure (Proposed Project).

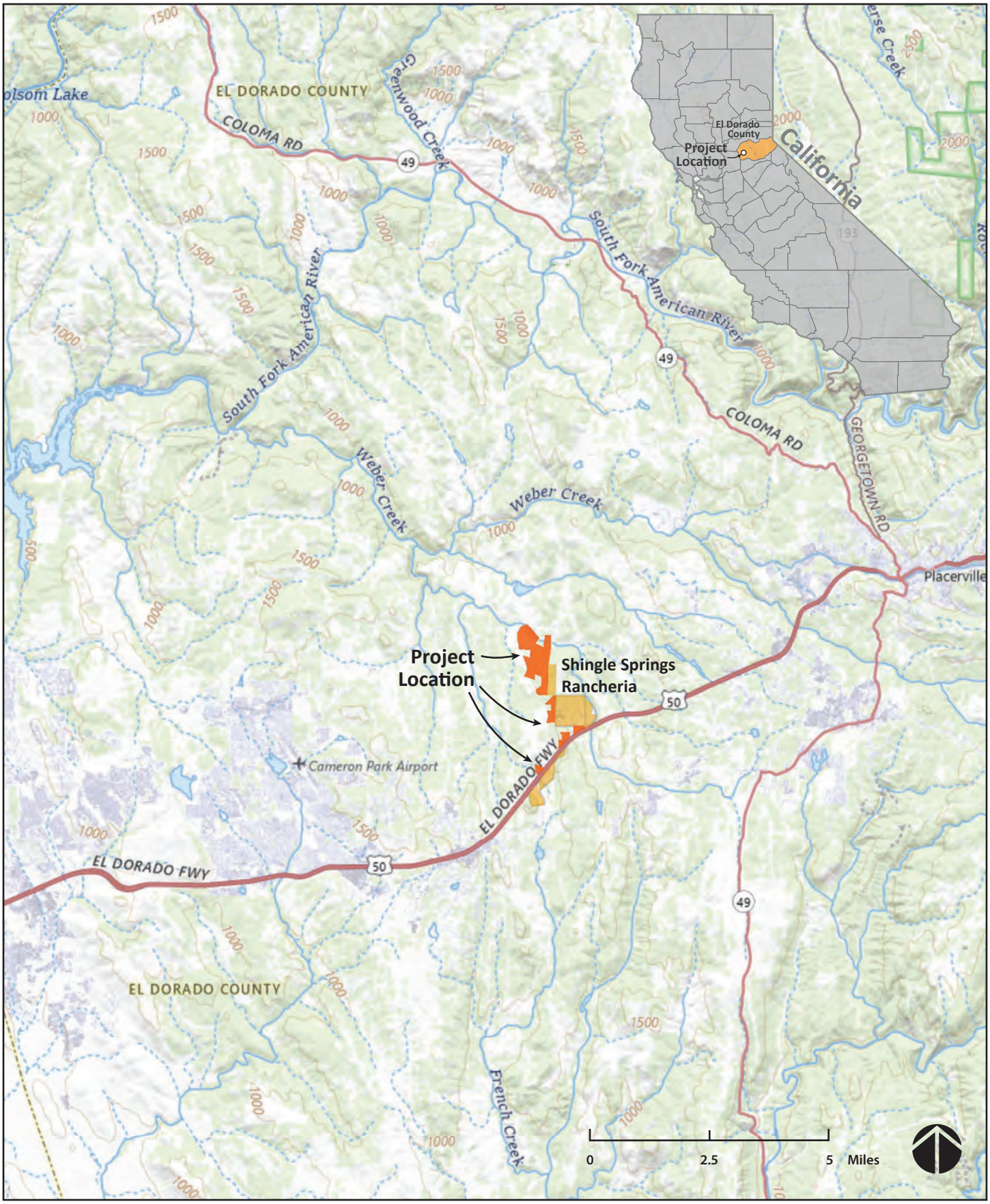
1.2 LOCATION AND SETTING

The proposed fee-to-trust parcels are located in western El Dorado County, California (**Figure 1-1**). The parcels are located near the existing Shingle Springs Rancheria north of Highway 50, approximately two miles northeast of the town of Shingle Springs, California. The elevation of the project area ranges from 1,100 to 1,600 feet above mean sea level. The parcels are located within Sections 18, 19, 29, 30, and 31 Township 9 and 10 North, Range 10 East, of the Shingle Springs, California 7.5-minute USGS quadrangle. The location for each parcel is shown in **Figure 1-2**. **Table 1-1** below provides site information.

Table 1-1: Project Parcel Details

Parcel	Assessor's Parcel Number	Common Name Reference	Approximate Acreage
1	319-020-005	Buhler 1	17.66
2	319-020-006	Buhler 2	2.54
3	319-020-007	Manclark 1	4.95
4	319-020-017	Manclark 2	5.25
5	319-020-027	Bilotta	10.0
6	319-020-036	Reddy	10.22
7	319-020-037	Stondell 1	20.41
8	319-020-023	Stondell 2	7.16
9	319-020-025	Stondell 3	2.84
10	319-020-014	Smith	35.85
11	319-020-028	Erickson	10.0
12	319-020-031	Donovan	10.0
13	319-030-030	Whitney	5.0
14	319-030-012	Pirrello	35.56
15	319-030-019	Martin	10.0
16	319-030-020	Pirrello 2	10.0
17	319-030-021	Irwin	10.0

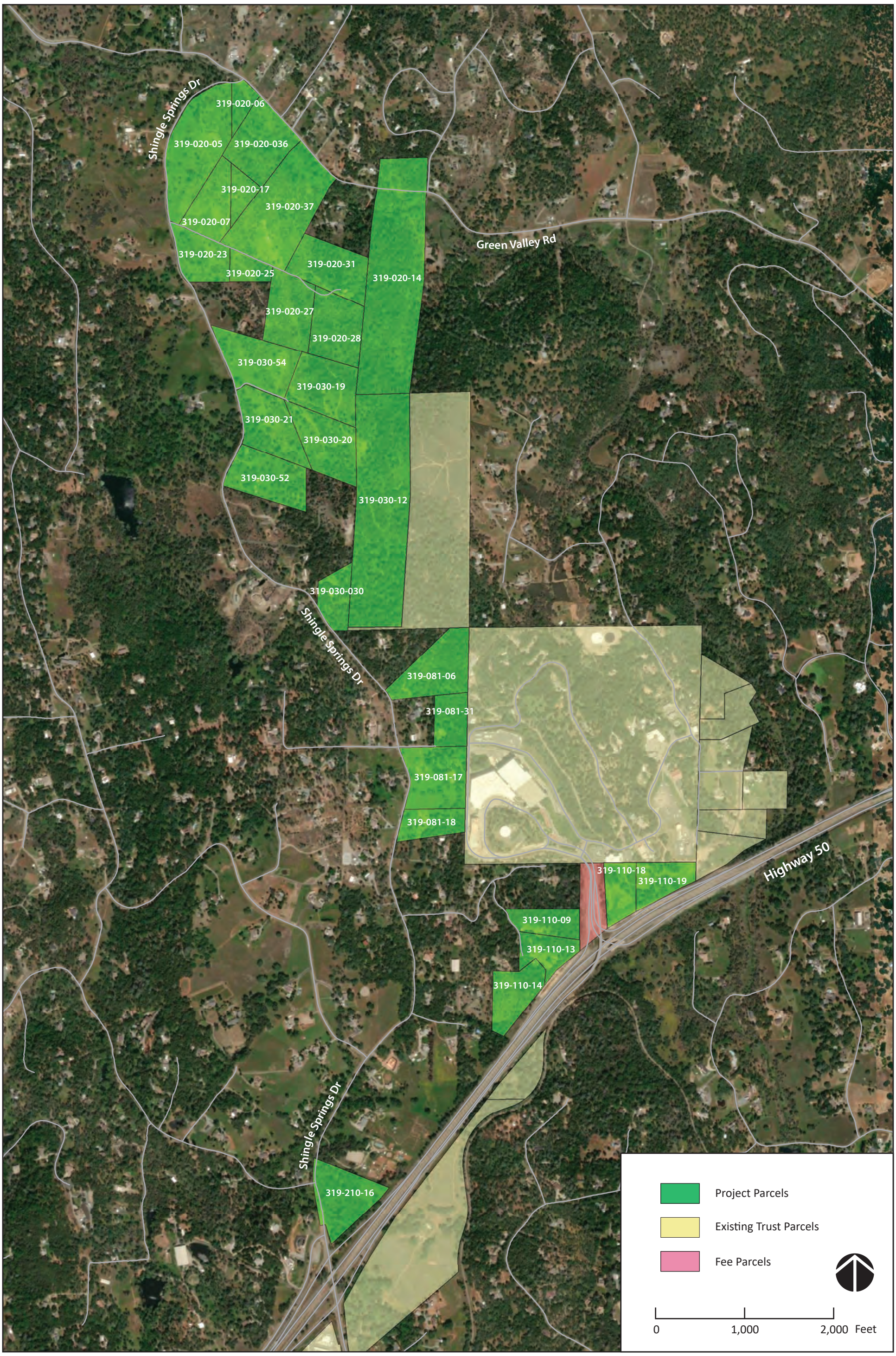
Parcel	Assessor's Parcel Number	Common Name Reference	Approximate Acreage
18	319-030-052	Lazenby	10.0
19	319-030-054	Sommers	9.47
20	319-081-006	McNamee	10.69
21	319-081-017	Pettibone	10.84
22	319-081-018	Armas	5.18
23	319-081-031	Lucy	5.01
24	319-110-009	Sayles	5.0
25	319-110-013	Detwiler	5.0
26	319-110-014	Renfro	6.51
27	319-110-018	Renfro 2	5.01
28	319-110-019	Renfro 3	5.57
29	319-210-016	Fong	10.0
		Total	**295.72**



Source: USGS, The National Map

FIGURE 1-1

REGIONAL LOCATION



Source: Acorn Environmental

FIGURE 1-2

PROJECT PARCELS

1.3 PURPOSE AND NEED FOR THE PROPOSED ACTION

The federal Proposed Action is the acquisition of the 295.7-acre project site in trust for the Tribe pursuant to the Secretary's authority under the Indian Reorganization Act, 25 USC § 5108. The purpose of the Proposed Action is to facilitate Tribal self-sufficiency and self-determination, thus satisfying the Department of the Interior's (Department) land acquisition policy as articulated in the Department's trust land regulations at 25 CFR Part 151. The long-term survival of the Tribe is dependent upon its ability to provide housing, employment, and community and governmental services to its members on Tribal trust lands. The Proposed Action would help accomplish these goals through reestablishing the Tribe's traditional land base and development of Tribal housing, commercial uses, emergency/safety facilities, and maintenance facilities. There is a current need to alleviate the shortage of on-reservation housing for the Tribe. Commercial uses would provide additional financial resources and employment opportunities to meet the needs of the Tribal community. Diversification of the Tribe's revenue stream on Tribal lands would contribute to economic self-sufficiency. The development of emergency/safety and maintenance facilities on Tribal land would ensure Tribal self-governance and self-determination by allowing the Tribe to exercise sovereign authority over facilities necessary for health, safety, and maintenance of Tribal lands.

The need for the Department to act on the Tribe's application is established by the Indian Reorganization Act (25 U.S.C. § 5108) and the Indian Land Consolidation Act (25 U.S.C. § 2202) and the relevant implementing federal regulations at 25 CFR Part 151. The Proposed Action triggers a BIA compliance review under the National Environmental Policy Act (NEPA; 42 USC § 4321-4375) and accompanying regulations (43 CFR Part 46). This EA is prepared to meet the BIA NEPA responsibility per 25 CFR Part 151.10 which is a request for Trust Acquisitions of land contiguous to the boundaries of an Indian reservation (25 CFR § 151.10).

This document has been prepared in accordance with the requirements of NEPA and accompanying regulations (43 CFR Part 46), 516 DM 1 – U.S. Department of the Interior Handbook of National Environmental Policy Act Implementation Procedures, and Pre-Acquisition Environmental Site Assessments Guidebook (59 Indian Affairs Manual [IAM] 5).

1.4 REGULATORY REQUIREMENTS AND APPROVALS

The following direct and indirect federal approvals and actions may be required for the Proposed Action or subsequent residential development:

- Transfer of the 29 parcels totaling approximately 295.7 acres into federal trust status for the Tribe by the Secretary of the Interior;
- Consultation with the U.S. Fish & Wildlife Service (USFWS) under Section 7 of the federal Endangered Species Act, if endangered species may be impacted by the Proposed Action; and
- Consultation with the State Historic Preservation Office under Section 106 of the National Historic Preservation Act.

Section 2 | Proposed Project and Alternatives

This section describes the alternatives that are analyzed within this EA. A reasonable range of alternatives has been selected based on consideration of the purpose and need of the Proposed Action and opportunities for potentially reducing environmental effects. These alternatives include the Proposed Project (Alternative A), the Reduced Intensity Alternative (Alternative B), and the No Action Alternative (Alternative C).

2.1 ALTERNATIVE A – PROPOSED PROJECT

The Proposed Action consists of the fee simple conveyance of the project site into federal trust status for the benefit of the Tribe. This land trust action would shift civil regulatory jurisdiction over the project site from the State of California (State) and El Dorado County to the Tribe and the federal government. Federal laws, such as the Clean Water Act and the federal Endangered Species Act, would continue to apply to the project site. Alternative A includes the proposed land uses described below.

2.1.1 Proposed Land Uses

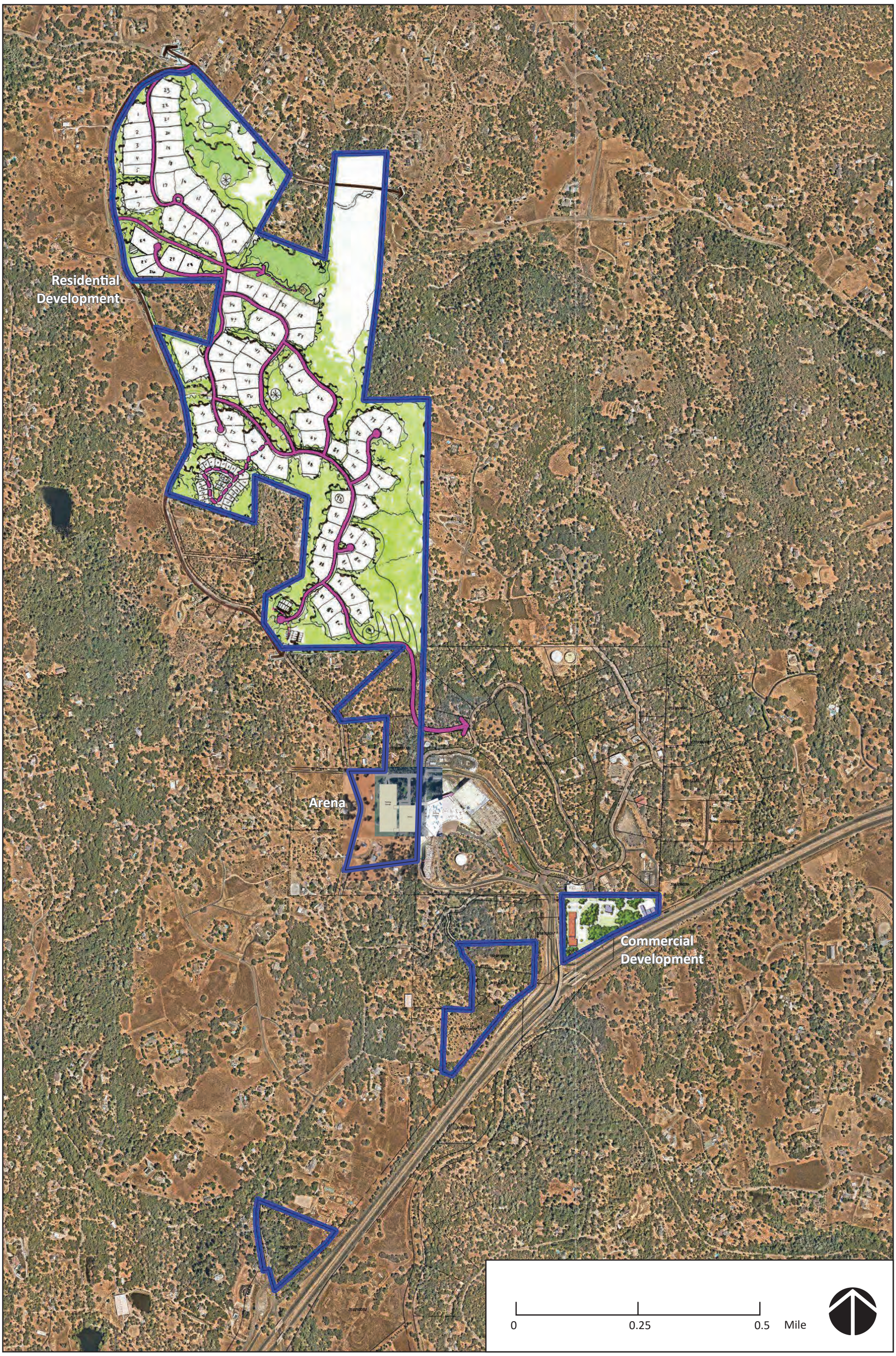
An overview of the proposed land uses is shown in **Figure 2-1.** The proposed land uses are described below.

Arena and Parking Garage

An arena would be developed west of the existing casino (Figure 2-2 of **Appendix A**). The arena would be an entirely enclosed venue providing up to approximately 5,000 seats for sporting events and concerts. Concession stands and retail space would be provided within the arena. The approximately 80,000 square foot arena would connect to the casino by an enclosed pedestrian bridge spanning Koto Road. The arena building would have a height of 100 feet above grade. The top of the arena building would be approximately five feet below the top of the existing casino. The pedestrian bridge will provide a clearance of 25 feet above Koto Road. A two-bay loading dock would be provided on the north side of the building.

The exterior of the arena would be similar to the existing casino building. The exterior walls would be clad with earth tone architectural panels that have horizontal ridges which cast shadows and reduce reflectivity. Exterior lighting would be limited to shielded security lighting consistent with lighting currently provided on the casino. Patrons would only be able to access the arena from the pedestrian bridge via the existing casino, and through a plaza/bus drop-off entrance on the east side of the building on Koto Road.

A parking garage would be developed west of the arena to provide approximately 1,280 parking spaces for events. The parking garage would be constructed of steel reinforced concrete and finished with a natural concrete surface, similar to the existing parking garage east of the casino. Security lighting would be provided within the interior of the parking garage (including the top floor), within the stairwells, and on the exterior walls above walkways. All lighting would be shielded to reduce illumination of the



Source: Kimley-Horn

FIGURE 2-1

ALTERNATIVE A SITE PLAN OVERVIEW

surrounding areas. The parking garage would have six levels and a height of approximately 70 feet. The top of the parking garage would be approximately 55 feet below the top of the existing casino and 50 feet below the top of the proposed arena.

The parking garage would be accessed by a new roadway extending from Koto Road. There would be an extension of the roadway to Shingle Springs Drive that would be limited to emergency access only. All patron and service traffic would enter and exit the site via Koto Road and Red Hawk Parkway.

The existing home located near the proposed arena site would be removed. Existing trees and vegetation would be retained to the extent feasible and additional screening trees and vegetation would be planted around the arena and parking garage.

Residential Development

The Tribe has developed preliminary plans for the residential development (Figure 2-3 of **Appendix A**). Once accepted into trust, the Tribe would complete the final designs of the housing development, including water and wastewater services, access road improvements, and other related infrastructure development in a manner consistent with all applicable laws, agreements, and environmental requirements. Construction of the homes would occur in phases as funds become available. For the purposes of the environmental analysis, it is assumed that up to 15 homes would be developed each year, with 132 homes developed in total. The phasing of residential development would be subject to the extension of supporting water and wastewater services and utilities.

The homes would include 16 townhomes in a clustered development, with four homes per building. The buildings would be surrounded by community gathering space with large backyards. An elders community would be provided with approximately 24 smaller homes and yards for easy maintenance. A community gathering space and elder center would be provided within the clustered development. The remaining 92 homes would be rural residential single-family homes on lots of approximately one acre. Large areas of open space will be provided to avoid areas of steep slopes and to provide recreation opportunities and resource protection.

The homes would be accessed by new and existing roads. Primary access would be through the existing Rancheria and on Green Valley Road. Access to Shingle Springs Drive will be limited to emergency access only. All proposed roadways would be developed consistent with El Dorado County standards with a minimum 18-foot-width.

Utilities would be provided from existing services and extended along the new and existing roads, with utilities installed within or alongside the roadbed.

Commercial Development

Approximately 30,000 square foot of commercial space is proposed south of the existing Shingle Springs Health and Wellness Center (Figure 2-4 of **Appendix A**). The commercial space would provide space for typical neighborhood-serving retail and commercial businesses. This development would serve the Rancheria and the surrounding community. Access would be provided from Honpie Road by the existing health clinic. Surface parking lots would provide parking on the ground floor of the development and adjacent areas. The development would be limited to two stories with a maximum building height of

approximately 45 feet. Existing trees and vegetation would be retained to the extent feasible and additional screening trees and vegetation would be planted around the buildings.

Multipurpose Emergency Shelter

A 5,300 square foot emergency shelter building is proposed east of the proposed commercial development and south of the existing fire station (Figure 2-4 of **Appendix A**). The building will provide a multipurpose emergency shelter building for the Tribe. Dedicated parking will be provided with access roads extending from the existing health clinic and directly to Honpie Road.

Maintenance Operations Buildings

A maintenance operations area will be provided south of the existing wastewater treatment plant (WWTP; Figure 2-4 of **Appendix A**). This area will provide for the relocation of existing maintenance operations located elsewhere on the Rancheria. This area would provide for the relocation of two approximately 3,000 square foot buildings. Access would be provided from Honpie Road.

2.1.2 Water Supply and Wastewater Treatment and Disposal

The existing Rancheria obtains its water supply from the El Dorado Irrigation District (EID). Thirteen of the project parcels are located within the EID service area. The remaining 16 parcels are adjacent to, but not located within EID's existing service area. The proposed arena, commercial development, multipurpose emergency shelter and maintenance buildings are all located within the existing EID service area. These proposed land uses would be supplied from the Rancheria's water supply system. The proposed residential development is located on parcels that are partly within and partly outside of the existing EIS service area. To gain service from EID for parcels that are not currently within their service area, the Tribe will need to request annexation from EID and the El Dorado County Local Agency Formation Commission (LAFCO). Alternatively, groundwater could be used to provide water supply for the homes. Existing wells could be used, and additional wells could be developed to serve individual or multiple homes. Based on well completion reports on file with the California Department of Water Resources well yields in the project area range from 0 to 200 gallons per minute (gpm), with most wells yielding 5 to 20 gpm. Use of groundwater may require filtration and disinfection as well as routine monitoring. If an onsite water supply system serves more than 15 connections (homes) or 25 people, the system would be required to comply with the requirements of the Safe Drinking Water Act.

Wastewater treatment and disposal for the proposed arena, commercial development, multipurpose emergency shelter and maintenance buildings would be provided by connection to the existing wastewater treatment and disposal system on the Rancheria. Wastewater treatment and disposal for the proposed homes would be provided by individual septic systems or connection to the existing wastewater treatment and disposal system on the Rancheria.

Wastewater on the Rancheria is treated at a WWTP that is owned and operated by the Tribe and located in the southeast corner of the Rancheria. All wastewater generated on the Rancheria (including the Red Hawk Casino, health center, and homes) is routed to the WWTP by force mains located within the roads on the Rancheria. The membrane bioreactor plant produces disinfected tertiary recycled water as defined by California Department of Health Regulations (Title 22 California Code of Regulations [CCR]). Under California Title 22 Regulations, allowed uses of disinfected tertiary recycled water include lawn and garden irrigation (including edible crops), flushing toilets, cleaning roads and sidewalks, and firefighting.

2.1.3 Grading and Drainage

Site preparation would include establishing access roads, driveways, building pads, septic fields (optional) and installing utilities. All areas disturbed during construction would be revegetated and all cut slopes would have a slope ratio of 1.5 to 1 (horizontal to vertical) or flatter, and fill slopes would have a slope ratio of 2 to 1 or flatter. These standards would ensure that slopes are stable and would be revegetated, thereby minimizing long-term erosion potential.

Surface runoff from the proposed access roads, and driveways would be directed through biofiltration swales (bioswales) to offset the added impervious area. The bioswales, planted with native grasses, would treat 100% of the runoff. The bioswales would tie into existing drainages and wetland swales to minimize erosion potential and to help maintain the current hydrology of the site. In addition, separate stormwater retention basins would be provided to manage runoff from the arena and parking garage and from the commercial development. The basins would be sized to retain and percolate stormwater on site to avoid any increase in site runoff.

2.1.4 Construction and Development Standards

The Tribe would require construction contractors to limit exterior construction to between the hours of 7 a.m. and 7 p.m. Monday through Friday, and 8 a.m. and 5 p.m. on weekends and federally recognized holidays.

The trust acquisition would eliminate the need for building permits to be issued from El Dorado County for the proposed homes. The Tribe, however, would ensure that equivalent development standards are maintained for the health, safety, and comfort of the residents. Specifically, the residences and road/utility improvements would be constructed consistent with development standards within the Tribe's Environmental Code (Title 1), Housing Ordinance (Title 5), and Land Use Ordinance (Title 7). Other applicable building code standards include the following:

California Building Code

The California Building Code (CBC) as set forth in Title 24 of the CCR contains general building design and construction requirements relating to fire and life safety, structural safety, and access compliance. The CBC includes the Energy, Electrical, Mechanical, Plumbing and Fire Codes.

El Dorado County Ordinances

The Proposed Project would be constructed and operated in a manner that is generally consistent with relevant El Dorado County Ordinances. These include the following:

- Grading, Erosion, and Sediment Control Ordinance (Chapter 110.14)
- Asbestos and Dust Protection (Chapter 8.44)
- Vegetation Management and Defensible Space Ordinance (Chapter 8.09)

El Dorado County Air Quality Management District

The Project would be constructed in a manner that substantially complies with all relevant El Dorado County Air Quality Management District Rules and Regulations, including the following:

- Rule 202, Visible Emissions.
- Rule 205, Nuisance.
- Rule 207, Particulate Matter.
- Rule 215, Architectural Coatings.
- Rule 223-1, Fugitive Dust.
- Rule 223-2, Asbestos Hazard Mitigation.

Other Development Standards

Setback requirements of the Tribe's Land Use Ordinance (Title 7, Section 7 Land Use Standards) would be met or exceeded along exterior boundaries of trust land. The developer would utilize the Underground Service Alert (USA) service and would coordinate with utility service providers regarding excavation and extension of services.

Tree removal would be conducted in compliance with the Tribe's Environmental Code (Title 1, Article 10 Natural Resources) and Land Use Ordinance (Title 7).

Outdoor residential lighting would be hooded/screened to direct light downward onto the subject parcel and would not negatively impact adjacent parcels.

Best Management Practices

Land Resources

Erosion control measures would be implemented during construction as described further under the Water Resources BMPs.

Water Resources

The following construction requirements would be included as part of the Proposed Project through contractual requirements to protect water quality:

- For construction activities disturbing one acre or more, the Tribe shall apply for coverage under and comply with the National Pollutant Discharge Elimination System (NPDES) General Construction Permit from the U.S. Environmental Protection Agency, for construction site runoff during the construction phase. A Stormwater Pollution Prevention Plan (SWPPP) shall be prepared, implemented, and maintained throughout the construction phase of the development, consistent with the General Construction Permit requirements. The SWPPP prepared for the project site shall include, but not be limited to, the following BMPs.
    - To the extent feasible, grading activities shall be limited to the immediate area required for construction.
    - Temporary erosion control measures (such as silt fences, fiber rolls, vegetated swales, a velocity dissipation structure, staked straw bales, temporary re-vegetation, rock check dams, erosion control blankets, and sediment traps) shall be employed for disturbed areas.
    - Construction activities shall be scheduled to minimize land disturbance during peak runoff periods.
    - Disturbed areas shall be paved or re-vegetated following construction activities.

- A spill prevention and countermeasure plan shall be developed that identifies proper storage, collection, and disposal measures for potential pollutants (such as fuel, fertilizers, pesticides, etc.) used on site.
- Petroleum products shall be stored, handled, used, and disposed of properly in accordance with provisions of the Clean Water Act (33 USC § 1251 to 1387).
- Construction materials, including topsoil and chemicals, shall be stored, covered, and isolated to prevent runoff losses and contamination of surface and groundwater.
- Fuel and vehicle maintenance areas shall be designed to control runoff.
- Sanitary facilities shall be provided for construction workers.
- Disposal facilities shall be provided for soil wastes, including excess asphalt during construction. Food-related trash shall be stored in closed containers and removed from the site daily.
- Wheel wash or rumble strips and sweeping of paved surfaces shall be used to remove any and all tracked soil.

Biological Resources

During the land use design and construction process, existing oak trees shall be retained to the greatest extent possible.

The following construction requirements would be included as part of the Proposed Project through contractual requirements to protect sensitive habitats and listed species:

- Wildlife exclusion should be erected near any channels or wetlands within proximity to construction; this may consist of erosion control fabric stapled to posts and keyed into the ground.
- Because listed species that occur in the region could potentially migrate into the project site between the time that the last field survey was completed and the start of construction, a pre-construction survey for listed species (especially amphibians) should be performed by a qualified biologist to ensure that listed species are not present. If any listed species are detected, construction should be delayed, and the United States Fish and Wildlife Service (USFWS) should be consulted on measures to avoid impacts including appropriate buffers and exclusion techniques.

Hazardous Materials

The following construction requirements would be included as part of the Proposed Project through contractual requirements to minimize the risk of fire during construction:

- Any construction equipment that normally includes a spark arrester shall be equipped with an arrester in good working order. This includes, but not be limited to, vehicles, heavy equipment, and chainsaws.
- During construction, staging areas, welding areas, or areas slated for development using spark-producing equipment would 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 firebreak.

Air Quality

The following construction requirements would be included as part of the Proposed Project through contractual requirements to reduce temporary construction emissions:

- For any earth moving that is more than 100 feet from all property lines, watering shall be conducted as necessary to prevent visible dust emissions from exceeding 100 feet in length in any direction.
- For all disturbed surface areas, dust suppression shall be applied in a sufficient quantity and frequency to maintain a stabilized surface; any areas that cannot be stabilized, as evidenced by wind driven dust, shall receive an application of water at least twice per day to at least 80 percent of the unstabilized area.
- For all unpaved roads used for any construction vehicular traffic, the roads shall be watered as often as necessary to minimize dust or chemical stabilizer shall be applied to all unpaved road surfaces in sufficient quantity and frequency to maintain a stabilized surface.
- Traffic speeds on the project site will be restricted to 15 miles per hour (mph) to reduce soil disturbance.
- Track-out control shall be provided to minimize tracking of soil onto neighboring roadways.

The following dust suppression BMPs would be implemented by the Tribe to control the production of fugitive dust and prevent wind erosion of bare and stockpiled soils:

- Dust emissions during transport of fill material or soil shall be minimized by wetting down loads, ensuring adequate freeboard (space from the top of the material to the top of the truck bed) on trucks and/or covering loads.
- Spills of transported material on public or private roads shall be promptly cleaned.
- On-site traffic shall be restricted to reduce soil disturbance and the transport of material onto roadways.
- Construction equipment and truck staging areas shall be located away from sensitive receptors, as practical and in consideration of potential effects on other resources.
- Dirt, gravel, and debris piles shall be covered as needed to reduce dust and wind-blown debris.

The following BMPs would be implemented by the Tribe to reduce emissions of criteria air pollutants (CAP) and diesel particulate matter (DPM):

- All diesel-powered equipment shall be properly maintained, and idling time shall be minimized to 5 minutes when construction equipment is not in use, unless per engine manufacturer's specifications or for safety reasons more time is required.
- Engines shall be kept in good mechanical condition to minimize exhaust emissions.
- All construction equipment with a hp rating of greater than 50 shall be equipped with diesel particulate filters, which would reduce approximately 85 percent of DPM.

The Tribe would reduce emissions of CAPs during operation through the following actions:

- The Tribe shall include electric vehicle (EV) capable spaces in the arena parking garage. The EV capable spaces shall be provided with EV supply equipment (i.e., chargers) to meet expected demand.
- The Tribe shall use energy efficient lighting and appliances to reduce energy usage, thus reducing indirect CAP emissions from the project.

Noise

The following construction requirements would be included as part of the Proposed Project through contractual requirements to minimize noise during construction:

- Construction activities shall only occur during the following timeframe:
  - Between the hours of 7 a.m. and 7 p.m., Monday through Friday
  - 8 a.m. and 5 p.m. on weekends
  - Federally recognized holidays
- The project contractor shall ensure that the following construction noise measures are met on-site during all phases of construction:
  - All equipment driven by internal combustion engines shall be equipped with mufflers, air-inlet silencers where appropriate, and any other shrouds, shields, or other noise-reducing features in good operating condition that meet or exceed original factory specifications. Mobile or fixed "package" equipment (e.g., arc welders, air compressors) shall be equipped with shrouds and noise- control features that are readily available for that type of equipment.
  - All mobile or fixed noise-producing equipment used on the project site that are regulated for noise output by a federal, state, or local agency shall comply with such regulations while in the course of project activity.
  - The construction contractor shall utilize "quiet" models of air compressors and other stationary noise sources where technology exists.
  - At all times during project grading and construction, stationary noise-generating equipment shall be located as far as practicable from sensitive receptors and placed so that emitted noise is directed away from residences.
  - Unnecessary idling of internal combustion engines shall be prohibited.
  - Construction staging areas shall be established at locations that would create the greatest distance between the construction-related noise sources and noise-sensitive receptors nearest the project site during all project construction activities, to the extent feasible.
  - Construction site and access road speed limits shall be established and enforced during the construction period.
  - The use of noise-producing signals, including horns, whistles, alarms, and bells, shall be for safety warning purposes only.
  - Project-related public address or music systems shall not be audible at any adjacent receptor.
  - Neighbors located adjacent to the construction site shall be notified of the construction schedule in writing once, at the beginning of the project. Subsequent noticing and/or coordination shall occur for significant changes to the construction schedule.
  - The construction contractor shall designate a "noise disturbance coordinator" who would be responsible for responding to any local complaints about construction noise. The disturbance coordinator shall be responsible for determining the cause of the noise complaint (e.g., starting too early, poor muffler, etc.) and instituting reasonable measures as warranted to correct the problem. A telephone number for the disturbance coordinator shall be conspicuously posted at the construction site.

2.2 ALTERNATIVE B – REDUCED INTENSITY ALTERNATIVE

Alternative B is similar to the Proposed Project but would include development of only the residential, multipurpose emergency shelter, and maintenance facility components. No commercial uses would be developed, including the proposed arena. All other aspects would be identical to the Proposed Project,

including the conveyance of the project site into federal trust status, water supply and wastewater treatment and disposal, grading and drainage, and development standards. The proposed residential site plan for Alternative B would be the same as provided for Alternative A (Figure 2-3 of **Appendix A)**. The proposed southern development site plan (multipurpose emergency shelter, and maintenance facility components) for Alternative B would be the same as provided for Alternative A, but would not include the commercial development (Figure 2-4 of **Appendix A)**.

2.3 ALTERNATIVE C – NO ACTION ALTERNATIVE

Under the No Action Alternative, the land would not be taken into trust and the Project and would not be developed with new housing or commercial uses. Existing single-family homes are assumed to remain. The Tribe would likely still develop the proposed multipurpose emergency shelter and maintenance facility with the land remaining in fee. The project site would remain within the jurisdiction of El Dorado County and could be developed at some point in the future consistent with federal, State, and local requirements. However, future development would be speculative. It is therefore assumed for the purposes of the EA that the majority of the project site would remain undeveloped or minimally utilized under the No Action Alternative.

2.4 COMPARISON OF THE PROPOSED ACTION AND ALTERNATIVES

2.4.1 Alternative A – Proposed Project

Alternative A could result in mitigatable environmental impacts to biological resources, cultural resources, transportation, noise, and visual resources.

2.4.2 Alternative B – Reduced-Intensity Alternative

Similar to Alternative A, development of Alternative B could result in mitigatable impacts to biological resources and cultural resources. These impacts would be slightly reduced in comparison to Alternative A and the transportation, noise, and visual impacts identified under Alternative A would be avoided.

2.4.3 Alternative C – No Action Alternative

While the No Action Alternative would result in reduced environmental effects in comparison to Alternatives A and B, this alternative would not meet the Tribe's objectives and the beneficial socioeconomic effects of the Proposed Project would not be realized.

2.4.4 Summary

Of the project alternatives evaluated in this EA, the Alternative A – Proposed Project would best meet the Tribe's objectives by reestablishing the Tribe's traditional land base and providing the desired level of development. While the No Action Alternative would not result in any of the environmental effects identified for the Proposed Project, all environmental effects from the Proposed Project would be reduced to a level of less-than-significant with implementation of protective measures and mitigation recommended in this EA.

Section 3 | Affected Environment and Environmental Consequences

3.1 LAND RESOURCES

3.1.1 Environmental Setting

Topography

The project site is located in the lower foothills of the Sierra Nevada Range. The topography of the project site is generally gently sloping with some steeper slopes along drainages and hillsides (Figure 3-1 of **Appendix A**). The project site is situated at an elevation range of approximately 1,100 to 1,600 feet above mean sea level.

Geologic Setting and Seismicity

Rock deposits within the project area consist of Mesozoic sedimentary, granitic, volcanic and ultramafic rocks (Miles and Goudey, 1997). Signs of mining activities are evident on the project site and surrounding areas, characterized by ground sluicing, mining ditches and mine shafts (Natural Investigations Company, 2022).

Within the project area is a relatively narrow zone of chaotically intermixed rocks known as the Sierra Foothills Mélange Belt. The metamorphic rocks are intermixed with rocks containing serpentine, called serpentinite. Naturally Occurring Asbestos (NOA) minerals, including chrysotile and tremolite, can also occur naturally in serpentine rock. The project site falls within an NOA Review Area designated by El Dorado County (El Dorado County, 2015).

While the project site is not within an identified fault zone, the area is subject to ground shaking from seismic activity on faults in both the Sierra Nevada Foothills and the San Francisco Bay Area. Figure 3-2 of **Appendix A** displays faults in the region. The project site is located near the Foothills Fault System which has the potential for landslides to occur where slopes are destabilized from cuts and fills associated with road building (El Dorado County, 2003).

Soils

Figure 3-3 of **Appendix A** provides a map of soils on the project site, while **Appendix B** details the characteristics of each soil type. The project site contains seven soil types, including Auburn silt loam (2 to 30 percent slopes), Auburn very rocky silt loam (2 to 30 percent slopes), Auburn very rocky silt loam (30 to 50 percent slopes), Diamond springs very fine sandy loam (15 to 30 percent slopes), Placer diggings, Serpentine rock land, and Sobrante silt loam (3 to 15 percent slopes) (NRCS, 2024).

Mineral Resources

The project site is within Mineral Resource Zone 3, which designates areas containing known or inferred concrete aggregate resources of undetermined mineral resource significance. See **Appendix B** for further details.

3.1.2 Impacts

Alternative A

Topography

Development of Alternative A would involve grading and the cutting and filling of slopes. These activities are not anticipated to result in significant impacts to topography. Development is primarily located in areas of the project site with gentle to moderate (0 – 20 percent) slopes. No construction would occur in the portions of the site that have steep (over 30 percent) slopes. Construction of Alternative A would have a less-than-significant effect on topography.

Geologic Setting and Seismicity

The proposed development has been designed to avoid construction on slopes greater than 30 thereby reducing the potential for landslide or subsidence hazards. Any fills needed to level building sites would be engineered and compacted to provide a stable foundation. All construction, including fill and foundation work would comply with the CBC. Due to the stable geology of the project site, compliance with the CBC, and avoidance of the steep slopes, geological hazards would be less than significant.

The project site is not located within a fault zone and surface rupture is not expected. The potential for strong shaking does exist, primarily from regional faults. Structural damage from shaking of buildings can be minimized by avoiding areas of geologic hazards such as soils with high shrink-swell characteristics and areas of slopes greater than 30 percent. The homes and roadways would be located in areas of the project site that have soils identified as having low shrink-swell potential. Development would primarily be located on areas with gentle to moderate (0 – 20 percent) slopes and slopes greater than 30 percent would not be developed.

As identified in **Section 2.1.5**, all development would be constructed in compliance with building code standards applicable in unincorporated El Dorado County at the time of construction, including the seismic design standards of the CBC. Accordingly, the development would be designed and constructed to withstand seismic shaking. Therefore, seismic shaking hazards would be less than significant.

Soils

Construction can lead to soil erosion as unprotected soils are eroded by stormwater runoff. Soils in the development area are loams with high erodibility factors. To ensure the reduction in soil erosion potential, the steeper slopes on the project site would be avoided. As described in **Section 2.1.4**, all disturbed areas would be revegetated and all cut slopes would have a slope ratio of 1.5 to 1 (horizontal to vertical) or flatter, and fill slopes would have a slope ratio of 2 to 1 or flatter. These standards would ensure that slopes are stable and would be revegetated, thereby minimizing long-term erosion potential.

As identified in **Section 2.1.5**, erosion control measures would be implemented as best management practices (BMPs) during construction. For construction activities disturbing one acre or more, the Tribe

shall apply for coverage under and comply with the National Pollutant Discharge Elimination System Construction General Permit from the U.S. Environmental Protection Agency, for construction site runoff during the construction phase. A Stormwater Pollution Prevention Plan (SWPPP) shall be prepared, implemented, and maintained throughout the construction phase of the development, consistent with the Construction General Permit requirements. The SWPPP would include measures to control runoff over exposed soils and the use of sediment traps such as straw wattles and silt fencing. Based on avoidance of steep slopes, incorporation of slope design and revegetation standards, and implementation of erosion control measures, potential soil erosion effects would be less than significant.

Mineral Resources

Construction of Alternative A would not result in the loss of any significant known mineral resources. While gold mining has occurred on the project site and in the general area in the past, no significant gold deposits are known to exist in the general area; therefore, no significant impacts would result.

Alternative B

Under Alternative B, impacts to land resources would be similar but reduced in comparison to Alternative A due to the reduced level of development. Overall, impacts to land resources would be less than significant with adherence to BMPs included in **Section 2.1.5**.

Alternative C

Under the No Action Alternative, the land would not be taken into trust and only the multipurpose emergency shelter and maintenance facility are assumed to be developed at some point in the future. Impacts to land resources from development would be less than significant, similar to their development under Alternatives A and B. There would be no impacts on the remainder of the project site.

3.2 WATER RESOURCES

The regulatory setting for water resources can be found in **Appendix B**.

3.2.1 Environmental Setting

Surface Water, Drainage, and Flooding

Watersheds and Drainage

The project site is located within the South Fork American River Watershed, within the smaller sub-watershed of Weber Creek. Weber Creek drains an approximate watershed area of 97.6 square miles and feeds into the South Fork American River above the Folsom Reservoir. The project site drains to Tennessee Creek, Dry Creek, and Slate Creek, which is a tributary of Dry Creek. These creeks in turn flow into Weber Creek north of the town of Rescue.

Surface Water Quality

Land use largely affects surface water quality, with both point source and nonpoint-source discharges contributing contaminants to surface waters. The nearest evaluated surface water to the project site is Weber Creek, which is not listed as an impaired waterbody under the Clean Water Act Section 303(d).

Flooding

The FIRM for the project site is Community Panel Number 06017C0750E (FEMA, 2008). Most of the project site is identified as Zone X, which is defined by FEMA as an area determined to be outside the 0.2% annual chance of flooding or 500-year floodplain (Figure 3-4 of **Appendix A**). A portion of the project site and the existing Rancheria is classified as Zone D. This area is classified as an area of undetermined, but possible flood hazard. Because the area classified as Zone D is surrounded by Zone X and does not have any significant streams, this area is not expected to present a flood hazard. In the northern portion of the project site are areas identified as Zone A, which is defined by FEMA as areas with a 1% annual chance of flooding or the 100-year floodplain with no depths or base flood elevations identified. This floodplain is associated with Dry Creek.

Groundwater

The primary mechanism for water storage and movement in the project area is within the structure of the soil and the joint systems in the rocks. The availability of groundwater in these fractured rock formations is variable and can be plentiful or quite limited. California Department of Water Resources (DWR) records identify eight wells on the project site, with individual yields ranging from approximately 1.8 to 20 gallons per minute (gpm) (DWR, 2023). The combined yield of project site wells based on well completion reports is 81 gpm. Near the project site, well completion reports identify well yields ranging from 0 to 200 gpm, with most wells yielding from 5 to 20 gpm.

3.2.2 Impacts

Alternative A

Surface Water and Drainage

Construction

Grading, excavation, and other construction-related activities could cause soil erosion at an accelerated rate during storm events. Another potential source of water quality degradation during construction activities is heavy machinery and other construction equipment. Construction equipment spills could result in the release of polluting constituents, such as heavy metals, oil, grease, and other petroleum hydrocarbons, to on-site channels. However, all potentially hazardous materials used during construction would be contained, stored, and used and handled in compliance with applicable federal standards and regulations. As discussed in **Section 2.1.5**, for construction activities disturbing at least one acre of soil the Tribe shall apply for coverage under the EPA's NPDES Construction General Permit and implement a SWPPP. The SWPPP would include standard measures to control runoff over exposed soils and the use of sediment traps such as straw wattles and silt fencing to prevent impacts to downstream aquatic resources. Based on avoidance of steep slopes, incorporation of slope design and revegetation standards, and implementation of erosion control measures, potential construction-related surface water quality and drainage impacts would be less than significant.

Operation

Alternative A would increase impervious surfaces, which has the potential to increase stormwater runoff during wet weather events. Increases in the peak flow of runoff could impact adequate drainage on the project site or contribute to drainage and erosion hazards downstream. As discussed in **Section 2.1.4**, surface runoff would be managed through the incorporation of retention basins and biofiltration swales (bioswales). Retention basins would be provided for the arena, parking garage and commercial

development. Runoff from the proposed access roads, driveways and smaller developed areas would be directed through bioswales to offset the added impervious area. The bioswales, planted with native grasses, would treat 100% of the runoff. The retention basins and bioswales would reduce site runoff into the adjacent drainage and ensure a reduction in mobile pollutants and sediments. Some of the runoff from the roofs and other impervious surfaces around the homes would be collected in the bioswales along roadways; other runoff would be dispersed into surrounding pervious areas (e.g. landscaping and undeveloped areas) and would not represent a substantial increase over existing conditions. Based on the avoidance of steep slopes, and incorporation of retention basins and bioswales, potential surface water quality and drainage effects would be less than significant.

Flooding

Alternative A does not propose development within a FEMA identified flood hazard zone or floodplain. The multipurpose emergency shelter and maintenance operations building are proposed in a portion of the project site for which flood risk is undetermined; however, based on nearby mapped areas and lack of surface waters, this area is not anticipated to be prone to flood hazards. Impacts associated with flooding would be less than significant.

Groundwater

Water Supply

Water supply would be provided from EID and/or groundwater wells. It is proposed that the arena, commercial development, multipurpose emergency shelter, and maintenance operations building connect to the EID system. Approximately eight residences on the project site are currently served by individual wells. Residential development may be connected to the EID system, served by groundwater wells, or a combination of both.

Near the project site, well completion reports identify well yields ranging from 0 to 200 gpm, with most wells yielding 5 to 20 gpm. A 5 gpm well is typically adequate for a single-family home. Based on well completion reports on file with DWR, at least 132 domestic wells have been developed in the PLSS Sections where the project site is located. It is anticipated that groundwater yields in the vicinity of the project site would meet the needs of Alternative A for homes not connected to the EID system and therefore Alternative A would result in less-than-significant impacts on the local groundwater supply.

Wastewater Treatment and Disposal

Wastewater treatment and disposal would be provided by septic systems and/or connection to the existing WWTP on the Rancheria. The existing homes on the project site use individual septic systems. It is proposed that the arena, commercial development, multipurpose emergency shelter and maintenance operations building connect to the WWTP. Individual residences may be served by the existing WWTP, have septic systems, or a combination of both.

If septic systems are used for homes, the systems would consist of a septic tank and leach field. These systems could be designed to serve individual homes or multiple homes. Shallow subsurface leach fields would allow for dispersing effluent over the greatest area possible, which would minimize risks of groundwater mounding and surface ponding, as well as impact the smallest amount of area possible within the proposed lots. Primary treatment of wastewater would be provided by septic tanks, which allow time and space for heavy solids and light grease to separate from wastewater. Solids settle to the bottom of the tank. Water from the septic tank would be slowly released to a leach field. Leach fields consist of perforated pipes that disperse effluent into the soil. Microorganisms in the soil, through an

aerobic process, decompose organic matter, solids, and nutrients in the effluent, thereby protecting groundwater quality.

A septic tank and leach field system that serves multiple family residences and has the capacity to serve 20 or more persons per day would qualify as a Class V injection well under the EPA Underground Injection Control Program. This would require submission of an Inventory of Injection Wells form as the first step in the EPA approval process. Wastewater effluent would be required to meet federal standards, and the leach fields would be setback from water sources consistent with El Dorado County standards.

Wastewater for the proposed arena, commercial development, emergency shelter, maintenance buildings would be treated at the Tribe's WWTP located on the Rancheria. As an option, wastewater from the residential development would also be treated at the WWTP. The existing WWTP complies with EPA's requirements. The plant produces disinfected tertiary recycled water as defined by Title 22 of the CCR. Recycled water is used within the toilets of the casino and for landscape irrigation. The remaining recycled water would be disposed on the Rancheria within the existing leach fields and spray fields. Impacts from wastewater treatment and disposal under this alternative would be less than significant.

Alternative B

Under Alternative B, impacts to water resources would be similar but reduced in comparison to Alternative A due to the reduced level of development. Overall, impacts to water resources would be less than significant with adherence to BMPs included in **Section 2.1.5**.

Alternative C

Under the No Action Alternative, the land would not be taken into trust and only the multipurpose emergency shelter and maintenance facility are assumed to be developed at some point in the future. Impacts would be less than significant, similar to their development under Alternatives A and B. There would be no impacts on the remainder of the project site.

3.3 AIR QUALITY

3.3.1 Regulatory Setting

The regulatory setting for air quality can be found in **Appendix B**.

3.3.2 Environmental Setting

Existing Air Quality Conditions

The project site is located in western El Dorado County, which is in the Mountain Counties Air Basin (MCAB). Air quality in the El Dorado County is influenced mostly by pollutant transport from upwind areas, such as the Sacramento and San Francisco Bay metropolitan areas, but also by local emission sources, such as wood burning stoves and fireplaces during the winter months and vehicles using area roadways and Highway 50.

NAAQS Designations

Western El Dorado County is classified as Severe-15 nonattainment for the 2008 8-hour ozone standard and Serious nonattainment for the 2015 8-hour ozone standard. Western El Dorado County is classified as Moderate nonattainment for the 2006 PM2.5 standard. Western El Dorado County is designated as attainment or unclassified for all other pollutants.

Hazardous Air Pollutants

Hazardous air pollutants (HAP) are a group of pollutants of concern that are a specific group of airborne chemicals designated by the EPA.

HAPs are less pervasive in the urban atmosphere than CAPs but are linked to short-term (acute) or long-term (chronic or carcinogenic) adverse human health effects. The majority of the estimated health risk from HAPs can be attributed to relatively few compounds, the most important being diesel particulate matter (DPM). Diesel engines emit a complex mixture of air pollutants composed of gaseous and solid material. The visible emissions in diesel exhaust are particulate matter that includes carbon. Diesel exhaust also contains a variety of harmful gases and over 40 other cancer-causing substances.

Naturally Occurring Asbestos

Portions of El Dorado County are underlain by ultramafic rock formations which contains naturally occurring asbestos. Asbestos is a health hazard when friable asbestos-containing materials become airborne. Inhalation of asbestos can cause fibrotic lung disease (asbestosis) and changes in the lining of the chest cavity (pleura). Naturally occurring asbestos is commonly found in serpentine and other ultramafic rock formations, and in the soils where these rock types are located.

Federal Class I Areas

The project site is not located within or adjacent to a federal Class I area. The nearest federal Class I areas are Desolation Wilderness (38 miles east) and Mokelumne Wilderness (40 miles east).

Sensitive Receptors

Some receptors are considered more sensitive than others to air pollutants. Schools, hospitals, and convalescent homes are considered to be relatively sensitive to poor air quality because children, elderly people, and the infirm are more susceptible to respiratory distress and other air quality related health problems. Residential areas are considered sensitive to poor air quality because people usually stay home for extended periods of time, with greater associated exposure to ambient air quality. Recreational uses are also considered sensitive due to the greater exposure to ambient air quality conditions because vigorous exercise associated with recreation places a high demand on the human respiratory system.

The land surrounding the project site is primarily rural residential. Homes are located on and directly adjacent to the project site. The closest schools to the project site are the California Montessori Project and Buckeye Elementary School located approximately 0.75 miles from the project site at the corner of Shingle Springs Drive and Buckeye Road. The closest assisted living facilities and medical centers are located over 2.5 miles away in Shingle Springs and Placerville.

3.3.3 Impacts

Methodology

Adverse impacts to ambient air quality could result if either construction or operation would result in violations of the CAA provisions, or if emissions would impede the ability of a state to meet NAAQSs. Construction and operation emissions were calculated using the EPA-approved California Emissions Estimator Model, Version 2022.1 (CalEEMod). The analysis assumes the construction of the arena, commercial space, multipurpose emergency shelter, maintenance operations buildings, and 15 homes would be constructed concurrently to provide a conservative estimate of emissions. The analysis of operation emissions is based on the completion of all proposed land uses.

Conformity regulations apply to federal actions that would cause emissions of CAPs above certain levels to occur in locations designated as nonattainment or maintenance areas for the emitted pollutants. As discussed in **Section 3.3.2**, the project site is in an area that is classified as being in attainment for all NAAQS with the exceptions of ozone and PM2.5. Based on the severe nonattainment status for ozone, the *de minimis* levels for VOCs and nitrogen oxides (NOx) are 25 tons per year. Based on the moderate nonattainment status for PM2.5 the *de minimis* level for PM2.5 is 100 tons per year. Because the project area is in attainment or unclassified for other CAPs, the least stringent *de minimis* levels of 100 tons per year are used as significant thresholds for PM10 and CO.

Alternative A

Construction Emissions

Construction of the proposed facilities would result in the temporary generation of emissions resulting from excavation, grading, material hauling, and worker trips. Fugitive dust, the dominant source of PM10 and PM2.5 emissions, is generated when vehicles and equipment disturb soil and other friable materials. Uncontrolled dust from construction can become a nuisance and potential health hazard to those living and working nearby. Off-road construction equipment is often diesel-powered and can be a substantial source of NOx emissions, in addition to PM10 and PM2.5 emissions. Worker commute trips and asphalt paving are dominant sources of ROG emissions. Such air quality effects generally would be temporary and localized.

Construction emissions were estimated using CalEEMod. The detailed output CalEEMod files generated for this analysis are included in **Appendix C.** The estimated construction emissions are summarized in **Table 3-1**.

Table 3-1: Estimated Construction Emissions – Alternative A

	VOC	NOx	CO	PM10	PM2.5
2025	0.33	3.24	3.49	20.3	2.20
2026	0.48	0.60	1.01	5.95	0.62
Maximum Emissions (tons/year)	0.48	3.24	3.49	20.3	2.20
De minimis level	25	25	100	100	100
Exceed level?	No	No	No	No	No

Source: **Appendix C**

As shown in **Table 3-1**, emissions of individual criteria pollutants from the construction of Alternative A would not exceed applicable *de minimis* levels; therefore, a conformity determination is not required for these pollutants during construction. Construction of Alternative A would not result in significant effects to regional air quality.

Operation Emissions

Operational emissions were estimated using CalEEMod. The analysis assumes the full buildout the proposed developments. Air quality effects associated with the operation of the proposed development would include emissions from vehicle traffic and area sources (e.g., landscape equipment, wood stoves and consumer products). The detailed output CalEEMod files generated for this analysis are included in **Appendix C**. The estimated operational emissions are summarized in **Table 3-2.**

Table 3-2: Estimated Operation Emissions – Alternative A

	VOC	NOx	CO	PM10	PM2.5
Maximum Emissions (tons/year)	13.3	4.13	36.0	5.77	2.58
De minimis level	25	25	100	100	100
Exceed level?	No	No	No	No	No

Source: **Appendix C**

As shown in **Table 3-2**, emissions of individual criteria pollutants from the operation of Alternative A would not exceed applicable *de minimis* levels; therefore, a conformity determination is not required for these pollutants during construction. Air quality impacts from operation of the development would be less than significant.

Hazardous Air Pollutants

Construction activities would result in short-term emissions of diesel particulate matter (DPM) from off-road heavy-duty diesel equipment exhaust and diesel-fueled haul trucks. Health risks associated with exposure of sensitive receptors to HAP emissions are typically based on the concentration of a substance or substances in the environment (dose) and the duration of exposure to the substance(s). Dose is

positively correlated with time, meaning that a longer exposure period would result in a higher exposure level. Thus, the risks estimated for a maximally exposed individual are higher if a fixed exposure occurs over a long period of time. According to the California Office of Environmental Health Hazard Assessment, health risk assessments, which determine the exposure of sensitive receptors to HAP emissions, should be based on a 70-year exposure period. Project construction, however, would occur over a much shorter period. Use of off-road heavy-duty diesel equipment would be limited and temporary, and diesel PM emissions would disperse rapidly with distance from the source. BMPs identified in **Section 2.1.5** include the use of diesel particulate filters on heavy equipment, which would reduce approximately 85 percent of DPM. Because HAP emissions would be limited in duration and amount, the project would result in a less-than-significant impact.

Operational HAPs are primarily associated with manufacturing sites, dry cleaners, autobody shops and industrial land uses. The Proposed Project does not include any facilities that would emit substantial sources of HAPs; accordingly, operational HAP emissions would be less than significant.

Naturally Occurring Asbestos

Construction within areas where NOA occurs can cause friable asbestos-containing materials to become airborne and present a health hazard. The project site is within an NOA Review Area identified by El Dorado County. Under El Dorado AQMD Rule 223-2, constructions projects in NOA Review Areas that move more than 20 cubic yards are required to comply with specified management practices and prepare an Asbestos Dust Mitigation Plan.

As identified in **Section 2.1.5**, Alternative A would be constructed in compliance with the applicable El Dorado AQMD Rules, including Rule 223-2 – Asbestos Hazard Mitigation. The bid specifications and construction contract would stipulate compliance with applicable El Dorado AQMD Rules and Regulations, including the preparation and implementation of an Asbestos Dust Mitigation Plan. The Asbestos Dust Mitigation Plan would identify best management practices to stabilize soil and avoid the generation of dust when handling asbestos-containing material. Compliance with Rule 223-2 would reduce impacts to a less-than-significant level.

Greenhouse Gas Emissions

This EA includes a quantification of GHG emissions resulting from Alternative A and a discussion of reduction measures. GHG emissions were estimated using CalEEMod (**Appendix C**). Estimated construction and operation GHG emissions are shown in **Table 3-3**. As shown, **c**onstruction GHG emissions are estimated at 1,562 tons of CO2e. Annual GHG emissions from operation of Alternative A is estimated at 5,897 tons of CO2e. Of this annual amount, 1,320 tons would be indirect emissions generated by mobile sources (cars and trucks).

Table 3-3: Estimated Greenhouse Gas Emissions – Alternative A

Emission Source	MT of CO2e/year
Construction (Total)	
Construction	1,562
Operation (Annual)	
Area	209
Energy	701
Mobile	4,895
Waste	59
Water	33
Refrigerants	0.4
Operation Total	5,897

Source: **Appendix C**

Implementation of Alternative A would not result in significant GHG emissions.

Alternative B

Under Alternative B, impacts to air quality would be similar to those under Alternative A; however, with a more limited scale of developments, the impacts to air quality would be reduced accordingly and less than significant.

Alternative C

Under the No Action Alternative, the land would not be taken into trust and no homes, commercial buildings or other improvements would be developed. No impacts to air quality would occur.

3.4 BIOLOGICAL RESOURCES

3.4.1 Regulatory Setting

The regulatory setting for biological resources can be found in **Appendix B**.

3.4.2 Environmental Setting

A Biological Assessment (BA) was completed for the Proposed Action and is included as **Appendix D**. This section summarizes information presented in the BA.

General Habitat Types and Sensitive Terrestrial Habitats

General habitat types within the project site include: Montane Riparian, Mixed Chaparral, Valley Foothill Riparian, Blue Oak Woodland, Valley Oak Woodland, Annual Grassland, Fresh Emergent Wetland, Riverine, Pasture, Urban, and Barren. These habitats are shown in Figure 3-5 of **Appendix A** and discussed further in **Appendix D**, a summary is provided below. Representative site photos are provided in

Attachment C of **Appendix D**. The following sensitive habitats occur in the project site: riparian habitat, and all wetlands and channels.

Potential Waters of the U.S.

The USFWS NWI identifies two features within the project site: Tennessee Creek and Dry Creek and associated wetlands. The general direction of surface runoff in the project area is to the northwest towards the South Fork American River. Locally, drainage flows to Tennessee Creek, Slate Creek, or Dry Creek.

Biological reconnaissance surveys included mapping of potential waters of the U.S. subject to USACE jurisdiction. Figure 3-5 of **Appendix A** provides an overview of water bodies found on the project site, and detailed maps are provided in **Appendix D**. Based upon USACE criteria, the following features within the project site were determined to be potentially subject to USACE jurisdiction:

- a perennial channel (Dry Creek), varying from 10 to 40 feet in width,
- an intermittent channel (Tennessee Creek), varying from 2 to 12 feet in width,
- various unnamed ephemeral channels (tributary to Dry Creek or to Tennessee Creek), 1 to 5 feet in width,
- various riverine wetlands (freshwater marshes) associated with the channels, and
- two stock ponds.

No vernal pools were detected within the project site.

Critical Habitat and Essential Fish Habitat

There are no critical habitats or essential fish habitat within, or adjacent to, the project site. The nearest critical habitat for California red-legged frog (*Rana draytonii*) is 17 miles to the east near the town of Camino. Critical habitat for the Pine Hill Endemics is at Pine Hill, 4 miles to the northwest of the project site.

Federally-Listed Species

A USFWS species list was generated online using the USFWS IPaC Trust Resource Report System (**Appendix D**). The following federally listed species have the potential to occur in the project area (**Appendix D**):

- El Dorado Bedstraw (*Galium californicum sierrae*) endangered
- Layne's Butterweed (*Senecio layeae*) threatened
- Pine Hill Ceanothus (*Ceanothus roderickii*) endangered
- Pine Hill Flannelbush (*Fremontodendron californicum decumbens*) endangered
- Stebbins' Morning-glory (*Calystegia stebbinsii*) endangered
- Northwestern pond turtle (*Actinemys marmorata*) proposed threatened
- California red-legged frog (*Rana draytonii*) threatened
- Foothill yellow-legged frog (South Sierra Distinct Population Segment; *Rana boylii*) endangered
- Monarch butterfly (*Danaus plexippus*) candidate

Plants

The only federally-listed plant species that could be present in the project area are those species called the "Pine Hill Endemics", named after the type locality and preserve areas / critical habitat areas. "Pine Hill Endemics" are specific plants found in only serpentine or gabbroic soils and only in this region of the world. The "Pine Hill Endemics" found to potentially occur in the project area are the El Dorado Bedstraw, Layne's Butterweed, Pine Hill Ceanothus, Pine Hill Flannelbush, and Stebbins' Morning-glory.

These Pine Hill Endemics are found only in a special soil type called "Rescue Series". According to the NRCS, the project site does not contain this soil type. Thus, the project site does not contain suitable habitat for El Dorado bedstraw, Layne's butterweed, Pine Hill ceanothus, Pine Hill flannel bush, or Stebbins' morning glory. These species are not discussed further in the EA.

Birds and Mammals

No federally-listed bird or mammal species were identified on the USFWS species list. Migratory birds do have suitable foraging and nesting habitat in the project site.

Reptiles and Amphibians

The following federally listed reptiles and amphibians were identified by the USFWS species list as having the potential to occur within the project site (**Appendix D**):

- Northwestern pond turtle (*Actinemys marmorata*) Proposed Threatened
- California red-legged frog (*Rana draytonii*) Threatened
- Foothill yellow-legged frog (South Sierra Distinct Population Segment; *Rana boylii*) Endangered

Fish and Invertebrates

The project site has one minor fishery resource—Dry Creek. However, migrating fish cannot access Dry Creek because of downstream impoundments (Folsom Dam, Nimbus Dam, etc.). These barriers prevent any federally listed fish species from occurring in Dry Creek.

The botanical surveys performed in 2022 and 2024 detected milkweed species (*Asclepias* spp.), a host plant for the monarch butterfly, in some patches of grassland areas. The project site contains suitable foraging habitat for the Monarch butterfly in the grassland habitats and it is within an Early Breeding Zone (**Appendix D**). There are no known roosting populations in or near the project site, and it is not within an overwintering zone. While the project site's grassland habitat constitutes suitable foraging habitat for monarch butterfly, it exists in isolated patches and does not constitute high-value foraging habitat.

State-Listed Species

No state-listed species occur in the project site, as determined by a query of the CNDDB and from field surveys. In 2018, one-special status plant species was detected within the project site, the Red Hills soaproot (*Chlorogalum grandiflorum*) (**Appendix D**). While not listed by under the California Endangered Species Act, the California Native Plant Society (CNPS) designates this species as a rare plant. This population is isolated, and removal of this one population is not expected to jeopardize the existence of the species as the species is protected in the Pine Hill preserve and other areas.

3.4.3 Impacts

Alternative A

Sensitive Habitats

Development would occur within oak woodland/forest, annual grassland, urbanized/developed, and chaparral habitats. These are common habitat types and are not considered sensitive under federal or state policies. The sensitive habitats within the project site (riparian habitats, channels, and wetlands) were designed to be avoided. Construction activities do not include land use changes to any riparian habitats, channels, or wetlands.

Waters of the U.S.

There are no wetlands or channels within the development area of Alternative A. Therefore, direct impacts to jurisdictional waters would not occur. Construction activities do not include land use change to channels, ponds, riparian habitat, or wetlands. Should future development occur, adherence to the NPDES permitting program and implementation of a SWPPP/BMPs (**Section 2.1.5**), indirect impacts to waters of the U.S. from construction activities would be less than significant.

Critical Habitat and Essential Fish Habitat

Designated or proposed Critical Habitat or Essential Fish Habitat does not occur within or adjacent to the project site. Therefore, there would be no impact to Critical Habitat or Essential Fish Habitat.

Federally Listed Species

Northwestern pond turtle

No populations of the northwestern pond turtle were detected during the multiple surveys performed over a 4-year span. Disturbances to the portions of the project site which contain suitable habitat only constitute an adverse effect if it occurs within the dispersal distance of an active population. The nearest known population occurs over 10 miles from the project site. Alternative A does not include disturbances or land use change to the perennial channels, ponds, riparian habitat or wetlands within the project site. With implementation of mitigation identified in **Section 4**, which includes pre-construction surveys, potential adverse effects to the northwester pond turtle during construction would be reduced to less than significant.

California red-legged frog

No populations of the California reg-legged frog were detected on the project site during multiple surveys performed over a 4-year span. Some portions of the project site contain some suitable habitat for California red-legged frogs: aquatic and riparian habitats of Dry Creek and Tennessee Creek. California red-legged frogs have apparently not recolonized the suitable habitat in the project site. In general, California red-legged frogs have had a difficult time recovering populations and recolonizing due to multiple factors—predation pressure (e.g. invasive bullfrogs), habitat degradation, and dispersal barriers; these factors are relevant in the project site as well. With implementation of mitigation identified in **Section 4**, which includes pre-construction surveys, potential adverse effects to the California red-legged frog during construction would be reduced to less than significant.

Foothill yellow-legged frog

No populations of the foothill yellow-legged frog were detected during the multiple surveys performed over a 4-year span. Disturbances to the portions of the project site which contain suitable habitat only constitute an adverse effect if it occurs within the dispersal distance of an active population. The nearest known population occurs over 10 miles from the project site. Alternative A does not include disturbances or land use change to the perennial channels, ponds, riparian habitat or wetlands within the project site. With implementation of mitigation identified in **Section 4**, which includes pre-construction surveys, potential adverse effects to the northwestern pond turtle during construction would be reduced to less than significant.

Monarch Butterfly

The project site contains suitable foraging habitat for the Monarch butterfly in the grassland habitats and it is within an Early Breeding Zone (**Appendix D**). There are no known roosting populations in or near the project site, and it is not within an overwintering zone. While the project site's grassland habitat constitutes suitable foraging habitat for monarch butterfly, it exists in isolated patches and does not constitute high-value foraging habitat. Implementation of mitigation identified in **Section 4,** which include protection measures for the milkweed plant, would reduce impacts to less than significant.

Migratory Birds

Trees, shrubs, and poles within the project site provide suitable nesting and perching habitat for migratory birds. If construction activities are conducted during the nesting season, nesting birds could be directly impacted by removal of trees, and indirectly impacted by noise, vibration, and other construction-related disturbance. Implementation of mitigation identified in **Section 4**, which includes pre-construction surveys, would reduce potential impacts on migratory birds to a less-than-significant level.

State Listed Species

No state listed species are known to occur in the project site, and project implementation is unlikely to impact any state listed species. One species designated by the CNPS to be very rare was observed in the development area, the Red Hills soaproot (*Chlorogalum grandiflorum*). This population is isolated, and impacts to this population are not expected to jeopardize the existence of the species, especially when the species has protection in the Bureau of Land Management's Pine Hill Preserve and other large preserve areas.

Alternative B

Under Alternative B, impacts to biological resources would be similar but reduced in comparison to Alternative A due to the reduced level of development. Overall, impacts to biological resources would be less than significant with mitigation identified in **Section 4**.

Alternative C

Under the No Action Alternative, the land would not be taken into trust and only the multipurpose emergency shelter and maintenance facility are assumed to be developed at some point in the future. As the development areas for these facilities are already disturbed, impacts to biological resources would be less than significant.

3.5 CULTURAL RESOURCES

Cultural Resources Investigations were prepared for the project site in 2022 and 2023 by Natural Investigations Company and are on file with the BIA Pacific Region (**Appendix E**). In 2022, approximately 255.1 acres of the project site were subject to a records search and survey. In 2023, the remaining 40.6 acres of the project site were subject to a records search and survey. The project site represents the Area of Potential Effect (APE) for purposes of Section 106 of the National Historic Preservation Act (NHPA). Key information from the Cultural Resources Reports is summarized below.

3.5.1 Regulatory Setting

The regulatory setting for cultural resources can be found in **Appendix B**.

3.5.2 Environmental Setting

The project area is located within the American River watershed, an area of intensive prehistoric use and occupation. A substantial Native American population inhabited the region prior to the mid 1800's until gold was discovered in the area. The project site is located within the ethnographic territory of the Nisenan (Southern Maidu) and Miwok. Prior to the gold rush, major villages supported themselves with the winter and spring salmonid runs, and vast floral and faunal resources, such as dense stands of oak. The early historic time period of the Sierra Nevada foothills near the project site is dominated by the discovery of gold in 1848. Mining occurred in nearly every ravine throughout the area, fueled by the discovery of gold deposits nearby in Folsom, Coloma, and along the South Fork of the American River.

Record Search

A California Historical Resources Information System (CHRIS) records search was conducted by the North Central Information Center (NCIC) on the campus of California State University, Sacramento on May 3, 2022 to determine whether prehistoric or historic cultural resources have been previously recorded within the APE and within a 0.5-mile radius of the APE (**Appendix E**). The CHRIS records search indicates that three cultural resources have been previously recorded within the APE, and nine additional resources have been recorded within the 0.5-mile search radius. The resources recorded within the APE include a historical mining site comprised of various features, the collapsed remains of an adit (mine entrance), and a trail segment.

Native American Consultation

Natural Investigations contacted the Native American Heritage Commission (NAHC) requesting a search of their Sacred Lands File for traditional cultural resources within or near the APE. The results of the searches returned by the NAHC were negative for Native American cultural resources in the project vicinity. The NAHC provided contact information for tribal members and organizations affiliated with the region and recommended that they be contacted for more information on the potential for Native American cultural resources within or near the APE. Natural Investigations sent project information letters and maps to all tribal contacts included on the NAHC list, requesting information on the potential for Native American cultural resources within or near the APE. Follow-up phone calls were made to all tribal contacts. To date, no responses have been received.

Field Survey

2022 Field Survey

An intensive pedestrian survey of 255.1 acres of the APE was conducted by Natural Investigations archaeologists in 2022 (**Appendix E**). Three cultural resources have been previously recorded on the project site (P-09-000329, -1972, and -1973), including a historical mining site comprised of various features, the collapsed remains of an adit, and a trail segment. The initial assessment of these sites found that they do not appear to be eligible for listing in the National Register of Historic Places (NRHP) or to constitute a historic property as defined under NHPA Section 300308. Background research finds no evidence that the sites are associated with any events (Criterion A) or people (Criterion B) significant in local, regional, or national history. The sites are types that are ubiquitous throughout the region, and so do not reflect the distinctive characteristics of a type, period, region, or method of construction, or represent the work of a master, or possesses high artistic values (Criterion C). Likewise, the sites are not likely to yield information important in history (Criterion D).

Four newly recorded archaeological sites were identified and recorded on the project site during the field survey (NIC-2022-SS-01 to -04). All are associated with the small-scale placer mining that took place in the area historically. Due to the lack of significant historical associations and limited research value, none of these minor mining resources appears to be eligible for listing in the NRHP or to constitute a historic property under any criteria as defined under NHPA Section 300308. The sites are not likely to yield information important in history (Criterion D).

Three historical isolates were identified and recorded on the project site during the field survey (NIC-2022-SS-ISO-01 to -03). The isolates include a single cone top can and two prospecting pits. No other artifacts or features were found in association with these isolates. Isolates are by definition found outside of an interpretable archaeological context comprised of groups of contemporary and associated artifacts, ecofacts, features, and/or sites. Without this context, isolates typically lack the potential to yield information important in history, the NRHP criterion (Criterion D) under which archaeological resources are most often found to be significant. As such, the three isolates identified on the project site during this inventory are not eligible for listing on the NRHP.

2023 Field Survey

The remaining 40.6 acres of the APE (not surveyed in 2022) were surveyed by Natural Investigations archaeologists in 2023 (**Appendix E**). The survey did not identify any prehistoric cultural resources or evidence to suggest a potential for buried deposits of cultural resources but did identify a segment of a historic water conveyance ditch (NIC-2023-SS-1). This ditch is an isolated segment that was part of a larger water conveyance system in the past that has been destroyed by residential development and road construction in the area.

Background research finds no evidence that the site is associated with any events (Criterion A) or people (Criterion B) significant in local, regional, or national history. Similar water conveyance systems are ubiquitous across the north-central Sierra, and so the site does not reflect the distinctive characteristics of a type, period, region, or method of construction, or represent the work of a master, or possesses high artistic values (Criterion C). The ditch cannot be associated with a specific period in history or historically important individual(s), it does not represent any unique features of design or construction, and it and is a typical example of water conveyance systems in the area. Consequently, the site does not meet Criterion D for inclusion on the NRHP. As such, the site is not eligible for listing on the NRHP.

3.5.3 Impacts

Alternative A

As described above, the APE does not contain known resources which are listed or eligible for listing on the NRHP. The APE primarily consists of Paleozoic metavolcanics and Mesozoic ultramafic rocks and Auburn series soils. These geologic formations and soils predate human occupation of the project area. Consequently, the potential for the presence of intact buried archaeological deposits in the APE is low to very low (Natural Investigations, 2022; 2023).

Although unlikely, it remains possible that construction of Alternative A could adversely impact previously undiscovered cultural resource, historic resources, or human remains. This is a potentially significant impact. Mitigation is provided in **Section 4** to reduce this impact to a less-than-significant level by ensuring the integrity of discovered cultural resources, historic resources, and human remains is protected.

Alternative B

Under Alternative B, impacts to cultural resources would be similar but reduced in comparison to Alternative A due to the reduced level of development. Overall, impacts to cultural resources would be potentially significant and reduced to a less-than-significant level by mitigation provided in **Section 4**.

Alternative C

Under the No Action Alternative, the land would not be taken into trust and only the multipurpose emergency shelter and maintenance facility are assumed to be developed at some point in the future. As the areas for these facilities are already graded, the potential for impacts to cultural resources is less than significant.

3.6 SOCIOECONOMIC CONDITIONS

3.6.1 Environmental Setting

El Dorado County Socioeconomic Setting

Population

Shingle Springs is located in the west-central area or “western slope” of El Dorado County. The County’s current population is estimated to be approximately 189,006, with most residents residing in unincorporated areas. The two largest cities are South Lake Tahoe (population 20,548), and Placerville (population 10,585) (CDOF, 2023a). The County’s population is expected to decrease by approximately 15 percent by 2060, with a projected total population of 159,660 (CDOF, 2024).

Housing

El Dorado County's housing consists primarily of single-family homes, which account for 84 percent of 95,278 total housing units. Multi-family units account for approximately 12 percent, and mobile homes make up about 4 percent. The average household has 2.5 persons (CDOF, 2023b).

Employment and Income

As of March 2024, El Dorado County's unemployment rate was 4.7 percent, below the state's average jobless rate of 5.3 percent (CEDD, 2024). Median household income is approximately $99,246, which is higher than the statewide average of $91,905 (US Census Bureau, 2023). Based on data from 2018-2022, about 7.6 percent of the population lives below the poverty level in the County, compared to a statewide average of 12.2 percent (US Census Bureau, 2023).

Shingle Springs Rancheria Socioeconomic Setting

The Tribe has a total enrollment of 562 members. The Tribe has 45 housing units available on the Rancheria. Each of these units is being used and the Tribe has a waiting list of around 173 Tribal Members waiting for homes.

3.6.2 Impacts

Alternative A

As described above, there are no low income or minority populations in the vicinity of the project site, except for the Tribe. The development of Alternative A would directly benefit tribal members by providing much needed affordable housing, stimulating economic growth, and creating employment opportunities.

The proposed housing under Alternative A would be compatible with adjacent residential development and would address the Tribe's need for on-reservation housing. The addition of 132 new homes on the Rancheria would expand available housing options for tribal members, specifically the approximately 173 tribal members on the housing waiting list, without significantly impacting El Dorado County's housing market, which already includes approximately 95,278 homes (CDOF, 2023b). Population changes would be minimal, as tribal members would primarily relocate from nearby areas. The addition of on-reservation housing would ensure tribal members can participate in important cultural activities and family gatherings held on the Rancheria. Potential adverse environmental effects are limited to short-term construction-related impacts. The incorporation of development standards and BMPs identified in **Section 2.1.5**, and mitigation measures identified in **Section 4**, ensure that all construction-related impacts would be less than significant. The surrounding community, including minority and low-income populations, will not be adversely impacted by the proposed development.

The development of Alternative A would not significantly impact the County's ability to provide governmental services. While the removal of the parcels from the County's jurisdiction would reduce property tax revenue, the Tribe provides services to the Rancheria, including fire protection and law enforcement, and contracts with other service providers for services. The Tribe also has an Intergovernmental Agreement with El Dorado, which provides tax revenue and other annual payments to the County.

Alternative A would result in increased economic activity, benefiting both the region's residents and tribal members. Additionally, construction of Alternative A and operation of the arena would generate employment opportunities for local residents.

With the implementation of development standards and BMPs, implementation of Alternative A would not result in significant socioeconomic or environmental justice impacts.

Alternative B

Under Alternative B, impacts to socioeconomic or environmental justice conditions would be similar to those under Alternative A. However, as Alternative B comprises only the residential, multipurpose emergency shelter, and maintenance facility components of Alternative A, the economic and employment benefits would be reduced, as well as the potential short-term construction-related impacts.

Alternative C

Under the No Action Alternative, the land would not be taken into trust and no further development would occur. No socioeconomic or environmental justice impacts would occur.

3.7 TRANSPORTATION AND CIRUCLATION

3.7.1 Environmental Setting

A Local Access, Safety, and Circulation Study (Traffic Study) was prepared in 2024 by Kimley Horn and is attached as **Appendix F**. Key information from the Traffic Impact Analysis is summarized below.

Existing Traffic Conditions

Study Area Roadway Intersections and Segments

To determine the existing traffic and circulation conditions in the vicinity of the project site, the following intersections and roadway segments were studied in **Appendix F**:

Intersections:

1. Koto Road/Red Hawk Parkway at Honpie Road
2. Shingle Springs Drive/Green Valley Road
3. Green Valley Road/Lotus Road
4. Green Valley Road/Greenstone Road
5. Green Valley Road/Missouri Flat Road
6. Missouri Flat Road/El Dorado Road
7. Green Valley Road/North Shingle Road
8. Green Valley Road/Ponderosa Road
9. Green Valley Road/Deer Valley Road
10. Green Valley Road/Cameron Park Drive/Starbuck Road

Roadway Segments:

1. Green Valley Road, east of Shingle Springs Drive
2. Green Valley Road, west of Shingle Springs Drive

Figure 3 in **Appendix F** displays the study locations and turning movements at each of the study intersections.

Existing Intersection Levels of Service

A Level of Service (LOS) analysis has been employed to provide a basis for describing existing traffic conditions. LOS measures the quality of traffic flow and is represented by letter designations from "A" to "F", with a grade of "A" referring to the best conditions, and "F" representing the worst conditions. Levels of service for intersections were evaluated against El Dorado County thresholds of LOS D for Rural Regions and LOS E for Community Regions. Table 5 in **Appendix F** shows the existing operating conditions for the study intersections. As shown in Table 5, the study intersections are operating at an acceptable level of LOS C or better.

Existing Roadway Segments

Roadway segments were assessed using the appropriate two-lane and multi-lane highway designations as defined in the HCM using HCS7 software. For LOS definition as defined in the HCM, refer to Table 4 in **Appendix F**. LOS for roadway segments are evaluated against El Dorado County thresholds of LOS D for Rural Regions and LOS E for Community Regions. Freeway segments were assessed using the appropriate functional segment designations as defined in the HCM using HCS7 software. LOS E was used as the operational threshold for all Caltrans' freeway facilities. Table 6 in **Appendix F** shows the operating conditions for the study roadway segments. As shown in Table 6, the study roadway segments are all operating at the acceptable level of LOS A. Table 7 in **Appendix F** shows the study freeway facilities operating conditions. As shown in Table 7, the study freeway facilities are operating at acceptable level of LOS D or better.

Bicycle and Pedestrian Facilities

Access to the project site is limited with only roadways providing access to the project. There are no bike lanes or sidewalks present along Shingle Springs Road and the adjoining roadways to provide positive separation between motor vehicle traffic and non-motorized transportation.

Transit Service

El Dorado Transit (EDT) operates buses throughout El Dorado County. Near the project site bus service is available with Route 50X. This Route is an express route between Placerville and Folsom. EDT operates thirteen trips, Monday through Friday from 6:00 a.m. until 7:00 p.m. Westbound stops at the Red Hawk Casino occur 10 minutes after the hour, at 6:10 a.m. through 6:10 p.m. There are 12 eastbound trips, with the first stop occurring at 8:41 a.m., recurring each hour until 6:41 p.m.

3.7.2 Impacts

Impacts to the transportation system would be significant if a project increases traffic volumes to the point where traffic exceeds the LOS standard of the applicable local jurisdiction. The El Dorado County General Plan establishes that roadways shall not be worse than LOS E in the Community Regions or LOS D in the Rural Centers and Rural Regions. If a project causes the peak hour LOS or volume/capacity ratio on a county road or state highway that would otherwise meet the County standards (without the project) to exceed these values, then the impact shall be considered significant. If any county road or state highway fails to meet the above listed county standards for peak hour LOS or volume/capacity ratios without the project, and the project will worsen conditions on the road or highway, then the impact shall be considered significant. Furthermore, if freeway facilities under Caltrans were to exceed LOS E levels, this would be considered a significant impact.

Alternative A

Trip Generation

The Proposed Project trip generation for the weekday, AM and PM peak-hours and Saturday peak-hour is presented in Table 1 in **Appendix F**. As shown in that table, Alternative A is estimated to generate 9,596 new weekday trips with 192 new trips occurring during the weekday AM peak-hour, 1,441 new trips occurring during the weekday PM peak-hour, and 1,401 new trips occurring during the Saturday peak-hour at sold out events. Trip distribution percentages are provided in Figure 5 in **Appendix F** while the associated assignment of project trips is shown in Figure 6 in **Appendix F**.

Intersection Level of Service

Existing (2023) plus Project peak-hour traffic volumes are presented in Figure 8 in **Appendix F** while Tables 8, 9, and 10 in **Appendix F** show the intersection, roadway segment, and freeway facilities operating conditions for this analysis scenario, respectively. As indicated by the tables, the study intersections operate from LOS A to LOS F, roadway segments from LOS A to LOS B, and the freeway facilities from LOS B to LOS D. As reflected in Table 8 in **Appendix F**, the additional traffic from Alternative A would result in one intersection deficiency as defined by the County.

Koto Road/Redhawk Parkway at Honpie Road on the Reservation currently operates at LOS A during the AM, PM, Friday PM, and Saturday Midday peak-hour without Alternative A. However, under the Existing (2023) + Project scenario, this intersection is anticipated to deteriorate to LOS F during the PM, Friday PM, and Saturday Midday peak-hour with the addition of the project. This is a significant impact as LOS F is below acceptable County standards. Therefore, mitigation has been included in **Section 4** to reduce the severity of this impact through raising the LOS level. The mitigation measure would entail optimizing signal timing. This would increase the predicted LOS F to LOS C during the PM and Friday PM peak hours and LOS B during the Saturday Midday peak hour. With mitigation, the impact to Koto Road/Redhawk Parkway at Honpie Road would become less than significant.

Traffic Signal Warrants

A summary of the peak-hour warrant results is presented in Table 18 in **Appendix F**. As shown in Table 18, the peak-hour signal warrant is satisfied under different analysis scenarios at Green Valley Road and Lotus Road (Intersection 3), meaning a signal would be required. As defined by the CAMUTCD, Intersection 3 meets Warrant 3 thresholds for signalization under Existing (2023) and Existing (2023) plus Project conditions. However, Intersection 3 is found to operate at acceptable levels of delay as defined by the County both with and without the Proposed Project under all analysis conditions. The CAMUTCD states," The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal." Since the Proposed Project does not degrade study area to unacceptable LOS levels in all scenarios, operation of the Proposed Project would not cause the requirement to signalize the facility.

Queuing Analysis

The 95th percentile vehicle queues were compared against the existing vehicle storage lengths at select intersection movements to determine if the queues are anticipated to exceed their available storage. Results of the queuing evaluation can be seen in Table 19 in **Appendix F** where shaded cells in the table represent conditions where the reported queue exceeds available vehicle storage capacity by more than one car length (25-feet). As shown Table 19 in **Appendix F**, the addition of Alternative A traffic adds modest amounts of additional queuing with no significant impact induced. Therefore, this impact is less than significant.

Facility Safety Review

A facility safety review identifies the existence of any current traffic problems in the local area, such as a high-crash location, non-standard intersection or roadway, or an intersection in need of a traffic signal. The County's 2021 Annual Collision Location Study7 (ACLS) provides data on facilities (i.e., intersections and roadway segments) throughout the County during a three-year period between January 1, 2019, and December 31, 2021. Using the ACLS, sites that experienced three or more incidents during this time frame were selected for investigation and determination of corrective action(s). Table 20 in **Appendix F** provides a summary of project analysis facilities included in the ACLS and their identified recommended actions. Collision data provided by the County does not identify safety deficiencies at any study facilities included in this assessment. Therefore, Alternative A is not anticipated to significantly alter these existing traffic conditions, and consequently a less than significant impact would occur.

Alternative B

Under Alternative B, transportation or circulation impacts would be similar to those under Alternative A; However, as Alternative B comprises only the residential, multipurpose emergency shelter, and maintenance facility components of Alternative A, vehicle trips and associated service impacts would be reduced accordingly and less than significant.

Alternative C

Under Alternative C, the land would not be taken into trust and development would occur. No transportation or circulation impacts would occur.

3.8 LAND USE AND AGRICULTURE

3.8.1 Regulatory Setting

The regulatory setting for land use and agriculture can be found in **Appendix B**.

3.8.2 Environmental Setting

Land Use

The project site is located in unincorporated El Dorado County, near the existing Shingle Springs Rancheria, and is mainly undeveloped except for eleven single-family homes, graded dirt roads, and fences. Most of the undeveloped area is oak woodland and chaparral. The project site is designated Low Density Residential (LDR) by the General Plan (El Dorado County, 2004). The LDR designation supports single-family residential development in rural settings. The Zoning Ordinance designates the project site as Residential Estate (RE). The RE designation aims to preserve rural character by regulating low-density and rural residential development, allowing one dwelling per five (RE-5) or ten acres (RE-10) (El Dorado County, 2018).

The project site is generally bordered by Green Valley Road to the north, existing trust parcels to the east, Highway 50 to the south, and Shingle Springs Drive to the west. The area east of the project site is zoned RE. North of the project site, beyond Green Valley Road, is zoned a combination of Two-acre Residential (R2A) and Three-acre Residential (R3A), while the area west of Shingle Springs Drive is zoned RE-10 with

some R2A areas beyond. South of Highway 50 is zoned Commercial Community (El Dorado County, 2018). The County zoning of the project site and surrounding area is shown in Figure 3-6 of **Appendix A**.

Agriculture

The completed Form AD 1006 for the project site is provided in **Appendix G**. Approximately 5.8 acres of the project site is identified by the NRCS as Farmland of Local Importance. The remainder of the approximately 295-acre project site is identified by the NRCS as not prime farmland. The project site is not under an active Williamson Act Contract (California DOC, 2024).

3.8.3 Impacts

Alternative A

Land Use

The Tribe proposes to build an arena and parking garage, residential development, emergency shelter, utility buildings, and commercial space. The project site is currently zoned RE, with a combination of 5 to 10 acre lots. The Proposed Project would result in the transfer of the project site into federal trust status for the benefit of the Tribe, thereby removing the property from County land use jurisdiction. Only federal and tribal land use regulations would apply to the project site once the land is taken into trust.

The residential component of the Proposed Project is comprised of 16 townhomes, 24 cottages, and 92 single-family homes, for a total of 132 units. The proposed residential development is generally consistent with the allowable residential uses for the RE zoning designation, which include community care facilities, single unit detached dwellings, guest houses, accessory dwelling units, and small transitional housing. Although the Proposed Project's residential density is higher on some parcels than the County's underlying zoning designation of RE (5 to 10 acre lots), it is compatible with the R2A and R3A zones directly north and south of the project site. Additionally, the number of residences is within what would be anticipated for the full project site as discussed in **Section 3.13.1**. Furthermore, the Tribe would voluntarily comply with the County's development standards, including minimum setback requirements, as specified in section 130.24.030 of the Zoning Ordinance.

The commercial component of Alternative A, located in the southern portion of the project site, includes the arena, parking garage, emergency shelter, utility buildings, and commercial space. This development would be similar in nature to the existing commercial development on the Rancheria, as well as the community commercial zoning designation south of Highway 50. Once the land is taken into federal trust, development of the project site would no longer be subject to County land use and zoning regulations, however, as noted in **Section 2.1.5**, the Proposed Project would be constructed and operated in a manner that is generally consistent with relevant El Dorado County Ordinances. This would include meeting setback requirements. Traffic from the commercial enterprises would be routed through the Rancheria and not through the adjacent residential area, which would reduce impacts on surrounding land uses. As identified in **Section 2.1.5**, existing trees and vegetation would be retained to the extent feasible and additional screening trees and vegetation would be planted around the buildings, which will minimize potential conflicts with adjacent residential land use. Alternative A would result in less-than-significant impacts associated with land use conflicts.

Agriculture

The project site contains 5.8 acres of Farmland of Local Importance. Per FPPA guidelines, if a site receives an FCIR combined score of 160 or more, alternative sites should be considered to determine if an alternative site would serve the proposed purpose and have a lower combined score or convert fewer acres of farmland (7 CFR § 658.4 (c)). A FCIR Form was completed for Alternative A (**Appendix G**). Assuming a maximum relative value of farmland, the total score would still be under 160 points and thus consideration of alternative sites is not warranted.

The County designates the project site and surrounding area for residential rather than agricultural use. However, customary agricultural activities associated with rural residential areas, such as home gardening, and the presence of horse stables and paddocks, are expected to continue under the Proposed Project. Alternative A would not interfere with existing agricultural uses within the surrounding rural residential community. No significant impacts to agriculture would occur.

Alternative B

Under Alternative B, impacts to land use and agriculture would be similar to those under Alternative A; however, with a more limited scale of developments (the arena, parking garage and commercial space would not be developed), the impacts to land use and agriculture would be reduced accordingly and less than significant.

Alternative C

Under the No Action Alternative, the land would not be taken into trust and only the multipurpose emergency shelter and maintenance facility are assumed to be developed at some point in the future. Impacts to land use and agriculture from development of these facilities would be less than significant, similar to their development under Alternatives A and B. There would be no impacts on the remainder of the project site.

3.9 PUBLIC SERVICES

3.9.1 Environmental Setting

Water Supply

El Dorado Irrigation District (EID) provides water to the Rancheria via a single 3-inch meter located in the southeastern portion of the project site. Within the Rancheria, water is delivered by a water system that is owned and operated by the Tribe independently of EID. This system, which includes a storage tank and booster pump station, receives potable water from EID under an existing agreement. The potable water is stored in a 500,000-gallon tank at the WWTP. The additional facilities associated with the potable water system are a high and low flow booster pump station, pump building and distribution system. The terms of the water supply agreement, detailed in Appendix C of **Appendix H**, state that EID will provide water service at a maximum instantaneous rate of 95 gpm and a total average volume of 135,000 gpd. The agreement also states that the Tribe may apply for more water in the future (**Appendix H**).

Thirteen of the project parcels are located within the EID service area. The remaining 16 parcels are adjacent to but not located within EID's existing service area (Figure 3-7 of **Appendix A**). EID's

Western/Eastern Supply Area derives its supplies under rights and entitlements emanating from both the South Fork American River watershed and the Cosumnes River watershed via Sly Park Reservoir. In 2022, EID estimated that it had an available supply of 30,580 acre-feet of water to serve the Western/Eastern Supply Area. The estimated water demand of this area is 26,212 acre-feet, leaving approximately 4,368 acre-feet unallocated. EID converts the unallocated amount to Equivalent Dwelling Units (EDUs) to estimate the availability of new water meters that can be issued. In 2022, EID estimated a total of 11,414 available EDUs in the Western/Eastern Supply Area (EID, 2022). EID has also estimated that it has adequate supply to provide for expected demand during normal and dry year conditions through 2045, its current planning horizon (EID, 2021).

Wastewater Service

Wastewater generated from the Rancheria is collected and pumped to an onsite WWTP that is owned and operated by the Tribe independent of EID and located in the southeast corner of the Rancheria. The WWTP employs a membrane bioreactor (MBR) process that produces highly treated tertiary effluent acceptable for irrigation purposes and other reuse applications, as defined by the California Department of Health Regulations (Title 22 CCR). Disinfected tertiary recycled water produced on-site is currently reused for toilet and urinal flushing, fire suppression, casino, hotel and clinic landscape irrigation, WWTP treatment process water, and tribal residential landscape irrigation. The remaining recycled water is disposed of on the Rancheria via leach and spray fields. Three seasonal storage tanks provide a total of 8.4 million gallons of recycled water storage capacity that is needed during winter when rain events temporarily preclude the use of the spray fields.

Solid Waste

El Dorado Disposal provides solid waste and recycling services for the Rancheria and project area, delivering non-hazardous waste to the Material Recovery Facility (MRF) in Placerville. Unrecovered materials from the MRF are sent to Potrero Hills Landfill (Suisun City, Solano County; permitted capacity: 83,100,000 cubic yards, 13,872,000 remaining; estimated closure: 2048) and Forward Landfill (Manteca, San Joaquin County; permitted capacity: 59,160,000 cubic yards, 24,720,669 remaining; estimated closure: 2036) (CalRecycle, 2022). The 2012 El Dorado County Solid Waste Management Plan aims to minimize waste generation, increase diversion to 75%, reduce improper disposal, and lower greenhouse gas emissions (El Dorado County, 2012).

Electricity, Natural Gas, and Telecommunications

Electricity and natural gas for the project area are provided by Pacific Gas and Electric (PG&E) (PG&E, 2014). Many private companies provide telephone, internet, and cable services to properties within the vicinity of the project site. Companies such as Verizon Wireless, T-Mobile, and AT&T offer a host of telecommunication services in the region.

Law Enforcement

Public safety within the Rancheria is ensured through the joint efforts of the Tribal Police and the El Dorado County Sheriff's Office (EDSO). The Tribal Police department employs sworn and non-sworn community service officers who assist in areas such as crime prevention, community outreach, dispatch, surveillance, and building security. All tribal officers are trained according to the standards set by the

California Commission on Peace Officer Standards and Training and/or the US Government's BIA FLETC, with regular updates to ensure continued proficiency (Shingle Springs Band of Miwok Indians, 2024).

Outside the Rancheria, law enforcement falls under the jurisdiction of EDSO. The Sheriff's Office has two main locations. The nearest one to the project site is located 6 miles east at 200 Industrial Drive, Placerville, CA. Additionally, a Sheriff's sub-station operates 10 miles west off Latrobe Road at 4355 Town Center Drive, El Dorado Hills, CA. The West Slope Patrol Unit of the EDSO provides patrol services to the Project area. The patrol unit of EDSO includes 2 lieutenants, 8 sergeants, and 50 deputies (Miller 2024, pers. comm.). Under a memorandum of understanding between El Dorado County and the Tribe, services are extended to the Rancheria.

Fire Protection and Emergency Medical Services

The El Dorado County Fire Protection District provides fire protection to the Rancheria and project area. The nearest station to the Project site is Station 28, located at 3860 Ponderosa Road in Shingle Springs, approximately two miles from the Project site. Station 28 is staffed 24 hours a day, 7 days a week by an engine company that is staffed with three firefighters and two emergency medical technicians (EMTs) (Cordero 2024, pers. comm.).

Wildland fire protection on the Rancheria is provided by the Tribal Fire Department. The Tribal Fire Department has 10 permanent and 8-10 seasonal firefighters. Personnel meet qualifications of the National Incident Management System (NIMS) Wildland Fire Qualifications System, National Wildfire Coordinating Group (NWCG), and BIA Incident Qualifications Card (Red Card) certification program. The Tribal Fire Department responds to incidents on the Rancheria and throughout northern California and coordinates fuel reduction, prevention, and suppression efforts on the Rancheria (Shingle Springs Band of Miwok Indians, 2024).

3.9.2 Impacts

Alternative A

Water Supply

The Proposed Project includes construction of a new arena and support facilities, commercial space, multi-purpose shelter and maintenance operations building and residential community. These facilities are expected to use potable water for consumption and toilet and urinal flushing. **Table 3-4** displays projected average day demands along with calculated maximum day demands (MDD) based on a 1.5 peaking factor. While the Tribe may choose to use groundwater to supply some or all of the proposed homes, the analysis in this section focuses on potential impacts to the EID water supply. For impacts to water resources associated with groundwater use, please refer to **Section 3.2**.

With the additional demands from the Proposed Project the total potable water demand is expected to exceed the current EID contractual limit of 135,000 gpd on an average daily basis. The exceedance is projected to be 9,600 gpd after the non-residential portions of the Proposed Project are constructed, and 43,000 gpd after completion of the residential component. As such, the EID contractual limits for instantaneous and average day flows will need to be amended to account for higher rates of demand for the Proposed Project.

In addition, to increasing the existing EID water supply limit, 16 of the 29 project parcels are adjacent to, but not located within EID's existing service area (Figure 3-7 of **Appendix A**). To gain service from EID for the proposed residential development on those 13 parcels, the Tribe will need to request annexation from EID and the El Dorado County Local Agency Formation Commission (LAFCO). Once approved, the Tribe would then be able to construct an extension of the Rancheria water system to supply the proposed homes.

Table 3-4: Current and Projected Water Demands

Parameter	Average Day Potable Demand (gpd)	Maximum Day Potable Demand (gpd)[1]
Existing Facilities	123,000	184,500
Project (arena and support facilities, incremental)	16,600	24,900
Project (residential, incremental)	38,300	57,450
Total without Residential	**139,600**	**209,400**
Total with Residential	**177,900**	**266,850**

Notes:
[1] Based on average day demand multiplied by a peaking factor of 1.5.
Source: **Appendix H**

Potable water for the proposed homes would be provided by an extension of the existing Rancheria water system that is owned and operated by the Tribe. Pipelines would be located along existing and proposed roads. Since the proposed residential development is situated at a lower elevation by approximately 250 feet, a pressure reducing valve (PRV) will be installed upstream of the development to manage pressure levels due to the elevation drop. The existing 0.5 MG potable water storage tank has adequate volume to meet the maximum daily demand of the Proposed Project. The current distribution pump station also has sufficient capacity to handle average, peak day, and peak hour demands (**Appendix H**).

In addition to residential service connections, fire hydrants would be provided consistent with the California Fire Code. The Rancheria water system was designed and constructed in compliance with the California Plumbing Code.

Alternative A would require 132 service connections/EDUs for the residential development. Based on the estimated water demand for the arena, commercial development and other proposed land uses provided in **Table 3-4** and EID's conversion to EDUs (0.57 acre-feet per EDU; EID, 2022), an additional 49 EDUs would be required. In total, the project would require a water supply of approximately 181 EDUs. EID has recently estimated that it has 11,414 available EDUs in the Western/Eastern Supply Area, where the project site and Rancheria are located. EID has also estimated that it has adequate supply to provide for expected demand during normal and dry year conditions through 2045, its current planning horizon. All service connections would be subject to conservation orders issued by the State and EID in response to drought conditions. The development of Alternative A would not result in significant water supply impacts.

Wastewater Service

The Proposed Project includes construction of a new arena and support facilities, commercial space, multi-purpose shelter and maintenance operations building and residential development. Total wastewater flows for the existing facilities and Proposed Project are detailed in **Table 3-5**.

An engineering feasibility study was conducted to evaluate the ability of the Tribe's existing wastewater treatment and disposal system to handle the additional wastewater flows from the Proposed Project (**Appendix H**). The feasibility study found that the wastewater system has adequate storage and disposal capacity to serve the Proposed Project. The extension of infrastructure to serve the proposed facilities would include new influent lift stations for the arena and residential development and pipelines connecting to the existing wastewater system. In addition, the WWTP would required improvements to accommodate the increase in flows. These improvements include upsizing the screens at the headworks, adding additional emergency storage capacity, increasing existing pump capacity, modifying the disinfection system, and modifying the electrical and control equipment. All of these improvements would occur with the existing WWTP. The improvements needed are described further in **Appendix H**. With these improvements to the WWTP and recycled water system, wastewater generated by the Proposed Project would not exceed the treatment or disposal capacity of the Tribe's wastewater treatment system; no adverse effects would occur.

Table 3-5: Projected Wastewater Flows

Parameter	Total Projected Wastewater Flow, no Residential (gpd)	Total Projected Wastewater Flow, with Residential (gpd)
Existing Facilities	139,000	139,000
Project (incremental)	15,000	49,000
Total Average Daily Wastewater Flow[1]	**154,000**	**188,000**

[1] All flows in this table are average day flows.
Source: **Appendix H**

Solid Waste

Solid waste would be generated during construction of the proposed homes and commercial facilities. Furthermore, solid waste would be generated from the residents who live in the homes and from the operation of the arena and other proposed facilities. Construction waste may include green waste from vegetation clearing, soil and rock from grading, and general waste of construction materials and packaging. Solid waste and recycling services would be provided to the homes and commercial facilities by El Dorado Disposal. All solid waste generated during construction and operation of the Proposed Project would be sent to El Dorado Disposal's Material Recovery Facility where over 50 percent of material is recovered for recycling. The remaining solid waste would be delivered to the Potrero Hills Landfill or Forward Landfill, which have adequate disposal capacity. Alternative A would result in a less-than-significant impact to solid waste service.

Electricity, Natural Gas, and Telecommunications

Construction on the project site poses a risk of damaging underground utilities, potentially leading to outages or injuries, which could have significant impacts. Therefore, before initiating construction of Alternative A, the Tribe is required to contact the Underground Service Alert (USA) of Northern/Central California and Nevada. This step ensures that utility service providers are informed of excavation activities at the work site, thus reducing the likelihood of unintentional disruption to existing utilities.

The Underground Service Alert (USA) of Northern/Central California and Nevada offers a complimentary "Dig Alert" service to all excavators, including contractors, homeowners, and others operating in the region. By making a single call, excavators automatically notify all USA members (utility service providers)

who may have underground facilities at the work site. In response, USA members mark or stake the horizontal path of underground facilities, provide information about these facilities, and grant clearance for excavation. This straightforward safety measure not only safeguards excavators from personal injury but also prevents damage to underground facilities (USA North, 2024).

The Tribe will engage with USA and coordinate with PG&E and other utility service providers regarding any excavation activities and extension of services to residential properties. No adverse effects on the utility system are anticipated.

Law Enforcement

The Tribal Police Department in conjunction with the El Dorado County Sheriff's Office would provide law enforcement services to the project site once the site is taken into trust. EDSO has indicated that they will be able to serve the Proposed Project. The EDSO expects that the additional facilities will increase calls for service and the necessary staffing levels will need to be negotiated between the EDSO, the Tribe and El Dorado County (Miller 2024, pers. comm.). The Tribe compensates El Dorado County under a Memorandum of Understanding and Intergovernmental Agreement for the provision of law enforcement services. The fiscal responsibility for staffing levels associated with a potential increased calls for service would be negotiated under the MOU/Intergovernmental Agreement. Based on EDSO's ability to serve the Proposed Project and an existing agreement in place to address fiscal impacts to El Dorado County, the Proposed Action would result in a less-than-significant impact to law enforcement services.

Fire Protection and Emergency Medical Services

Fire risks may occur as the result of the Proposed Action during construction and operation of the proposed facilities. The short-term construction related effects include the potential fire threat associated with equipment and vehicles coming into contact with wildland areas. Construction vehicles and equipment such as welders, torches, and grinders may accidentally spark and ignite vegetation and building materials. This increased risk of fire during the construction of the proposed facilities would be like that found at other construction sites. Hazardous Avoidance BMPs, as presented in **Section 2.1.5**, have been incorporated into the project description to prevent fire from construction.

The construction of the proposed facilities would be undertaken consistent with the California Fire Code and the County's Vegetation Management and Defensible Space Ordinance (see **Section 2.1.5**, Development Standards). The Tribal Fire Department actively manages fuel reduction, prevention and suppression efforts on the Rancheria. The Tribe also contracts with El Dorado County Fire Protection District to provide fire protection and EMT service to the Rancheria.

The operation of Alternative A would create additional demand for fire protection and emergency services from the Tribal Fire Department and El Dorado Fire Department District. The El Dorado County Fire Protection District has indicated that the additional homes and facilities should not create an impact that would exceed the capabilities of Station 28 (Cordero 2024, pers. comm.). Impacts from the arena would be isolated to large events, and the structure itself would not create an impact exceeding the capabilities of Station 28 and surrounding units. EMS services for the Proposed Project would be provided by Tribal EMTs and the District consistent with current practice. The Tribe compensates the El Dorado County Fire Protection District for the services it provides. Therefore, Alternative A would have a less than significant effect on fire protection and emergency medical services.

Alternative B

Under Alternative B, impacts on public services would be similar to those under Alternative A. However, as Alternative B comprises only the residential component of Alternative A, the potential impacts to public services would be reduced accordingly and less than significant.

Alternative C

Under the No Action Alternative, the land would not be taken into trust and only the multipurpose emergency shelter and maintenance facility are assumed to be developed at some point in the future. Impacts to public services from development of these facilities would be less than significant, similar to their development under Alternatives A and B. There would be no impacts on the remainder of the project site.

3.10 NOISE

3.10.1 Regulatory Setting

The regulatory setting can be found in **Appendix B**.

3.10.2 Environmental Setting

Existing Ambient Noise

The existing noise environment in the project site area is defined primarily by vehicle traffic on the local roadway network, existing Red Hawk Casino operations, and construction activity on the existing Rancheria property. The primary source of traffic noise in the project vicinity is US-50, and Green Valley Road also contributes to the ambient noise environment. To quantify the existing ambient noise environment on the project site, Saxelby Acoustics conducted a noise study that involved a continuous noise measurement survey (noise study attached as **Appendix I**). The noise measurement locations are shown on Figure 3-8 of **Appendix A**. A summary of the noise level measurement survey is provided in **Table 3-6**. **Appendix I** contains the complete results of the noise monitoring. The sound level meter was programmed to record the maximum, median, and average noise levels at each site during the survey. The maximum value, denoted L_{max}, represents the highest noise level measured. The average value, denoted L_{eq}, represents the energy average of all of the noise received by the sound level meter microphone during the monitoring period. The median value, denoted L_{50}, represents the sound level exceeded 50 percent of the time during the monitoring period.

Sensitive Receptors

Some land uses are considered more sensitive to noise than others. Land uses often associated with sensitive receptors generally include residences, schools, libraries, hospitals, and passive recreational areas. Noise sensitive land uses are typically given special attention in order to achieve protection from excessive noise.

Sensitivity is a function of noise exposure (in terms of both exposure duration and insulation from noise) and the types of activities involved. In the vicinity of the project site, sensitive land uses include existing single-family residential uses located west of south of the project site.

Table 3-6: Existing Ambient Noise Levels Using Continuous 24-Hour Measurements (dBA)

Site	Date	L_{dn}	Daytime (7:00 am - 10:00 pm)			Nighttime (10:00 pm – 7:00 am)		
			L_{eq}	L_{50}	L_{max}	L_{eq}	L_{50}	L_{max}
LT-1	2/23/24	70	72	55	84	53	39	57
	2/24/24	50	49	39	64	42	39	55
	2/25/24	48	46	43	64	40	38	53
LT-2	2/23/24	55	51	47	70	49	45	64
	2/24/24	56	52	48	71	49	46	67
	2/25/24	55	52	48	71	48	45	66
LT-3	2/23/24	61	57	51	77	54	49	73
	2/24/24	63	58	53	79	56	50	77
	2/25/24	62	59	53	78	55	50	75
LT-4	2/23/24	71	68	68	78	63	59	73
	2/24/24	69	67	67	78	62	58	75
	2/25/24	68	67	67	77	60	56	71

Source: **Appendix I**

3.10.3 Impacts

During construction, a significant impact would occur if construction activities were to occur outside of the acceptable timeframe of hours of 7 a.m. and 7 p.m., Monday through Friday, and 8 a.m. and 5 p.m. on weekends, and on federally recognized holiday as specified in Policy 6.5.1.11 of the General Plan.

In additional, a significant vibration impact would occur if the alternatives were to produce vibrations levels capable of causing structural damage, as specified in **Table 3-7**.

Alternative A

Construction Noise

Noise from construction activities would add to the noise environment in the immediate project site vicinity. As indicated in **Appendix I**, activities involved in construction would generate maximum noise levels ranging from 76 to 90 dBA L_{max} at a distance of 50 feet. The nearest residential uses are located approximately 600 feet to the west, as measured from the center of the proposed entertainment center. At this distance, maximum construction noise levels would be in the range of 35-49 dBA L_{eq} and 55-69 dBA L_{max} at the nearest residential uses. This could exceed the County's 60 dBA L_{max} construction noise level limits, as outlined in **Appendix I**. However, as stated in the County General Plan Policy 6.5.1.11 and Chapter 130.37 of the County Code, the construction activities are exempt if they occur between the hours of 7 a.m. and 7 p.m., Monday through Friday, and 8 a.m. and 5 p.m. on weekends, and on federally recognized holidays. BMPs have been included in **Section 2.1.5** that ensure construction activities would not occur outside of these limits and that construction noise would be reduced to the extent feasible. Therefore, no significant adverse noise impacts are expected to occur.

Construction Vibration

Construction vibration impacts include human annoyance and building structural damage. Human annoyance occurs when construction vibration rises significantly above the threshold of perception. Building damage can take the form of cosmetic or structural. **Table 3-7** depicts vibration levels from common construction equipment at different distances. For construction damage to occur, a sensitive receptor would need to be exposed to vibration levels at 0.2 in/sec (see **Table 3-7**), and only vibratory rollers are capable of producing this level at 25 feet. Sensitive receptors which could be impacted by construction related vibrations are located further than 25 feet from construction activities. At distances greater than 25 feet, construction vibrations are not predicted to exceed acceptable levels. Therefore, no adverse impact related to ground borne vibrations are anticipated to occur.

Table 3-7: Vibration Levels for Various Construction Equipment

Type of Equipment	Peak Particle Velocity at 25 feet (inches/second)	Peak Particle Velocity at 50 feet (inches/second)	Peak Particle Velocity at 100 feet (inches/second)
Large Bulldozer	0.089	0.031	0.011
Loaded Trucks	0.076	0.027	0.010
Small Bulldozer	0.003	0.001	0.000
Auger/drill Rigs	0.089	0.031	0.011
Jackhammer	0.035	0.012	0.004
Vibratory Hammer	0.070	0.025	0.009
Vibratory Compactor/roller	0.210 (Less than 0.20 at 26 feet)	0.074	0.026

Source**: Appendix I**

Operational Noise

Out of the potential sources of noise generated by the operation of Alternative A, the generated traffic would be the largest contributor to ambient noise increases overall. **Table 3-8** summarizes the modeled traffic noise levels at the nearest sensitive receptors along each roadway segment in the project site area (Appendix C of **Appendix I** provides the complete inputs and results of the FHWA traffic modeling). The County guidelines specify that where existing traffic noise levels are less than 60 dB L_{dn}, a +5 dBA L_{dn} increase in roadway noise levels at the activity area of the sensitive receptor will be considered a significant increase. As shown in **Table 3-8**, Alternative A is predicted to result in an increase in a maximum traffic noise level of 0.6 dBA which is below the +5 dBA L_{dn} threshold. Therefore, no adverse effect associated with increases in the ambient noise environment is anticipated to occur.

Table 3-8: Predicted Traffic Noise Level And Project-Related Traffic Noise Level Increases

Roadway	Segment	Existing no Project	Existing + Project	Change
Green Valley Rd	West of Shingle Springs Dr	55.5	56.1	0.6
Shingle Springs Dr*	South Green Valley Rd	46.0	46.3	0.3
Lotus Rd	North of Green Valley Rd	56.2	56.3	0.1
Green Valley Rd	South of Lotus Rd	57.3	57.5	0.2
Greenstone Rd	South of Green Valley Rd	59.1	59.2	0.1
Green Valley Rd	East of Greenstone Rd	59.4	59.9	0.5
Missouri Flat Rd	East of Green Valley Rd	60.6	60.8	0.2
Missouri Flat Rd	East of El Dorado Rd	53.1	53.2	0.1
El Dorado Rd	South of Missouri Flat Rd	57.2	57.2	0.0
Shingle Rd	South of Green Valley Rd	62.8	62.9	0.1
Ponderosa Rd	South of Green Valley Rd	56.2	56.4	0.2
Deer Valley Rd	North of Green Valley Rd	59.1	59.2	0.1
Cameron Park Dr	South Green Valley Rd	56.6	56.9	0.3

Source: **Appendix I**

Operational noise generated by the proposed residential development would be consistent with typical residential neighborhood noise. The primary noise sources include vehicle-related sounds (e.g. engine ignition), lawn mowers, and children playing. These noise sources already exist in the project site area and development of the proposed residential developments would not significantly add to the existing noise environment. For example, the maximum noise levels generated by the residential HVAC units and on-site vehicle circulation are predicted to be no more than 10 dBA, or greater, than average (L_{eq}) values. The El Dorado County maximum nighttime noise level standard is 55 dBA L_{max}, which is 10 dBA higher than the L_{eq} standard. Therefore, where average noise levels are consistent with the L_{eq} standards, maximum noise levels will also be consistent with the County's standards. Based upon the predicted average noise levels of 32 dBA, the maximum noise levels will be 42 dBA and would therefore be consistent with the County maximum standards. Therefore, residential activities do not have the potential to significantly increase noise levels in the vicinity of the project site or expose off-site sensitive receptors to adverse noise levels. Noise impacts from operation of the residential developments would be less than significant.

The remaining components of Alternative A would generate operational noise different from the residential development. The commercial center of the Proposed Project is predicted to expose nearby residences to noise levels up to 32 dBA, L_{eq} during both daytime (7:00 a.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) hours (refer to Figure 4 in **Appendix I** for an illustration), both being consistent with the County threshold of 40 dBA, L_{eq}. As shown on Figure 3-9 of **Appendix A**, the event center is predicted to expose nearby residences to noise levels up to 44 dBA, L_{eq} during both daytime (7:00 a.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) hours. The predicted project noise levels would exceed the El Dorado County General Plan noise standard for non-transportation noise sources of 40 dBA, L_{eq}. Therefore, impacts resulting from operational noise would be potentially significant. To reduce the impact, mitigation has been included in **Section 4**. Mitigation would include the construction of an 8-foot sound wall or alternative measures to reduce the maximum noise levels. As shown in Figure 3-10 of **Appendix A**, with the sound wall, noise levels would be reduced to acceptable levels below 40 dBA, L_{eq}. With implementation mitigation, the operational noise impacts would be reduced to less-than significant.

Alternative B

Under Alternative B, noise impacts would be similar to those under Alternative A; however, with a more limited scale of developments (the arena, parking garage and commercial space would not be developed), the potential noise impacts would be reduced accordingly and less than significant.

Alternative C

Under the No Action Alternative, the land would not be taken into trust and only the multipurpose emergency shelter and maintenance facility are assumed to be developed at some point in the future. Impacts to noise from development of these facilities would be less than significant, similar to their development under Alternatives A and B. There would be no impacts on the remainder of the project site.

3.11 HAZARDOUS MATERIALS

3.11.1 Environmental Setting

No hazardous material sites were identified on the project site in the GeoTracker (SWRCB, 2024) and EnviroStor (DTSC, 2024), databases. Within two miles of the approximate center of the project site are two sites. One is a Leaking Underground Storage Tank (LUST) site case that was closed in 1991 (Kumar's Corner T0601700036); this site is south of the project site and Highway 50. The other is a site that was screened for contaminants in the late 1980s and no further action was recommended (Shaw Mine near Indian Creek Ranch MINE 09100003; this site is east of the project site and east of Greenstone Road. Neither site has an open issue which would restrict use of the project site.

Field surveys of the project site were conducted in 2018, 2022, 2024 and 2025. No Recognized Environmental Conditions, which refers to the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of release of any hazardous substances or petroleum products within a property into structures or into the ground, groundwater, or surface water, were identified on or in the immediate vicinity of the project site that would be likely to pose a significant impact to the environmental integrity of the project site.

3.11.2 Impacts

Alternative A

No hazardous materials have been identified on the project sites or within a distance that would expose people or the environment to hazardous materials at adverse levels.

During construction, it is possible that hazardous materials, such as fuel, solvents, paint, and adhesives would be used on site and the potential for an accidental release exists. However, standard construction BMPs included in **Section 2.1.5** would reduce or eliminate the potential for impacts from accidental releases. Compliance with the NPDES General Construction Permit and preparation of a SWPPP, as well as compliance with federal laws related to the handling of hazardous materials would reduce potential construction impacts to a less-than-significant level.

The majority of waste produced by Alternative A would be nonhazardous. The small quantities of hazardous materials that would be generated or used may include pesticides, fertilizers, motor oil, hydraulic fluid, solvents, disinfectants, cleaners, lubricants, paint, and paint thinner. The amount and type of hazardous materials that would be generated are common to residential and commercial developments and associated maintenance facilities, and do not pose unusual storage, handling or disposal issues. Adverse effects associated with the accidental release of hazardous materials during operation would be less than significant.

Alternative B

Under Alternative B, impacts related to hazardous materials would be similar but reduced in comparison to Alternative A due to the reduced level of development; thus, impacts would be less than significant.

Alternative C

Under the No Action Alternative, the land would not be taken into trust and only the multipurpose emergency shelter and maintenance facility are assumed to be developed at some point in the future. Impacts related to hazardous materials from development of these facilities would be less than significant, similar to their development under Alternatives A and B. There would be no impacts on the remainder of the project site.

3.12 VISUAL RESOURCES

3.12.1 Regulatory Setting

Ther regulatory setting for visual resources can be found in **Appendix B**.

3.12.2 Environmental Setting

The visual character of the project area is defined by rolling wooded hills with scattered rural homes and fields. The project site is located in wooded hilly terrain (1,100 to 1,600 feet in elevation) with limited views from surrounding areas. Vegetation on the site is predominantly oak woodland, chaparral, and grasslands. Due to the topography and vegetation, there is limited visibility of the project site from Highway 50 and surrounding areas.

The surrounding area is primarily rural residential with 5 to 12-acre lots. The only public road within a mile of the Rancheria is Highway 50. There are numerous privately maintained roads serving the surrounding residential area. Potential off-Reservation visual receptors in the project area are residents and motorists on nearby roadways. Scenic vistas in the project area include views of the rolling wooded hills and distant views of the Sierra Nevada.

3.12.3 Impacts

Alternative A

Scenic resources in the project area include views of the rolling wooded hills and distant views of the Sierra Nevada. The Project includes the development of structures that would be visible from areas surrounding the Rancheria and would affect scenic vistas in the area. These structures include the arena,

parking garage, residential development, and the southern development area (commercial, emergency shelter, and maintenance buildings.

Arena and Parking Garage

Due to topography and vegetation, there is limited visibility of the existing casino and parking garage from nearby surrounding areas. The visibility of the proposed arena and parking garage was analyzed to determine where the buildings would be visible from. Google Earth Pro was used for this analysis because it provides high-resolution terrain data that includes vegetation and existing buildings (including the existing casino and parking garage). A viewshed map (Figure 3-11 of **Appendix A**) was generated based on the proposed height of the arena, which is situated at a higher elevation and would be the highest proposed building with the largest viewshed.

The only public road within a mile of the Rancheria is Highway 50. Due to topography and vegetation, the arena and parking garage will not be visible from Highway 50 except for a short section of the highway west of Shingle Springs Drive. This portion of Highway 50 is approximately one mile from the project site. The arena and parking garage would be partially visible to eastbound motorists for a brief period of time in this location. Due to the distance, the arena and parking garage would make up a small portion of a motorist's view.

As shown Figure 3-11 of **Appendix A**, the proposed arena and parking garage would be most visible from the private roads and homes west of the Rancheria, in particular from Shingle Springs Drive, which is located approximately 150 feet from the proposed parking garage location. Figure 3-12 of **Appendix A** provides a rendering of the proposed arena and parking garage from a residential area approximately 450 southwest of the proposed parking garage. As shown in Figure 3-12 of **Appendix A**, the proposed arena and parking garage would increase the amount of buildings visible from this location. Currently, the view includes the existing casino and hotel rising above and behind existing trees. The proposed arena and parking garage would bring the buildings closer and there would be less intervening trees and vegetation to screen the view of the proposed buildings. As described in **Section 2.1.2**, screening trees and vegetation would be planted around the arena and parking garage. This would reduce the amount of building visible and would reduce the visual impacts during daylight hours. However, at night the open sides of the parking garage would allow vehicle lights to shine across the adjacent residential area. This would be a significant impact. Mitigation is identified in **Section 4** to provide screening of the open parking garage sides to reduce lighting impacts on the adjacent residential area. With implementation of this mitigation, visual impacts from the arena and parking garage would be less than significant.

Southern Development Area

The Tribe is proposing to develop a commercial center, multipurpose emergency shelter and maintenance buildings south of the existing Rancheria. These facilities would be developed between Highway 50 and existing developments on the south side of the Rancheria, which include the health clinic, fire station and WWTP. This area is generally visible from Highway 50 although it is partly obscured by the numerous mature oak trees on the site. Because of the trees and topography, this development area is not visible to motorists until they are directly passing the area and views open up. The proposed facilities would be built in the open areas of the site. Most of the existing trees would be retained. The proposed maintenance buildings would be situated closest to the highway and would be the most visible component. The multipurpose emergency shelter would be developed in an area surrounded by existing oak trees and would be less visible from the highway. The commercial building would be located closest to Red Hawk Parkway and the existing 5-story health clinic. The commercial building would be visible from

the adjacent section of Highway 50, but would be screened by existing mature oak trees from motorists further from the site. As identified in in **Section 2.1.2**, existing trees and vegetation would be retained to the extent feasible and additional screening trees and vegetation would be planted around the buildings. The proposed buildings would be similar in scale to other commercial buildings in the area along Highway 50, including at South Shingle Road to the west and El Dorado Road to the east. Because the buildings would be screened by existing and proposed trees and vegetation and are consistent with other development in the area, visual impacts would be less than significant.

Residential Development

The proposed housing development would be similar in nature to existing rural residential development on the adjacent Rancheria and surrounding area. Due to the topography and the predominately evergreen woodland vegetation, views of the new homes and roadways would be limited from the surrounding areas. Most of the homes would be single-family residential and would be consistent with the housing in the surrounding area. The townhomes and elders' community would be higher-density developments. These homes would be clustered and surrounded by retained trees and other vegetation. All of the residential development would be developed on an internal road network, which would reduce views of the development from neighboring areas. Because the residential development would be generally consistent with the surrounding rural residential area and because of the retention of existing trees and other vegetation, the visual impacts of the residential development would be less than significant.

Alternative B

Under Alternative B, only the residential, multipurpose emergency shelter, and maintenance facility components would be developed. Visual impacts from the development of those facilities would be the same as those identified under Alternative A. No significant visual impacts would occur.

Alternative C

Under the No Action Alternative, the land would not be taken into trust and only the multipurpose emergency shelter and maintenance facility are assumed to be developed at some point in the future. Impacts related to visual resources from development of these facilities would be less than significant, similar to their development under Alternatives A and B. There would be no impacts on the remainder of the project site.

3.13 GROWTH-INDUCING AND CUMULATIVE IMPACTS

3.13.1 Growth-Inducing Impacts

Growth-inducing effects are defined as effects that foster economic or population growth, either directly or indirectly. The growth-inducing analysis below conservatively focuses on Alternative A because Alternative A would result in the highest generation of new residential uses and potential jobs. Growth-inducing effects of Alternatives B would be similar to and less than Alternative A. Growth-inducing effects under Alternative C would be negligible.

Alternative A would create employment opportunities through the proposed arena and commercial development uses. The number of new employment opportunities is relatively limited, and it is anticipated that these employees would already live within the region due to the project site proximity to

Highway 50. Alternative A does not include roadway, utility, or other infrastructure improvements that would facilitate development outside of the project site and Rancheria.

Alternative A would directly increase population on the project site by developing Tribal housing. The project site and surrounding area are currently zoned for rural residential development, and homes exist on the project site and in the surrounding area. While the proposed housing would be at a higher density than currently provided by County zoning on the project site, the County provides for much higher density residential zones adjacent to rural residential zones in other areas of the County. Because the Rancheria serves as the only residential land base for the Tribe, and Tribe is facing a housing shortage, Alternative A represents an orderly and efficient means of increasing housing supply. As noted in **Section 2.1.5**, Alternative A would be constructed and operated in a manner that is generally consistent with relevant El Dorado County Ordinances. This would include meeting setback requirements. Because the proposed residential development would served by an internal road network and by water and wastewater services provided by the Tribe, potential adverse impacts associated with higher density development would be avoided.

In summary, Alternative A would not result in unplanned growth or result in other adverse growth-inducing impacts.

3.13.2 Cumulative Impacts

Cumulative impacts refer to the effects of a project that are individually limited but cumulatively considerable off-Reservation. “Cumulatively considerable” means that the incremental effects of a project are considerable when viewed in connection with the effects of past, current, or probable future projects. The cumulative impacts analysis conservatively focuses on Alternative A because Alternative A would result in the most amount of development among the alternatives under consideration. The cumulative impacts of Alternatives B would be similar to and less than Alternative A. Cumulative impacts under Alternative C would be negligible.

Cumulative Setting

The assessment of impacts tasks into account the “cumulative environment” which is defined by other projects that may contribute to the environmental impacts within the same geographic area as the alternative under consideration.

The geographic boundaries of the cumulative effects zone have been determined by the nature of the resources affected and the distance that effects may travel. As an example, increased sedimentation of waterways that result from Alternative A are limited to the watershed in which they occur. As a result, it is only necessary to examine incremental effects within that watershed. Air quality emissions, however, travel over far greater distances and therefore necessitate analysis at the air basin level. For this analysis, the geographic boundaries of the cumulative effects zone are generally that of western El Dorado County, although for some resources (water, biological etc.) smaller boundaries may be used.

The means of establishing projects that may contribute to environmental conditions in the region is the growth assumptions of the El Dorado County General Plan. The 2021-2029 Housing Element of the General Plan was adopted in 2021 and amended in 2022 (El Dorado County, 2022). The Housing Element projects a population of 208,457 in 2030 and 225,419 in 2040. Using a baseline 2020 population of 193,227, it is assumed that the County population will increase about 17 percent between 2020 and 2040.

In addition to the growth assumed in the General Plan, the cumulative analysis takes into account the commercial and residential development on the Rancheria. This includes the recent expansion of the Red Hawk Casino with a hotel and the Apex Entertainment Center.

Cumulative Impacts

Land Resources

Cumulative development in the region will include development necessary to accommodate the County's planned growth for this area. Such development will increase the potential for seismic hazards, erosion, and topsoil loss. Alternative A would not result in significant contributions to these potential impacts. The project site is not near an Alquist-Priolo Earthquake Fault Zone or other mapped seismic hazard. As identified in **Section 2.1.5**, construction of Alternative A would comply with the CBC. Compliance with the CBC would ensure that the proposed structures would be constructed to withstand seismic ground shaking. As addressed in **Section 3.1.2**, avoidance of steep slopes, incorporation of slope design and revegetation standards, and implementation of erosion control measures, potential soil erosion effects would be less than significant. Cumulative impacts to land resources are therefore considered to be less than significant.

Water Resources

Cumulative growth in the region will result in increased potential for sedimentation, pollution, and stormwater flows in the South Fork American River Watershed. Likewise, development may increase flooding risks or adversely impact groundwater conditions. As addressed in **Section 3.2.3**, to offset the proposed impervious surfaces, retention basins and bioswales would be constructed to treat 100% of the equivalent net increase in impervious areas of the arena, parking garage, commercial development and roadways. The basins and bioswales would reduce site runoff into the adjacent drainage and ensure a reduction in mobile pollutants and sediments. Proposed development is located outside of the floodplain. Wastewater treatment and disposal would be provided by individual septic systems and/or connection to the existing wastewater treatment and disposal system on the Rancheria. Under either scenario, the treatment and disposal of wastewater would comply with EPA regulations and would not result in adverse impacts to surface or groundwater quality. In addition, the Tribe would be required to implement a SWPPP with erosion control measures during construction. Alternative A's contribution to cumulative water resource impacts would be less than significant.

Air Quality

Cumulative development in the Mountain Counties Air Basin will include development that has the potential to impact air resources. Cumulative air quality impacts will occur if projects in the region cause exceedances of the State or National Ambient Air Quality Standards. **Section 3.3.3** addresses the potential air quality and GHG emission impacts of Alternative A.

By its very nature, air pollution is largely a cumulative impact, and the analysis of criteria pollutants and GHG emissions in **Section 3.3.3** addresses potential cumulative impacts. Emissions of all criteria pollutants are below *de minimis* levels and therefore are considered to be less than significant. With regard to GHG emissions, the proposed development would be of new construction and would meet the current CBC standards, including the use of energy-efficient construction materials and appliances. As identified in **Section 2.1.5**, Alternative A would be constructed in compliance with the applicable El Dorado AQMD Rules, and BMPs have been provided to reduce project-related GHG emissions. Operational BMPs would reduce GHG emissions by the installation of energy efficient lighting and appliances and installation of EV

charging stations. With implementation of these development standards (compliance with applicable El Dorado AQMD rules and GHG BMPs), Alternative A would not result in a significant contribution to cumulative air quality or GHG impacts.

Biological Resources

As development occurs in the region, natural habitat will be impacted. Cumulative impacts to biological resources include the fragmentation and loss of oak woodlands, wetlands, riparian vegetation, and other important wildlife habitat. Such habitat loss could impact special-status species and nesting birds that depend on such habitat and could limit the ability of animals to move through the region. Compliance with federal, state, and local regulations will reduce habitat loss by restricting the areas where development may occur and requiring mitigation of habitat impacts; however, some cumulative loss of habitat will nevertheless occur. Development of Alternative A has the potential to impact northwestern pond turtle, California red-legged frog, foothill yellow-legged from, monarch butterfly, and migratory birds. Mitigation measures have been identified to avoid or reduce potential impacts on biological resources to a less-than-significant level. Mitigation measures include pre-construction surveys, avoidance of habitat and listed species, providing buffer areas around sensitive resources, and avoiding construction during the bird nesting season. These measures will ensure that potential impacts to biological resources would be reduced to a less-than-significant level. Alternative A's contribution to cumulative biological resource impacts is considered to be less than significant.

Cultural Resources

Cumulative development in the region will include development that has the potential to impact cultural resources. Potential cultural resource impacts include the loss of archaeological sites during excavation and the disturbance or destruction of historic buildings. As discussed in **Section 3.5.3**, no cultural resources are known to exist on the project site that are listed in, or eligible for listing on, the NRHP. Mitigation measures have been identified to prevent the loss of buried archaeological resources if encountered inadvertently during grading or excavation on the project site. Alternative A's contribution to cumulative cultural resource impacts is considered to be less than significant.

Socioeconomic Conditions

Cumulative development in the region is expected to occur as El Dorado County approves additional residential and commercial development in the western portion of the County. As development continues to occur, potential socioeconomic impacts may occur. Types of socioeconomic impacts include adverse changes in the housing market, population, taxes, employment and income levels, and community cohesion. The proposed residential development would provide needed housing for tribal members, and would be benefit the socioeconomic conditions of the Tribe. Additionally, operation of the arena and commercial development would generate employment opportunities for local residents. While the removal of the parcels from the County's jurisdiction would reduce property tax revenue, the Tribe provides services to the Rancheria, including fire protection and law enforcement, and contracts with other service providers for services. The Tribe also has an Intergovernmental Agreement with El Dorado, which provides tax revenue and other annual payments to the County. No other adverse socioeconomic impacts would occur as the result of the proposed fee-to-trust acquisition and residential development. Alternative A would not result in adverse environmental effects, and no populations would be adversely impacted by the project. Cumulative socioeconomic effects are therefore considered to be less than significant.

Transportation and Circulation

Level of Service

A LOS evaluation similar to the one in **Section 3.7** was performed to assess the LOS levels at the study intersections, segments and freeway facilities in the cumulative scenarios. Tables 11, 12, and 13 in **Appendix F** show the intersection, roadway segment, and freeway facilities operating conditions for the Cumulative (2043) scenario, respectively. As indicated by the tables, the study intersections operate from LOS A to LOS D, roadway segments operate at LOS A, and freeway facilities operate from LOS C to LOS D. These levels are all acceptable operating conditions. Tables 14, 15, and 16 in **Appendix F** show the intersection, roadway segment, and freeway facilities operating conditions for the Cumulative (2024) plus Project scenario. As shown in these tables, the study intersections operate from LOS A to LOS D, roadway segments from LOS A to LOS B, and freeway facilities from LOS C to LOS D. During the cumulative year, the additional traffic from Alternative would not cause the LOS conditions to deteriorate to unacceptable operation levels. Therefore, the Alternative A would have a less-than-significant impact.

Traffic Signal Warrants

A peak-hour traffic signal evaluation was performed for the cumulative setting in a similar manner as in **Section 3.7**, with results shown in Table 19 in **Appendix F.** As shown therein, Green Valley Road/Lotus Road (Intersection 3) meets thresholds for requiring signalization under Cumulative (2043), and Cumulative (2043) plus Project conditions. However, Intersection 3 would operate at acceptable levels of delay both with and without Alternative A under all analysis conditions. Therefore, for similar reasons as **Section 3.8**, the impact would not be significant enough to warrant a signal on the traffic evaluation alone. This impact is less than significant.

Queuing Analysis

As in **Section 3.7**, a queuing analysis was conducted to assess whether Alternative A would increase queuing at the study intersections. The results of this analysis for the cumulative setting are shown in Table 19 in **Appendix F**, with shaded cells representing conditions where reported queue already exceed available vehicle storage capacity by more than one car length. As shown therein, the westbound left-turn queue at Green Valley Road and Cameron Park Drive/Starbuck Road (Intersection 10) will exceed the available storage capacity during both the AM and PM peak-hours under Cumulative (2043) scenarios with and without Alternative A. Alternative A is estimated to contribute a nominal amount (less than or equal to 25 feet) of queueing to the Cumulative (2043) baseline deficiency for the westbound left-turn movement at Intersection 10. Given that Alternative A is not anticipated to cause the queuing deficiency and will only contribute minorly, this impact is considered less than significant.

Land Use and Agriculture

Cumulative land use and agriculture impacts that may occur as the region grows include the development of conflicting land uses, the loss of community character or integrity, and the displacement of agriculture. The proposed residential development of Alternative A is generally consistent with the allowable residential uses for the County's Rural Estate zoning designation. While the density of the proposed residential development is higher than that of the county (approximately one unit per acre compared to the County's standard of one unit per five to ten acres), all setback requirements of the El Dorado County Zoning Ordinance would be met or exceeded along exterior boundaries of trust land. The proposed residential development would be consistent with land uses in adjacent residential areas. The commercial component of Alternative A, includes the arena, parking garage, emergency shelter, utility buildings, and commercial space. This development would be similar in nature to the existing commercial development on the Rancheria. As noted in **Section 2.1.5**, Alternative A would be constructed and operated in a manner

that is generally consistent with relevant El Dorado County Ordinances. This would include meeting setback requirements. Traffic from the commercial enterprises would be routed through the Rancheria and not through the adjacent residential area, which would reduce impacts on surrounding land uses. As identified in **Section 2.1.5**, existing trees and vegetation would be retained to the extent feasible and additional screening trees and vegetation would be planted around the buildings, which will minimize potential conflicts with adjacent residential land use. As a result, no conflicts with adjacent land uses are expected. The project site does not support agricultural, nor would the proposed development impact agriculture in the surrounding area, which is limited to gardens and some livestock grazing associated with rural residences. Alternative A's contribution to cumulative land use and agriculture impacts is considered less than significant.

Public Services

As development occurs in the region, demands for public services will increase. Typically, public services are paid by development fees, rates, and property taxes. As such, the provision of public services typically expands to serve the additional demand. The provision of adequate water supply is the most crucial concern in drought-prone California. State regulations have sought to ensure an adequate water supply exists prior to approval of major development projects; however, water supply continues to be a key concern for residents. EID, the primary urban water supplier in El Dorado County, projects that its water supplies exceed the projected growth in water demand within the service area through 2045, its current planning horizon (EID, 2021). Alternative A would be served through the Tribe's independent water supply system (with water supplied by EID) and/or by groundwater wells. No significant impacts to water or wastewater services are expected. The proposed development would be served by the same law enforcement, fire protection, solid waste and utility services that are currently provided to the Rancheria. Alternative A's contribution to cumulative public service impacts is considered to be less than significant.

Noise

Cumulative development in western El Dorado County would result in localized noise level increases. The primary source would occur along roadways where traffic levels increase or in neighborhoods where urban uses are expanding or intensifying. As addressed in **Section 3.10.2**, construction of the proposed facilities would result in short-term increases in noise in the vicinity of the project site. Because BMPs in **Section 2.1.5** would ensure that construction hours are limited in duration and would be restricted to the hours identified by the El Dorado County General Plan, construction noise impacts would be less than significant. Operation of Alternative A would increase the traffic noise levels; however, because all commercial traffic would be routed through the Rancheria and Red Hawk Parkway to Highway 50, traffic noise impacts would generally not impact nearby residential land uses. Mitigation has been identified where traffic noise could impact an adjacent residential property. The identified sound wall or alternative measures would ensure that noise levels do not exceed the County's noise standard. No other potentially significant operational noise impacts would occur. Therefore, the Alternative A would not result in a cumulatively considerable contribution to noise impacts.

Hazardous Materials

As cumulative development occurs in the region, the potential exists for development projects to increase hazardous material impacts on public health and the environment. Impacts can occur as the result of the improper use and disposal of hazardous materials, or through contact with existing hazardous materials encountered during construction. No hazardous material impacts are expected to occur as the result of Alternative A, as database searches and site visits found no hazardous materials on the project site and surrounding area. All applicable federal regulations pertaining to the use and disposal of hazardous

materials would be followed during construction and operation. Alternative A's contribution to cumulative hazardous material impacts is considered to be less than significant.

Visual Resources

Cumulative visual impacts that may occur as the region grows include the loss of scenic vistas or the aesthetic quality of views in the region as residential and commercial development alters the natural landscape. Alternative A would result in the development of residential and commercial uses near similar existing uses. While the proposed residential development would alter the existing natural landscape of the project site, the development would be visually consistent with the surrounding rural residential land uses. Similarly, the arena and parking garage would be adjacent to existing Tribal casino facilities. Views from other residences and roadways surrounding the project site would be screened by the predominately evergreen woodland vegetation. Mitigation has been included to provide shielding of the open sides of the parking garage so that vehicle lights cannot shine across the adjacent residential area. With implementation of this measure and due to the limited visibility of the site and consistency of the proposed development with surrounding land uses, Alternative A's contribution to cumulative visual resource impacts would be less than significant.

Section 4 | Mitigation

NEPA requires that, if a project would have significant adverse effects on the environment, mitigation for those impacts must be identified. Mitigation measures to be implemented during construction and operation of the alternatives are summarized in table below. All mitigation is enforceable because it is (1) inherent to the project design; and/or (2) or required by federal or tribal regulations.

Resource Area	Proposed Mitigation	Alternative
Biological Resources	The following measures shall be implemented to minimize or avoid impacts to waters of the U.S.: A. If impacts to waters of the U.S. and wetland habitat are unavoidable, a 404 permit and 401 Certification under the CWA shall be obtained from the USACE and EPA. Mitigation for loss of waters of the U.S. shall occur at a minimum 1:1 ratio through habitat creation, restoration, or purchase of USACE-approved credits. This may occur along the alignment of the re-routed drainage or within bioretention areas. All permit terms and conditions shall be adhered to. The following measures shall be implemented to avoid construction-phase take of northwestern pond turtle, foothill yellow-legged frog, and California red-legged frog: B. To ensure that northwestern pond turtle, foothill yellow-legged frog, and California red-legged frog are not present in construction areas, a qualified biologist shall conduct pre-construction clearance surveys. A qualified biologist is defined as a person who has the educational background, training, and work experience (handling experience and/or permits) required to perform a specific biological task and has been approved by the USFWS. If either of these species are discovered during the survey, project construction activities shall not begin until the USFWS has been consulted and avoidance and minimization measures established and then implemented. C. Once the pre-construction surveys confirm that northwestern pond turtle, foothill yellow-legged frog, and California red-legged frog are not present, the construction crew shall immediately install animal exclusion fencing to separate construction areas from marshes and channels proposed for avoidance. The fencing shall be constructed out of plastic weed cloth or construction fabric, shall be keyed into the ground, and shall be supported by stakes and wire mesh, as needed. Fencing shall also be opaque, a minimum of three feet in height, and installed with a smooth material such that it cannot be climbed. A qualified biologist shall oversee the installation of the exclusionary fencing to ensure its suitability. A qualified biologist shall also make regular inspections during the preconstruction period and during the construction periods when grading and other ground disturbance activities are occurring to ensure the integrity of the fence. D. All construction personnel shall receive worker environmental awareness training before they enter the construction site. The	A, B

Resource Area	Proposed Mitigation	Alternative
	training program shall include, at a minimum, descriptions of the focal species (northwestern pond turtle, foothill yellow-legged frog, and California red-legged frog, and monarch butterflies), and how to identify and avoid these focal species. Personnel shall be trained to halt work in the event that one of these focal species is observed within the work area and allow the individual to leave the work site on their own. Personnel shall be instructed to limit work activities to the designated construction areas and to properly store equipment and materials in the designated laydown area. A qualified biologist shall make regular inspections during the construction periods when grading and other ground disturbance activities are occurring to ensure BMPs are being adequately followed. The following measures shall be implemented to minimize impacts to northwestern pond turtle, foothill yellow-legged frog, and California red-legged frog: E. The development shall be designed such that culverts, free-span bridges, or similar will be installed where roadways cross drainages. Road crossings of drainages shall be designed such that northwestern pond turtle, foothill yellow-legged frog, and California red-legged frog can freely pass underneath proposed roadways. Additionally, a permanent barrier such as a curb shall be installed around the perimeter of paved areas, with the exception of points of access, to discourage northwestern pond turtle, foothill yellow-legged frog, and California red-legged frog from entering the built environment. Designs of the barrier shall be submitted to USFWS for coordination and approval. The following measures shall be implemented to minimize or avoid operational impacts to monarch butterflies: F. Use of insecticides shall be prohibited; use of herbicides shall follow USFWS-approved BMPs. G. The development shall utilize only native species in habitat restoration. H. Monarchs, other pollinators, and their habitats shall be protected from pesticides, including insecticides, fungicides, and herbicides. The Tribe shall avoid applying herbicides to blooming flowers when monarch butterflies are likely around (October 1 – February 28). I. The protection of existing milkweed populations where feasible and the facilitation of expanding milkweed populations through planting. J. Landscaping activities shall maximize use of non-chemical weed and pest prevention. K. Landscaping plans shall select a mosaic plant palate of native species that bloom throughout the year to the greatest extent feasible. The following measures shall be implemented to avoid impacts to nesting birds:	

Resource Area	Proposed Mitigation	Alternative
	L. If construction activities commence during the general nesting season (March to September), a preconstruction nest survey shall be conducted by a qualified biologist on and within 500 feet of proposed construction. If active nests are identified, the qualified biologist shall consult the USFWS to develop measures to avoid "take" of active nests prior to the initiation of any construction activities. M. Avoidance measures include establishment of a buffer zone using construction fencing or similar, or the postponement of construction until after the nesting season, or until after a qualified biologist has determined the nest is no longer active. Avoidance buffers may vary in size depending on habitat characteristics, project-related activities, and disturbance levels.	
Cultural Resources	N. In the event that a cultural resource is inadvertently discovered during project activities, work must be halted within 30 feet of the find and a qualified archaeologist (36 CFR Part 61) notified immediately so that an assessment of its potential significance can be undertaken. The BIA Regional Archaeologist must also be notified immediately. Construction activities may continue in other areas, but may not resume in the area of the find until the BIA provides written permission. If the discovery proves to be significant, additional work, such as data recovery excavation, may be warranted and would be discussed in consultation with the BIA, affiliated tribal organizations, and any other relevant regulatory agencies or invested parties, as appropriate. O. If human remains are discovered during ground-disturbing activities, the BIA Regional Archaeologist and a Shingle Springs Tribal representative shall be notified immediately. The notice shall be followed up within 24 hours with written documentation stating the geographical location by county and State, the contents of the discovery, and the steps taken to secure and protect the human remains or cultural items, as well as the activity that led to the discovery and confirmation that all activity around the discovery has stopped. No further disturbance shall occur until representatives of the Tribe and BIA have resolved which party will assume primary management authority for the discovery, appropriate measures have been taken and the party with primary management authority has provided written certification to the person responsible for the activity that led to the discovery identifying any measures to protect the discovery if appropriate, and the date on which activity may resume around the discovery (43 CFR § 10.5).	A, B
Transportation and Circulation	P. The Tribe shall optimize the signal timing at the Koto Road/Redhawk Parkway at Honpie Road intersection for the PM, Friday PM, Saturday Midday peak-hours to increase LOS levels at this intersection.	A
Noise	Q. The Tribe shall construct an 8-foot-tall sound wall (as shown in **Figure 3-10**) to reduce noise impacts from the proposed arena unless future project design changes or other factors result in compliance with the County exterior noise standards at adjacent	A

Resource Area	Proposed Mitigation	Alternative
	non-Tribal properties. Future design changes could include additional buffer distance, traffic control measures, or other measures verified by a qualified acoustical engineer.	
Visual Resources	R. The Tribe shall install screens or other physical barriers on the open sides of the parking garage to prevent vehicle lights from shining directly on the adjacent residential area. Screens or other physical barriers shall be required on the north, west and south sides of the parking garage.	A

Section 5 | Consultation and Coordination

This section lists agencies and organizations consulted during the preparation of this EIS.

Agencies and Organizations, Consulted	Summary of Consultation and Coordination
U.S. Fish & Wildlife Service (USFWS)	The USFWS IPaC database was accessed to obtain a list of federally listed special-status species with the potential to occur in the vicinity of the project site. Additionally, the USFWS National Wetlands Inventory was accessed to identify potential wetlands and waters in the vicinity of the project site.
National Oceanic and Atmospheric Administration, Fisheries Service (NOAA Fisheries)	The NOAA Fisheries website was reviewed for information concerning special-status fish species, critical habitat, and Essential Fish Habitat (EFH).
U.S. Geological Survey (USGS)	The USGS website was reviewed for information concerning geological information and hazards, such as landslides and mineral data.
U.S. Census Bureau	The U.S. Census Bureau website was reviewed for information concerning demographic data.
U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS)	The USDA NRCS was consulted for data concerning farmland and soil characteristics information. A Farmland Conversion Impact Rating was submitted to the NRCS and is provided in **Appendix G**.
National Park Service (NPS)	The NPS website was consulted through reviewing the National Register of Historic Places database for results in proximity to the project site.
Native American Tribes	Various Native American Tribes were consulted under Section 106 of the NHPA.
Tribe	The Tribe was consulted throughout the NEPA process in its role as Applicant.
California Department of Finance (CDF)	The CDF website was reviewed for information concerning population and housing estimates.
California Native American Heritage Commission (NAHC)	The NAHC was consulted to conduct a review of the Sacred Lands File. The NAHC also supplied a list of Native American individuals who may have information regarding the sacred lands or other cultural resources in the vicinity of the area of potential effects (APE).
California Department of Conservation (DOC)	The DOC was consulted to determine California Important Farmland in proximity to the project site.

Agencies and Organizations, Consulted	Summary of Consultation and Coordination
California Department of Resources Recycling and Recovery (CalRecycle)	The CalRecycle website was reviewed to obtain information about solid waste generation numbers, and capacity and permit information for landfills.
California Department of Fish and Wildlife (CDFW)	CDFW's California Natural Diversity Database and RareFind 5 were reviewed to determine if any State-listed special-status species have the potential to occur in the vicinity of the project site.
Sheriff's Office	The El Dorado County Sheriff's Office was consulted for assessing law enforcement service impacts.
Fire District	The El Dorado County Fire Protection District was consulted for assessing fire and EMS service impacts.
El Dorado County (County)	The County General plan was consulted for relevant environment information and thresholds for environment impacts, such as acceptable operation levels for county-operated roadways.
Caltrans	Caltrans LOS thresholds were consulted for assessing acceptable operation levels for highway facilities and PeMS data was used to approximate peak-hour freeway segment volume.
Air Quality Management District	The El Dorado County Air Quality Management District website was reviewed to obtain information related to air quality and climate conditions in El Dorado County.
California State Water Resource Control Board (SWRCB)	The SWRCB's online tool GeoTracker was utilized to obtain information about hazardous materials near the project site. GeoTracker is the California Water Boards' data management system that tracks sites impacting or potentially impacting water quality, including those requiring cleanup as well as various unregulated projects and permitted facilities.
California Department of Toxic Substances Control (DTSC)	DTSC's online tool EnviroStor was utilized to obtain information about hazardous materials near the project site. EnviroStor is the data management system used by California's Department of Toxic Substances Control to track cleanup, permitting, enforcement and investigation activities at hazardous waste facilities and contaminated sites that require further investigation.

Section 6 | References

California DOC, 2024. California Williamson Act Enrollment Finder. Available online at: https://maps.conservation.ca.gov/dlrp/WilliamsonAct/App/index.html. Accessed June 15, 2024.

California Department of Finance (CDOF), 2023a. E-1 Population Estimates for Cities, Counties and the State with Annual Percent Change — January 1, 2022 and 2023. Available online at: https://dof.ca.gov/forecasting/demographics/estimates-e1/. Accessed April 24, 2024.

CDOF 2023b. E-5 Population and Housing Estimates for Cities, Counties and the State — January 1, 2021-2022. Available online at: https://dof.ca.gov/Forecasting/Demographics/Estimates/estimates-e5-2010-2021/. Accessed April 24, 2024.

CDOF, 2024. Report P-2A: Total Population Projections, California Counties, 2020-2060 (Baseline 2019 Population Projections; Vintage 2023 Release). Available online at: https://dof.ca.gov/Forecasting/Demographics/projections/. Accessed April 24, 2024.

California Department of Resources Recycling and Recovery (CalRecycle), 2022. Solid Waste Information System Facility/Site Activity Search. Available at: https://www2.calrecycle.ca.gov /SolidWaste/Activity. Accessed December 10, 2022.

California Department of Toxic Substances Control (DTSC), 2024. EnviroStor Map. https://www.envirostor.dtsc.ca.gov/public/map/. Accessed July 2024.

California Department of Water Resources (DWR), 2023. Well Completion Report Map Application. Available online at: https://gis.water.ca.gov/app/wcr/. Accessed March 2023.

California Employment Development Department (CEDD), 2024. Labor Market Information by California Geographic Areas. Available online at: https://labormarketinfo.edd.ca.gov/geography/lmi-by-geography.html. Accessed April 24, 2024.

California Geological Survey (CGS), 2015. Fault Activity Map of California. Available at: https://maps.conservation.ca.gov/cgs/fam/. Accessed July, 2024.

CGS, 2018. Mineral Land Classification Map of Concrete Aggregate in the Greater Sacramento Area Production-Consumption Region.

Cordero, T. 2024, Personal Communication with T. Cordero, Fire Chief, El Dorado County Fire Protection District, May 2, 2024.

El Dorado County, 2003. El Dorado County General Plan Draft Environmental Impact Report. May 2003.

El Dorado County, 2004. 2004 El Dorado County General Plan A Plan for Managed Growth and Open Roads; a Plan for Quality Neighborhoods and Traffic Relief. Available online at: https://www.eldoradocounty.ca.gov/Land-Use/Planning-Services/Plans-Documents#section-2. Accessed June 1, 2024.

El Dorado County, 2012. El Dorado County Solid Waste Management Plan. Available online at: https://www.edcgov.us/Government/emd/solidwaste/Pages/swmplan.aspx. Accessed April 2024.

El Dorado County, 2015. Asbestos Review Areas, Western Slope, County of El Dorado, State of California.

El Dorado County, 2018. El Dorado County Zoning Ordinance. Available online at: https://www.eldoradocounty.ca.gov/files/assets/county/v/1/documents/land-use/planning-amp-zoning/home/title-130-master-complete-adopted-08-14-18-amd-3.28.24.pdf. Accessed June 2024.

El Dorado County, 2022. El Dorado County General Plan 2021-2029 Housing Element. Amended March 22, 2022. Available online at: https://www.eldoradocounty.ca.gov/files/assets/county/v/1/documents/land-use/planning-amp-zoning/adopted-general-plan/final-2021-2029-housing-element_bos-adoption-3-22-22.pdf. Accessed July 2024.

El Dorado Irrigation District (EID), 2021. 2020 Urban Water Master Plan. Adopted June 28, 2021. Available online at: https://www.eid.org/home/showpublisheddocument/5666/637619651261230000. Accessed April 2024.

EID, 2022. Water Supply and Demand Report. Available online at: https://www.eid.org/home/show publisheddocument/13035/638025472167330000. Accessed April 25, 2024.

Environmental Protection Agency (EPA), 2016. What Climate Change Means for California. August 2016. Available online at: https://www.epa.gov/sites/default/files/2016-09/documents/climate-change-ca.pdf. Accessed March 2023.

Federal Emergency Management Agency (FEMA), 2008. FIRM Community Panel Number 06017C0750E. Effective September 26, 2008.

Interagency Working Group on Social Cost of Greenhouse Gases, United States Government (IWG), 2021. Technical support Document: Social Cost of Carbon, Methane, and Nitrous Oxide, Interim Estimates under Executive Order 13990. February 2021.

Miles, S. R. and C. B. Goudey, 1997. Ecological Subregions of California: Section and Subsection Descriptions. USDA Forest Service Pacific Southwest Region, San Francisco, CA.

Miller, D., 2024. Personal Communication with D. Miller, Sergeant, El Dorado County Sheriff's Office, June 27, 2024.

Natural Investigations, Co., 2022. Cultural and Paleontological Resources Inventory for Fee-To-Trust Applications 3, 4, and 5 in Shingle Springs, El Dorado County, California. On file with BIA Pacific Region.

Natural Investigations, Co., 2023. Cultural and Paleontological Resources Inventory for the Shingle Spring Rancheria Fee-To-Trust - Application 3 Project, El Dorado County, California. On file with BIA Pacific Region.

PG&E, 2014. Service Area Map. Available online at: https://www.pge.com/tariffs/assets/pdf/tariffbook/ELEC_MAPS_Service%20Area%20Map.pdf. Accessed April 2024.

Shingle Springs Band of Miwok Indians, 2024. Departments. Available online at: https://www.shinglespringsrancheria.com/departments/. Accessed April 27, 2024.

State Water Resources Control Board (SWRCB), 2022. California 2020-2022 Integrated Report (303(d) List/305(b) Report). Appendix A: Proposed Final 2020-2022 303(d) List. Available online at: https://www.waterboards.ca.gov/water_issues/programs/tmdl/2010state_ir_reports/category5_report.shtml. Accessed July 2024.

SWRCB, 2024. GeoTracker Map. Available online at: https://geotracker.waterboards.ca.gov/map/?CMD=runreport&myaddress=Sacramento. Accessed July 2024.

United States Census Bureau, 2023. QuickFacts, El Dorado County, California. Available online at: https://www.census.gov/quickfacts/fact/table/eldoradocountycalifornia,US/RHI125222#RHI125222. Accessed April 24, 2024.

United States Department of Agriculture, Natural Resources Conservation Service (NRCS), 2024. Custom Soil Resource Report. Available at [https://websoilsurvey.sc.egov.usda.gov]. Accessed April 29, 2024.

United States Geological Survey (USGS), 2011. Mineral Resource Data System. Available at: https://mrdata.usgs.gov/general/map-us.html. Accessed July, 2024.

USA North, 2024. Excavation Handbook. Available online at: https://usanorth811.org/images/2020CAHandbook.pdf. Accessed April 26, 2024.

WRCC, 2024. Placerville, CA Site (046960). Period of Record Monthly Climate Summary. Period of Record : 01/01/1900 to 05/17/2011. Available online at: https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca6960. Accessed July 2024.

Section 7 | Preparers

LEAD AGENCY

Bureau of Indian Affairs (BIA)

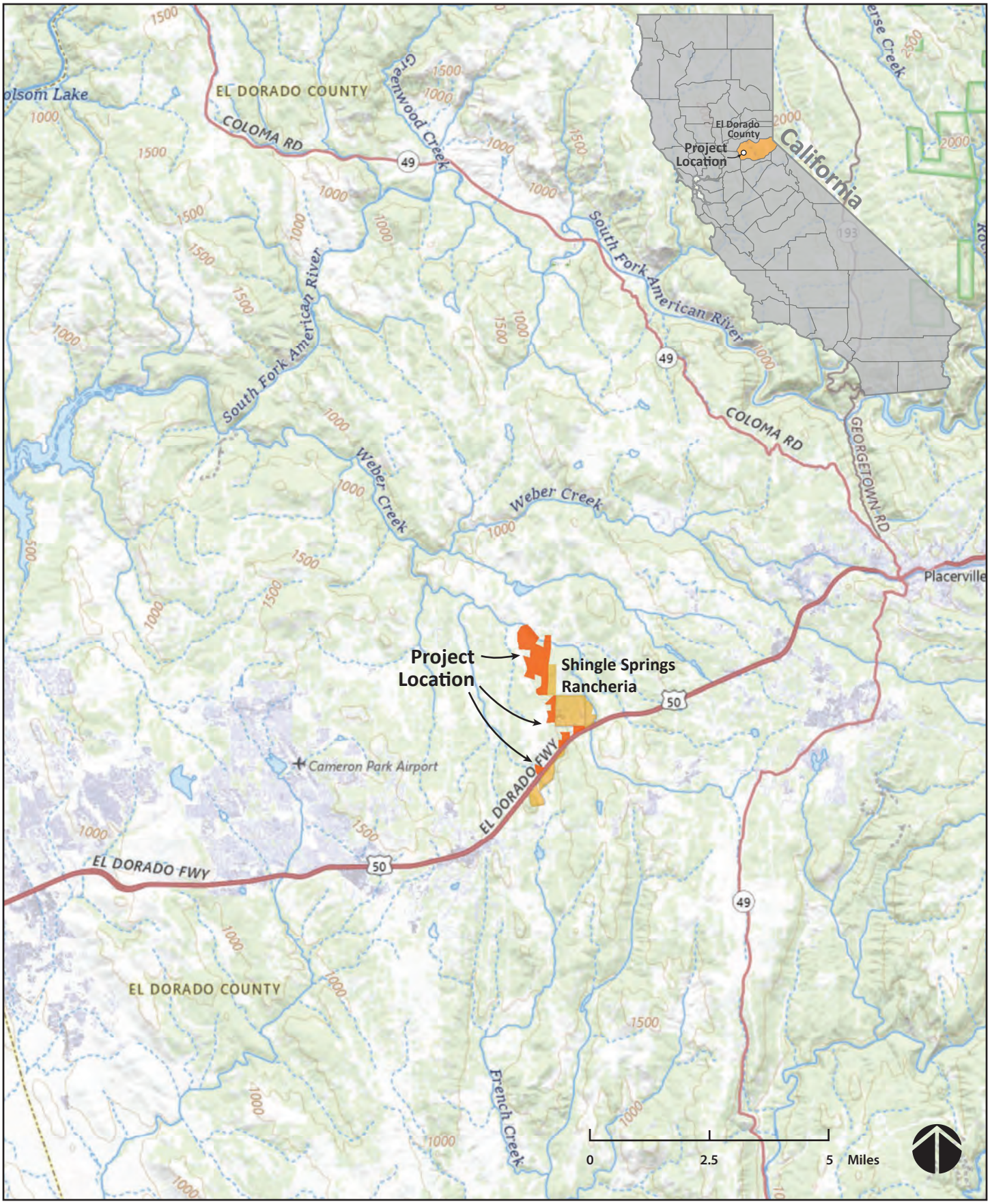
Felix Kitto
Jacilyn Snyder
Jennifer Hayden
Chad Brousard
Dan Hall

ENVIRONMENTAL CONSULTANTS

Name	Qualifications	Participation
Acorn Environmental – Environmental Assessment		
Josh Ferris	BA, 24 years of experience	Project Director
Jennifer Wade	BA, 20 years of experience	Project Manager
G.O. Graening	BA, MS, PhD; 28 years of experience	Senior Biologist
Kristen Miner	BS, MS; 10 years of experience	Environmental Analyst
Emma Miller	BA, 3 years of experience	Environmental Analyst
Daniel Schack	BS, M.Ed; 14 years of experience	Environmental Analyst
Jeremy Huey	BA, MS; +12 years of experience	Graphics
Katie Francisco	BS, 2 years of experience	Environmental Analyst
Natural Investigations – Cultural Resources		
John Nadolski, M.A.,	MA	Cultural Resources Study
Phil Hanes, M.A., RPA	MA, RPA	Cultural Resources Study
Natalie Marshall	BA	Cultural Resources Study
Tim Spillane, M.A., RPA	MA, RPA	Cultural Resources Study
Andrew Dang	BA	Cultural Resources Study
Saxelby Acoustics – Noise		
Luke Saxelby	BS, INCE Board Certified	Noise Assessment
Kimley-Horn – Traffic		
Stephen Dillon	P.E.	Traffic Impact Study

Appendix A

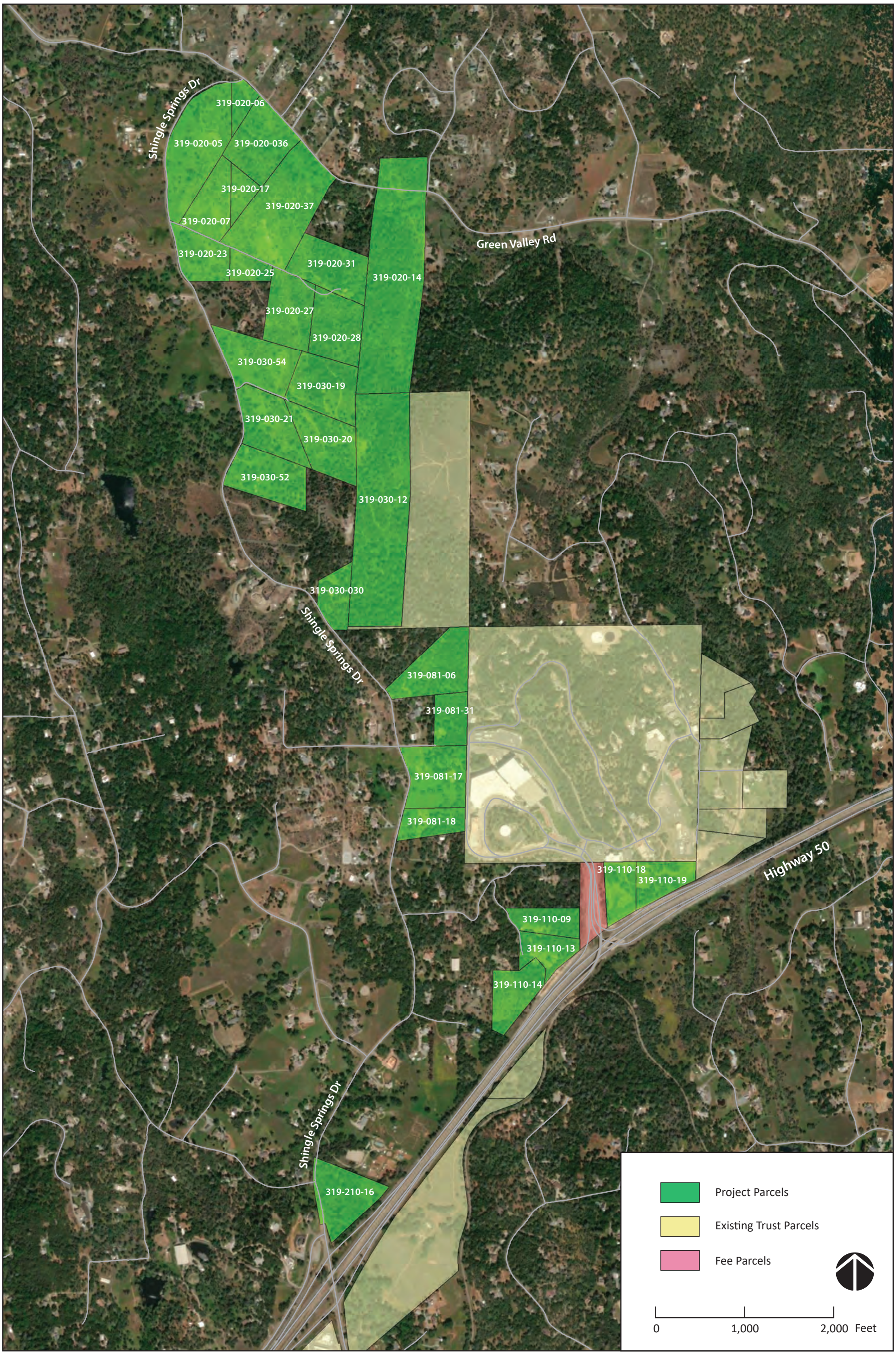
Environmental Assessment Figures



Source: USGS, The National Map

FIGURE 1-1

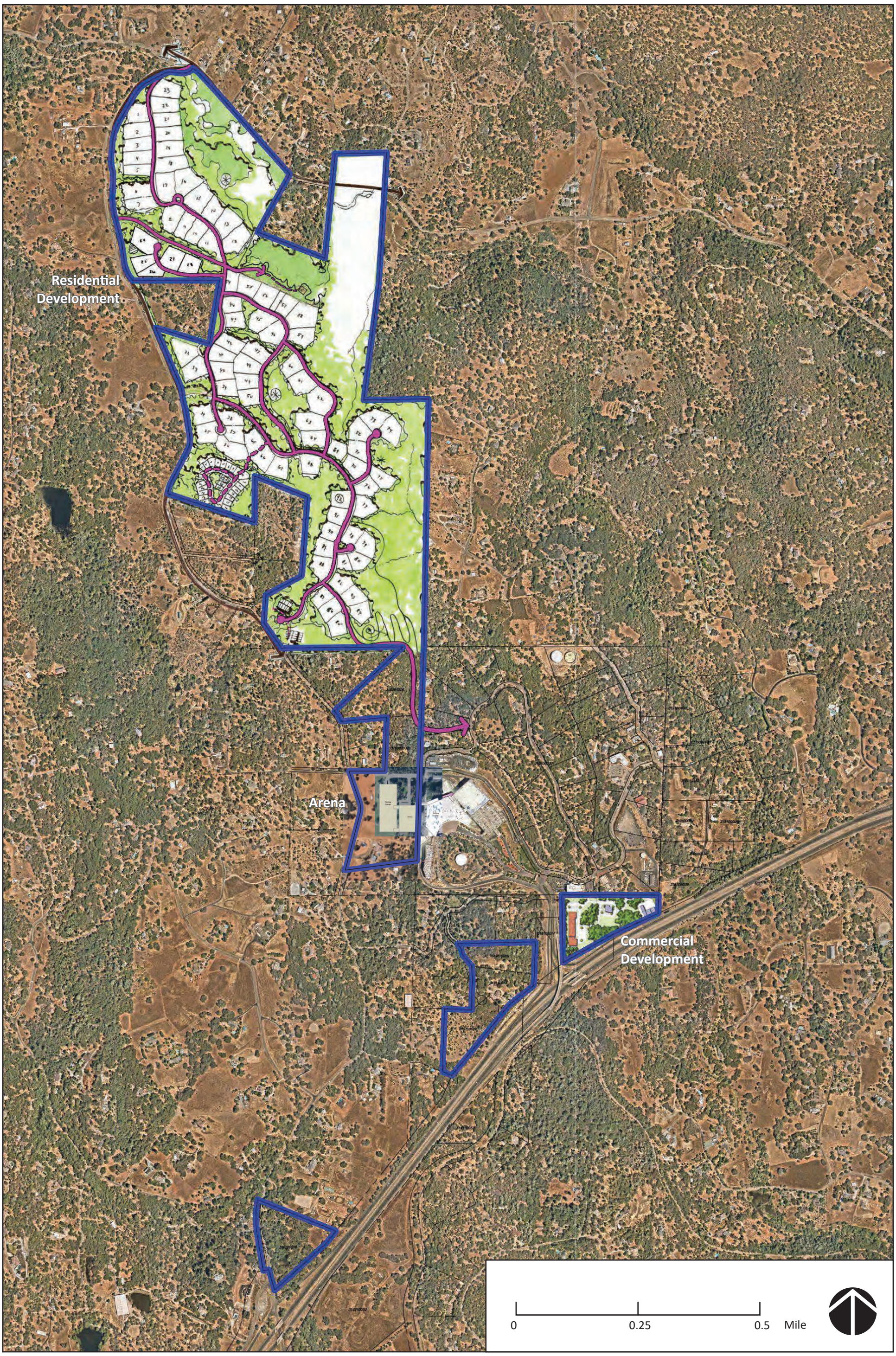
REGIONAL LOCATION



Source: Acorn Environmental

FIGURE 1-2

PROJECT PARCELS



Source: Kimley-Horn

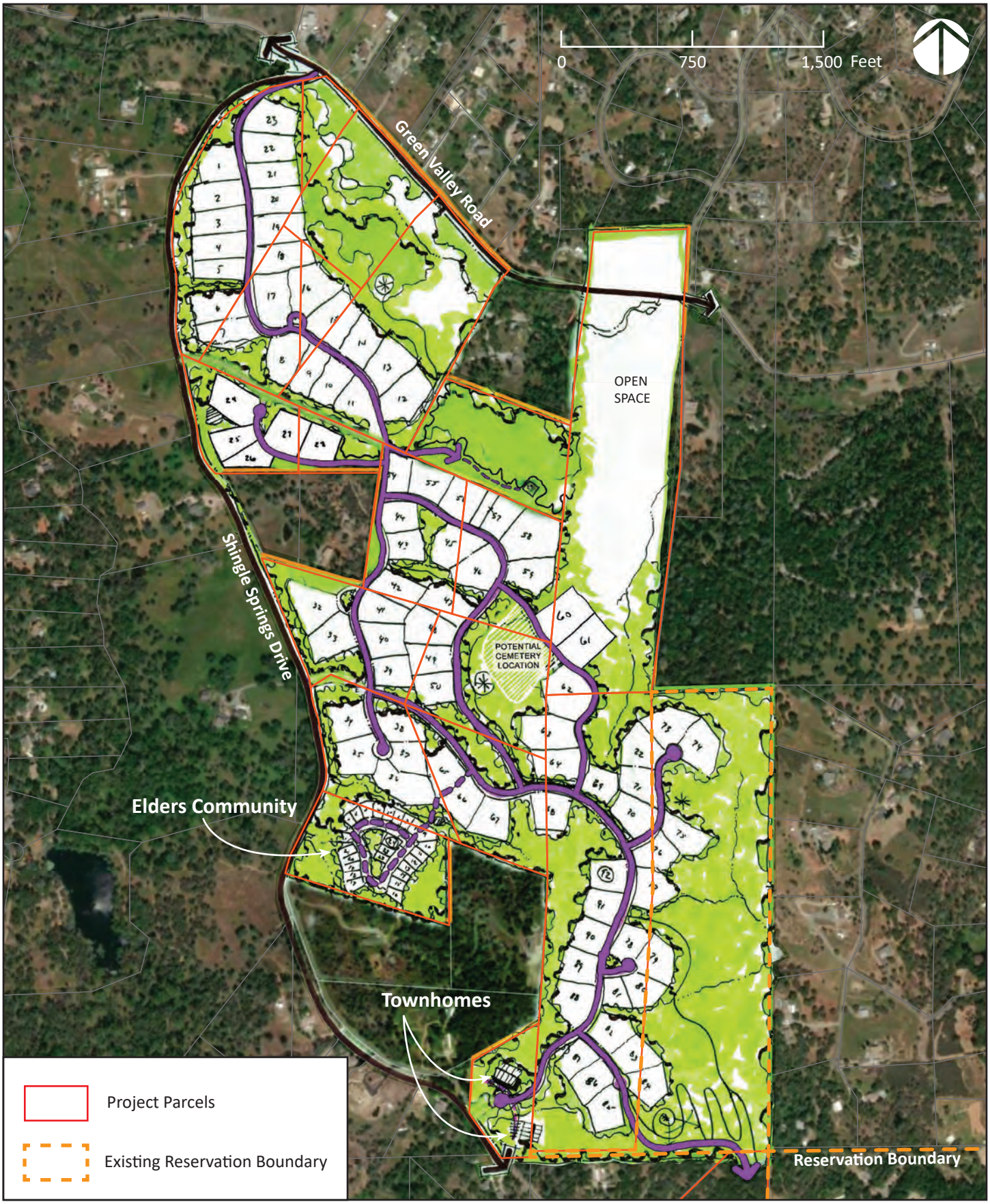
FIGURE 2-1

ALTERNATIVE A SITE PLAN OVERVIEW

Source: Kimley-Horn

FIGURE 2-2

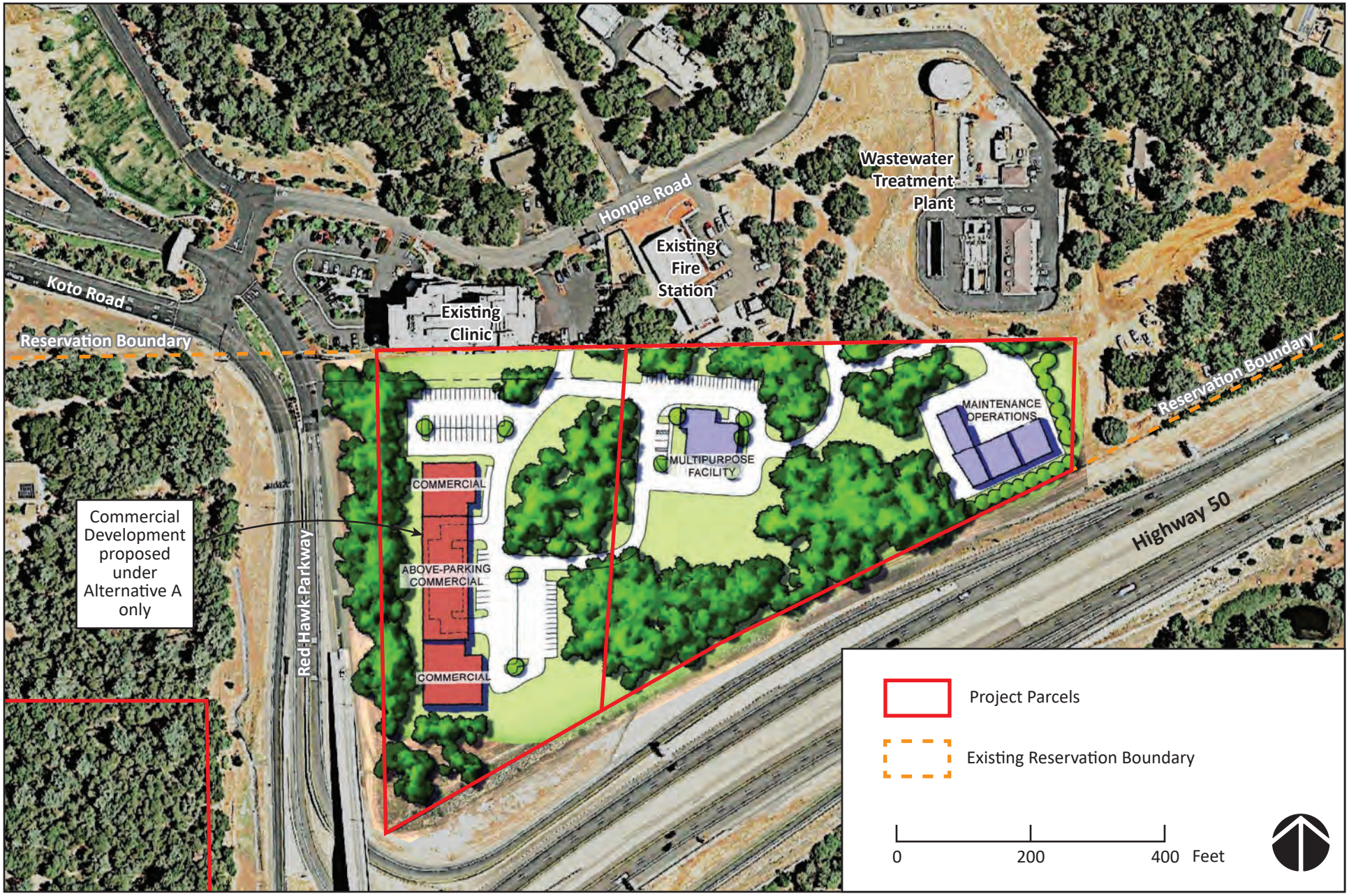
ALTERNATIVE A - ARENA SITE PLAN



Source: Kimley-Horn

FIGURE 2-3

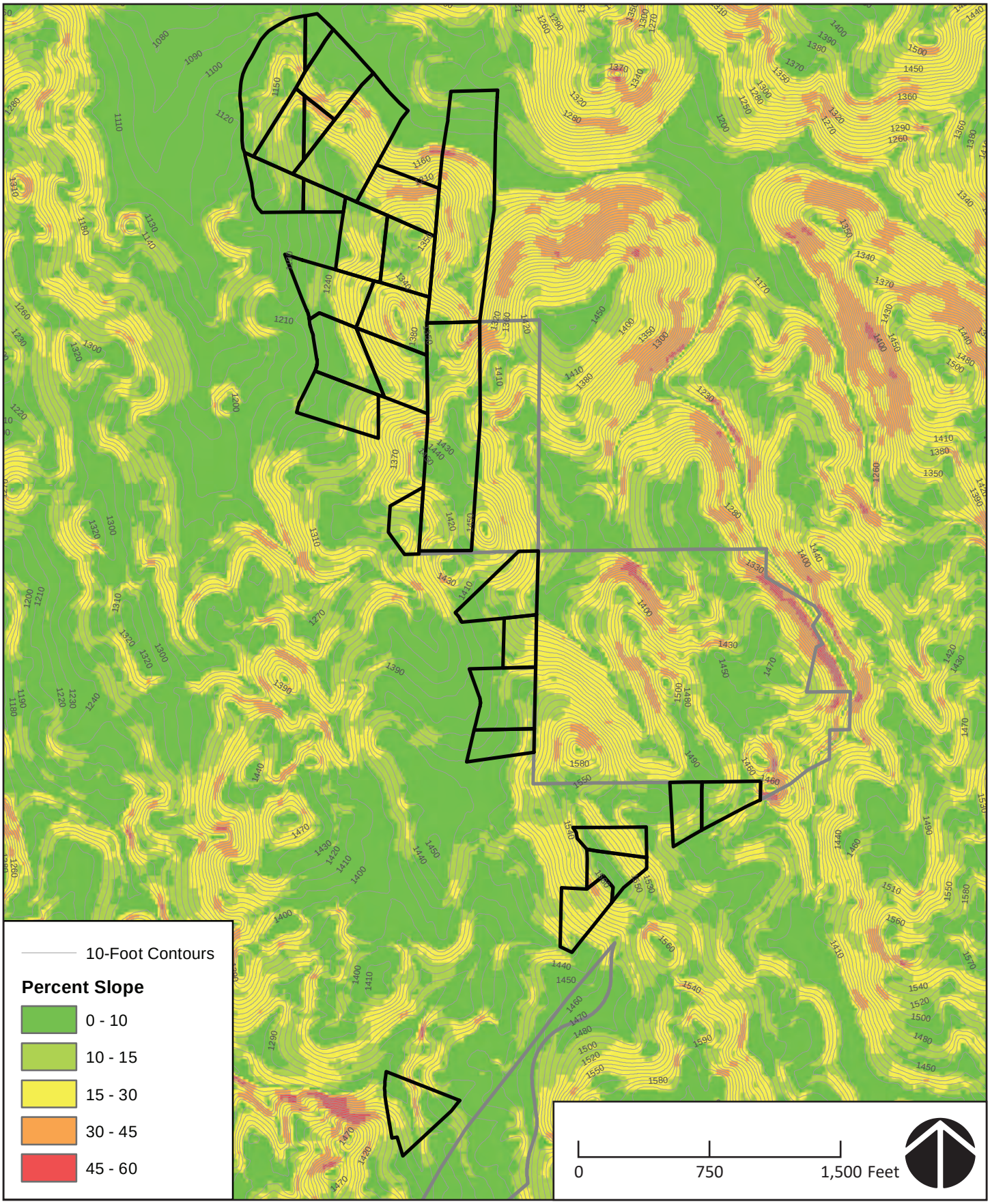
RESIDENTIAL DEVELOPMENT PLAN



Source: Kimley-Horn

FIGURE 2-4

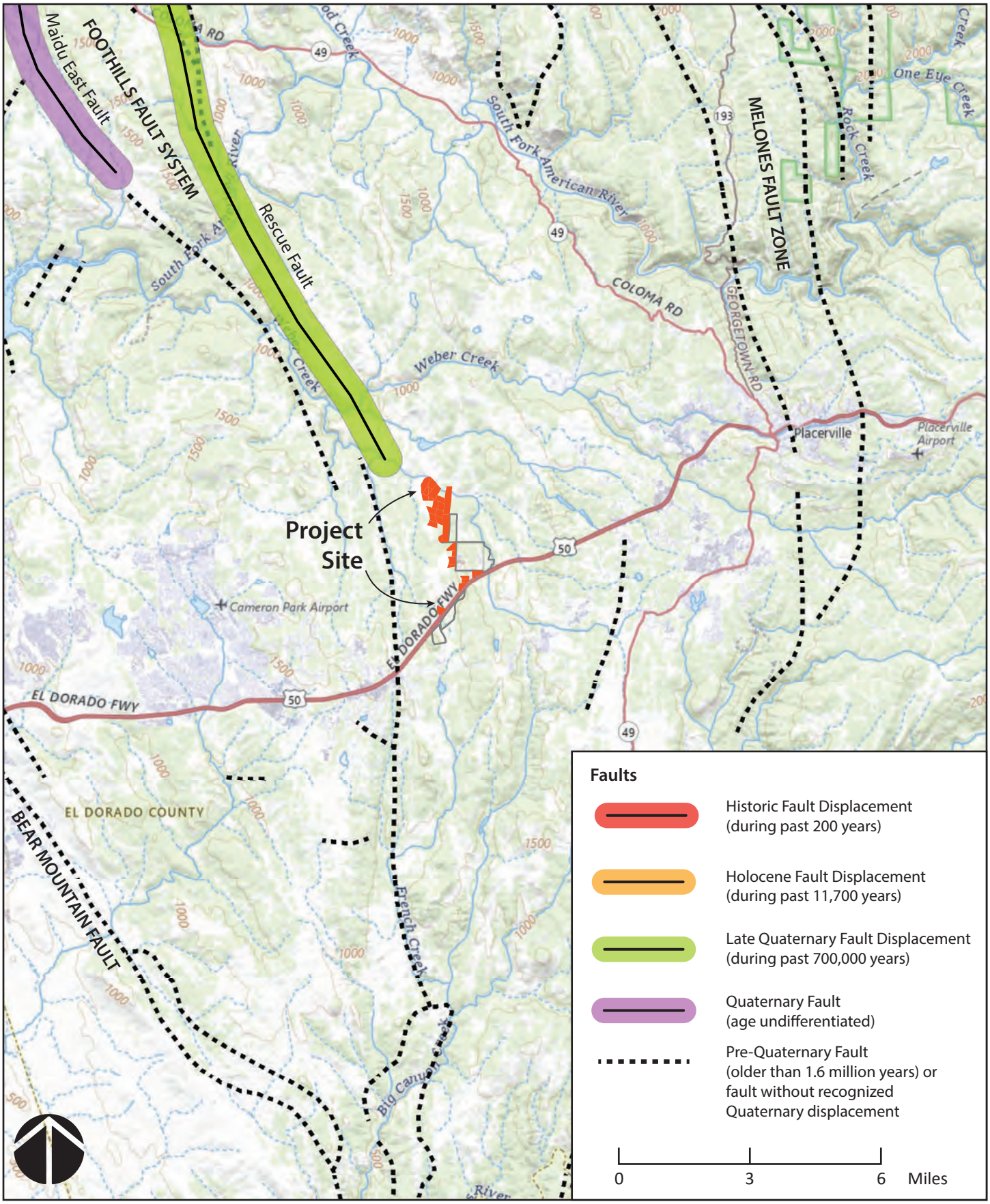
SOUTHERN DEVELOPMENT PLAN



Source: Acorn Environmental

FIGURE 3-1

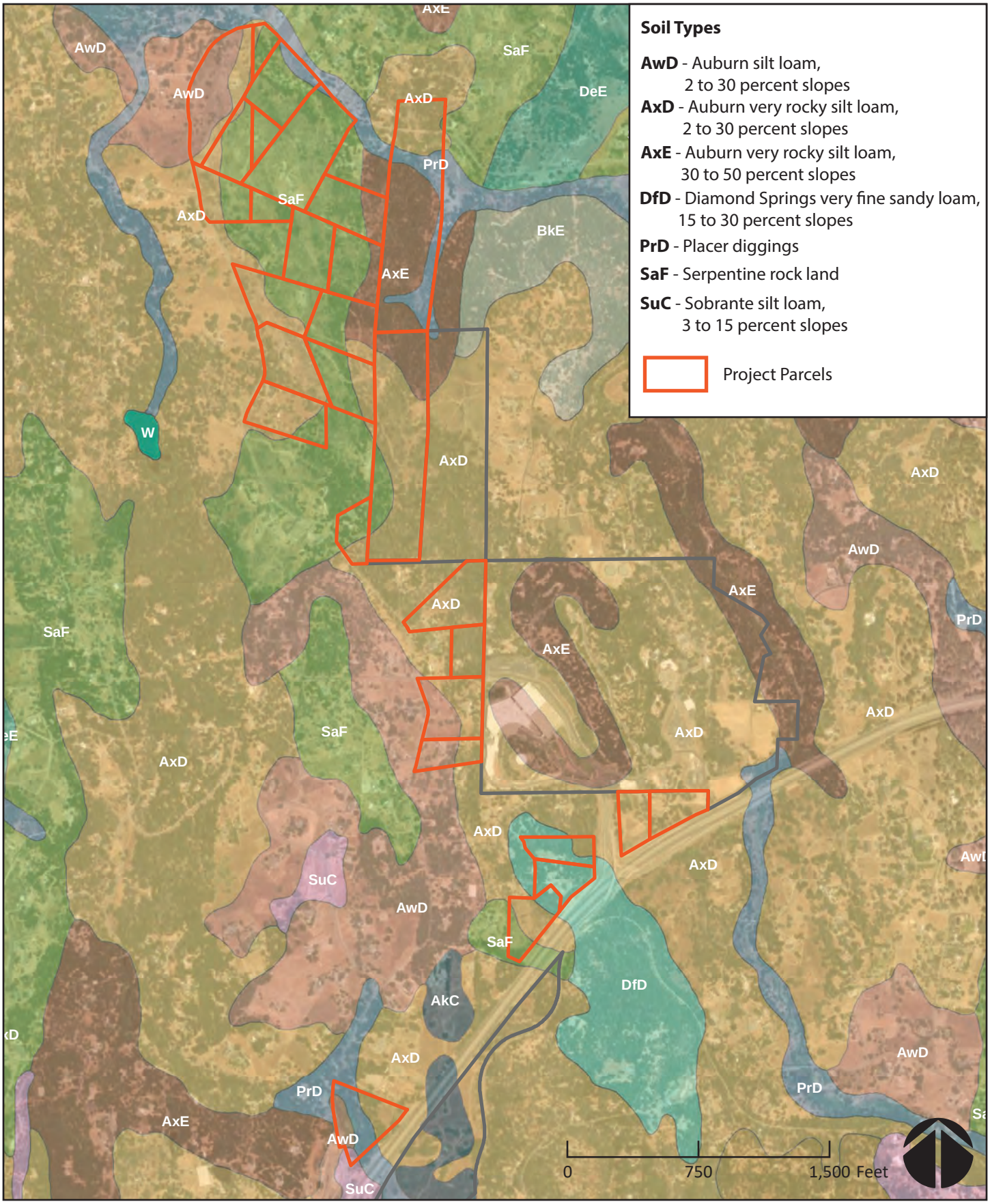
SLOPE MAP



Source: USGS, CGS

FIGURE 3-2

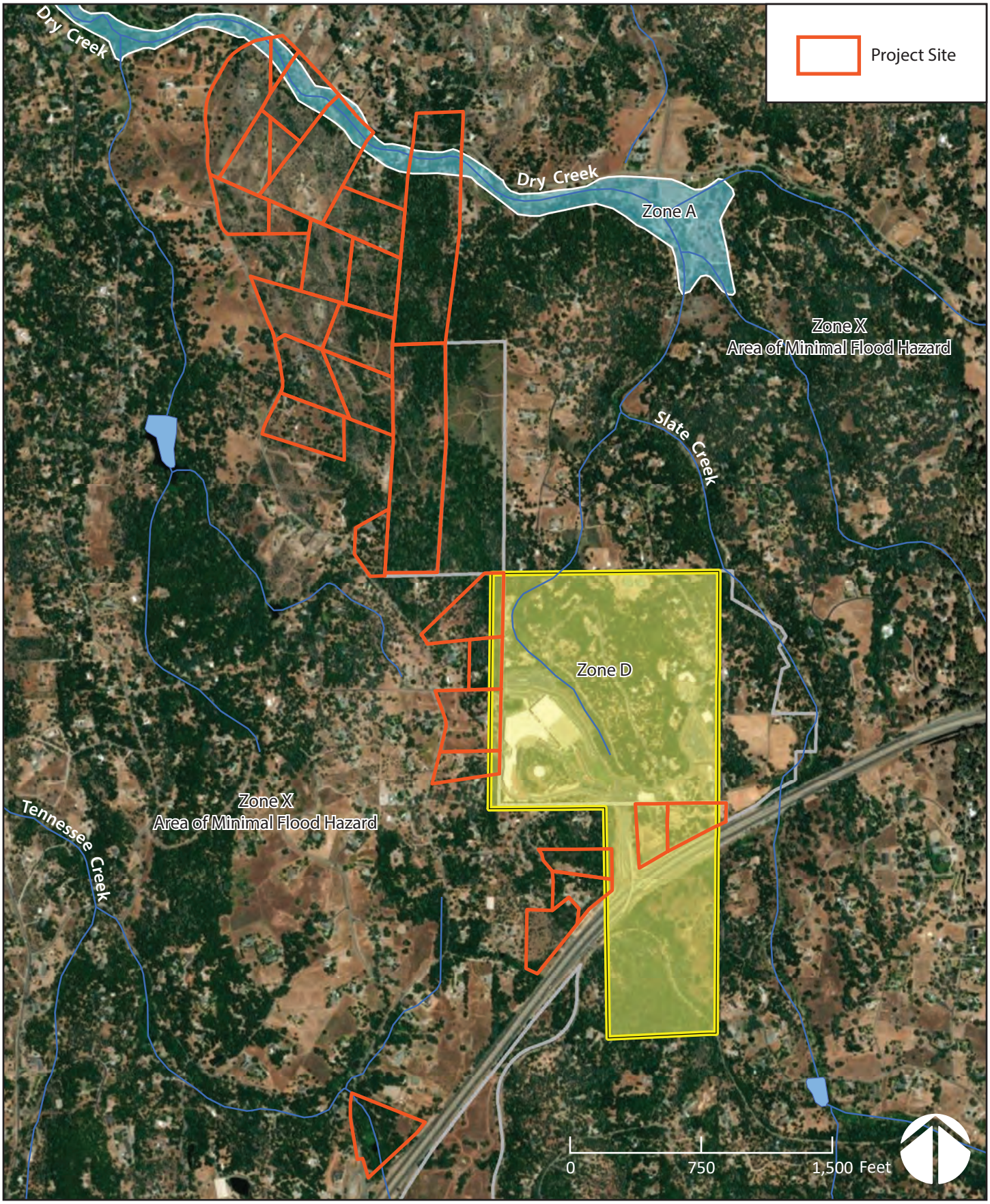
FAULT MAP



Source: NRCS

FIGURE 3-3

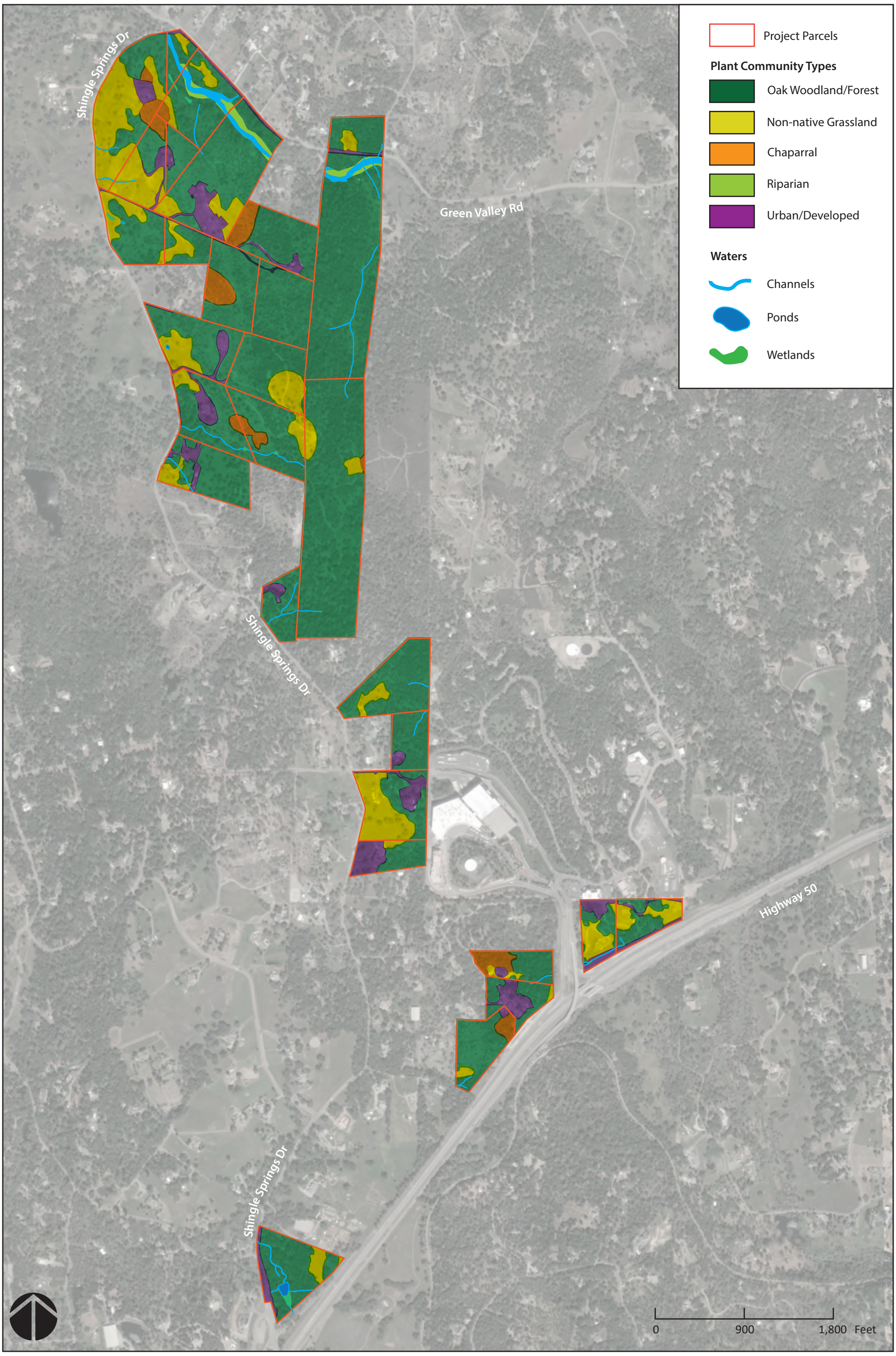
SOIL MAP



Source: USGS, FEMA

FIGURE 3-4

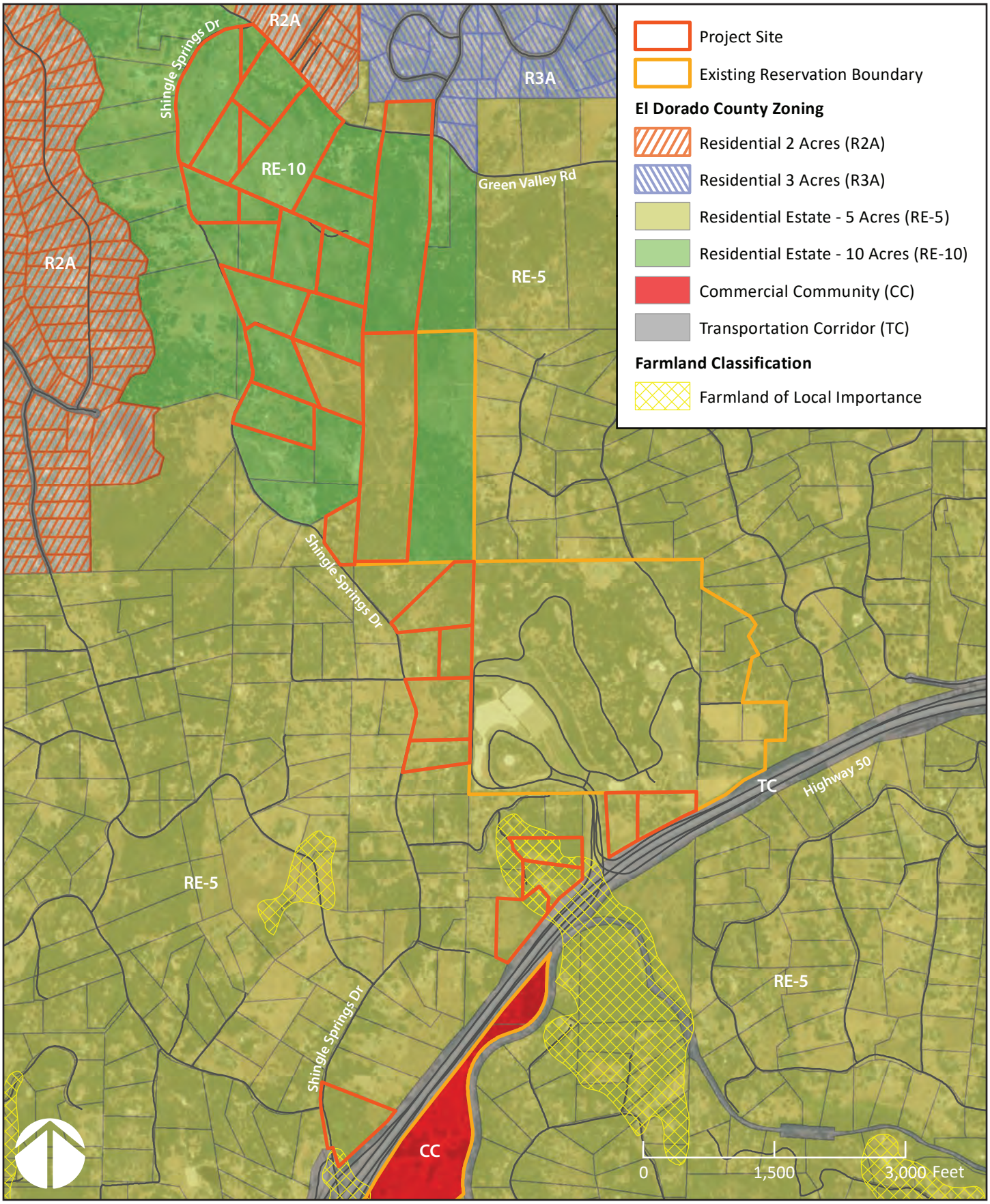
CREEKS AND FLOOD ZONES



Source: Biological Assessment

FIGURE 3-5

PLANT COMMUNITIES AND WATERS



Source: El Dorado County

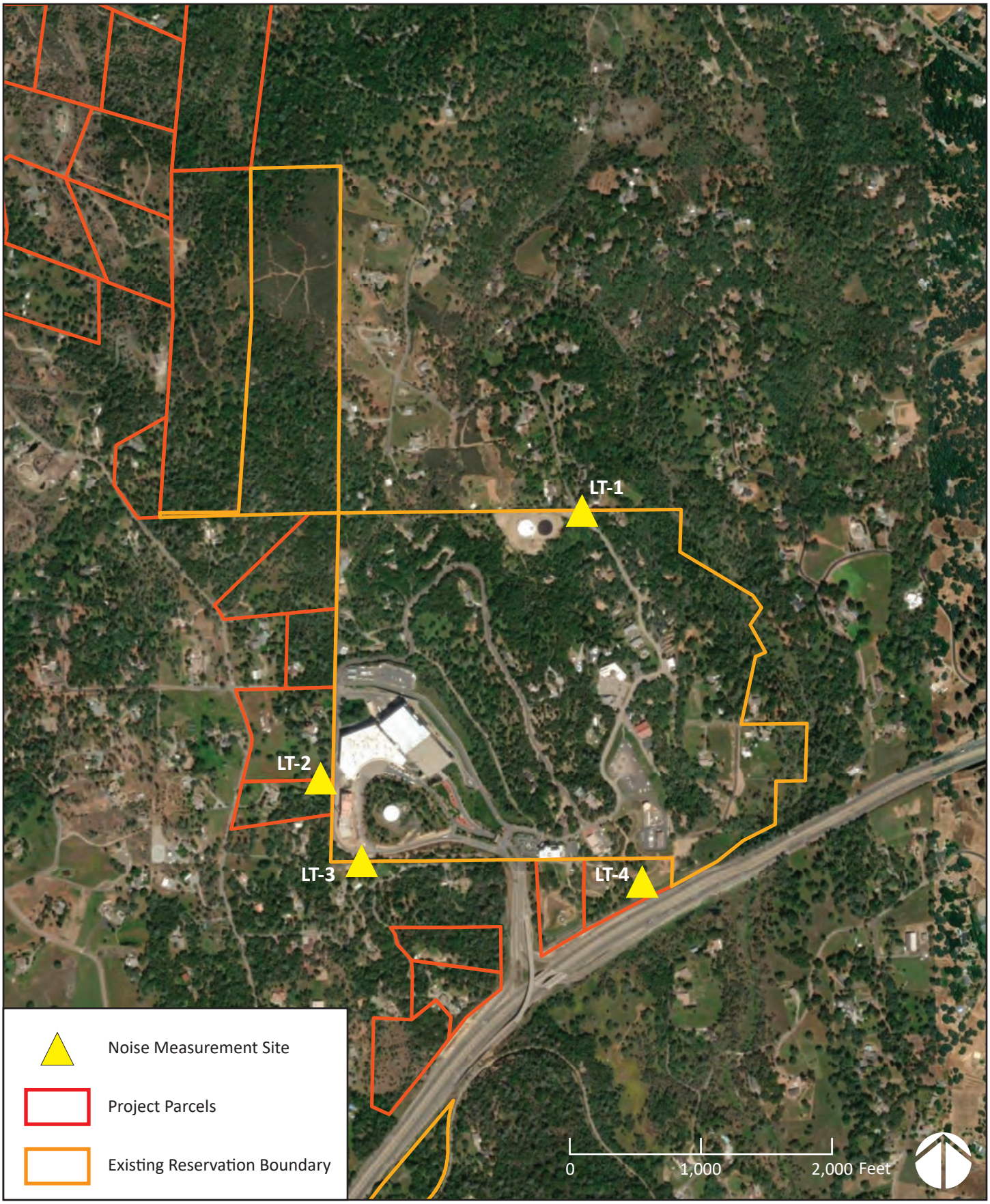
FIGURE 3-6

ZONING AND AGRICULTURAL RESOURCES

Source: El Dorado County

FIGURE 3-7

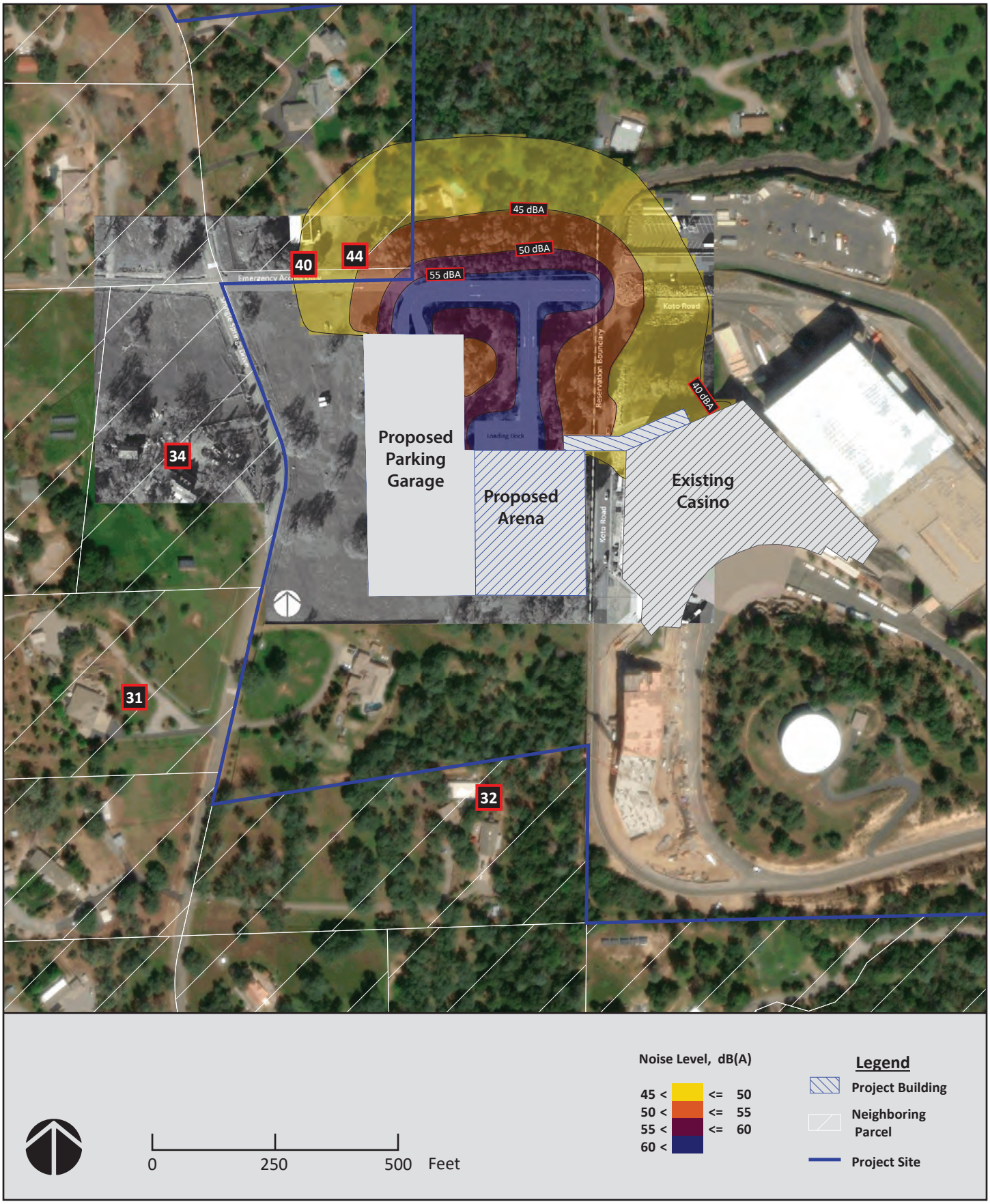
EID SERVICE AREA



Source: Saxelby Acoustics

FIGURE 3-8

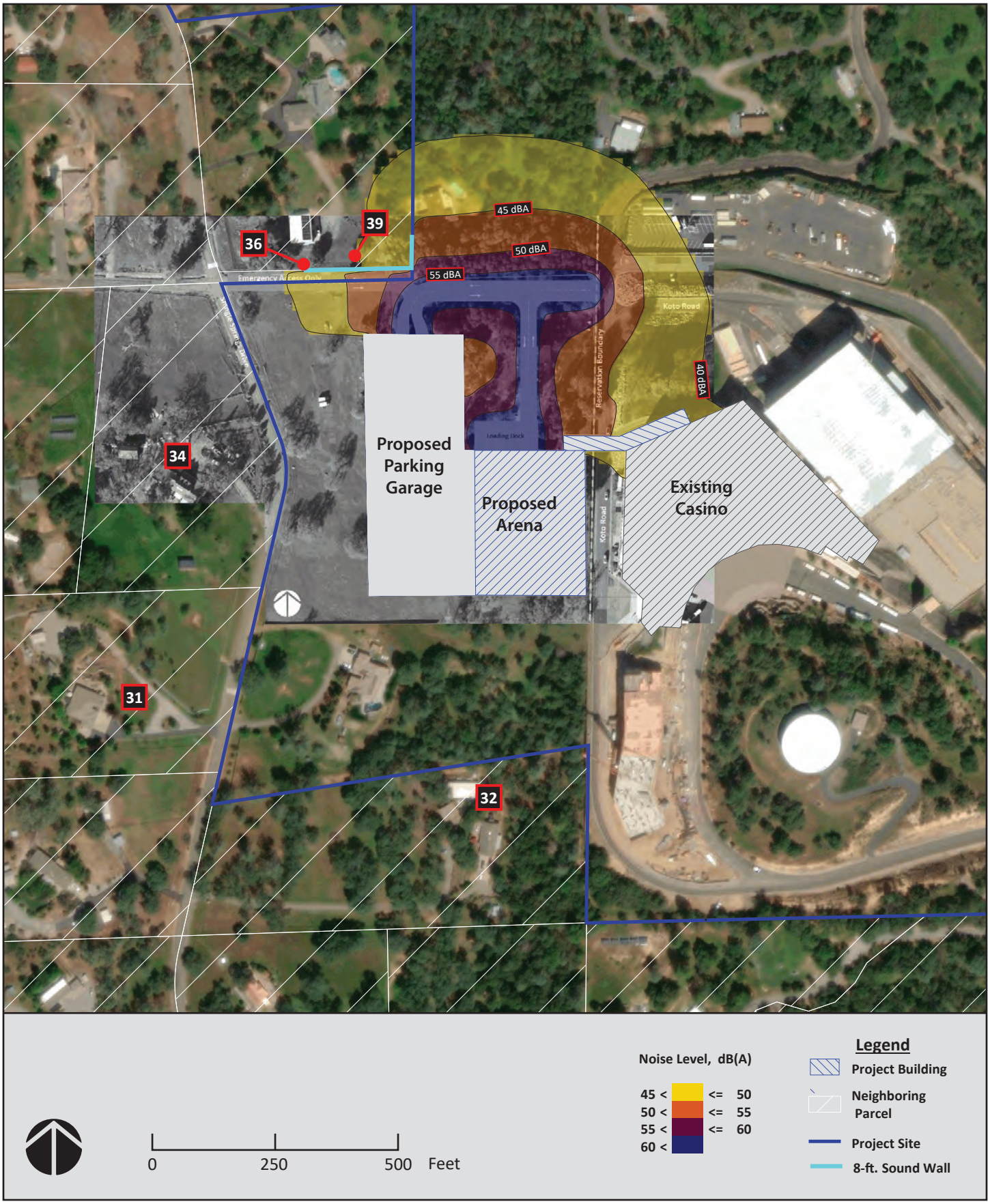
NOISE MEASUREMENT LOCATIONS



Source: Saxelby Acoustics

FIGURE 3-9

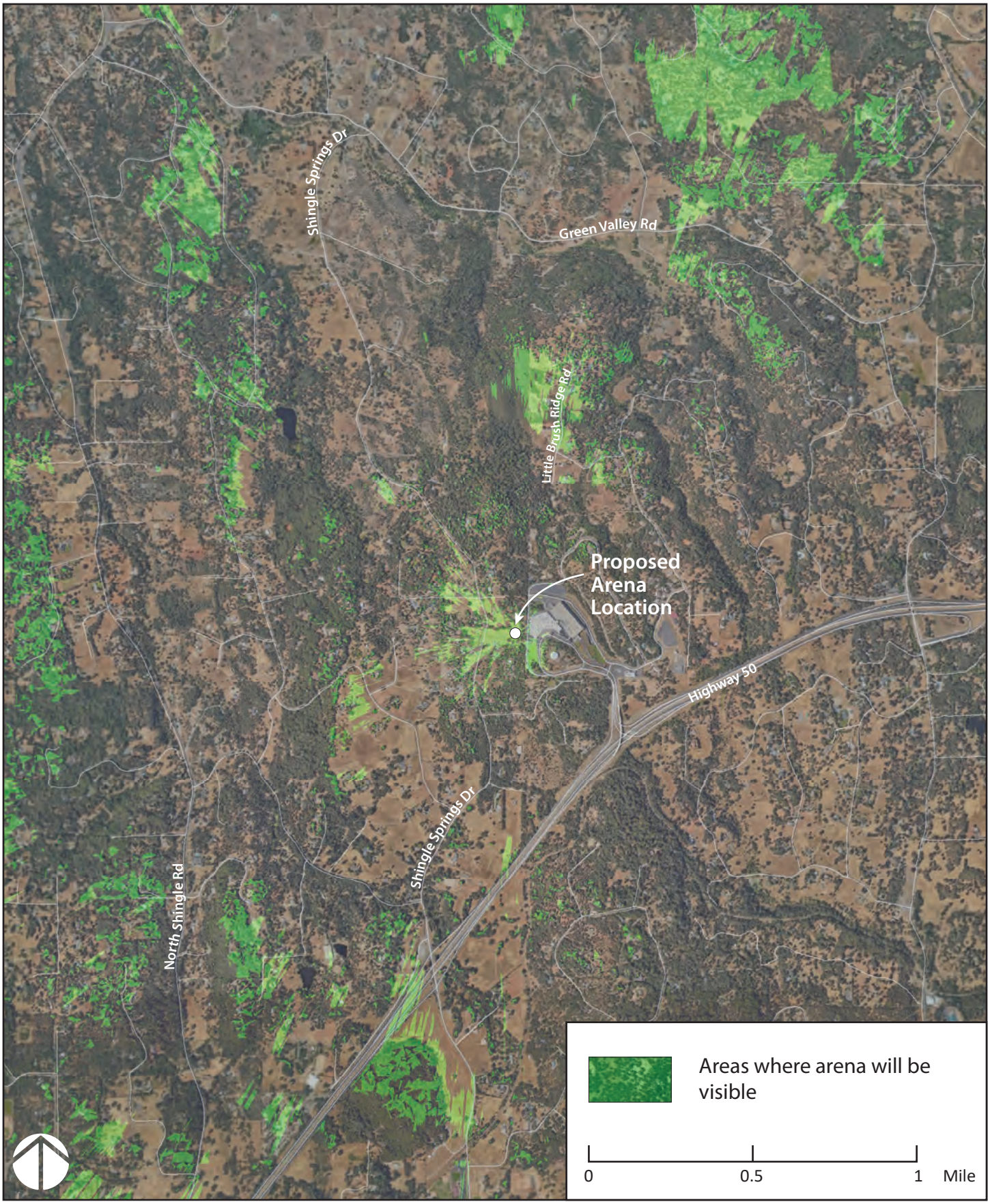
ESTIMATED ARENA NOISE CONTOURS



Source: Saxelby Acoustics

FIGURE 3-10

ESTIMATED ARENA NOISE CONTOURS WITH SOUND WALL



Source: Google Earth

FIGURE 3-11

ARENA VIEWSHED

Existing view of existing casino and hotel from residential area west of Rancheria.

Rendering of proposed arena and parking garage from residential area west of Rancheria.

Source: SSBMI

FIGURE 3-12

ARENA AND PARKING GARAGE RENDERING

Appendix B

Expanded Settings

5170 Golden Foothill Parkway
El Dorado Hills, CA 95762
916.235.8224 | www.acorn-env.com

Shingle Springs Rancheria 295.7-Acre Fee-to-Trust Project
Expanded Regulatory and Environmental Setting

Prepared By: Acorn Environmental
Date: September 2025

Introduction

This memorandum has been prepared to provide expanded background information on the regulatory and environmental setting for the Shingle Springs Rancheria 295.7-Acre Fee-to-Trust Project Environmental Assessment (EA). All referenced figures are provided in **Appendix A** of the EA.

Land Resources

Environmental Setting

Topography

The project site is located in the lower foothills of the Sierra Nevada Range. Landforms in the area are typical of the Sierra Nevada foothills with low rounded hills, occasional protruding rock outcroppings and mixed oak woodlands interspersed with broad grassy areas. The project site is situated at an elevation range of approximately 1,100 to 1,600 feet above mean sea level. The Project Site has diverse topography, ranging from flat terrain to steeply sloped areas. The proposed development has been designed to avoid construction on slopes greater than 30.

Geological Setting and Seismicity

The project site is located in a transitional zone between two geomorphic provinces, with the Great Valley Geomorphic Province to the west and the Sierra Nevada Geomorphic Province to the east. Rock deposits within the project area consist of Mesozoic sedimentary, granitic, volcanic and ultramafic rocks (Miles and Goudey, 1997). Historic mining activities in the area reflect the presence of auriferous (gold-bearing) deposits. Signs of mining activities are evident on the project site and surrounding areas, characterized by ground sluicing, mining ditches and mine shafts (Natural Investigations Company, 2022).

Within the project area is a relatively narrow zone of chaotically intermixed rocks known as the Sierra Foothills Melange Belt. These rocks include what once was an ancient sea floor. Within this belt, especially along the Bear Mountain Fault Zone, the metamorphic rocks are intermixed with rocks containing serpentine, called serpentinite. Serpentine is a group of common rock-forming minerals that are derived from magnesium-rich silicate minerals in igneous and metamorphic rocks. Naturally Occurring Asbestos (NOA) minerals, including chrysotile and tremolite, can also occur naturally in serpentine rock. The project

site falls within an NOA Review Area designated by El Dorado County (El Dorado County, 2015). Grading activities have the potential to encounter weathered and un-weathered bedrock.

While the project site is not within an identified fault zone, the area is subject to ground shaking from seismic activity on faults in both the Sierra Nevada Foothills and the San Francisco Bay Area. Faults in the area are related to the Foothills Fault System, approximately one mile west of the project site and the Melones Fault Zone in the Sierra Nevada foothills located approximately eight miles east of the project site (Figure 3-2 of **Appendix A**). The nearest fault with historic displacement is the northern end of the Foothill Fault System, approximately 73 miles from the project site (CGS, 2015).

Surface ground rupture during an earthquake is unlikely due to the distance of active faults from the project site. The primary earthquake hazards for the project site are the effects of ground shaking. Ground shaking may affect areas for hundreds of miles around a fault. El Dorado County is not considered to be at risk from seismically induced landslides. However, the project site is located near the Foothills Fault System which has the potential for landslides to occur where slopes are destabilized from cuts and fills associated with road building (El Dorado County, 2003).

The project site is not located within a fault zone and surface rupture is not expected. The potential for strong shaking does exist, primarily from regional faults. Structural damage from the shaking of buildings can be minimized by avoiding areas of geologic hazards such as soils with high shrink-swell characteristics and areas of slopes greater than 30 percent. The homes and roadways would be located in areas of the project site that have soils identified as having low shrink-swell potential. Development would primarily be located on areas with gentle to moderate (0 – 20 percent) slopes and slopes greater than 30 percent would not be developed.

Soil Types and Characteristics

The U.S. Department of Agriculture Natural Resources Conservation Service (USDA NRCS) Web Soil Survey was used to map soil units and provide a summary of major physical characteristics for each unit (NRCS, 2024). The soil units listed in **Table 1** were mapped on the Project Site.

Table 1: On-site Soil Properties

Soils	Landform	Profile	Drainage	Runoff Class	Erodibility (k-Factor)	Hydric Soil	Linear Extensibility*
AwD Auburn silt loam, 2 to 30 percent slopes	Hills	0 to 14 in: silt loam 14 to 18 in: un-weathered bedrock	Well drained	Low	High (.49)	No	Low
AxD Auburn very rocky silt loam, 2 to 30 percent slopes	Hills	0 to 14 in: silt loam 14 to 18 in: un-weathered bedrock	Well drained	Medium	High (.49)	No	Low
AxE Auburn very rocky silt loam, 30 to 50 percent slopes	Hills	0 to 14 in: silt loam 14 to 18 in: un-weathered bedrock	Well drained	High	High (.49)	No	Low
DfD Diamond Springs very fine sandy loam, 15 to 30	Mountain Slopes	0 to 9 in: very fine sandy loam 9 to 36 in: clay loam 36 to 40 in: sandy clay	Well drained	High	High (.43)	No	Low

Soils	Landform	Profile	Drainage	Runoff Class	Erodibility (k-Factor)	Hydric Soil	Linear Extensibility*
percent slopes		loam 40 to 44 in: weathered bedrock					
PrD Placer diggings	n/a	0 to 60 in: fine sandy loam, cobbles	n/a	Low	Low (.10)	No	Low
SaF Serpentine rock land	n/a	0 to 4 in: un-weathered bedrock	n/a	Very high	n/a	No	n/a
SuC Sobrante silt loam, 3 to 15 percent slopes	Hillslopes	0 to 11 in: silt loam 11 to 24 in: clay loam 24 to 30 in: weathered bedrock 30 to 34 in: un-weathered bedrock	Well drained	Medium	High (.43)	No	Low

Source: NRCS, 2024
*Shrink-Swell Potential

Soil erosion susceptibility ranges from low to high for soils on the Project Site, however all soils have a low shrink-swell potential. All soils with classified drainage are well drained and there are no hydric soils present on the Project Site.

Mineral Resources

The California Geological Survey (CGS) identifies the general project area as a Mineral Resource Zone 3, which designates areas containing known or inferred concrete aggregate resources of undetermined mineral resource significance (CGS, 2018). The USGS identifies a historic lode gold mine (General Lee) in the project site, although no significant gold deposits are known to exist in the area (APN 319-030-012) (USGS, 2011).

Water Resources

Regulatory Setting

Clean Water Act

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

- Sections 303 and 304 provide for water quality standards, criteria, and guidelines. Section 303(d) requires states to identify impaired off-Reservation water bodies, rank these impaired bodies based on severity of contamination and uses for the waters, and develop water quality management strategies, usually in the form of total maximum daily loads for the contaminant(s) of concern.
- Section 401 (Water Quality Certification) requires an applicant for any federal permit that proposes an activity that may result in a discharge to waters of the U.S., to obtain certification

from the EPA for on-trust land activities, or the state for off-Reservation activities, that the discharge will comply with other provisions of the CWA.

- Section 402 establishes the National Pollutant Discharge Elimination System (NPDES), a permitting system for the discharge of any pollutant (except for dredged or fill material) into waters of the U.S. Discharges to surface waters from wastewater treatment plants require an NPDES permit. Each NPDES permits contain limits on concentrations of pollutants discharged to surface waters to prevent degradation of water quality and protect beneficial uses. Construction projects disturbing one or more acres of soil must apply for coverage under the EPA's Construction General Permit. The EPA's Construction General Permit also requires the development and implementation of a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP must list BMPs that address stormwater runoff rates and quality
- Section 404 establishes a permit program for the discharge of dredged or fill material into waters of the U.S. This permit program is jointly administered by the USACE and the EPA.

National Flood Insurance Program

In response to increasing costs of disaster relief, Congress passed the National Flood Insurance Act (NFIP) of 1968 and the Flood Disaster Protection Act of 1973. The purpose of these acts was to reduce the need for large, publicly funded flood control structures and disaster relief by restricting development on floodplains. The Federal Emergency Management Agency (FEMA) administers the NFIP to provide subsidized flood insurance to communities that comply with FEMA regulations limiting development in floodplains. FEMA issues flood insurance rate maps (FIRMs) for communities participating in the NFIP. A FIRM is the official map of a community prepared by FEMA to delineate both the special flood hazard areas and the flood risk premium zones applicable to the community.

Safe Drinking Water Act

Under the mandate of the Safe Drinking Water Act, the EPA sets legally enforceable National Primary Drinking Water Regulations (primary standards) that apply to public water systems. These standards are established to protect human health by limiting the levels of contaminants in drinking water. The EPA also defines National Secondary Drinking Water Regulations (secondary standards) for contaminants that cause cosmetic and aesthetic effects, but not for health effects. The EPA recommends that these secondary standards be met but does not require systems to comply with them.

The EPA does not oversee the construction and permitting of groundwater wells, but requires that public health standards, such as an effectively installed sanitary seal, are in place. Both primary and secondary drinking water standards are expressed as either Maximum Contaminant Levels, which define the highest level of a contaminant allowed in drinking water, or Maximum Contaminant Level Goals, which define the level of a contaminant below which there is no known or expected risk to health. Monitoring requirements for public water systems typically include total coliform, nitrate, inorganic chemicals, volatile organic chemicals, non-volatile synthetic organic chemicals, secondary drinking water standard constituents, and general chemistry (including alkalinity, hardness, and minerals). The frequency of sampling varies and may be reduced over time.

Environmental Setting

Surface Water, Drainage, and Flooding

Watersheds and Drainage

Average annual precipitation for the region is approximately 38 inches per year (Western Regional Climate Center, 2024). Summers are hot and dry, and winters are cool and moist. A majority of the annual precipitation falls between the months of November and April.

Surface Water Quality

Land use largely affects surface water quality, with both point source and nonpoint-source discharges contributing contaminants to surface waters. Water quality in the South Fork American River Watershed is generally good; however, the South Fork (below Slab Creek Reservoir to Folsom Lake) is listed on the Clean Water Act Section 303(d) list of impaired water bodies for mercury because of historical mining activities (SWRCB, 2022). The nearest evaluated surface water to the project site is Weber Creek, which is not listed as an impaired waterbody.

Groundwater

The primary mechanism for water storage and movement in the project area is within the structure of the soil and the joint systems in the rocks. Groundwater in this region resides in fractures in the underlying bedrock. The occurrence and geometry of the fractures dictate the flow patterns within the rocks. Some rainfall will infiltrate the soil and be made available to plants and to the air for evapotranspiration, and a portion will reach the lower permeability rock layer beneath the soils. At this point, the water will flow through the soil along the soil-rock boundary until a rock fracture conducts the water into the underlying rock or until the soil becomes too thin to support the flow, forming a seasonal spring. The availability of groundwater in these fractured rock formations is variable and can be plentiful or quite limited.

Groundwater is used extensively in the project area for domestic water supply. Based on well completion reports on file with the California Department of Water Resources (DWR), at least 132 domestic wells have been developed in the Public Land Survey System (PLSS) Sections where the project site is located. This total includes dry wells that were abandoned and wells that are not actively used. DWR records identify eight wells on the project site, with individual yields ranging from approximately 1.8 to 20 gallons per minute (gpm) (DWR, 2023). The combined yield of project site wells based on well completion reports is 81 gpm. Near the project site, well completion reports identify well yields ranging from 0 to 200 gpm, with most wells yielding from 5 to 20 gpm.

Air Quality

Regulatory Setting

Criteria Pollutants

Certain air pollutants have been recognized to cause notable health problems and consequential damage to the environment either directly or in reaction with other pollutants, due to their presence in elevated concentrations in the atmosphere. Such pollutants have been identified and regulated as part of the overall endeavor to prevent further deterioration and facilitate improvement in air quality. The pollutants regulated by the United States Environmental Protection Agency (EPA) and California Air Resources Control Board (CARB) and subject to emissions control requirements adopted by federal, state and local

regulatory agencies include ozone (O_3), volatile organic compounds (VOCs), nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), particulate matter (PM10 and PM2.5), and lead (Pb). These pollutants are referred to as "criteria air pollutants" because of the specific standards, or criteria, which have been adopted for them. The National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) have been set at levels considered safe to protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly with a margin of safety, and to protect public welfare, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

Federal

The EPA is responsible for implementing and enforcing the federal Clean Air Act (CAA) and developing the NAAQS. As part of its implementation responsibilities, the EPA requires each state to prepare and submit a state implementation plan (SIP) that demonstrates the means to attain and/or maintain the federal standards. The SIP must integrate federal, state, and local plan components and regulations to identify specific measures to reduce pollution in nonattainment areas, using a combination of performance standards and market-based programs. EPA responsibilities under the CAA includes regulating mobile sources, such as cars, trucks, buses, and planes. The provisions of Title II of the CAA have resulted in tailpipe emission standards for vehicles, which have generally strengthened over time to improve air quality

State

CARB is the state agency responsible for coordinating both state and federal air pollution control programs in California. It is primarily responsible for ensuring implementation of the 1988 California Clean Air Act (CCAA), for responding to the federal CAA requirements, and for regulating emissions from motor vehicles and consumer products within the state. CCAA requirements include annual emission reductions, development and use of low emission vehicles, establishment of the CAAQS, and submittal of air quality attainment plans by air districts for incorporation into the California SIP. The CCAA and other California air quality statutes invest local air districts, such as the El Dorado County Air Quality Management District (AQMD), with the responsibility for regulating most stationary sources, and to a certain extent, area sources.

General Conformity

The 1990 Amendment to CAA Section 176 requires the federal EPA to promulgate rules to ensure that federal actions conform to state efforts to control emissions of pollutants. These rules, known as the General Conformity Rule (40 C.F.R. Parts 51.850–51.860 and 93.150–93.160), require any federal agency responsible for an action in a federal nonattainment/maintenance area to demonstrate conformity to the applicable State Implementation Plan (SIP), by either determining that the action is exempt from the General Conformity Rule requirements or subject to a formal conformity determination.

Actions would be exempt, and thus conform to the SIP, if an applicability analysis shows that the total direct and indirect emissions of nonattainment/maintenance pollutants from project construction and operation activities would be less than specified emission rate thresholds, known as *de minimis* levels. If not determined exempt, a formal conformity determination would be required. The General Conformity Rule is applicable only for project criteria pollutants and their precursors for which an area is designated nonattainment or that is covered by a maintenance plan.

Greenhouse Gas Emissions

State

The Global Warming Solutions Act of 2006 (Assembly Bill [AB] 32) is the overarching law that requires the State to set statewide GHG reduction targets. AB 32 required CARB to develop a Climate Change Scoping Plan that describes the approach California will take to reduce GHGs to achieve emission reduction goals, and to update the plan every five years. CARB approved the first Scoping Plan in 2008, and the most recent update was approved in 2022. The 2022 updated expands on earlier plans with a target of reducing anthropogenic emissions to 85 percent below 1990 levels by 2045, and adds carbon neutrality as guide for the capture and store carbon through land use management and technology.

Biological Resources

Regulatory Setting

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) of 1918, as amended, is designed to protect migratory birds and requires project-related disturbances to be reduced or eliminated during the nesting season (generally February 1 through August 31).

Federal Endangered Species Act

The Federal Endangered Species Act (FESA) protected federally listed wildlife and their habitat from take. Section 7 of the FESA requires consultation for federal agencies and tribes if take of a listed species is necessary to complete an otherwise lawful activity. The loss of habitat for a species is considered an impact to the species. The FESA defines critical habitat as the specific geographic areas within a listed species range that contain features considered essential for the conservation of the listed species.

Sections 404 and 401 of the Clean Water Act

Section 404 and 401 of the Clean Water Act (CWA) define the wetlands and waters of the U.S. subject to jurisdiction of the U.S. Army Corps of Engineers (USACE) and/or the State. It also guides the permitting and mitigation of filling or dredging waters of the U.S. under the authority of Section 404 of the CWA by the USACE or the EPA.

Regional Habitat Conservation Plans

The project area does not fall within the boundaries of any adopted habitat conservation plan (HCP) or natural community conservation plan. El Dorado County does not have an adopted HCP or natural community conservation plan, but they are developing a future plan called the Integrated Natural Resources Management Plan (INRMP) for the western half of the County.

Environmental Setting

Methodology

Preliminary Research and Data Gathering

The following information was used for the preparation of reports listed above and in determining the environmental setting of the project site:

- Aerial imagery of the project site;

- Any readily-available previous biological resource studies pertaining to the project site or vicinity;
- United States Geologic Service (USGS) 7.5 degree-minute topographic quadrangles of the project site and vicinity;
- California Natural Diversity Database (CNDDB), electronically updated monthly by subscription to California Department of Fish and Wildlife;
- United States Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) of the project site and vicinity; and
- USFWS Information for Planning and Conservation (IPaC) species list (IPaC Trust Resources Report).

Site Assessments

Consulting Biologist, G.O. Graening, Ph.D., and Tim Nosal, M.S. conducted a biological field assessment on November 9, 13, and 20, 2018 for the project site. Dr. Graening and Derrek Murray from the Environmental Department of the Tribe conducted a biological field assessment again on June 21 and 24, 2022. Dr. Graening conducted an additional field assessment on March 21, 2024. A summary of the survey methodologies is provided in the BA (**Appendix D**).

Habitats

Montane Riparian

Montane riparian habitats are generally characterized by variable and structurally diverse vegetation, often occurring in narrow and dense grove with a sparse understory. The montane riparian zone may provide suitable habitat for food, cover, and reproduction for amphibians, reptiles, birds, and mammals.

Mixed Chaparral

Mixed chaparral habitats are generally characterized by homogeneous brushland dominated by shrubs with thick evergreen leaves and high density at maturity. No wildlife species are restricted to mixed chaparral with species being found mostly in other shrub-dominated types.

Valley Foothill Riparian

Valley foothill riparian habitats are generally characterized by winter deciduous trees with a subcanopy tree layer and understory shrub layer. The valley foothill riparian zone may provide suitable habitat for food, water, migration and dispersal corridors, and other coverage for wildlife.

Blue Oak Woodland

Blue oak woodland is generally characterized by an overstory of scattered, broad-leaf trees that commonly form an open savanna-like stand with an understory of an annual grassland extension. Assuming other special habitat requirements are met, the blue oak woodland may provide suitable habitat for amphibians and reptiles, birds, and mammals species.

Valley Oak Woodland

Valley oak woodland can vary from savanna-like to forest-like stands, with closed canopies comprised of winter-deciduous and broad leaf trees. Typically comprised of valley oaks, the ground cover consists of well-developed annual grasses and forbs. The valley oak woodland may provide birds and mammals with food resources, as well as cover for other wildlife.

Annual Grassland

Annual grassland habitat is generally characterized by open grasslands comprised of annual plant species and structures depending on factors such as weather patterns and livestock grazing. Many wildlife species may use annual grasslands for foraging, but may also require special habitat features for breeding, resting, and escape cover.

Fresh Emergent Wetland

Fresh emergent wetlands are generally characterized by rooted herbaceous hydrophytes that are flooded frequently so that vegetation roots prosper in anaerobic environments. These habitats may provide food, cover, and water for various species of birds, mammals, reptiles, and amphibians.

Riverine

Riverine habitats are generally characterized by intermittent or continually running water, distinguishing a river and stream with changes in velocity, temperate, and turbidity. Open water zones may provide resting, escape cover, or hunting areas for various bird species, with near-shores water providing food. Some mammal species may also be found in riverine habitats.

Pasture

Pasture habitats are generally characterized by a mix of perennial grasses and legumes that provide full canopy closure with height varying depending on season and livestock levels. Pastures may be used by a variety of species depending on adjacent habitat and the geographic area. Nesting may occur from ground-nesting birds if there is adequate residual vegetation. When flooded, pastures may provide feeding and roosting habitat for wetland-associated birds and with adequate escape cover, elk, deer, and antelope may also graze in pasture habitat.

Urban

The structure of urban habitats can vary with tree grove, street strip, shade tree/lawn, lawn, and shrub cover being the five types of vegetation structures. Wildlife is relevant to three urban categories: downtown, urban residential, and suburbia. Species richness is low in highly developed downtown areas, with decreasing development from the inner cover outward. Urban residential zones are characterized by denser and varied shade trees, lawns, hedges, and planted gardens, and can be characterized by a variety of species. Suburban areas may have tracts of natural vegetation such as chaparral, grassland, and oak woodland as well as landscaped gardens and lawns. Wildlife density may increase with decreasing species diversity, proportional to native species occurrence. Bird species, mammals, and reptiles may occur.

Barren

Barren habitats are characterized by the absence of vegetation, with structure and composition determined by the regional and surrounding environment. Urban settings may be classified as barren if vegetation cover does not meet the threshold for vegetation habitat. The structure of non-vegetated substrate can be critical for habitat. For instance, bird species may utilize rock ledges for nests, while others may use open ground cover for scrape nests. Reptiles may use sandy soil for burrowing or egg laying, with some mammals utilizing slopes for cover.

Cultural and Paleontological Resources

Regulatory Setting

National Historic Preservation Act

Cultural resources are considered during federal undertakings chiefly under Section 106 of the NHPA through one of its implementing regulations, 36 CFR 800 (Protection of Historic Properties), as well as NEPA. Properties of traditional religious and cultural importance to Native Americans are considered under Section 101(d)(6)(A) of NHPA.

Section 106 of the NHPA (54 U.S.C. § 306108) requires federal agencies to take into account the effects of their undertakings on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register of Historic Places (NRHP) and to afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment on such undertakings (36 CFR 800.1). Under Section 106, the significance of any adversely affected cultural resource is assessed and mitigation measures are proposed to reduce any impacts to an acceptable level. Significant cultural resources are those resources that are listed in, or are eligible for listing on the NRHP per the criteria listed at 36 CFR 60.4.

The quality of significance in American history, architecture, archaeology, engineering and culture is present in districts, sites, buildings, structures, and objects that:

A. are associated with events that have made a significant contribution to the broad patterns of our history; or
B. are associated with the lives of persons significant in our past; or
C. embody the distinctive characteristics of a type, period, or method of installation, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
D. have yielded, or may be likely to yield, information important in prehistory or history.

In addition to meeting one or more of the above criteria, eligibility for the NRHP requires that a resource retain sufficient integrity to convey its significance. Seven aspects of integrity have been defined which help communicate the significance of a historic property: location, design, setting, materials, workmanship, feeling, and association.

Native American Graves Protection and Repatriation Act

The Native American Graves Protection and Repatriation Act (NAGPRA), 25 USC 3001 et seq., provides a process for museums and federal agencies to return Native American cultural items – human remains, funerary objects, sacred objects, or objects of cultural patrimony – to lineal descendants, and culturally affiliated Indian tribes and Native Hawaiian organizations. NAGPRA includes provisions for unclaimed and culturally unidentifiable Native American cultural items, intentional and inadvertent discovery of Native American cultural items on federal and Tribal lands, and penalties for noncompliance and illegal trafficking.

Archaeological Resources Protection Act of 1979

The Archaeological Resources Protection Act of 1979 (ARPA; Public Law 96-95; 16 USC 470aa-mm) provides for the protection of archaeological resources and sites that are on public and Indian lands, and fosters increased cooperation and exchange of information between governmental authorities, the professional archaeological community, and private individuals having collections of archaeological

resources and data that were obtained before October 31, 1979. ARPA also provides for penalties for noncompliance and illegal trafficking.

Socioeconomic Conditions

The socioeconomic conditions setting does not require expansion

Transportation and Circulation

Environmental Setting

Methodology

A Traffic Study was prepared (attached to the EA as **Appendix F**), and this Traffic Study assesses the potential impacts from the Proposed Project on existing transportation and circulation. The number of trips anticipated to be generated by the Proposed Project was primarily approximated using data included in the *ITE Trip Generation Manual, 11th Edition* (ITE).

Two different conditions in two different settings were examined: No Project and Plus Project under Existing (2023) and Cumulative (2043) conditions. Figure 3 in **Appendix F** illustrates the study intersections, traffic control, and lane configurations while the freeway study facilities are depicted in Figure 4 in **Appendix F**.

The number of trips anticipated to be generated by the Proposed Project was derived using data included in the ITE Trip Generation Manual, 11th Edition and data provided by the Tribe. These trips were then assigned to the roadway network based on the project area roadway volumes and engineering judgement. Using these volumes, LOS was determined at the study facilities. Detailed calculations are included in Appendix C in **Appendix F**. The same software identified in Section 3.7.1 of the EA was also used to assess project impacts (additional information can be found in **Appendix F** of the EA).

A planning level assessment of the need for traffic signalization was performed for the un-signalized study intersections. This evaluation was performed consistently with the peak-hour warrant methodologies noted in Section 4C of the California Manual on Uniform Traffic Control Devices (CAMUTCD), dated March 30, 2021. A queuing study was conducted to evaluate the capacity of the existing turn lanes at the study intersections. Synchro reports were used to conduct the queuing analysis.

Land Use

Regulatory Setting

Federal

Farmland Protection Policy Act

The goal of the Farmland Protection Policy Act (FPPA) is to minimize the extent that federal actions and programs result in the conversion of agricultural lands to non-agricultural uses. Pursuant to the FPPA, the Farmland Conversion Rating Form (Form AD 1006) is used to determine the value of the farmland under consideration and the level of protection such land should receive.

State

Williamson Act

Under the provisions of California's Williamson Act (California Land Conservation Act 1965, Section 51200), landowners contract with the County to maintain agricultural or open space use of their lands in return for a reduced property tax assessment. Withdrawal involves a 10-year period of tax adjustment to full market value before protected open space can be converted to urban uses. Consequently, land under a Williamson Act Contract can be in either a non-renewal status or a renewal status.

Local

Land uses and zoning in the unincorporated portion of the County are regulated by El Dorado County through the El Dorado County General Plan and Zoning Ordinance. The current General Plan was adopted in 2004 and has been periodically amended since. An amended Public Health, Safety, and Noise Element of the General Plan was adopted in May 2024.

Public Services and Utilities

The public services and utilities setting does not require expansion.

Noise

Fundamentals of Sounds and Vibrations

Sounds

Noise can be generally defined as unwanted sound. Sound, traveling in the form of waves from a source, exerts a sound pressure level (referred to as sound level) that is measured in decibels (dB), with 0 dB corresponding roughly to the threshold of human hearing and 120 dB corresponding to the threshold of very loud, such as a rock band. A common statistical tool is the average, or equivalent, sound level (L_{eq}), which corresponds to a steady-state A weighted sound level containing the same total energy as a time varying signal over a given time period (usually one hour). The L_{eq} is the foundation of the composite noise descriptor, L_{dn}, and shows very good correlation with community response to noise. The day/night average level (DNL or L_{dn}) is based upon the average noise level over a 24-hour day, with a +10-decibel weighing applied to noise occurring during nighttime (10:00 p.m. to 7:00 a.m.) hours. The nighttime penalty is based upon the assumption that people react to nighttime noise exposures as though they were twice as loud as daytime exposures.

With regards to increases in A-weighted noise level, the following relationships occur:

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived;
- Outside of the laboratory, a 3 dBA change is considered a just-perceivable difference;
- A change in level of at least 5 dBA is required before any noticeable change in human response would be expected; and
- A 10 dBA change is subjectively heard as approximately a doubling in loudness and can cause an adverse response.

Additional information regarding the fundamentals of sounds can be found in EA **Appendix I**.

Vibrations

Vibration is like noise in that it involves a source, a transmission path, and a receiver. While vibration is related to noise, it differs in that in that noise is generally considered to be pressure waves transmitted through air, whereas vibration usually consists of the excitation of a structure or surface. As with noise, vibration consists of amplitude and frequency. A person's perception to the vibration will depend on their individual sensitivity to vibration, as well as the amplitude and frequency of the source and the response of the system which is vibrating. Vibration can be measured in terms of acceleration, velocity, or displacement. A common practice is to monitor vibration measures in terms of peak particle velocities in inches per second. Standards pertaining to perception as well as damage to structures have been developed for vibration levels defined in terms of peak particle velocities (p.p.v.).

Human and structural response to different vibration levels is influenced by a number of factors, including ground type, distance between source and receptor, duration, and the number of perceived vibration events. **Table 2** shows Caltrans developed vibration levels that would normally be required to result in damage to structures. The vibration levels are presented in terms of p.p.v.in inches per second. **Table 2** indicates that the threshold for architectural damage to structures is 0.20 in/sec p.p.v.

Table 2: Effects of Vibration on People and Buildings

Peak Particle Velocity, mm/second	Peak Particle Velocity, in/second	Human Reaction	Effect on Buildings
0.15-0.30	0.006-0.019	Threshold of perception; possibility of intrusion.	Vibrations unlikely to cause damage of any type.
2.0	0.08	Vibrations readily perceptible.	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected.
2.5	0.10	Level at which continuous vibrations begin to annoy people.	Virtually no risk of "architectural" damage to normal buildings.
5.0	0.20	Vibrations annoying to people in buildings (this agrees with the levels established for people standing on bridges and subjected to relative short periods of vibrations).	Threshold at which there is a risk of "architectural" damage to normal dwelling - houses with plastered walls and ceilings. Special types of finish such as lining of walls, flexible ceiling treatment, etc., would minimize

Peak Particle Velocity, mm/second	Peak Particle Velocity, in/second	Human Reaction	Effect on Buildings
			"architectural" damage.
10-15	0.4-0.6	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges.	Vibrations at a greater level than normally expected from traffic, but would cause "architectural" dam age and possibly minor structural damage.

Source: EA **Appendix I**

Regulatory Setting

Federal

There are no federal regulations related to noise that apply to the project site. Federal regulations establish noise limits for medium and heavy trucks (more than 4.5 tons, gross vehicle weight rating) under 40 CFR Part 205, Subpart B. The federal truck pass-by noise standard is 80 dB at 15 meters from the vehicle pathway centerline. These controls are implemented through regulatory controls on truck manufacturers.

State

There are no state regulations related to noise that apply to the project site. The California Code of Regulations has guidelines for evaluating the compatibility of various off-Reservation land uses as a function of community noise exposure. The State also establishes noise limits for vehicles licensed to operate on public roads. For heavy trucks, the State pass-by standard is consistent with the federal limit of 80 dB at 15 meters from the centerline for light trucks and passenger cars less than 4.5 tons. These standards are implemented through controls on vehicle manufacturers and by legal sanction of vehicle operators by State and local law enforcement officials.

Local

The El Dorado County General Plan serves as the overall guiding policy document for land use, development, and environmental quality for the County. The Public Health, Safety, and Noise Element of the General Plan contains noise standards for transportation, non-transportation (stationary), and construction noise sources. The policies contained in this element serve as guides for identifying noise levels and reducing or avoiding adverse noise effects on residents. The General Plan states that noise from new transportation sources should not exceed 60 dB L_{dn} in residential areas. Noise created by proposed non-transportation noise sources should not exceed 50 dB L_{eq} during the daytime (7 a.m. – 7 p.m.), 45 dB L_{eq} during the evening (7 p.m. – 10 p.m.), and 40 dB L_{eq} during the night (10 p.m. – 7 a.m.). Furthermore, the County General Plan outlines construction thresholds in the Public health, Safety, and Nosie Element**.** However, County General Plan Policy 6.5.1.11 specifies that construction activities that occur between the hours of 7 a.m. and 7 p.m., Monday through Friday, and 8 a.m. and 5 p.m. on weekends, and on federally recognized holidays are exempt from construction noise thresholds specified in Table HS - 5, Table HS - 6, and Table HS – 7 of the General Plan. Additional local regulatory information can be found in **Appendix I** of the EA.

Environmental Setting

Methodology

An Environmental Noise Assessment was prepared by Saxelby Acoustics to assess the potential noise impacts from the alternatives on the ambient noise environment (attached as **Appendix I**). Traffic noise levels were modeled in the SoundPLAN modeling software to account for multiple sources of ambient noise. Inputs to the model included sound power levels for the proposed event center, existing and proposed mechanical equipment, existing and proposed buildings, terrain type, and locations of sensitive receptors. These predictions are made in accordance with International Organization for Standardization (ISO) standard 9613-2:1996 (Acoustics – Attenuation of sound during propagation outdoors).

Noise levels due to traffic were calculated using the Federal Highway Administration Highway Traffic Noise Prediction Model (FHWA RD-77-108). The model is based upon the Calveno reference noise 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. Project trip generation volumes were provided by **Appendix F** while truck usage and vehicle speeds on the local area roadways were estimated from field observations Additional information regarding the sound modeling for traffic can be found in **Appendix I**.

When determining the significance of impacts and appropriate mitigation for new development projects, the following criteria were taken into consideration based on Policy 6.5.1.12 of the County General Plan during operation:

- Where existing or projected future traffic noise levels are less than 60 dBA L_{dn} at the outdoor activity areas of residential uses, an increase of more than 5 dBA L_{dn} caused by a new transportation noise source will be considered significant;
- Where existing or projected future traffic noise levels range between 60 and 65 dBA L_{dn} at the outdoor activity areas of residential uses, an increase of more than 3 dBA L_{dn} caused by a new transportation noise source will be considered significant; and
- Where existing or projected future traffic noise levels are greater than 65 dBA L_{dn} at the outdoor activity areas of residential uses, an increase of more than 1.5 dBA L_{dn} caused by a new transportation noise will be considered significant.

Hazardous Materials

Environmental Setting

Hazardous materials and hazardous wastes are subject to extensive federal, state, and local regulations to protect public health and the environment. These regulations provide definitions of hazardous materials; establish reporting requirements; set guidelines for handling, storage, transport, and disposal of hazardous wastes; and require health and safety provisions for workers and the public.

The principal agencies regulating the generation, transportation, and disposal of hazardous materials are the EPA and the U.S. Department of Transportation (USDOT). 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. A site may be listed on a hazardous materials database while still being compliant with federal, state, and local laws. A hazardous material is defined in California Health and Safety Code Division 20 Chapter 6.95 Section 25501. A hazardous material can

include materials that because of quantity, concentration, physical characteristics, or chemical characteristics, pose a potential hazard to human health and safety or to the environment if released into the workplace or the environment. These materials include a substance or product which the manufacturer or producer is required to prepare a safety data sheet; A radioactive material; A substance listed under Title 49 of the Code of Federal Regulations; and substances listed in Section 339 of Title 8 of the California Code of Regulations (CCR).

The SWRCB GeoTracker database, the California Department of Toxic Substances Control (DTSC) and EnviroStor databases were searched for records of known storage tank sites and known sites of hazardous materials generation, storage, and/or contamination, as well as for locations of past and current hazardous waste involvement and storage, use, and disposal violations. These regulatory agency databases are only as accurate as the data entered and date the data entered into the regulatory agency-maintained database was last updated. If not reported to the appropriate regulatory agency, installation of underground storage tanks or hazardous materials releases would not be listed on the regulatory agency databases searched.

Visual Resources

Regulatory Setting

Caltrans State Scenic Highway Program

Highway 50 is officially designated as a Scenic Highway east of Placerville to South Lake Tahoe. However, west of Placerville in the project area, Highway 50 has not been identified by the California Department of Transportation (Caltrans) as eligible for designation.

El Dorado County General Plan

The Land Use Element of the El Dorado County General Plan includes goals to maintain characteristic natural landscape features, maintain and enhance the character of existing rural and urban communities, and elimination of high intensity lighting and glare consistent with prudent safety practices. The following specific objectives and policies are relevant to the assessment of aesthetic concerns:

Objective 2.3.1: Topography and Native Vegetation

> Provide for the retention of distinct topographical features and conservation of the native vegetation of the County.

Objective 2.3.2: Hillsides and Ridge Lines

> Maintain the visual integrity of hillsides and ridge lines.
>
> Policy 2.3.2.1 Disturbance of slopes thirty (30) percent or greater shall be discouraged to minimize the visual impacts of grading and vegetation removal.

Objective 2.8.1: Lighting Standards

> Provide standards, consistent with prudent safety practices, for the elimination of high intensity lighting and glare.

Policy 2.8.1.1 Development shall limit excess nighttime light and glare from parking area lighting, signage, and buildings. Consideration will be given to design features, namely directional shielding for street lighting, parking lot lighting, sport field lighting, and other significant light sources, that could reduce effects from nighttime lighting. In addition, consideration will be given to the use of automatic shutoffs or motion sensors for lighting features in rural areas to further reduce excess nighttime light.

El Dorado County Zoning Ordinance

The El Dorado County Zoning Ordinance includes Chapter 130.34 – Outdoor Lighting. This chapter requires that all outdoor lighting "shall be located, adequately shielded, and directed such that no direct light falls outside the property line, or into the public right-of-way."

References

California Department of Water Resources (DWR), 2023. Well Completion Report Map Application. Available online at: https://gis.water.ca.gov/app/wcr/. Accessed March 2023.

California Geological Survey (CGS), 2015. Fault Activity Map of California. Available at: https://maps.conservation.ca.gov/cgs/fam/. Accessed July, 2024.

CGS, 2018. Mineral Land Classification Map of Concrete Aggregate in the Greater Sacramento Area Production-Consumption Region.

El Dorado County, 2003. El Dorado County General Plan Draft Environmental Impact Report. May 2003.

El Dorado County, 2015. Asbestos Review Areas, Western Slope, County of El Dorado, State of California.

Miles, S. R. and C. B. Goudey, 1997. Ecological Subregions of California: Section and Subsection Descriptions. USDA Forest Service Pacific Southwest Region, San Francisco, CA.

Natural Investigations, Co., 2022. Cultural and Paleontological Resources Inventory for Fee-To-Trust Applications 3, 4, and 5 in Shingle Springs, El Dorado County, California. On file with BIA Pacific Region.

State Water Resources Control Board (SWRCB), 2022. California 2020-2022 Integrated Report (303(d) List/305(b) Report). Appendix A: Proposed Final 2020-2022 303(d) List. Available online at: https://www.waterboards.ca.gov/water_issues/programs/tmdl/2010state_ir_reports/category5_report.shtml. Accessed July 2024.

United States Department of Agriculture, Natural Resources Conservation Service (NRCS), 2024. Custom Soil Resource Report. Available at [https://websoilsurvey.sc.egov.usda.gov]. Accessed April 29, 2024.

United States Geological Survey (USGS), 2011. Mineral Resource Data System. Available at: https://mrdata.usgs.gov/general/map-us.html. Accessed July, 2024.

WRCC, 2024. Placerville, CA Site (046960). Period of Record Monthly Climate Summary. Period of Record : 01/01/1900 to 05/17/2011. Available online at: https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca6960. Accessed July 2024

Appendix C

Air Quality Modeling Files

Shingle Springs Rancheria 295.7-Acre FTT Project Detailed Report

Table of Contents

1. Basic Project Information

1.1. Basic Project Information

1.2. Land Use Types

1.3. User-Selected Emission Reduction Measures by Emissions Sector

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

2.2. Construction Emissions by Year, Unmitigated

2.3. Construction Emissions by Year, Mitigated

3. Construction Emissions Details

3.1. Demolition (2025) - Unmitigated

3.2. Demolition (2025) - Mitigated

3.3. Site Preparation (2025) - Unmitigated

3.4. Site Preparation (2025) - Mitigated

3.5. Grading (2025) - Unmitigated

3.6. Grading (2025) - Mitigated

3.7. Building Construction (2025) - Unmitigated

3.8. Building Construction (2025) - Mitigated

3.9. Building Construction (2026) - Unmitigated

3.10. Building Construction (2026) - Mitigated

3.11. Paving (2026) - Unmitigated

3.12. Paving (2026) - Mitigated

3.13. Architectural Coating (2026) - Unmitigated

3.14. Architectural Coating (2026) - Mitigated

4. Operations Emissions Details

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

4.10.4. Soil Carbon Accumulation By Vegetation Type - Mitigated

4.10.5. Above and Belowground Carbon Accumulation by Land Use Type - Mitigated

4.10.6. Avoided and Sequestered Emissions by Species - Mitigated

5. Activity Data

5.1. Construction Schedule

5.2. Off-Road Equipment

5.2.1. Unmitigated

5.2.2. Mitigated

5.3. Construction Vehicles

5.3.1. Unmitigated

5.3.2. Mitigated

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

5.5. Architectural Coatings

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

5.6.2. Construction Earthmoving Control Strategies

5.7. Construction Paving

5.8. Construction Electricity Consumption and Emissions Factors

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

5.18.1.2. Mitigated

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

5.18.1.2. Mitigated

5.18.2. Sequestration

5.18.2.1. Unmitigated

5.18.2.2. Mitigated

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

6.2. Initial Climate Risk Scores

6.3. Adjusted Climate Risk Scores

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

7.2. Healthy Places Index Scores

7.3. Overall Health & Equity Scores

7.4. Health & Equity Measures

7.5. Evaluation Scorecard

7.6. Health & Equity Custom Measures

8. User Changes to Default Data

1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	Shingle Springs Rancheria 295.7-Acre FTT Project
Construction Start Date	1/1/2025
Lead Agency	Bureau of Indian Affairs
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	2.30
Precipitation (days)	42.6
Location	38.70053683196042, -120.9121824376835
County	El Dorado-Mountain County
City	Unincorporated
Air District	El Dorado County AQMD
Air Basin	Mountain Counties
TAZ	408
EDFZ	4
Electric Utility	Pacific Gas & Electric Company
Gas Utility	Pacific Gas & Electric
App Version	2022.1.1.26

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
Condo/Townhouse	4.00	Dwelling Unit	4.60	6,400	0.00	87,120	37.0	—
Arena	80.0	1000sqft	4.30	80,000	0.00	80,000	—	—

Strip Mall	30.0	1000sqft	3.00	30,000	0.00	13,000	—	—
Unrefrigerated Warehouse-No Rail	6.00	1000sqft	0.75	6,000	0.00	0.00	—	—
Single Family Housing	7.00	Dwelling Unit	131	13,650	0.00	570,636	18.0	—
Retirement Community	4.00	Dwelling Unit	6.00	4,240	0.00	32,670	10.0	—
Unenclosed Parking with Elevator	1,050	Space	4.00	420,000	0.00	0.00	—	—
Government (Civic Center)	5.30	1000sqft	0.12	5,300	0.00	4,000	—	Multipurpose Emergency Building

1.3. User-Selected Emission Reduction Measures by Emissions Sector

Sector	#	Measure Title
Construction	C-10-A	Water Exposed Surfaces
Construction	C-10-C	Water Unpaved Construction Roads
Construction	C-11	Limit Vehicle Speeds on Unpaved Roads
Construction	C-12	Sweep Paved Roads

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	26.4	15.5	28.4	0.04	0.47	179	179	0.43	18.2	18.7	—	7,847	7,847	0.22	0.55	16.9	8,032
Mit.	26.4	15.5	28.4	0.04	0.47	179	179	0.43	18.2	18.7	—	7,847	7,847	0.22	0.55	16.9	8,032

% Reduced	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	3.88	81.1	34.4	0.36	1.54	312	314	1.44	35.0	36.4	—	36,298	36,298	0.44	4.68	1.29	37,706
Mit.	3.88	81.1	34.4	0.36	1.54	307	308	1.44	32.8	34.2	—	36,298	36,298	0.44	4.68	1.29	37,706
% Reduced	—	—	—	—	—	2%	2%	—	6%	6%	—	—	—	—	—	—	—
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	2.65	17.8	19.1	0.06	0.48	112	112	0.45	12.1	12.6	—	7,609	7,609	0.14	0.69	5.80	7,825
Mit.	2.65	17.8	19.1	0.06	0.48	111	111	0.45	11.6	12.1	—	7,609	7,609	0.14	0.69	5.80	7,825
% Reduced	—	—	—	—	—	1%	1%	—	4%	4%	—	—	—	—	—	—	—
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.48	3.24	3.49	0.01	0.09	20.4	20.5	0.08	2.22	2.30	—	1,260	1,260	0.02	0.11	0.96	1,296
Mit.	0.48	3.24	3.49	0.01	0.09	20.2	20.3	0.08	2.12	2.20	—	1,260	1,260	0.02	0.11	0.96	1,296
% Reduced	—	—	—	—	—	1%	1%	—	4%	4%	—	—	—	—	—	—	—
Exceeds (Annual)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Threshold	25.0	25.0	100	—	—	—	100	—	—	100	—	—	—	—	—	—	—
Unmit.	No	No	No	—	—	—	No	—	—	No	—	—	—	—	—	—	—
Mit.	No	No	No	—	—	—	No	—	—	No	—	—	—	—	—	—	—

2.2. Construction Emissions by Year, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2025	2.32	15.5	28.4	0.04	0.47	179	179	0.43	18.2	18.7	—	7,847	7,847	0.22	0.55	16.9	8,032
2026	26.4	14.6	27.3	0.04	0.40	179	179	0.37	18.2	18.6	—	7,754	7,754	0.14	0.55	15.5	7,935
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2025	3.88	81.1	34.4	0.36	1.54	312	314	1.44	35.0	36.4	—	36,298	36,298	0.44	4.68	1.29	37,706
2026	2.11	15.1	24.4	0.04	0.40	179	179	0.37	18.2	18.6	—	7,498	7,498	0.16	0.55	0.40	7,665
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2025	1.79	17.8	19.1	0.06	0.48	112	112	0.45	12.1	12.6	—	7,609	7,609	0.14	0.69	5.80	7,825
2026	2.65	3.31	5.52	0.01	0.09	32.5	32.6	0.09	3.33	3.42	—	1,573	1,573	0.03	0.11	1.35	1,607
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2025	0.33	3.24	3.49	0.01	0.09	20.4	20.5	0.08	2.22	2.30	—	1,260	1,260	0.02	0.11	0.96	1,296
2026	0.48	0.60	1.01	< 0.005	0.02	5.94	5.95	0.02	0.61	0.62	—	261	261	0.01	0.02	0.22	266

2.3. Construction Emissions by Year, Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2025	2.32	15.5	28.4	0.04	0.47	179	179	0.43	18.2	18.7	—	7,847	7,847	0.22	0.55	16.9	8,032
2026	26.4	14.6	27.3	0.04	0.40	179	179	0.37	18.2	18.6	—	7,754	7,754	0.14	0.55	15.5	7,935
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2025	3.88	81.1	34.4	0.36	1.54	307	308	1.44	32.8	34.2	—	36,298	36,298	0.44	4.68	1.29	37,706
2026	2.11	15.1	24.4	0.04	0.40	179	179	0.37	18.2	18.6	—	7,498	7,498	0.16	0.55	0.40	7,665

Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2025	1.79	17.8	19.1	0.06	0.48	111	111	0.45	11.6	12.1	—	7,609	7,609	0.14	0.69	5.80	7,825
2026	2.65	3.31	5.52	0.01	0.09	32.5	32.6	0.09	3.33	3.42	—	1,573	1,573	0.03	0.11	1.35	1,607
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2025	0.33	3.24	3.49	0.01	0.09	20.2	20.3	0.08	2.12	2.20	—	1,260	1,260	0.02	0.11	0.96	1,296
2026	0.48	0.60	1.01	< 0.005	0.02	5.94	5.95	0.02	0.61	0.62	—	261	261	0.01	0.02	0.22	266

3. Construction Emissions Details

3.1. Demolition (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.40	22.2	19.9	0.03	0.92	—	0.92	0.84	—	0.84	—	3,425	3,425	0.14	0.03	—	3,437
Demolition	—	—	—	—	—	0.76	0.76	—	0.12	0.12	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.61	0.55	< 0.005	0.03	—	0.03	0.02	—	0.02	—	93.8	93.8	< 0.005	< 0.005	—	94.2
Demolition	—	—	—	—	—	0.02	0.02	—	< 0.005	< 0.005	—	—	—	—	—	—	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.11	0.10	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	15.5	15.5	< 0.005	< 0.005	—	15.6
Demolition	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.07	0.74	0.00	0.00	9.30	9.30	0.00	0.95	0.95	—	151	151	< 0.005	0.01	0.02	153
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.02	1.37	0.14	0.01	0.01	7.76	7.77	0.01	0.80	0.81	—	788	788	< 0.005	0.12	0.03	824
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.23	0.23	0.00	0.02	0.02	—	4.24	4.24	< 0.005	< 0.005	0.01	4.30
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.04	< 0.005	< 0.005	< 0.005	0.19	0.19	< 0.005	0.02	0.02	—	21.6	21.6	< 0.005	< 0.005	0.02	22.6
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	0.04	0.04	0.00	< 0.005	< 0.005	—	0.70	0.70	< 0.005	< 0.005	< 0.005	0.71
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	0.03	0.03	< 0.005	< 0.005	< 0.005	—	3.57	3.57	< 0.005	< 0.005	< 0.005	3.74

3.2. Demolition (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.40	22.2	19.9	0.03	0.92	—	0.92	0.84	—	0.84	—	3,425	3,425	0.14	0.03	—	3,437
Demolition	—	—	—	—	—	0.76	0.76	—	0.12	0.12	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.61	0.55	< 0.005	0.03	—	0.03	0.02	—	0.02	—	93.8	93.8	< 0.005	< 0.005	—	94.2
Demolition	—	—	—	—	—	0.02	0.02	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.11	0.10	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	15.5	15.5	< 0.005	< 0.005	—	15.6
Demolition	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.07	0.74	0.00	0.00	9.30	9.30	0.00	0.95	0.95	—	151	151	< 0.005	0.01	0.02	153
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.02	1.37	0.14	0.01	0.01	7.76	7.77	0.01	0.80	0.81	—	788	788	< 0.005	0.12	0.03	824
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.23	0.23	0.00	0.02	0.02	—	4.24	4.24	< 0.005	< 0.005	0.01	4.30
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.04	< 0.005	< 0.005	< 0.005	0.19	0.19	< 0.005	0.02	0.02	—	21.6	21.6	< 0.005	< 0.005	0.02	22.6
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	0.04	0.04	0.00	< 0.005	< 0.005	—	0.70	0.70	< 0.005	< 0.005	< 0.005	0.71
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	0.03	0.03	< 0.005	< 0.005	< 0.005	—	3.57	3.57	< 0.005	< 0.005	< 0.005	3.74

3.3. Site Preparation (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	3.31	31.6	30.2	0.05	1.37	—	1.37	1.26	—	1.26	—	5,295	5,295	0.21	0.04	—	5,314
Dust From Material Movement	—	—	—	—	—	19.7	19.7	—	10.1	10.1	—	—	—	—	—	—	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.18	1.73	1.65	< 0.005	0.07	—	0.07	0.07	—	0.07	—	290	290	0.01	< 0.005	—	291
Dust From Material Movement	—	—	—	—	—	1.08	1.08	—	0.55	0.55	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.32	0.30	< 0.005	0.01	—	0.01	0.01	—	0.01	—	48.0	48.0	< 0.005	< 0.005	—	48.2
Dust From Material Movement	—	—	—	—	—	0.20	0.20	—	0.10	0.10	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.08	0.08	0.87	0.00	0.00	10.9	10.9	0.00	1.11	1.11	—	177	177	< 0.005	0.01	0.02	179
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.19	0.02	< 0.005	< 0.005	1.09	1.09	< 0.005	0.11	0.11	—	111	111	< 0.005	0.02	< 0.005	116
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.05	0.00	0.00	0.53	0.53	0.00	0.05	0.05	—	9.89	9.89	< 0.005	< 0.005	0.02	10.0
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	0.05	0.05	< 0.005	0.01	0.01	—	6.06	6.06	< 0.005	< 0.005	< 0.005	6.35
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	0.10	0.10	0.00	0.01	0.01	—	1.64	1.64	< 0.005	< 0.005	< 0.005	1.66
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	1.00	1.00	< 0.005	< 0.005	< 0.005	1.05

3.4. Site Preparation (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	3.31	31.6	30.2	0.05	1.37	—	1.37	1.26	—	1.26	—	5,295	5,295	0.21	0.04	—	5,314
Dust From Material Movement	—	—	—	—	—	7.67	7.67	—	3.94	3.94	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.18	1.73	1.65	< 0.005	0.07	—	0.07	0.07	—	0.07	—	290	290	0.01	< 0.005	—	291
Dust From Material Movement	—	—	—	—	—	0.42	0.42	—	0.22	0.22	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.32	0.30	< 0.005	0.01	—	0.01	0.01	—	0.01	—	48.0	48.0	< 0.005	< 0.005	—	48.2
Dust From Material Movement	—	—	—	—	—	0.08	0.08	—	0.04	0.04	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.08	0.08	0.87	0.00	0.00	10.9	10.9	0.00	1.11	1.11	—	177	177	< 0.005	0.01	0.02	179
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.19	0.02	< 0.005	< 0.005	1.09	1.09	< 0.005	0.11	0.11	—	111	111	< 0.005	0.02	< 0.005	116
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.05	0.00	0.00	0.53	0.53	0.00	0.05	0.05	—	9.89	9.89	< 0.005	< 0.005	0.02	10.0
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	0.05	0.05	< 0.005	0.01	0.01	—	6.06	6.06	< 0.005	< 0.005	< 0.005	6.35
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	0.10	0.10	0.00	0.01	0.01	—	1.64	1.64	< 0.005	< 0.005	< 0.005	1.66
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	1.00	1.00	< 0.005	< 0.005	< 0.005	1.05

3.5. Grading (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	3.20	29.7	28.3	0.06	1.23	—	1.23	1.14	—	1.14	—	6,599	6,599	0.27	0.05	—	6,622
Dust From Material Movement	—	—	—	—	—	9.33	9.33	—	3.67	3.67	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.26	2.44	2.33	0.01	0.10	—	0.10	0.09	—	0.09	—	542	542	0.02	< 0.005	—	544
Dust From Material Movement	—	—	—	—	—	0.77	0.77	—	0.30	0.30	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.45	0.42	< 0.005	0.02	—	0.02	0.02	—	0.02	—	89.8	89.8	< 0.005	< 0.005	—	90.1
Dust From Material Movement	—	—	—	—	—	0.14	0.14	—	0.06	0.06	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.09	0.09	0.99	0.00	0.00	12.4	12.4	0.00	1.26	1.26	—	202	202	0.01	0.01	0.02	204
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.60	51.3	5.11	0.30	0.30	291	291	0.30	30.1	30.4	—	29,497	29,497	0.17	4.62	1.27	30,880
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.08	0.00	0.00	0.90	0.90	0.00	0.09	0.09	—	17.0	17.0	< 0.005	< 0.005	0.03	17.2
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.05	4.18	0.41	0.02	0.02	21.1	21.2	0.02	2.20	2.22	—	2,425	2,425	0.01	0.38	1.73	2,540
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.16	0.16	0.00	0.02	0.02	—	2.81	2.81	< 0.005	< 0.005	0.01	2.85
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	0.76	0.08	< 0.005	< 0.005	3.86	3.86	< 0.005	0.40	0.41	—	401	401	< 0.005	0.06	0.29	421

3.6. Grading (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	3.20	29.7	28.3	0.06	1.23	—	1.23	1.14	—	1.14	—	6,599	6,599	0.27	0.05	—	6,622

Dust From Material Movement	—	—	—	—	—	3.64	3.64	—	1.43	1.43	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.26	2.44	2.33	0.01	0.10	—	0.10	0.09	—	0.09	—	542	542	0.02	< 0.005	—	544
Dust From Material Movement	—	—	—	—	—	0.30	0.30	—	0.12	0.12	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.45	0.42	< 0.005	0.02	—	0.02	0.02	—	0.02	—	89.8	89.8	< 0.005	< 0.005	—	90.1
Dust From Material Movement	—	—	—	—	—	0.05	0.05	—	0.02	0.02	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.09	0.09	0.99	0.00	0.00	12.4	12.4	0.00	1.26	1.26	—	202	202	0.01	0.01	0.02	204
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.60	51.3	5.11	0.30	0.30	291	291	0.30	30.1	30.4	—	29,497	29,497	0.17	4.62	1.27	30,880

Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.08	0.00	0.00	0.90	0.90	0.00	0.09	0.09	—	17.0	17.0	< 0.005	< 0.005	0.03	17.2
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.05	4.18	0.41	0.02	0.02	21.1	21.2	0.02	2.20	2.22	—	2,425	2,425	0.01	0.38	1.73	2,540
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.16	0.16	0.00	0.02	0.02	—	2.81	2.81	< 0.005	< 0.005	0.01	2.85
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	0.76	0.08	< 0.005	< 0.005	3.86	3.86	< 0.005	0.40	0.41	—	401	401	< 0.005	0.06	0.29	421

3.7. Building Construction (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.13	10.4	13.0	0.02	0.43	—	0.43	0.40	—	0.40	—	2,398	2,398	0.10	0.02	—	2,406
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.13	10.4	13.0	0.02	0.43	—	0.43	0.40	—	0.40	—	2,398	2,398	0.10	0.02	—	2,406
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.62	5.74	7.17	0.01	0.24	—	0.24	0.22	—	0.22	—	1,318	1,318	0.05	0.01	—	1,323

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.11	1.05	1.31	< 0.005	0.04	—	0.04	0.04	—	0.04	—	218	218	0.01	< 0.005	—	219
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	1.11	0.76	14.6	0.00	0.00	144	144	0.00	14.7	14.7	—	2,604	2,604	0.12	0.09	10.1	2,644
Vendor	0.08	4.33	0.76	0.02	0.04	34.6	34.6	0.04	3.57	3.60	—	2,846	2,846	< 0.005	0.43	6.79	2,982
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	1.00	1.03	11.5	0.00	0.00	144	144	0.00	14.7	14.7	—	2,343	2,343	0.06	0.09	0.26	2,372
Vendor	0.08	4.57	0.78	0.02	0.04	34.6	34.6	0.04	3.57	3.60	—	2,846	2,846	< 0.005	0.43	0.18	2,975
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.55	0.51	6.44	0.00	0.00	70.0	70.0	0.00	7.15	7.15	—	1,316	1,316	0.03	0.05	2.39	1,335
Vendor	0.05	2.49	0.42	0.01	0.02	16.8	16.9	0.02	1.74	1.76	—	1,565	1,565	< 0.005	0.24	1.61	1,637
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.10	0.09	1.18	0.00	0.00	12.8	12.8	0.00	1.31	1.31	—	218	218	0.01	0.01	0.40	221
Vendor	0.01	0.45	0.08	< 0.005	< 0.005	3.07	3.08	< 0.005	0.32	0.32	—	259	259	< 0.005	0.04	0.27	271
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.8. Building Construction (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.13	10.4	13.0	0.02	0.43	—	0.43	0.40	—	0.40	—	2,398	2,398	0.10	0.02	—	2,406
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.13	10.4	13.0	0.02	0.43	—	0.43	0.40	—	0.40	—	2,398	2,398	0.10	0.02	—	2,406
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.62	5.74	7.17	0.01	0.24	—	0.24	0.22	—	0.22	—	1,318	1,318	0.05	0.01	—	1,323
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.11	1.05	1.31	< 0.005	0.04	—	0.04	0.04	—	0.04	—	218	218	0.01	< 0.005	—	219
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	1.11	0.76	14.6	0.00	0.00	144	144	0.00	14.7	14.7	—	2,604	2,604	0.12	0.09	10.1	2,644
Vendor	0.08	4.33	0.76	0.02	0.04	34.6	34.6	0.04	3.57	3.60	—	2,846	2,846	< 0.005	0.43	6.79	2,982

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	1.00	1.03	11.5	0.00	0.00	144	144	0.00	14.7	14.7	—	2,343	2,343	0.06	0.09	0.26	2,372
Vendor	0.08	4.57	0.78	0.02	0.04	34.6	34.6	0.04	3.57	3.60	—	2,846	2,846	< 0.005	0.43	0.18	2,975
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.55	0.51	6.44	0.00	0.00	70.0	70.0	0.00	7.15	7.15	—	1,316	1,316	0.03	0.05	2.39	1,335
Vendor	0.05	2.49	0.42	0.01	0.02	16.8	16.9	0.02	1.74	1.76	—	1,565	1,565	< 0.005	0.24	1.61	1,637
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.10	0.09	1.18	0.00	0.00	12.8	12.8	0.00	1.31	1.31	—	218	218	0.01	0.01	0.40	221
Vendor	0.01	0.45	0.08	< 0.005	< 0.005	3.07	3.08	< 0.005	0.32	0.32	—	259	259	< 0.005	0.04	0.27	271
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.9. Building Construction (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.07	9.85	13.0	0.02	0.38	—	0.38	0.35	—	0.35	—	2,397	2,397	0.10	0.02	—	2,405
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	1.07	9.85	13.0	0.02	0.38	—	0.38	0.35	—	0.35	—	2,397	2,397	0.10	0.02	—	2,405
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.20	1.87	2.46	< 0.005	0.07	—	0.07	0.07	—	0.07	—	455	455	0.02	< 0.005	—	457
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.34	0.45	< 0.005	0.01	—	0.01	0.01	—	0.01	—	75.3	75.3	< 0.005	< 0.005	—	75.6
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	1.06	0.69	13.7	0.00	0.00	144	144	0.00	14.7	14.7	—	2,556	2,556	0.04	0.09	9.22	2,594
Vendor	0.08	4.04	0.71	0.02	0.02	34.6	34.6	0.02	3.57	3.58	—	2,801	2,801	< 0.005	0.43	6.26	2,936
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.95	0.95	10.7	0.00	0.00	144	144	0.00	14.7	14.7	—	2,300	2,300	0.06	0.09	0.24	2,330
Vendor	0.08	4.27	0.75	0.02	0.02	34.6	34.6	0.02	3.57	3.58	—	2,801	2,801	< 0.005	0.43	0.16	2,930
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.18	0.16	2.07	0.00	0.00	24.2	24.2	0.00	2.47	2.47	—	446	446	0.01	0.02	0.75	452
Vendor	0.02	0.80	0.14	< 0.005	< 0.005	5.81	5.82	< 0.005	0.60	0.60	—	532	532	< 0.005	0.08	0.51	557
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.38	0.00	0.00	4.41	4.41	0.00	0.45	0.45	—	73.8	73.8	< 0.005	< 0.005	0.12	74.9
Vendor	< 0.005	0.15	0.03	< 0.005	< 0.005	1.06	1.06	< 0.005	0.11	0.11	—	88.0	88.0	< 0.005	0.01	0.09	92.2
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.10. Building Construction (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.07	9.85	13.0	0.02	0.38	—	0.38	0.35	—	0.35	—	2,397	2,397	0.10	0.02	—	2,405
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.07	9.85	13.0	0.02	0.38	—	0.38	0.35	—	0.35	—	2,397	2,397	0.10	0.02	—	2,405
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.20	1.87	2.46	< 0.005	0.07	—	0.07	0.07	—	0.07	—	455	455	0.02	< 0.005	—	457
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.34	0.45	< 0.005	0.01	—	0.01	0.01	—	0.01	—	75.3	75.3	< 0.005	< 0.005	—	75.6

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	1.06	0.69	13.7	0.00	0.00	144	144	0.00	14.7	14.7	—	2,556	2,556	0.04	0.09	9.22	2,594
Vendor	0.08	4.04	0.71	0.02	0.02	34.6	34.6	0.02	3.57	3.58	—	2,801	2,801	< 0.005	0.43	6.26	2,936
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.95	0.95	10.7	0.00	0.00	144	144	0.00	14.7	14.7	—	2,300	2,300	0.06	0.09	0.24	2,330
Vendor	0.08	4.27	0.75	0.02	0.02	34.6	34.6	0.02	3.57	3.58	—	2,801	2,801	< 0.005	0.43	0.16	2,930
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.18	0.16	2.07	0.00	0.00	24.2	24.2	0.00	2.47	2.47	—	446	446	0.01	0.02	0.75	452
Vendor	0.02	0.80	0.14	< 0.005	< 0.005	5.81	5.82	< 0.005	0.60	0.60	—	532	532	< 0.005	0.08	0.51	557
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.38	0.00	0.00	4.41	4.41	0.00	0.45	0.45	—	73.8	73.8	< 0.005	< 0.005	0.12	74.9
Vendor	< 0.005	0.15	0.03	< 0.005	< 0.005	1.06	1.06	< 0.005	0.11	0.11	—	88.0	88.0	< 0.005	0.01	0.09	92.2
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.11. Paving (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.76	7.12	9.94	0.01	0.32	—	0.32	0.29	—	0.29	—	1,511	1,511	0.06	0.01	—	1,516
Paving	0.62	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.39	0.54	< 0.005	0.02	—	0.02	0.02	—	0.02	—	82.8	82.8	< 0.005	< 0.005	—	83.1
Paving	0.03	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.07	0.10	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	13.7	13.7	< 0.005	< 0.005	—	13.8
Paving	0.01	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.07	0.04	0.88	0.00	0.00	9.30	9.30	0.00	0.95	0.95	—	165	165	< 0.005	0.01	0.60	168
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.04	0.00	0.00	0.45	0.45	0.00	0.05	0.05	—	8.32	8.32	< 0.005	< 0.005	0.01	8.44
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	0.08	0.08	0.00	0.01	0.01	—	1.38	1.38	< 0.005	< 0.005	< 0.005	1.40
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.12. Paving (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.76	7.12	9.94	0.01	0.32	—	0.32	0.29	—	0.29	—	1,511	1,511	0.06	0.01	—	1,516
Paving	0.62	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.39	0.54	< 0.005	0.02	—	0.02	0.02	—	0.02	—	82.8	82.8	< 0.005	< 0.005	—	83.1
Paving	0.03	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.07	0.10	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	13.7	13.7	< 0.005	< 0.005	—	13.8
Paving	0.01	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.07	0.04	0.88	0.00	0.00	9.30	9.30	0.00	0.95	0.95	—	165	165	< 0.005	0.01	0.60	168
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.04	0.00	0.00	0.45	0.45	0.00	0.05	0.05	—	8.32	8.32	< 0.005	< 0.005	0.01	8.44
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	0.08	0.08	0.00	0.01	0.01	—	1.38	1.38	< 0.005	< 0.005	< 0.005	1.40
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.13. Architectural Coating (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.12	0.86	1.13	< 0.005	0.02	—	0.02	0.02	—	0.02	—	134	134	0.01	< 0.005	—	134
Architectural Coatings	26.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.07	0.09	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	11.0	11.0	< 0.005	< 0.005	—	11.0
Architectural Coatings	2.15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.01	0.02	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	1.82	1.82	< 0.005	< 0.005	—	1.82
Architectural Coatings	0.39	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.21	0.14	2.73	0.00	0.00	28.8	28.8	0.00	2.93	2.93	—	511	511	0.01	0.02	1.84	519

Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.01	0.18	0.00	0.00	2.09	2.09	0.00	0.21	0.21	—	38.6	38.6	< 0.005	< 0.005	0.07	39.2
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.03	0.00	0.00	0.38	0.38	0.00	0.04	0.04	—	6.40	6.40	< 0.005	< 0.005	0.01	6.49
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.14. Architectural Coating (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.12	0.86	1.13	< 0.005	0.02	—	0.02	0.02	—	0.02	—	134	134	0.01	< 0.005	—	134
Architectural Coatings	26.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.07	0.09	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	11.0	11.0	< 0.005	< 0.005	—	11.0
Architectural Coatings	2.15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.01	0.02	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	1.82	1.82	< 0.005	< 0.005	—	1.82
Architectural Coatings	0.39	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.21	0.14	2.73	0.00	0.00	28.8	28.8	0.00	2.93	2.93	—	511	511	0.01	0.02	1.84	519
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.01	0.18	0.00	0.00	2.09	2.09	0.00	0.21	0.21	—	38.6	38.6	< 0.005	< 0.005	0.07	39.2
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.03	0.00	0.00	0.38	0.38	0.00	0.04	0.04	—	6.40	6.40	< 0.005	< 0.005	0.01	6.49

Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

4. Operations Emissions Details

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.4. Soil Carbon Accumulation By Vegetation Type - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.5. Above and Belowground Carbon Accumulation by Land Use Type - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.6. Avoided and Sequestered Emissions by Species - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Demolition	Demolition	1/1/2025	1/14/2025	5.00	10.0	—
Site Preparation	Site Preparation	1/15/2025	2/11/2025	5.00	20.0	—
Grading	Grading	2/12/2025	3/25/2025	5.00	30.0	—
Building Construction	Building Construction	3/26/2025	4/7/2026	5.00	270	—
Paving	Paving	4/8/2026	5/5/2026	5.00	20.0	—
Architectural Coating	Architectural Coating	5/6/2026	6/16/2026	5.00	30.0	—

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Demolition	Concrete/Industrial Saws	Diesel	Average	1.00	8.00	33.0	0.73
Demolition	Excavators	Diesel	Average	3.00	8.00	36.0	0.38
Demolition	Rubber Tired Dozers	Diesel	Average	2.00	8.00	367	0.40
Site Preparation	Rubber Tired Dozers	Diesel	Average	3.00	8.00	367	0.40
Site Preparation	Tractors/Loaders/Back hoes	Diesel	Average	4.00	8.00	84.0	0.37
Grading	Excavators	Diesel	Average	2.00	8.00	36.0	0.38
Grading	Graders	Diesel	Average	1.00	8.00	148	0.41
Grading	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Grading	Scrapers	Diesel	Average	2.00	8.00	423	0.48
Grading	Tractors/Loaders/Back hoes	Diesel	Average	2.00	8.00	84.0	0.37
Building Construction	Cranes	Diesel	Average	1.00	7.00	367	0.29
Building Construction	Forklifts	Diesel	Average	3.00	8.00	82.0	0.20
Building Construction	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
Building Construction	Tractors/Loaders/Back hoes	Diesel	Average	3.00	7.00	84.0	0.37
Building Construction	Welders	Diesel	Average	1.00	8.00	46.0	0.45
Paving	Pavers	Diesel	Average	2.00	8.00	81.0	0.42
Paving	Paving Equipment	Diesel	Average	2.00	8.00	89.0	0.36
Paving	Rollers	Diesel	Average	2.00	8.00	36.0	0.38
Architectural Coating	Air Compressors	Diesel	Average	1.00	6.00	37.0	0.48

5.2.2. Mitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Demolition	Concrete/Industrial Saws	Diesel	Average	1.00	8.00	33.0	0.73
Demolition	Excavators	Diesel	Average	3.00	8.00	36.0	0.38
Demolition	Rubber Tired Dozers	Diesel	Average	2.00	8.00	367	0.40
Site Preparation	Rubber Tired Dozers	Diesel	Average	3.00	8.00	367	0.40
Site Preparation	Tractors/Loaders/Back hoes	Diesel	Average	4.00	8.00	84.0	0.37
Grading	Excavators	Diesel	Average	2.00	8.00	36.0	0.38
Grading	Graders	Diesel	Average	1.00	8.00	148	0.41
Grading	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Grading	Scrapers	Diesel	Average	2.00	8.00	423	0.48
Grading	Tractors/Loaders/Back hoes	Diesel	Average	2.00	8.00	84.0	0.37
Building Construction	Cranes	Diesel	Average	1.00	7.00	367	0.29
Building Construction	Forklifts	Diesel	Average	3.00	8.00	82.0	0.20
Building Construction	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
Building Construction	Tractors/Loaders/Back hoes	Diesel	Average	3.00	7.00	84.0	0.37
Building Construction	Welders	Diesel	Average	1.00	8.00	46.0	0.45
Paving	Pavers	Diesel	Average	2.00	8.00	81.0	0.42
Paving	Paving Equipment	Diesel	Average	2.00	8.00	89.0	0.36
Paving	Rollers	Diesel	Average	2.00	8.00	36.0	0.38
Architectural Coating	Air Compressors	Diesel	Average	1.00	6.00	37.0	0.48

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Demolition	—	—	—	

Demolition	Worker	15.0	14.3	LDA,LDT1,LDT2
Demolition	Vendor	—	8.80	HHDT,MHDT
Demolition	Hauling	8.90	20.0	HHDT
Demolition	Onsite truck	—	—	HHDT
Site Preparation	—	—	—	—
Site Preparation	Worker	17.5	14.3	LDA,LDT1,LDT2
Site Preparation	Vendor	—	8.80	HHDT,MHDT
Site Preparation	Hauling	1.25	20.0	HHDT
Site Preparation	Onsite truck	—	—	HHDT
Grading	—	—	—	—
Grading	Worker	20.0	14.3	LDA,LDT1,LDT2
Grading	Vendor	—	8.80	HHDT,MHDT
Grading	Hauling	333	20.0	HHDT
Grading	Onsite truck	—	—	HHDT
Building Construction	—	—	—	—
Building Construction	Worker	232	14.3	LDA,LDT1,LDT2
Building Construction	Vendor	90.3	8.80	HHDT,MHDT
Building Construction	Hauling	0.00	20.0	HHDT
Building Construction	Onsite truck	—	—	HHDT
Paving	—	—	—	—
Paving	Worker	15.0	14.3	LDA,LDT1,LDT2
Paving	Vendor	—	8.80	HHDT,MHDT
Paving	Hauling	0.00	20.0	HHDT
Paving	Onsite truck	—	—	HHDT
Architectural Coating	—	—	—	—
Architectural Coating	Worker	46.4	14.3	LDA,LDT1,LDT2
Architectural Coating	Vendor	—	8.80	HHDT,MHDT
Architectural Coating	Hauling	0.00	20.0	HHDT

Architectural Coating	Onsite truck	—	—	HHDT

5.3.2. Mitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Demolition	—	—	—	—
Demolition	Worker	15.0	14.3	LDA,LDT1,LDT2
Demolition	Vendor	—	8.80	HHDT,MHDT
Demolition	Hauling	8.90	20.0	HHDT
Demolition	Onsite truck	—	—	HHDT
Site Preparation	—	—	—	—
Site Preparation	Worker	17.5	14.3	LDA,LDT1,LDT2
Site Preparation	Vendor	—	8.80	HHDT,MHDT
Site Preparation	Hauling	1.25	20.0	HHDT
Site Preparation	Onsite truck	—	—	HHDT
Grading	—	—	—	—
Grading	Worker	20.0	14.3	LDA,LDT1,LDT2
Grading	Vendor	—	8.80	HHDT,MHDT
Grading	Hauling	333	20.0	HHDT
Grading	Onsite truck	—	—	HHDT
Building Construction	—	—	—	—
Building Construction	Worker	232	14.3	LDA,LDT1,LDT2
Building Construction	Vendor	90.3	8.80	HHDT,MHDT
Building Construction	Hauling	0.00	20.0	HHDT
Building Construction	Onsite truck	—	—	HHDT
Paving	—	—	—	—
Paving	Worker	15.0	14.3	LDA,LDT1,LDT2
Paving	Vendor	—	8.80	HHDT,MHDT
Paving	Hauling	0.00	20.0	HHDT

Paving	Onsite truck	—	—	HHDT
Architectural Coating	—	—	—	—
Architectural Coating	Worker	46.4	14.3	LDA,LDT1,LDT2
Architectural Coating	Vendor	—	8.80	HHDT,MHDT
Architectural Coating	Hauling	0.00	20.0	HHDT
Architectural Coating	Onsite truck	—	—	HHDT

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

Control Strategies Applied	PM10 Reduction	PM2.5 Reduction
Water unpaved roads twice daily	55%	55%
Limit vehicle speeds on unpaved roads to 25 mph	44%	44%

5.5. Architectural Coatings

Phase Name	Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
Architectural Coating	49,187	16,396	189,791	61,521	10,454

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (Cubic Yards)	Material Exported (Cubic Yards)	Acres Graded (acres)	Material Demolished (Building Square Footage)	Acres Paved (acres)
Demolition	0.00	0.00	0.00	7,700	—
Site Preparation	0.00	200	30.0	0.00	—
Grading	80,000	0.00	90.0	0.00	—
Paving	0.00	0.00	0.00	0.00	8.33

5.6.2. Construction Earthmoving Control Strategies

Non-applicable. No control strategies activated by user.

5.7. Construction Paving

Land Use	Area Paved (acres)	% Asphalt
Condo/Townhouse	0.50	100%
Arena	0.60	100%
Strip Mall	1.30	100%
Unrefrigerated Warehouse-No Rail	0.50	100%
Single Family Housing	0.08	100%
Retirement Community	0.60	100%
Unenclosed Parking with Elevator	4.00	10%
Government (Civic Center)	0.75	100%

5.8. Construction Electricity Consumption and Emissions Factors

kWh per Year and Emission Factor (lb/MWh)

Year	kWh per Year	CO2	CH4	N2O
2025	0.00	204	0.03	< 0.005
2026	0.00	204	0.03	< 0.005

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1.2. Mitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.1.2. Mitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.2. Sequestration

5.18.2.1. Unmitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

5.18.2.2. Mitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

Cal-Adapt midcentury 2040–2059 average projections for four hazards are reported below for your project location. These are under Representation Concentration Pathway (RCP) 8.5 which assumes GHG emissions will continue to rise strongly through 2050 and then plateau around 2100.

Climate Hazard	Result for Project Location	Unit
Temperature and Extreme Heat	28.5	annual days of extreme heat
Extreme Precipitation	11.8	annual days with precipitation above 20 mm
Sea Level Rise	—	meters of inundation depth
Wildfire	24.5	annual hectares burned

Temperature and Extreme Heat data are for grid cell in which your project are located. The projection is based on the 98th historical percentile of daily maximum/minimum temperatures from observed historical data (32 climate model ensemble from Cal-Adapt, 2040–2059 average under RCP 8.5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Extreme Precipitation data are for the grid cell in which your project are located. The threshold of 20 mm is equivalent to about ¾ an inch of rain, which would be light to moderate rainfall if received over a full day or heavy rain if received over a period of 2 to 4 hours. Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Sea Level Rise data are for the grid cell in which your project are located. The projections are from Radke et al. (2017), as reported in Cal-Adapt (Radke et al., 2017, CEC-500-2017-008), and consider inundation location and depth for the San Francisco Bay, the Sacramento-San Joaquin River Delta and California coast resulting different increments of sea level rise coupled with extreme storm events. Users may select from four scenarios to view the range in potential inundation depth for the grid cell. The four scenarios are: No rise, 0.5 meter, 1.0 meter, 1.41 meters
Wildfire data are for the grid cell in which your project are located. The projections are from UC Davis, as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider historical data of climate, vegetation, population density, and large (> 400 ha) fire history. Users may select from four model simulations to view the range in potential wildfire probabilities for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	2	0	0	N/A
Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	1	0	0	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	0	0	0	N/A
Air Quality Degradation	N/A	N/A	N/A	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	2	1	1	3
Sea Level Rise	N/A	N/A	N/A	N/A

Wildfire	1	1	1	2
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	1	1	1	2
Air Quality Degradation	N/A	N/A	N/A	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Exposure Indicators	—
AQ-Ozone	76.9
AQ-PM	12.9
AQ-DPM	6.98
Drinking Water	18.5
Lead Risk Housing	19.4
Pesticides	34.8
Toxic Releases	12.3
Traffic	61.4
Effect Indicators	—
CleanUp Sites	0.00
Groundwater	0.00

Haz Waste Facilities/Generators	39.8
Impaired Water Bodies	0.00
Solid Waste	0.00
Sensitive Population	—
Asthma	43.2
Cardio-vascular	23.1
Low Birth Weights	27.1
Socioeconomic Factor Indicators	—
Education	13.7
Housing	31.2
Linguistic	0.00
Poverty	11.3
Unemployment	39.2

7.2. Healthy Places Index Scores

The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Economic	—
Above Poverty	72.01334531
Employed	13.29398178
Median HI	79.7767227
Education	—
Bachelor's or higher	69.88322854
High school enrollment	23.59810086
Preschool enrollment	65.37918645
Transportation	—
Auto Access	94.58488387
Active commuting	15.56525087

Social	—
2-parent households	62.44065187
Voting	95.68843834
Neighborhood	—
Alcohol availability	90.6711151
Park access	13.28114975
Retail density	14.20505582
Supermarket access	24.56050302
Tree canopy	97.72873091
Housing	—
Homeownership	90.27332221
Housing habitability	92.42910304
Low-inc homeowner severe housing cost burden	34.76196587
Low-inc renter severe housing cost burden	93.89195432
Uncrowded housing	72.73193892
Health Outcomes	—
Insured adults	86.30822533
Arthritis	0.0
Asthma ER Admissions	52.6
High Blood Pressure	0.0
Cancer (excluding skin)	0.0
Asthma	0.0
Coronary Heart Disease	0.0
Chronic Obstructive Pulmonary Disease	0.0
Diagnosed Diabetes	0.0
Life Expectancy at Birth	24.3
Cognitively Disabled	52.2
Physically Disabled	41.1

Heart Attack ER Admissions	45.3
Mental Health Not Good	0.0
Chronic Kidney Disease	0.0
Obesity	0.0
Pedestrian Injuries	19.6
Physical Health Not Good	0.0
Stroke	0.0
Health Risk Behaviors	—
Binge Drinking	0.0
Current Smoker	0.0
No Leisure Time for Physical Activity	0.0
Climate Change Exposures	—
Wildfire Risk	0.0
SLR Inundation Area	0.0
Children	87.0
Elderly	17.2
English Speaking	81.5
Foreign-born	3.4
Outdoor Workers	67.5
Climate Change Adaptive Capacity	—
Impervious Surface Cover	97.7
Traffic Density	29.8
Traffic Access	0.0
Other Indices	—
Hardship	34.4
Other Decision Support	—
2016 Voting	94.0

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	7.00
Healthy Places Index Score for Project Location (b)	72.0
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	No
Project Located in a Low-Income Community (Assembly Bill 1550)	No
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.
b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.4. Health & Equity Measures

No Health & Equity Measures selected.

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

7.6. Health & Equity Custom Measures

No Health & Equity Custom Measures created.

8. User Changes to Default Data

Screen	Justification
Land Use	Based on project description.
Operations: Vehicle Data	Trip generation adjusted to match traffic study (Kimley Horn, 2024).
Operations: Water and Waste Water	Adjusted to match Water and Wastewater Feasibility Study (HSE, 2024).
Operations: Road Dust	All roads paved onsite.
Construction: Construction Phases	Estimated construction schedule.
Construction: Architectural Coatings	CARB compliant paint.
Construction: Paving	Site plans.

Shingle Springs Rancheria 295.7-Acre FTT Project Detailed Report

Table of Contents

1. Basic Project Information

1.1. Basic Project Information

1.2. Land Use Types

1.3. User-Selected Emission Reduction Measures by Emissions Sector

2. Emissions Summary

2.4. Operations Emissions Compared Against Thresholds

2.5. Operations Emissions by Sector, Unmitigated

4. Operations Emissions Details

4.1. Mobile Emissions by Land Use

4.1.1. Unmitigated

4.2. Energy

4.2.1. Electricity Emissions By Land Use - Unmitigated

4.2.3. Natural Gas Emissions By Land Use - Unmitigated

4.3. Area Emissions by Source

4.3.1. Unmitigated

4.4. Water Emissions by Land Use

4.4.1. Unmitigated

4.5. Waste Emissions by Land Use

4.5.1. Unmitigated

4.6. Refrigerant Emissions by Land Use

4.6.1. Unmitigated

4.7. Offroad Emissions By Equipment Type

4.7.1. Unmitigated

4.8. Stationary Emissions By Equipment Type

4.8.1. Unmitigated

4.9. User Defined Emissions By Equipment Type

4.9.1. Unmitigated

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

5. Activity Data

5.9. Operational Mobile Sources

5.9.1. Unmitigated

5.10. Operational Area Sources

5.10.1. Hearths

5.10.1.1. Unmitigated

5.10.2. Architectural Coatings

5.10.3. Landscape Equipment

5.11. Operational Energy Consumption

5.11.1. Unmitigated

5.12. Operational Water and Wastewater Consumption

5.12.1. Unmitigated

5.13. Operational Waste Generation

5.13.1. Unmitigated

5.14. Operational Refrigeration and Air Conditioning Equipment

5.14.1. Unmitigated

5.15. Operational Off-Road Equipment

5.15.1. Unmitigated

5.16. Stationary Sources

5.16.1. Emergency Generators and Fire Pumps

5.16.2. Process Boilers

5.17. User Defined

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

5.18.2. Sequestration

5.18.2.1. Unmitigated

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

6.2. Initial Climate Risk Scores

6.3. Adjusted Climate Risk Scores

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

7.2. Healthy Places Index Scores

7.3. Overall Health & Equity Scores

7.4. Health & Equity Measures

7.5. Evaluation Scorecard

7.6. Health & Equity Custom Measures

8. User Changes to Default Data

1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	Shingle Springs Rancheria 295.7-Acre FTT Project
Operational Year	2026
Lead Agency	Bureau of Indian Affairs
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	2.30
Precipitation (days)	42.6
Location	38.70053683196042, -120.9121824376835
County	El Dorado-Mountain County
City	Unincorporated
Air District	El Dorado County AQMD
Air Basin	Mountain Counties
TAZ	408
EDFZ	4
Electric Utility	Pacific Gas & Electric Company
Gas Utility	Pacific Gas & Electric
App Version	2022.1.1.26

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
Condo/Townhouse	16.0	Dwelling Unit	4.60	25,600	0.00	87,120	37.0	—
Arena	80.0	1000sqft	4.30	80,000	0.00	80,000	—	—

Strip Mall	30.0	1000sqft	3.00	30,000	0.00	13,000	—	—
Unrefrigerated Warehouse-No Rail	6.00	1000sqft	0.75	6,000	0.00	0.00	—	—
Single Family Housing	92.0	Dwelling Unit	131	179,400	0.00	570,636	234	—
Retirement Community	24.0	Dwelling Unit	6.00	25,440	0.00	32,670	61.0	—
Unenclosed Parking with Elevator	1,050	Space	4.00	420,000	0.00	0.00	—	—
Government (Civic Center)	5.30	1000sqft	0.12	5,300	0.00	4,000	—	Multipurpose Emergency Building

1.3. User-Selected Emission Reduction Measures by Emissions Sector

No measures selected

2. Emissions Summary

2.4. Operations Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	240	30.9	478	0.89	35.0	2,927	2,962	34.8	298	333	3,805	48,747	52,552	19.6	2.25	156	53,868
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	233	34.3	425	0.85	35.0	2,927	2,962	34.8	298	333	3,805	45,606	49,411	19.8	2.41	6.48	50,631
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	73.1	22.6	197	0.40	8.22	23.4	31.6	8.16	5.97	14.1	963	33,714	34,677	16.6	1.61	50.3	35,620

Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	13.3	4.13	36.0	0.07	1.50	4.27	5.77	1.49	1.09	2.58	159	5,582	5,741	2.74	0.27	8.32	5,897
Exceeds (Annual)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Threshold	25.0	25.0	100	—	—	—	100	—	—	100	—	—	—	—	—	—	—
Unmit.	No	No	No	—	—	—	No	—	—	No	—	—	—	—	—	—	—

2.5. Operations Emissions by Sector, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Sector	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	22.6	24.8	197	0.42	0.47	2,927	2,927	0.44	298	298	—	42,857	42,857	1.64	1.85	154	43,603
Area	217	4.22	280	0.45	34.4	—	34.4	34.2	—	34.2	3,666	1,645	5,311	3.39	0.26	—	5,475
Energy	0.11	1.87	1.22	0.01	0.15	—	0.15	0.15	—	0.15	—	4,210	4,210	0.51	0.04	—	4,235
Water	—	—	—	—	—	—	—	—	—	—	38.4	35.1	73.5	3.94	0.09	—	200
Waste	—	—	—	—	—	—	—	—	—	—	101	0.00	101	10.1	0.00	—	353
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2.49	2.49
Total	240	30.9	478	0.89	35.0	2,927	2,962	34.8	298	333	3,805	48,747	52,552	19.6	2.25	156	53,868
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	20.8	28.5	174	0.39	0.47	2,927	2,927	0.44	298	298	—	39,833	39,833	1.83	2.01	3.99	40,483
Area	212	3.95	249	0.45	34.4	—	34.4	34.2	—	34.2	3,666	1,529	5,195	3.38	0.26	—	5,357
Energy	0.11	1.87	1.22	0.01	0.15	—	0.15	0.15	—	0.15	—	4,210	4,210	0.51	0.04	—	4,235
Water	—	—	—	—	—	—	—	—	—	—	38.4	35.1	73.5	3.94	0.09	—	200
Waste	—	—	—	—	—	—	—	—	—	—	101	0.00	101	10.1	0.00	—	353
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2.49	2.49

Total	233	34.3	425	0.85	35.0	2,927	2,962	34.8	298	333	3,805	45,606	49,411	19.8	2.41	6.48	50,631
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	15.1	19.7	125	0.29	0.33	23.4	23.7	0.32	5.97	6.28	—	29,068	29,068	1.26	1.41	47.8	29,567
Area	57.9	1.02	71.3	0.10	7.74	—	7.74	7.70	—	7.70	824	401	1,225	0.76	0.06	—	1,261
Energy	0.11	1.87	1.22	0.01	0.15	—	0.15	0.15	—	0.15	—	4,210	4,210	0.51	0.04	—	4,235
Water	—	—	—	—	—	—	—	—	—	—	38.4	35.1	73.5	3.94	0.09	—	200
Waste	—	—	—	—	—	—	—	—	—	—	101	0.00	101	10.1	0.00	—	353
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2.49	2.49
Total	73.1	22.6	197	0.40	8.22	23.4	31.6	8.16	5.97	14.1	963	33,714	34,677	16.6	1.61	50.3	35,620
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	2.75	3.60	22.8	0.05	0.06	4.27	4.33	0.06	1.09	1.15	—	4,813	4,813	0.21	0.23	7.91	4,895
Area	10.6	0.19	13.0	0.02	1.41	—	1.41	1.41	—	1.41	136	66.4	203	0.13	0.01	—	209
Energy	0.02	0.34	0.22	< 0.005	0.03	—	0.03	0.03	—	0.03	—	697	697	0.08	0.01	—	701
Water	—	—	—	—	—	—	—	—	—	—	6.36	5.81	12.2	0.65	0.02	—	33.1
Waste	—	—	—	—	—	—	—	—	—	—	16.7	0.00	16.7	1.67	0.00	—	58.5
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.41	0.41
Total	13.3	4.13	36.0	0.07	1.50	4.27	5.77	1.49	1.09	2.58	159	5,582	5,741	2.74	0.27	8.32	5,897

4. Operations Emissions Details

4.1. Mobile Emissions by Land Use

4.1.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Condo/T	0.83	0.86	6.84	0.01	0.02	101	101	0.02	10.3	10.3	—	1,477	1,477	0.06	0.06	5.30	1,503
Arena	5.71	6.40	50.8	0.11	0.12	758	758	0.11	77.2	77.3	—	11,095	11,095	0.42	0.48	39.9	11,287
Strip Mall	8.86	9.93	78.7	0.17	0.19	1,176	1,176	0.18	120	120	—	17,212	17,212	0.65	0.74	61.8	17,511
Unrefrigerated Warehouse-No Rail	0.07	0.08	0.62	< 0.005	< 0.005	9.23	9.24	< 0.005	0.94	0.94	—	135	135	0.01	0.01	0.49	137
Single Family Housing	5.59	5.81	46.1	0.10	0.11	679	679	0.10	69.1	69.2	—	9,953	9,953	0.39	0.43	35.7	10,128
Retirement Community	0.37	0.38	3.03	0.01	0.01	44.5	44.6	0.01	4.53	4.54	—	653	653	0.03	0.03	2.34	665
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Government (Civic Center)	1.20	1.34	10.7	0.02	0.03	159	159	0.02	16.2	16.2	—	2,331	2,331	0.09	0.10	8.38	2,372
Total	22.6	24.8	197	0.42	0.47	2,927	2,927	0.44	298	298	—	42,857	42,857	1.64	1.85	154	43,603
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	0.76	0.99	6.10	0.01	0.02	101	101	0.02	10.3	10.3	—	1,373	1,373	0.07	0.07	0.14	1,396
Arena	5.25	7.35	44.8	0.10	0.12	758	758	0.11	77.2	77.3	—	10,312	10,312	0.47	0.52	1.03	10,479
Strip Mall	8.15	11.4	69.5	0.16	0.19	1,176	1,176	0.18	120	120	—	15,997	15,997	0.72	0.81	1.60	16,257

Unrefrigerated Warehou Rail	0.06	0.09	0.55	< 0.005	< 0.005	9.23	9.24	< 0.005	0.94	0.94	—	126	126	0.01	0.01	0.01	128
Single Family Housing	5.11	6.68	41.1	0.09	0.11	679	679	0.10	69.1	69.2	—	9,252	9,252	0.44	0.47	0.93	9,405
Retirement Community	0.34	0.44	2.70	0.01	0.01	44.5	44.6	0.01	4.53	4.54	—	607	607	0.03	0.03	0.06	617
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Government (Civic Center)	1.10	1.54	9.41	0.02	0.03	159	159	0.02	16.2	16.2	—	2,167	2,167	0.10	0.11	0.22	2,202
Total	20.8	28.5	174	0.39	0.47	2,927	2,927	0.44	298	298	—	39,833	39,833	1.83	2.01	3.99	40,483
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	0.12	0.16	0.99	< 0.005	< 0.005	0.18	0.19	< 0.005	0.05	0.05	—	207	207	0.01	0.01	0.34	210
Arena	0.14	0.18	1.16	< 0.005	< 0.005	0.22	0.22	< 0.005	0.06	0.06	—	247	247	0.01	0.01	0.41	252
Strip Mall	1.36	1.83	11.6	0.03	0.03	2.19	2.22	0.03	0.56	0.59	—	2,461	2,461	0.11	0.12	4.05	2,503
Unrefrigerated Warehouse-No Rail	0.01	0.02	0.10	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	0.01	—	21.1	21.1	< 0.005	< 0.005	0.03	21.5
Single Family Housing	0.91	1.15	7.28	0.02	0.02	1.35	1.37	0.02	0.34	0.36	—	1,520	1,520	0.07	0.07	2.49	1,546

Retirement Commun	0.06	0.07	0.46	< 0.005	< 0.005	0.09	0.09	< 0.005	0.02	0.02	—	97.0	97.0	< 0.005	< 0.005	0.16	98.7
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Government (Civic Center)	0.14	0.19	1.22	< 0.005	< 0.005	0.23	0.23	< 0.005	0.06	0.06	—	260	260	0.01	0.01	0.43	264
Total	2.75	3.60	22.8	0.05	0.06	4.27	4.33	0.06	1.09	1.15	—	4,813	4,813	0.21	0.23	7.91	4,895

4.2. Energy

4.2.1. Electricity Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	46.1	46.1	0.01	< 0.005	—	46.6
Arena	—	—	—	—	—	—	—	—	—	—	—	462	462	0.07	0.01	—	466
Strip Mall	—	—	—	—	—	—	—	—	—	—	—	146	146	0.02	< 0.005	—	148
Unrefrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	—	35.0	35.0	0.01	< 0.005	—	35.3

Single Family Housing	—	—	—	—	—	—	—	—	—	—	—	438	438	0.07	0.01	—	443
Retirement Community	—	—	—	—	—	—	—	—	—	—	—	59.6	59.6	0.01	< 0.005	—	60.2
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	661	661	0.11	0.01	—	668
Government (Civic Center)	—	—	—	—	—	—	—	—	—	—	—	62.0	62.0	0.01	< 0.005	—	62.6
Total	—	—	—	—	—	—	—	—	—	—	—	1,910	1,910	0.31	0.04	—	1,929
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	46.1	46.1	0.01	< 0.005	—	46.6
Arena	—	—	—	—	—	—	—	—	—	—	—	462	462	0.07	0.01	—	466
Strip Mall	—	—	—	—	—	—	—	—	—	—	—	146	146	0.02	< 0.005	—	148
Unrefrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	—	35.0	35.0	0.01	< 0.005	—	35.3
Single Family Housing	—	—	—	—	—	—	—	—	—	—	—	438	438	0.07	0.01	—	443
Retirement Community	—	—	—	—	—	—	—	—	—	—	—	59.6	59.6	0.01	< 0.005	—	60.2

Unenclo Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	661	661	0.11	0.01	—	668
Government (Civic Center)	—	—	—	—	—	—	—	—	—	—	—	62.0	62.0	0.01	< 0.005	—	62.6
Total	—	—	—	—	—	—	—	—	—	—	—	1,910	1,910	0.31	0.04	—	1,929
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	7.64	7.64	< 0.005	< 0.005	—	7.71
Arena	—	—	—	—	—	—	—	—	—	—	—	76.5	76.5	0.01	< 0.005	—	77.2
Strip Mall	—	—	—	—	—	—	—	—	—	—	—	24.2	24.2	< 0.005	< 0.005	—	24.4
Unrefrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	—	5.79	5.79	< 0.005	< 0.005	—	5.85
Single Family Housing	—	—	—	—	—	—	—	—	—	—	—	72.6	72.6	0.01	< 0.005	—	73.3
Retirement Community	—	—	—	—	—	—	—	—	—	—	—	9.87	9.87	< 0.005	< 0.005	—	9.97
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	110	110	0.02	< 0.005	—	111
Government (Civic Center)	—	—	—	—	—	—	—	—	—	—	—	10.3	10.3	< 0.005	< 0.005	—	10.4
Total	—	—	—	—	—	—	—	—	—	—	—	316	316	< 0.005	< 0.005	—	319

4.2.3. Natural Gas Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	0.01	0.09	0.04	< 0.005	0.01	—	0.01	0.01	—	0.01	—	119	119	0.01	< 0.005	—	119
Arena	0.05	0.89	0.75	0.01	0.07	—	0.07	0.07	—	0.07	—	1,063	1,063	0.09	< 0.005	—	1,066
Strip Mall	< 0.005	0.07	0.06	< 0.005	0.01	—	0.01	0.01	—	0.01	—	82.9	82.9	0.01	< 0.005	—	83.2
Unrefrigerated Warehouse-No Rail	< 0.005	0.01	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	10.7	10.7	< 0.005	< 0.005	—	10.7
Single Family Housing	0.04	0.68	0.29	< 0.005	0.05	—	0.05	0.05	—	0.05	—	858	858	0.08	< 0.005	—	860
Retirement Community	0.01	0.09	0.04	< 0.005	0.01	—	0.01	0.01	—	0.01	—	117	117	0.01	< 0.005	—	117
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Government (Civic Center)	< 0.005	0.04	0.03	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	49.0	49.0	< 0.005	< 0.005	—	49.2
Total	0.11	1.87	1.22	0.01	0.15	—	0.15	0.15	—	0.15	—	2,299	2,299	0.20	< 0.005	—	2,306

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	0.01	0.09	0.04	< 0.005	0.01	—	0.01	0.01	—	0.01	—	119	119	0.01	< 0.005	—	119
Arena	0.05	0.89	0.75	0.01	0.07	—	0.07	0.07	—	0.07	—	1,063	1,063	0.09	< 0.005	—	1,066
Strip Mall	< 0.005	0.07	0.06	< 0.005	0.01	—	0.01	0.01	—	0.01	—	82.9	82.9	0.01	< 0.005	—	83.2
Unrefrigerated Warehouse-No Rail	< 0.005	0.01	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	10.7	10.7	< 0.005	< 0.005	—	10.7
Single Family Housing	0.04	0.68	0.29	< 0.005	0.05	—	0.05	0.05	—	0.05	—	858	858	0.08	< 0.005	—	860
Retirement Community	0.01	0.09	0.04	< 0.005	0.01	—	0.01	0.01	—	0.01	—	117	117	0.01	< 0.005	—	117
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Government (Civic Center)	< 0.005	0.04	0.03	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	49.0	49.0	< 0.005	< 0.005	—	49.2
Total	0.11	1.87	1.22	0.01	0.15	—	0.15	0.15	—	0.15	—	2,299	2,299	0.20	< 0.005	—	2,306
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	< 0.005	0.02	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	19.7	19.7	< 0.005	< 0.005	—	19.8
Arena	0.01	0.16	0.14	< 0.005	0.01	—	0.01	0.01	—	0.01	—	176	176	0.02	< 0.005	—	176

Strip Mall	< 0.005	0.01	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	13.7	13.7	< 0.005	< 0.005	—	13.8
Unrefrigerated Warehouse-No Rail	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	1.77	1.77	< 0.005	< 0.005	—	1.77
Single Family Housing	0.01	0.12	0.05	< 0.005	0.01	—	0.01	0.01	—	0.01	—	142	142	0.01	< 0.005	—	142
Retirement Community	< 0.005	0.02	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	19.4	19.4	< 0.005	< 0.005	—	19.4
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Government (Civic Center)	< 0.005	0.01	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	8.12	8.12	< 0.005	< 0.005	—	8.14
Total	0.02	0.34	0.22	< 0.005	0.03	—	0.03	0.03	—	0.03	—	381	381	0.03	< 0.005	—	382

4.3. Area Emissions by Source

4.3.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Source	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hearths	202	3.95	249	0.45	34.4	—	34.4	34.2	—	34.2	3,666	1,529	5,195	3.38	0.26	—	5,357

Consumer Products	7.54	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	2.79	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	4.53	0.27	31.0	< 0.005	0.05	—	0.05	0.03	—	0.03	—	117	117	< 0.005	< 0.005	—	117
Total	217	4.22	280	0.45	34.4	—	34.4	34.2	—	34.2	3,666	1,645	5,311	3.39	0.26	—	5,475
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hearths	202	3.95	249	0.45	34.4	—	34.4	34.2	—	34.2	3,666	1,529	5,195	3.38	0.26	—	5,357
Consumer Products	7.54	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	2.79	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	212	3.95	249	0.45	34.4	—	34.4	34.2	—	34.2	3,666	1,529	5,195	3.38	0.26	—	5,357
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hearths	8.28	0.16	10.2	0.02	1.41	—	1.41	1.40	—	1.40	136	56.9	193	0.13	0.01	—	199
Consumer Products	1.38	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.51	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.41	0.02	2.79	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	9.54	9.54	< 0.005	< 0.005	—	9.57
Total	10.6	0.19	13.0	0.02	1.41	—	1.41	1.41	—	1.41	136	66.4	203	0.13	0.01	—	209

4.4. Water Emissions by Land Use

4.4.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Arena	—	—	—	—	—	—	—	—	—	—	11.6	10.6	22.2	1.19	0.03	—	60.5
Strip Mall	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Unrefrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Single Family Housing	—	—	—	—	—	—	—	—	—	—	26.8	24.5	51.3	2.75	0.07	—	140
Retirement Community	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Government (Civic Center)	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00

Total	—	—	—	—	—	—	—	—	—	—	38.4	35.1	73.5	3.94	0.09	—	200
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Arena	—	—	—	—	—	—	—	—	—	—	11.6	10.6	22.2	1.19	0.03	—	60.5
Strip Mall	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Unrefrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Single Family Housing	—	—	—	—	—	—	—	—	—	—	26.8	24.5	51.3	2.75	0.07	—	140
Retirement Community	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Government (Civic Center)	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	38.4	35.1	73.5	3.94	0.09	—	200
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Arena	—	—	—	—	—	—	—	—	—	—	1.92	1.76	3.68	0.20	≤ 0.005	—	10.0

Strip Mall	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Unrefrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Single Family Housing	—	—	—	—	—	—	—	—	—	—	4.44	4.05	8.49	0.46	0.01	—	23.1
Retirement Community	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Government (Civic Center)	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	6.36	5.81	12.2	0.65	0.02	—	33.1

4.5. Waste Emissions by Land Use

4.5.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	5.80	0.00	5.80	0.58	0.00	—	20.3

Arena	—	—	—	—	—	—	—	—	—	—	1.19	0.00	1.19	0.12	0.00	—	4.15
Strip Mall	—	—	—	—	—	—	—	—	—	—	17.0	0.00	17.0	1.70	0.00	—	59.4
Unrefrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	3.04	0.00	3.04	0.30	0.00	—	10.6
Single Family Housing	—	—	—	—	—	—	—	—	—	—	27.7	0.00	27.7	2.77	0.00	—	96.8
Retirement Community	—	—	—	—	—	—	—	—	—	—	30.0	0.00	30.0	3.00	0.00	—	105
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Government (Civic Center)	—	—	—	—	—	—	—	—	—	—	16.3	0.00	16.3	1.63	0.00	—	57.0
Total	—	—	—	—	—	—	—	—	—	—	101	0.00	101	10.1	0.00	—	353
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	5.80	0.00	5.80	0.58	0.00	—	20.3
Arena	—	—	—	—	—	—	—	—	—	—	1.19	0.00	1.19	0.12	0.00	—	4.15
Strip Mall	—	—	—	—	—	—	—	—	—	—	17.0	0.00	17.0	1.70	0.00	—	59.4

Unrefrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	3.04	0.00	3.04	0.30	0.00	—	10.6
Single Family Housing	—	—	—	—	—	—	—	—	—	—	27.7	0.00	27.7	2.77	0.00	—	96.8
Retirement Community	—	—	—	—	—	—	—	—	—	—	30.0	0.00	30.0	3.00	0.00	—	105
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Government (Civic Center)	—	—	—	—	—	—	—	—	—	—	16.3	0.00	16.3	1.63	0.00	—	57.0
Total	—	—	—	—	—	—	—	—	—	—	101	0.00	101	10.1	0.00	—	353
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	0.96	0.00	0.96	0.10	0.00	—	3.36
Arena	—	—	—	—	—	—	—	—	—	—	0.20	0.00	0.20	0.02	0.00	—	0.69
Strip Mall	—	—	—	—	—	—	—	—	—	—	2.81	0.00	2.81	0.28	0.00	—	9.83
Unrefrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	0.50	0.00	0.50	0.05	0.00	—	1.76
Single Family Housing	—	—	—	—	—	—	—	—	—	—	4.58	0.00	4.58	0.46	0.00	—	16.0

Retirement	—	—	—	—	—	—	—	—	—	—	4.97	0.00	4.97	0.50	0.00	—	17.4
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Government (Civic Center)	—	—	—	—	—	—	—	—	—	—	2.70	0.00	2.70	0.27	0.00	—	9.43
Total	—	—	—	—	—	—	—	—	—	—	16.7	0.00	16.7	1.67	0.00	—	58.5

4.6. Refrigerant Emissions by Land Use

4.6.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.18	0.18
Arena	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.50	0.50
Strip Mall	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.19	0.19
Single Family Housing	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.28	1.28
Retirement Community	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.32	0.32

Governm (Civic Center)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.01	0.01
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2.49	2.49
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.18	0.18
Arena	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.50	0.50
Strip Mall	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.19	0.19
Single Family Housing	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.28	1.28
Retirement Community	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.32	0.32
Government (Civic Center)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.01	0.01
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2.49	2.49
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.03	0.03
Arena	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.08	0.08
Strip Mall	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.03	0.03
Single Family Housing	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.21	0.21

Retirement	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.05	0.05
Government (Civic Center)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	< 0.005	< 0.005
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.41	0.41

4.7. Offroad Emissions By Equipment Type

4.7.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.8. Stationary Emissions By Equipment Type

4.8.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.9. User Defined Emissions By Equipment Type

4.9.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

5. Activity Data

5.9. Operational Mobile Sources

5.9.1. Unmitigated

Land Use Type	Trips/Weekday	Trips/Saturday	Trips/Sunday	Trips/Year	VMT/Weekday	VMT/Saturday	VMT/Sunday	VMT/Year
Condo/Townhouse	117	130	100	42,565	1,492	1,660	1,280	542,371
Arena	0.00	857	0.00	44,689	0.00	12,491	0.00	651,298
Strip Mall	1,330	1,261	613	444,367	19,377	18,381	8,932	6,476,141
Unrefrigerated Warehouse-No Rail	10.4	10.4	10.4	3,811	152	152	152	55,535
Single Family Housing	868	878	787	313,205	11,066	11,183	10,023	3,990,897
Retirement Community	57.6	48.7	46.8	19,998	734	621	596	254,814
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Government (Civic Center)	180	0.00	0.00	46,953	2,625	0.00	0.00	684,288

5.10. Operational Area Sources

5.10.1. Hearths

5.10.1.1. Unmitigated

Hearth Type	Unmitigated (number)
Condo/Townhouse	—

Wood Fireplaces	6
Gas Fireplaces	9
Propane Fireplaces	0
Electric Fireplaces	0
No Fireplaces	2
Conventional Wood Stoves	0
Catalytic Wood Stoves	1
Non-Catalytic Wood Stoves	1
Pellet Wood Stoves	0
Single Family Housing	—
Wood Fireplaces	32
Gas Fireplaces	51
Propane Fireplaces	0
Electric Fireplaces	0
No Fireplaces	9
Conventional Wood Stoves	0
Catalytic Wood Stoves	5
Non-Catalytic Wood Stoves	5
Pellet Wood Stoves	0
Retirement Community	—
Wood Fireplaces	8
Gas Fireplaces	13
Propane Fireplaces	0
Electric Fireplaces	0
No Fireplaces	2
Conventional Wood Stoves	0
Catalytic Wood Stoves	1
Non-Catalytic Wood Stoves	1

Pellet Wood Stoves	0

5.10.2. Architectural Coatings

Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
466641	155,547	189,791	61,521	10,454

5.10.3. Landscape Equipment

Season	Unit	Value
Snow Days	day/yr	0.00
Summer Days	day/yr	180

5.11. Operational Energy Consumption

5.11.1. Unmitigated

Electricity (kWh/yr) and CO2 and CH4 and N2O and Natural Gas (kBTU/yr)

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)
Condo/Townhouse	82,547	204	0.0330	0.0040	371,519
Arena	826,397	204	0.0330	0.0040	3,316,689
Strip Mall	261,362	204	0.0330	0.0040	258,768
Unrefrigerated Warehouse-No Rail	62,608	204	0.0330	0.0040	33,329
Single Family Housing	784,365	204	0.0330	0.0040	2,676,282
Retirement Community	106,677	204	0.0330	0.0040	364,779
Unenclosed Parking with Elevator	1,183,560	204	0.0330	0.0040	0.00
Government (Civic Center)	110,925	204	0.0330	0.0040	153,006

5.12. Operational Water and Wastewater Consumption

5.12.1. Unmitigated

Land Use	Indoor Water (gal/year)	Outdoor Water (gal/year)
Condo/Townhouse	0.00	0.00
Arena	6,059,000	0.00
Strip Mall	0.00	0.00
Unrefrigerated Warehouse-No Rail	0.00	0.00
Single Family Housing	13,979,500	0.00
Retirement Community	0.00	0.00
Unenclosed Parking with Elevator	0.00	0.00
Government (Civic Center)	0.00	0.00

5.13. Operational Waste Generation

5.13.1. Unmitigated

Land Use	Waste (ton/year)	Cogeneration (kWh/year)
Condo/Townhouse	10.8	—
Arena	2.20	—
Strip Mall	31.5	—
Unrefrigerated Warehouse-No Rail	5.64	—
Single Family Housing	51.3	—
Retirement Community	55.7	—
Unenclosed Parking with Elevator	0.00	—
Government (Civic Center)	30.2	—

5.14. Operational Refrigeration and Air Conditioning Equipment

5.14.1. Unmitigated

Land Use Type	Equipment Type	Refrigerant	GWP	Quantity (kg)	Operations Leak Rate	Service Leak Rate	Times Serviced
Condo/Townhouse	Average room A/C & Other residential A/C and heat pumps	R-410A	2,088	< 0.005	2.50	2.50	10.0
Condo/Townhouse	Household refrigerators and/or freezers	R-134a	1,430	0.12	0.60	0.00	1.00
Arena	Other commercial A/C and heat pumps	R-410A	2,088	< 0.005	4.00	4.00	18.0
Arena	Stand-alone retail refrigerators and freezers	R-134a	1,430	0.04	1.00	0.00	1.00
Arena	Walk-in refrigerators and freezers	R-404A	3,922	< 0.005	7.50	7.50	20.0
Strip Mall	Other commercial A/C and heat pumps	R-410A	2,088	< 0.005	4.00	4.00	18.0
Strip Mall	Stand-alone retail refrigerators and freezers	R-134a	1,430	0.04	1.00	0.00	1.00
Strip Mall	Walk-in refrigerators and freezers	R-404A	3,922	< 0.005	7.50	7.50	20.0
Single Family Housing	Average room A/C & Other residential A/C and heat pumps	R-410A	2,088	< 0.005	2.50	2.50	10.0
Single Family Housing	Household refrigerators and/or freezers	R-134a	1,430	0.12	0.60	0.00	1.00
Retirement Community	Average room A/C & Other residential A/C and heat pumps	R-410A	2,088	< 0.005	2.50	2.50	10.0
Retirement Community	Household refrigerators and/or freezers	R-134a	1,430	0.22	0.60	0.00	1.00

Government (Civic Center)	Household refrigerators and/or freezers	R-134a	1,430	0.02	0.60	0.00	1.00
Government (Civic Center)	Other commercial A/C and heat pumps	R-410A	2,088	< 0.005	4.00	4.00	18.0

5.15. Operational Off-Road Equipment

5.15.1. Unmitigated

Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor

5.16. Stationary Sources

5.16.1. Emergency Generators and Fire Pumps

Equipment Type	Fuel Type	Number per Day	Hours per Day	Hours per Year	Horsepower	Load Factor

5.16.2. Process Boilers

Equipment Type	Fuel Type	Number	Boiler Rating (MMBtu/hr)	Daily Heat Input (MMBtu/day)	Annual Heat Input (MMBtu/yr)

5.17. User Defined

Equipment Type	Fuel Type

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.2. Sequestration

5.18.2.1. Unmitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

Cal-Adapt midcentury 2040–2059 average projections for four hazards are reported below for your project location. These are under Representation Concentration Pathway (RCP) 8.5 which assumes GHG emissions will continue to rise strongly through 2050 and then plateau around 2100.

Climate Hazard	Result for Project Location	Unit
Temperature and Extreme Heat	28.5	annual days of extreme heat
Extreme Precipitation	11.8	annual days with precipitation above 20 mm
Sea Level Rise	—	meters of inundation depth
Wildfire	24.5	annual hectares burned

Temperature and Extreme Heat data are for grid cell in which your project are located. The projection is based on the 98th historical percentile of daily maximum/minimum temperatures from observed historical data (32 climate model ensemble from Cal-Adapt, 2040–2059 average under RCP 8.5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Extreme Precipitation data are for the grid cell in which your project are located. The threshold of 20 mm is equivalent to about ¾ an inch of rain, which would be light to moderate rainfall if received over a full day or heavy rain if received over a period of 2 to 4 hours. Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Sea Level Rise data are for the grid cell in which your project are located. The projections are from Radke et al. (2017), as reported in Cal-Adapt (Radke et al., 2017, CEC-500-2017-008), and consider inundation location and depth for the San Francisco Bay, the Sacramento-San Joaquin River Delta and California coast resulting different increments of sea level rise coupled with extreme storm events. Users may select from four scenarios to view the range in potential inundation depth for the grid cell. The four scenarios are: No rise, 0.5 meter, 1.0 meter, 1.41 meters
Wildfire data are for the grid cell in which your project are located. The projections are from UC Davis, as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider historical data of climate, vegetation, population density, and large (> 400 ha) fire history. Users may select from four model simulations to view the range in potential wildfire probabilities for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	2	0	0	N/A
Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	1	0	0	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	0	0	0	N/A
Air Quality Degradation	N/A	N/A	N/A	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	2	1	1	3
Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	1	1	1	2
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	1	1	1	2
Air Quality Degradation	N/A	N/A	N/A	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.

The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Exposure Indicators	—
AQ-Ozone	76.9
AQ-PM	12.9
AQ-DPM	6.98
Drinking Water	18.5
Lead Risk Housing	19.4
Pesticides	34.8
Toxic Releases	12.3
Traffic	61.4
Effect Indicators	—
CleanUp Sites	0.00
Groundwater	0.00
Haz Waste Facilities/Generators	39.8
Impaired Water Bodies	0.00
Solid Waste	0.00
Sensitive Population	—
Asthma	43.2
Cardio-vascular	23.1
Low Birth Weights	27.1

Socioeconomic Factor Indicators	—
Education	13.7
Housing	31.2
Linguistic	0.00
Poverty	11.3
Unemployment	39.2

7.2. Healthy Places Index Scores

The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Economic	—
Above Poverty	72.01334531
Employed	13.29398178
Median HI	79.7767227
Education	—
Bachelor's or higher	69.88322854
High school enrollment	23.59810086
Preschool enrollment	65.37918645
Transportation	—
Auto Access	94.58488387
Active commuting	15.56525087
Social	—
2-parent households	62.44065187
Voting	95.68843834
Neighborhood	—
Alcohol availability	90.6711151
Park access	13.28114975
Retail density	14.20505582

Supermarket access	24.56050302
Tree canopy	97.72873091
Housing	—
Homeownership	90.27332221
Housing habitability	92.42910304
Low-inc homeowner severe housing cost burden	34.76196587
Low-inc renter severe housing cost burden	93.89195432
Uncrowded housing	72.73193892
Health Outcomes	—
Insured adults	86.30822533
Arthritis	0.0
Asthma ER Admissions	52.6
High Blood Pressure	0.0
Cancer (excluding skin)	0.0
Asthma	0.0
Coronary Heart Disease	0.0
Chronic Obstructive Pulmonary Disease	0.0
Diagnosed Diabetes	0.0
Life Expectancy at Birth	24.3
Cognitively Disabled	52.2
Physically Disabled	41.1
Heart Attack ER Admissions	45.3
Mental Health Not Good	0.0
Chronic Kidney Disease	0.0
Obesity	0.0
Pedestrian Injuries	19.6
Physical Health Not Good	0.0
Stroke	0.0

Health Risk Behaviors	—
Binge Drinking	0.0
Current Smoker	0.0
No Leisure Time for Physical Activity	0.0
Climate Change Exposures	—
Wildfire Risk	0.0
SLR Inundation Area	0.0
Children	87.0
Elderly	17.2
English Speaking	81.5
Foreign-born	3.4
Outdoor Workers	67.5
Climate Change Adaptive Capacity	—
Impervious Surface Cover	97.7
Traffic Density	29.8
Traffic Access	0.0
Other Indices	—
Hardship	34.4
Other Decision Support	—
2016 Voting	94.0

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	7.00
Healthy Places Index Score for Project Location (b)	72.0
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	No
Project Located in a Low-Income Community (Assembly Bill 1550)	No
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.
b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.4. Health & Equity Measures

No Health & Equity Measures selected.

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

7.6. Health & Equity Custom Measures

No Health & Equity Custom Measures created.

8. User Changes to Default Data

Screen	Justification
Land Use	Based on project description.
Operations: Vehicle Data	Trip generation adjusted to match traffic study (Kimley Horn, 2024).
Operations: Water and Waste Water	Adjusted to match Water and Wastewater Feasibility Study (HSE, 2024).
Operations: Road Dust	All roads paved onsite.

Shingle Springs Rancheria 295.7-Acre FTT Project Detailed Report

Table of Contents

1. Basic Project Information

1.1. Basic Project Information

1.2. Land Use Types

1.3. User-Selected Emission Reduction Measures by Emissions Sector

2. Emissions Summary

2.4. Operations Emissions Compared Against Thresholds

2.5. Operations Emissions by Sector, Unmitigated

4. Operations Emissions Details

4.1. Mobile Emissions by Land Use

4.1.1. Unmitigated

4.2. Energy

4.2.1. Electricity Emissions By Land Use - Unmitigated

4.2.3. Natural Gas Emissions By Land Use - Unmitigated

4.3. Area Emissions by Source

4.3.1. Unmitigated

4.4. Water Emissions by Land Use

4.4.1. Unmitigated

4.5. Waste Emissions by Land Use

4.5.1. Unmitigated

4.6. Refrigerant Emissions by Land Use

4.6.1. Unmitigated

4.7. Offroad Emissions By Equipment Type

4.7.1. Unmitigated

4.8. Stationary Emissions By Equipment Type

4.8.1. Unmitigated

4.9. User Defined Emissions By Equipment Type

4.9.1. Unmitigated

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

5. Activity Data

5.9. Operational Mobile Sources

5.9.1. Unmitigated

5.10. Operational Area Sources

5.10.1. Hearths

5.10.1.1. Unmitigated

5.10.2. Architectural Coatings

5.10.3. Landscape Equipment

5.11. Operational Energy Consumption

5.11.1. Unmitigated

5.12. Operational Water and Wastewater Consumption

5.12.1. Unmitigated

5.13. Operational Waste Generation

5.13.1. Unmitigated

5.14. Operational Refrigeration and Air Conditioning Equipment

5.14.1. Unmitigated

5.15. Operational Off-Road Equipment

5.15.1. Unmitigated

5.16. Stationary Sources

5.16.1. Emergency Generators and Fire Pumps

5.16.2. Process Boilers

5.17. User Defined

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

5.18.2. Sequestration

5.18.2.1. Unmitigated

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

6.2. Initial Climate Risk Scores

6.3. Adjusted Climate Risk Scores

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

7.2. Healthy Places Index Scores

7.3. Overall Health & Equity Scores

7.4. Health & Equity Measures

7.5. Evaluation Scorecard

7.6. Health & Equity Custom Measures

8. User Changes to Default Data

1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	Shingle Springs Rancheria 295.7-Acre FTT Project
Operational Year	2045
Lead Agency	Bureau of Indian Affairs
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	2.30
Precipitation (days)	42.6
Location	38.70053683196042, -120.9121824376835
County	El Dorado-Mountain County
City	Unincorporated
Air District	El Dorado County AQMD
Air Basin	Mountain Counties
TAZ	408
EDFZ	4
Electric Utility	Pacific Gas & Electric Company
Gas Utility	Pacific Gas & Electric
App Version	2022.1.1.26

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
Condo/Townhouse	16.0	Dwelling Unit	4.60	25,600	0.00	87,120	37.0	—
Arena	80.0	1000sqft	4.30	80,000	0.00	80,000	—	—

Strip Mall	30.0	1000sqft	3.00	30,000	0.00	13,000	—	—
Unrefrigerated Warehouse-No Rail	6.00	1000sqft	0.75	6,000	0.00	0.00	—	—
Single Family Housing	92.0	Dwelling Unit	131	179,400	0.00	570,636	234	—
Retirement Community	24.0	Dwelling Unit	6.00	25,440	0.00	32,670	61.0	—
Unenclosed Parking with Elevator	1,050	Space	4.00	420,000	0.00	0.00	—	—
Government (Civic Center)	5.30	1000sqft	0.12	5,300	0.00	4,000	—	Multipurpose Emergency Building

1.3. User-Selected Emission Reduction Measures by Emissions Sector

No measures selected

2. Emissions Summary

2.4. Operations Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	231	14.2	411	0.79	34.7	2,927	2,961	34.5	298	332	3,805	39,330	43,136	18.9	1.47	18.7	44,064
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	225	15.5	360	0.77	34.7	2,927	2,961	34.5	298	332	3,805	36,715	40,521	19.0	1.57	2.91	41,467
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	67.3	9.50	153	0.34	8.00	23.3	31.3	7.95	5.93	13.9	963	27,250	28,213	16.0	1.02	7.52	28,924

Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	12.3	1.73	27.9	0.06	1.46	4.25	5.71	1.45	1.08	2.53	159	4,512	4,671	2.66	0.17	1.25	4,789
Exceeds (Annual)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Threshold	25.0	25.0	100	—	—	—	100	—	—	100	—	—	—	—	—	—	—
Unmit.	No	No	No	—	—	—	No	—	—	No	—	—	—	—	—	—	—

2.5. Operations Emissions by Sector, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Sector	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	13.7	8.15	130	0.33	0.15	2,927	2,927	0.14	298	298	—	33,440	33,440	0.98	1.07	16.2	33,799
Area	217	4.21	280	0.45	34.4	—	34.4	34.2	—	34.2	3,666	1,645	5,311	3.39	0.26	—	5,475
Energy	0.11	1.87	1.22	0.01	0.15	—	0.15	0.15	—	0.15	—	4,210	4,210	0.51	0.04	—	4,235
Water	—	—	—	—	—	—	—	—	—	—	38.4	35.1	73.5	3.94	0.09	—	200
Waste	—	—	—	—	—	—	—	—	—	—	101	0.00	101	10.1	0.00	—	353
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2.49	2.49
Total	231	14.2	411	0.79	34.7	2,927	2,961	34.5	298	332	3,805	39,330	43,136	18.9	1.47	18.7	44,064
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	12.8	9.65	109	0.30	0.15	2,927	2,927	0.14	298	298	—	30,942	30,942	1.03	1.18	0.42	31,318
Area	212	3.95	249	0.45	34.4	—	34.4	34.2	—	34.2	3,666	1,529	5,195	3.38	0.26	—	5,357
Energy	0.11	1.87	1.22	0.01	0.15	—	0.15	0.15	—	0.15	—	4,210	4,210	0.51	0.04	—	4,235
Water	—	—	—	—	—	—	—	—	—	—	38.4	35.1	73.5	3.94	0.09	—	200
Waste	—	—	—	—	—	—	—	—	—	—	101	0.00	101	10.1	0.00	—	353
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2.49	2.49

Total	225	15.5	360	0.77	34.7	2,927	2,961	34.5	298	332	3,805	36,715	40,521	19.0	1.57	2.91	41,467
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	9.31	6.61	80.3	0.22	0.11	23.3	23.4	0.10	5.93	6.03	—	22,604	22,604	0.73	0.82	5.03	22,872
Area	57.9	1.02	71.3	0.10	7.74	—	7.74	7.70	—	7.70	824	401	1,225	0.76	0.06	—	1,261
Energy	0.11	1.87	1.22	0.01	0.15	—	0.15	0.15	—	0.15	—	4,210	4,210	0.51	0.04	—	4,235
Water	—	—	—	—	—	—	—	—	—	—	38.4	35.1	73.5	3.94	0.09	—	200
Waste	—	—	—	—	—	—	—	—	—	—	101	0.00	101	10.1	0.00	—	353
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2.49	2.49
Total	67.3	9.50	153	0.34	8.00	23.3	31.3	7.95	5.93	13.9	963	27,250	28,213	16.0	1.02	7.52	28,924
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	1.70	1.21	14.7	0.04	0.02	4.25	4.27	0.02	1.08	1.10	—	3,742	3,742	0.12	0.14	0.83	3,787
Area	10.6	0.19	13.0	0.02	1.41	—	1.41	1.41	—	1.41	136	66.4	203	0.13	0.01	—	209
Energy	0.02	0.34	0.22	< 0.005	0.03	—	0.03	0.03	—	0.03	—	697	697	0.08	0.01	—	701
Water	—	—	—	—	—	—	—	—	—	—	6.36	5.81	12.2	0.65	0.02	—	33.1
Waste	—	—	—	—	—	—	—	—	—	—	16.7	0.00	16.7	1.67	0.00	—	58.5
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.41	0.41
Total	12.3	1.73	27.9	0.06	1.46	4.25	5.71	1.45	1.08	2.53	159	4,512	4,671	2.66	0.17	1.25	4,789

4. Operations Emissions Details

4.1. Mobile Emissions by Land Use

4.1.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Condo/T	0.50	0.29	4.50	0.01	0.01	101	101	< 0.005	10.2	10.3	—	1,152	1,152	0.03	0.04	0.56	1,165
Arena	3.45	2.09	33.4	0.09	0.04	758	758	0.04	77.1	77.2	—	8,657	8,657	0.25	0.27	4.20	8,749
Strip Mall	5.36	3.25	51.9	0.13	0.06	1,176	1,176	0.06	120	120	—	13,430	13,430	0.39	0.43	6.51	13,573
Unrefrigerated Warehouse-No Rail	0.04	0.03	0.41	< 0.005	< 0.005	9.23	9.23	< 0.005	0.94	0.94	—	105	105	< 0.005	< 0.005	0.05	107
Single Family Housing	3.39	1.93	30.3	0.08	0.04	679	679	0.03	69.1	69.1	—	7,766	7,766	0.23	0.25	3.76	7,851
Retirement Community	0.22	0.13	1.99	0.01	< 0.005	44.5	44.5	< 0.005	4.53	4.53	—	510	510	0.02	0.02	0.25	515
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Government (Civic Center)	0.73	0.44	7.02	0.02	0.01	159	159	0.01	16.2	16.2	—	1,819	1,819	0.05	0.06	0.88	1,839
Total	13.7	8.15	130	0.33	0.15	2,927	2,927	0.14	298	298	—	33,440	33,440	0.98	1.07	16.2	33,799
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	0.47	0.34	3.83	0.01	0.01	101	101	< 0.005	10.2	10.3	—	1,066	1,066	0.04	0.04	0.01	1,080
Arena	3.22	2.48	28.2	0.08	0.04	758	758	0.04	77.1	77.2	—	8,010	8,010	0.26	0.30	0.11	8,107
Strip Mall	4.99	3.85	43.7	0.12	0.06	1,176	1,176	0.06	120	120	—	12,426	12,426	0.41	0.47	0.17	12,576

Unrefrigerated Warehou Rail	0.04	0.03	0.34	< 0.005	< 0.005	9.23	9.23	< 0.005	0.94	0.94	—	97.6	97.6	< 0.005	< 0.005	< 0.005	98.7
Single Family Housing	3.16	2.28	25.8	0.07	0.04	679	679	0.03	69.1	69.1	—	7,187	7,187	0.25	0.28	0.10	7,276
Retirement Community	0.21	0.15	1.69	< 0.005	< 0.005	44.5	44.5	< 0.005	4.53	4.53	—	472	472	0.02	0.02	0.01	478
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Government (Civic Center)	0.68	0.52	5.92	0.02	0.01	159	159	0.01	16.2	16.2	—	1,683	1,683	0.06	0.06	0.02	1,703
Total	12.8	9.65	109	0.30	0.15	2,927	2,927	0.14	298	298	—	30,942	30,942	1.03	1.18	0.42	31,318
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	0.08	0.05	0.64	< 0.005	< 0.005	0.18	0.18	< 0.005	0.05	0.05	—	161	161	0.01	0.01	0.04	163
Arena	0.08	0.06	0.75	< 0.005	< 0.005	0.22	0.22	< 0.005	0.06	0.06	—	192	192	0.01	0.01	0.04	195
Strip Mall	0.84	0.61	7.45	0.02	0.01	2.18	2.19	0.01	0.55	0.56	—	1,914	1,914	0.06	0.07	0.43	1,936
Unrefrigerated Warehouse-No Rail	0.01	0.01	0.06	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	< 0.005	—	16.4	16.4	< 0.005	< 0.005	< 0.005	16.6
Single Family Housing	0.57	0.39	4.68	0.01	0.01	1.34	1.35	0.01	0.34	0.35	—	1,182	1,182	0.04	0.04	0.26	1,196

Retirement Commun	0.04	0.02	0.30	< 0.005	< 0.005	0.09	0.09	< 0.005	0.02	0.02	—	75.5	75.5	< 0.005	< 0.005	0.02	76.4
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Government (Civic Center)	0.09	0.06	0.79	< 0.005	< 0.005	0.23	0.23	< 0.005	0.06	0.06	—	202	202	0.01	0.01	0.05	205
Total	1.70	1.21	14.7	0.04	0.02	4.25	4.27	0.02	1.08	1.10	—	3,742	3,742	0.12	0.14	0.83	3,787

4.2. Energy

4.2.1. Electricity Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	46.1	46.1	0.01	< 0.005	—	46.6
Arena	—	—	—	—	—	—	—	—	—	—	—	462	462	0.07	0.01	—	466
Strip Mall	—	—	—	—	—	—	—	—	—	—	—	146	146	0.02	< 0.005	—	148
Unrefrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	—	35.0	35.0	0.01	< 0.005	—	35.3

Single Family Housing	—	—	—	—	—	—	—	—	—	—	—	438	438	0.07	0.01	—	443
Retirement Community	—	—	—	—	—	—	—	—	—	—	—	59.6	59.6	0.01	< 0.005	—	60.2
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	661	661	0.11	0.01	—	668
Government (Civic Center)	—	—	—	—	—	—	—	—	—	—	—	62.0	62.0	0.01	< 0.005	—	62.6
Total	—	—	—	—	—	—	—	—	—	—	—	1,910	1,910	0.31	0.04	—	1,929
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	46.1	46.1	0.01	< 0.005	—	46.6
Arena	—	—	—	—	—	—	—	—	—	—	—	462	462	0.07	0.01	—	466
Strip Mall	—	—	—	—	—	—	—	—	—	—	—	146	146	0.02	< 0.005	—	148
Unrefrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	—	35.0	35.0	0.01	< 0.005	—	35.3
Single Family Housing	—	—	—	—	—	—	—	—	—	—	—	438	438	0.07	0.01	—	443
Retirement Community	—	—	—	—	—	—	—	—	—	—	—	59.6	59.6	0.01	< 0.005	—	60.2

Unenclo Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	661	661	0.11	0.01	—	668
Government (Civic Center)	—	—	—	—	—	—	—	—	—	—	—	62.0	62.0	0.01	< 0.005	—	62.6
Total	—	—	—	—	—	—	—	—	—	—	—	1,910	1,910	0.31	0.04	—	1,929
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	7.64	7.64	< 0.005	< 0.005	—	7.71
Arena	—	—	—	—	—	—	—	—	—	—	—	76.5	76.5	0.01	< 0.005	—	77.2
Strip Mall	—	—	—	—	—	—	—	—	—	—	—	24.2	24.2	< 0.005	< 0.005	—	24.4
Unrefrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	—	5.79	5.79	< 0.005	< 0.005	—	5.85
Single Family Housing	—	—	—	—	—	—	—	—	—	—	—	72.6	72.6	0.01	< 0.005	—	73.3
Retirement Community	—	—	—	—	—	—	—	—	—	—	—	9.87	9.87	< 0.005	< 0.005	—	9.97
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	—	110	110	0.02	< 0.005	—	111
Government (Civic Center)	—	—	—	—	—	—	—	—	—	—	—	10.3	10.3	< 0.005	< 0.005	—	10.4
Total	—	—	—	—	—	—	—	—	—	—	—	316	316	0.05	0.01	—	319

4.2.3. Natural Gas Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	0.01	0.09	0.04	< 0.005	0.01	—	0.01	0.01	—	0.01	—	119	119	0.01	< 0.005	—	119
Arena	0.05	0.89	0.75	0.01	0.07	—	0.07	0.07	—	0.07	—	1,063	1,063	0.09	< 0.005	—	1,066
Strip Mall	< 0.005	0.07	0.06	< 0.005	0.01	—	0.01	0.01	—	0.01	—	82.9	82.9	0.01	< 0.005	—	83.2
Unrefrigerated Warehouse-No Rail	< 0.005	0.01	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	10.7	10.7	< 0.005	< 0.005	—	10.7
Single Family Housing	0.04	0.68	0.29	< 0.005	0.05	—	0.05	0.05	—	0.05	—	858	858	0.08	< 0.005	—	860
Retirement Community	0.01	0.09	0.04	< 0.005	0.01	—	0.01	0.01	—	0.01	—	117	117	0.01	< 0.005	—	117
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Government (Civic Center)	< 0.005	0.04	0.03	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	49.0	49.0	< 0.005	< 0.005	—	49.2
Total	0.11	1.87	1.22	0.01	0.15	—	0.15	0.15	—	0.15	—	2,299	2,299	0.20	< 0.005	—	2,306

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	0.01	0.09	0.04	< 0.005	0.01	—	0.01	0.01	—	0.01	—	119	119	0.01	< 0.005	—	119
Arena	0.05	0.89	0.75	0.01	0.07	—	0.07	0.07	—	0.07	—	1,063	1,063	0.09	< 0.005	—	1,066
Strip Mall	< 0.005	0.07	0.06	< 0.005	0.01	—	0.01	0.01	—	0.01	—	82.9	82.9	0.01	< 0.005	—	83.2
Unrefrigerated Warehouse-No Rail	< 0.005	0.01	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	10.7	10.7	< 0.005	< 0.005	—	10.7
Single Family Housing	0.04	0.68	0.29	< 0.005	0.05	—	0.05	0.05	—	0.05	—	858	858	0.08	< 0.005	—	860
Retirement Community	0.01	0.09	0.04	< 0.005	0.01	—	0.01	0.01	—	0.01	—	117	117	0.01	< 0.005	—	117
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Government (Civic Center)	< 0.005	0.04	0.03	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	49.0	49.0	< 0.005	< 0.005	—	49.2
Total	0.11	1.87	1.22	0.01	0.15	—	0.15	0.15	—	0.15	—	2,299	2,299	0.20	< 0.005	—	2,306
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	< 0.005	0.02	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	19.7	19.7	< 0.005	< 0.005	—	19.8
Arena	0.01	0.16	0.14	< 0.005	0.01	—	0.01	0.01	—	0.01	—	176	176	0.02	< 0.005	—	176

Strip Mall	< 0.005	0.01	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	13.7	13.7	< 0.005	< 0.005	—	13.8
Unrefrigerated Warehouse-No Rail	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	1.77	1.77	< 0.005	< 0.005	—	1.77
Single Family Housing	0.01	0.12	0.05	< 0.005	0.01	—	0.01	0.01	—	0.01	—	142	142	0.01	< 0.005	—	142
Retirement Community	< 0.005	0.02	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	19.4	19.4	< 0.005	< 0.005	—	19.4
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Government (Civic Center)	< 0.005	0.01	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	8.12	8.12	< 0.005	< 0.005	—	8.14
Total	0.02	0.34	0.22	< 0.005	0.03	—	0.03	0.03	—	0.03	—	381	381	0.03	< 0.005	—	382

4.3. Area Emissions by Source

4.3.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Source	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hearths	202	3.95	249	0.45	34.4	—	34.4	34.2	—	34.2	3,666	1,529	5,195	3.38	0.26	—	5,357

Consumer Products	7.54	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	2.79	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	4.52	0.27	31.1	< 0.005	0.05	—	0.05	0.03	—	0.03	—	117	117	< 0.005	< 0.005	—	117
Total	217	4.21	280	0.45	34.4	—	34.4	34.2	—	34.2	3,666	1,645	5,311	3.39	0.26	—	5,475
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hearths	202	3.95	249	0.45	34.4	—	34.4	34.2	—	34.2	3,666	1,529	5,195	3.38	0.26	—	5,357
Consumer Products	7.54	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	2.79	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	212	3.95	249	0.45	34.4	—	34.4	34.2	—	34.2	3,666	1,529	5,195	3.38	0.26	—	5,357
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hearths	8.28	0.16	10.2	0.02	1.41	—	1.41	1.40	—	1.40	136	56.9	193	0.13	0.01	—	199
Consumer Products	1.38	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.51	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.41	0.02	2.80	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	9.54	9.54	< 0.005	< 0.005	—	9.57
Total	10.6	0.19	13.0	0.02	1.41	—	1.41	1.41	—	1.41	136	66.4	203	0.13	0.01	—	209

4.4. Water Emissions by Land Use

4.4.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Arena	—	—	—	—	—	—	—	—	—	—	11.6	10.6	22.2	1.19	0.03	—	60.5
Strip Mall	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Unrefrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Single Family Housing	—	—	—	—	—	—	—	—	—	—	26.8	24.5	51.3	2.75	0.07	—	140
Retirement Community	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Government (Civic Center)	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00

Total	—	—	—	—	—	—	—	—	—	—	38.4	35.1	73.5	3.94	0.09	—	200
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Arena	—	—	—	—	—	—	—	—	—	—	11.6	10.6	22.2	1.19	0.03	—	60.5
Strip Mall	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Unrefrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Single Family Housing	—	—	—	—	—	—	—	—	—	—	26.8	24.5	51.3	2.75	0.07	—	140
Retirement Community	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Government (Civic Center)	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	38.4	35.1	73.5	3.94	0.09	—	200
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Arena	—	—	—	—	—	—	—	—	—	—	1.92	1.76	3.68	0.20	≤ 0.005	—	10.0

Strip Mall	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Unrefrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Single Family Housing	—	—	—	—	—	—	—	—	—	—	4.44	4.05	8.49	0.46	0.01	—	23.1
Retirement Community	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Government (Civic Center)	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	6.36	5.81	12.2	0.65	0.02	—	33.1

4.5. Waste Emissions by Land Use

4.5.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	5.80	0.00	5.80	0.58	0.00	—	20.3

Arena	—	—	—	—	—	—	—	—	—	—	1.19	0.00	1.19	0.12	0.00	—	4.15
Strip Mall	—	—	—	—	—	—	—	—	—	—	17.0	0.00	17.0	1.70	0.00	—	59.4
Unrefrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	3.04	0.00	3.04	0.30	0.00	—	10.6
Single Family Housing	—	—	—	—	—	—	—	—	—	—	27.7	0.00	27.7	2.77	0.00	—	96.8
Retirement Community	—	—	—	—	—	—	—	—	—	—	30.0	0.00	30.0	3.00	0.00	—	105
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Government (Civic Center)	—	—	—	—	—	—	—	—	—	—	16.3	0.00	16.3	1.63	0.00	—	57.0
Total	—	—	—	—	—	—	—	—	—	—	101	0.00	101	10.1	0.00	—	353
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	5.80	0.00	5.80	0.58	0.00	—	20.3
Arena	—	—	—	—	—	—	—	—	—	—	1.19	0.00	1.19	0.12	0.00	—	4.15
Strip Mall	—	—	—	—	—	—	—	—	—	—	17.0	0.00	17.0	1.70	0.00	—	59.4

Unrefrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	3.04	0.00	3.04	0.30	0.00	—	10.6
Single Family Housing	—	—	—	—	—	—	—	—	—	—	27.7	0.00	27.7	2.77	0.00	—	96.8
Retirement Community	—	—	—	—	—	—	—	—	—	—	30.0	0.00	30.0	3.00	0.00	—	105
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Government (Civic Center)	—	—	—	—	—	—	—	—	—	—	16.3	0.00	16.3	1.63	0.00	—	57.0
Total	—	—	—	—	—	—	—	—	—	—	101	0.00	101	10.1	0.00	—	353
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	0.96	0.00	0.96	0.10	0.00	—	3.36
Arena	—	—	—	—	—	—	—	—	—	—	0.20	0.00	0.20	0.02	0.00	—	0.69
Strip Mall	—	—	—	—	—	—	—	—	—	—	2.81	0.00	2.81	0.28	0.00	—	9.83
Unrefrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	0.50	0.00	0.50	0.05	0.00	—	1.76
Single Family Housing	—	—	—	—	—	—	—	—	—	—	4.58	0.00	4.58	0.46	0.00	—	16.0

Retirement	—	—	—	—	—	—	—	—	—	—	4.97	0.00	4.97	0.50	0.00	—	17.4
Unenclosed Parking with Elevator	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Government (Civic Center)	—	—	—	—	—	—	—	—	—	—	2.70	0.00	2.70	0.27	0.00	—	9.43
Total	—	—	—	—	—	—	—	—	—	—	16.7	0.00	16.7	1.67	0.00	—	58.5

4.6. Refrigerant Emissions by Land Use

4.6.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.18	0.18
Arena	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.50	0.50
Strip Mall	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.19	0.19
Single Family Housing	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.28	1.28
Retirement Community	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.32	0.32

Governm (Civic Center)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.01	0.01
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2.49	2.49
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.18	0.18
Arena	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.50	0.50
Strip Mall	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.19	0.19
Single Family Housing	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.28	1.28
Retirement Community	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.32	0.32
Government (Civic Center)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.01	0.01
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2.49	2.49
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.03	0.03
Arena	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.08	0.08
Strip Mall	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.03	0.03
Single Family Housing	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.21	0.21

Retirement	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.05	0.05
Government (Civic Center)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	< 0.005	< 0.005
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.41	0.41

4.7. Offroad Emissions By Equipment Type

4.7.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.8. Stationary Emissions By Equipment Type

4.8.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.9. User Defined Emissions By Equipment Type

4.9.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

5. Activity Data

5.9. Operational Mobile Sources

5.9.1. Unmitigated

Land Use Type	Trips/Weekday	Trips/Saturday	Trips/Sunday	Trips/Year	VMT/Weekday	VMT/Saturday	VMT/Sunday	VMT/Year
Condo/Townhouse	117	130	100	42,565	1,492	1,660	1,280	542,371
Arena	0.00	857	0.00	44,689	0.00	12,491	0.00	651,298
Strip Mall	1,330	1,261	613	444,367	19,377	18,381	8,932	6,476,141
Unrefrigerated Warehouse-No Rail	10.4	10.4	10.4	3,811	152	152	152	55,535
Single Family Housing	868	878	787	313,205	11,066	11,183	10,023	3,990,897
Retirement Community	57.6	48.7	46.8	19,998	734	621	596	254,814
Unenclosed Parking with Elevator	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Government (Civic Center)	180	0.00	0.00	46,953	2,625	0.00	0.00	684,288

5.10. Operational Area Sources

5.10.1. Hearths

5.10.1.1. Unmitigated

Hearth Type	Unmitigated (number)
Condo/Townhouse	—

Wood Fireplaces	6
Gas Fireplaces	9
Propane Fireplaces	0
Electric Fireplaces	0
No Fireplaces	2
Conventional Wood Stoves	0
Catalytic Wood Stoves	1
Non-Catalytic Wood Stoves	1
Pellet Wood Stoves	0
Single Family Housing	—
Wood Fireplaces	32
Gas Fireplaces	51
Propane Fireplaces	0
Electric Fireplaces	0
No Fireplaces	9
Conventional Wood Stoves	0
Catalytic Wood Stoves	5
Non-Catalytic Wood Stoves	5
Pellet Wood Stoves	0
Retirement Community	—
Wood Fireplaces	8
Gas Fireplaces	13
Propane Fireplaces	0
Electric Fireplaces	0
No Fireplaces	2
Conventional Wood Stoves	0
Catalytic Wood Stoves	1
Non-Catalytic Wood Stoves	1

Pellet Wood Stoves	0

5.10.2. Architectural Coatings

Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
466641	155,547	189,791	61,521	10,454

5.10.3. Landscape Equipment

Season	Unit	Value
Snow Days	day/yr	0.00
Summer Days	day/yr	180

5.11. Operational Energy Consumption

5.11.1. Unmitigated

Electricity (kWh/yr) and CO2 and CH4 and N2O and Natural Gas (kBTU/yr)

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)
Condo/Townhouse	82,547	204	0.0330	0.0040	371,519
Arena	826,397	204	0.0330	0.0040	3,316,689
Strip Mall	261,362	204	0.0330	0.0040	258,768
Unrefrigerated Warehouse-No Rail	62,608	204	0.0330	0.0040	33,329
Single Family Housing	784,365	204	0.0330	0.0040	2,676,282
Retirement Community	106,677	204	0.0330	0.0040	364,779
Unenclosed Parking with Elevator	1,183,560	204	0.0330	0.0040	0.00
Government (Civic Center)	110,925	204	0.0330	0.0040	153,006

5.12. Operational Water and Wastewater Consumption

5.12.1. Unmitigated

Land Use	Indoor Water (gal/year)	Outdoor Water (gal/year)
Condo/Townhouse	0.00	0.00
Arena	6,059,000	0.00
Strip Mall	0.00	0.00
Unrefrigerated Warehouse-No Rail	0.00	0.00
Single Family Housing	13,979,500	0.00
Retirement Community	0.00	0.00
Unenclosed Parking with Elevator	0.00	0.00
Government (Civic Center)	0.00	0.00

5.13. Operational Waste Generation

5.13.1. Unmitigated

Land Use	Waste (ton/year)	Cogeneration (kWh/year)
Condo/Townhouse	10.8	—
Arena	2.20	—
Strip Mall	31.5	—
Unrefrigerated Warehouse-No Rail	5.64	—
Single Family Housing	51.3	—
Retirement Community	55.7	—
Unenclosed Parking with Elevator	0.00	—
Government (Civic Center)	30.2	—

5.14. Operational Refrigeration and Air Conditioning Equipment

5.14.1. Unmitigated

Land Use Type	Equipment Type	Refrigerant	GWP	Quantity (kg)	Operations Leak Rate	Service Leak Rate	Times Serviced
Condo/Townhouse	Average room A/C & Other residential A/C and heat pumps	R-410A	2,088	< 0.005	2.50	2.50	10.0
Condo/Townhouse	Household refrigerators and/or freezers	R-134a	1,430	0.12	0.60	0.00	1.00
Arena	Other commercial A/C and heat pumps	R-410A	2,088	< 0.005	4.00	4.00	18.0
Arena	Stand-alone retail refrigerators and freezers	R-134a	1,430	0.04	1.00	0.00	1.00
Arena	Walk-in refrigerators and freezers	R-404A	3,922	< 0.005	7.50	7.50	20.0
Strip Mall	Other commercial A/C and heat pumps	R-410A	2,088	< 0.005	4.00	4.00	18.0
Strip Mall	Stand-alone retail refrigerators and freezers	R-134a	1,430	0.04	1.00	0.00	1.00
Strip Mall	Walk-in refrigerators and freezers	R-404A	3,922	< 0.005	7.50	7.50	20.0
Single Family Housing	Average room A/C & Other residential A/C and heat pumps	R-410A	2,088	< 0.005	2.50	2.50	10.0
Single Family Housing	Household refrigerators and/or freezers	R-134a	1,430	0.12	0.60	0.00	1.00
Retirement Community	Average room A/C & Other residential A/C and heat pumps	R-410A	2,088	< 0.005	2.50	2.50	10.0
Retirement Community	Household refrigerators and/or freezers	R-134a	1,430	0.22	0.60	0.00	1.00

Government (Civic Center)	Household refrigerators and/or freezers	R-134a	1,430	0.02	0.60	0.00	1.00
Government (Civic Center)	Other commercial A/C and heat pumps	R-410A	2,088	< 0.005	4.00	4.00	18.0

5.15. Operational Off-Road Equipment

5.15.1. Unmitigated

Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor

5.16. Stationary Sources

5.16.1. Emergency Generators and Fire Pumps

Equipment Type	Fuel Type	Number per Day	Hours per Day	Hours per Year	Horsepower	Load Factor

5.16.2. Process Boilers

Equipment Type	Fuel Type	Number	Boiler Rating (MMBtu/hr)	Daily Heat Input (MMBtu/day)	Annual Heat Input (MMBtu/yr)

5.17. User Defined

Equipment Type	Fuel Type

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.2. Sequestration

5.18.2.1. Unmitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

Cal-Adapt midcentury 2040–2059 average projections for four hazards are reported below for your project location. These are under Representation Concentration Pathway (RCP) 8.5 which assumes GHG emissions will continue to rise strongly through 2050 and then plateau around 2100.

Climate Hazard	Result for Project Location	Unit
Temperature and Extreme Heat	28.5	annual days of extreme heat
Extreme Precipitation	11.8	annual days with precipitation above 20 mm
Sea Level Rise	—	meters of inundation depth
Wildfire	24.5	annual hectares burned

Temperature and Extreme Heat data are for grid cell in which your project are located. The projection is based on the 98th historical percentile of daily maximum/minimum temperatures from observed historical data (32 climate model ensemble from Cal-Adapt, 2040–2059 average under RCP 8.5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Extreme Precipitation data are for the grid cell in which your project are located. The threshold of 20 mm is equivalent to about ¾ an inch of rain, which would be light to moderate rainfall if received over a full day or heavy rain if received over a period of 2 to 4 hours. Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Sea Level Rise data are for the grid cell in which your project are located. The projections are from Radke et al. (2017), as reported in Cal-Adapt (Radke et al., 2017, CEC-500-2017-008), and consider inundation location and depth for the San Francisco Bay, the Sacramento-San Joaquin River Delta and California coast resulting different increments of sea level rise coupled with extreme storm events. Users may select from four scenarios to view the range in potential inundation depth for the grid cell. The four scenarios are: No rise, 0.5 meter, 1.0 meter, 1.41 meters
Wildfire data are for the grid cell in which your project are located. The projections are from UC Davis, as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider historical data of climate, vegetation, population density, and large (> 400 ha) fire history. Users may select from four model simulations to view the range in potential wildfire probabilities for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	2	0	0	N/A
Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	1	0	0	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	0	0	0	N/A
Air Quality Degradation	N/A	N/A	N/A	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	2	1	1	3
Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	1	1	1	2
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	1	1	1	2
Air Quality Degradation	N/A	N/A	N/A	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.

The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Exposure Indicators	—
AQ-Ozone	76.9
AQ-PM	12.9
AQ-DPM	6.98
Drinking Water	18.5
Lead Risk Housing	19.4
Pesticides	34.8
Toxic Releases	12.3
Traffic	61.4
Effect Indicators	—
CleanUp Sites	0.00
Groundwater	0.00
Haz Waste Facilities/Generators	39.8
Impaired Water Bodies	0.00
Solid Waste	0.00
Sensitive Population	—
Asthma	43.2
Cardio-vascular	23.1
Low Birth Weights	27.1

Socioeconomic Factor Indicators	—
Education	13.7
Housing	31.2
Linguistic	0.00
Poverty	11.3
Unemployment	39.2

7.2. Healthy Places Index Scores

The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Economic	—
Above Poverty	72.01334531
Employed	13.29398178
Median HI	79.7767227
Education	—
Bachelor's or higher	69.88322854
High school enrollment	23.59810086
Preschool enrollment	65.37918645
Transportation	—
Auto Access	94.58488387
Active commuting	15.56525087
Social	—
2-parent households	62.44065187
Voting	95.68843834
Neighborhood	—
Alcohol availability	90.6711151
Park access	13.28114975
Retail density	14.20505582

Supermarket access	24.56050302
Tree canopy	97.72873091
Housing	—
Homeownership	90.27332221
Housing habitability	92.42910304
Low-inc homeowner severe housing cost burden	34.76196587
Low-inc renter severe housing cost burden	93.89195432
Uncrowded housing	72.73193892
Health Outcomes	—
Insured adults	86.30822533
Arthritis	0.0
Asthma ER Admissions	52.6
High Blood Pressure	0.0
Cancer (excluding skin)	0.0
Asthma	0.0
Coronary Heart Disease	0.0
Chronic Obstructive Pulmonary Disease	0.0
Diagnosed Diabetes	0.0
Life Expectancy at Birth	24.3
Cognitively Disabled	52.2
Physically Disabled	41.1
Heart Attack ER Admissions	45.3
Mental Health Not Good	0.0
Chronic Kidney Disease	0.0
Obesity	0.0
Pedestrian Injuries	19.6
Physical Health Not Good	0.0
Stroke	0.0

Health Risk Behaviors	—
Binge Drinking	0.0
Current Smoker	0.0
No Leisure Time for Physical Activity	0.0
Climate Change Exposures	—
Wildfire Risk	0.0
SLR Inundation Area	0.0
Children	87.0
Elderly	17.2
English Speaking	81.5
Foreign-born	3.4
Outdoor Workers	67.5
Climate Change Adaptive Capacity	—
Impervious Surface Cover	97.7
Traffic Density	29.8
Traffic Access	0.0
Other Indices	—
Hardship	34.4
Other Decision Support	—
2016 Voting	94.0

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	7.00
Healthy Places Index Score for Project Location (b)	72.0
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	No
Project Located in a Low-Income Community (Assembly Bill 1550)	No
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.
b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.4. Health & Equity Measures

No Health & Equity Measures selected.

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

7.6. Health & Equity Custom Measures

No Health & Equity Custom Measures created.

8. User Changes to Default Data

Screen	Justification
Land Use	Based on project description.
Operations: Vehicle Data	Trip generation adjusted to match traffic study (Kimley Horn, 2024).
Operations: Water and Waste Water	Adjusted to match Water and Wastewater Feasibility Study (HSE, 2024).
Operations: Road Dust	All roads paved onsite.

Appendix D

Biological Assessment

BIOLOGICAL ASSESSMENT

Shingle Springs Band of Miwok Indians
295.7-Acre Fee-to-Trust Project

El Dorado County, California | July 2024

Lead Agency:

Bureau of Indian Affairs
Pacific Regional Office
2800 Cottage Way
Sacramento, CA 95825

BIOLOGICAL ASSESSMENT

Shingle Springs Band of Miwok Indians
295.7-Acre Fee-to-Trust Project

El Dorado County, California | July 2024

Lead Agency:

Bureau of Indian Affairs
Pacific Regional Office
2800 Cottage Way
Sacramento, CA 95825
916.978.6000

Prepared By:

Acorn Environmental
5170 Golden Foothill Parkway
El Dorado Hills, CA 95762
916.235.8224
www.acorn-env.com

Table of Contents

Section 1 | Introduction 3
1.1 Purpose of Assessment 3
1.2 Description of the Proposed Action and Action Area 3
1.2.1 Proposed Land Uses 3
1.2.2 Water Supply and Wastewater Treatment and Disposal 10
1.2.3 Grading and Drainage 12
1.3 Listed Species and Critical Habitat 12
1.3.1 Critical Habitat 12
1.3.2 USFWS Species List 12
1.3.3 Historical Occurrences of Listed Species 13
1.4 Consultation To Date 13
Section 2 | Methods 15
2.1 Preliminary Data Gathering and Research 15
2.2 Field Surveys 15
2.3 Mapping and Other Analyses 15
Section 3 | Results of Field Surveys 17
3.1 Environmental Setting 17
3.2 Inventory of Flora and Fauna from Field Survey 17
3.2.1 Flora and Fauna Observed During Field Survey 17
3.2.2 Listed Species Observed During Field Survey 20
3.3 Terrestrial Vegetation Communities and Wildlife Habitat Types 20
3.4 Potentially Jurisdictional Waters / Aquatic Habitats 30
Section 4 | Federally-Listed Species Assessment 31
4.1 Reptiles and Amphibians 31
4.1.1 Northwestern pond turtle 31
4.1.2 California red-legged frog 31
4.1.3 Foothill yellow-legged frog 32
4.2 Insects 33
4.2.1 Monarch butterfly 33
4.3 Plants 33
Section 5 | Effects Determination 35
5.1 Potential Adverse Effects Upon Critical Habitat 35
5.2 Potential Adverse Effects Upon Listed Species 35
5.2.1 Northwestern pond turtle 35
5.2.2 California red-legged frog 36
5.2.3 Foothill yellow-legged frog 36
5.2.4 Monarch Butterfly 37
5.2.5 Pine Hill Endemic Plants 37
5.3 Potential Adverse Effects Upon Migratory Birds 37
5.4 Avoidance, Minimization, and Mitigation Measures 38
5.4.1 Aquatic Animal Protection During Construction 38
5.4.2 Protection of Nesting and Migratory Birds During Construction 38

5.4.3 Monarch Butterfly Conservation Recommendations 39
5.4.4 Water Resource Protection 39
Section 6 | References 40
Section 7 | Qualifications of Authors / Surveyors 42

List of Figures

Figure 1: Regional Location 4
Figure 2: Project Parcels 5
Figure 3: Proposed Site Plan 6
Figure 4A-C: Site Plan Detail 8
Figure 5: CNDDB Records 14
Figure 6: Regional Topography 18
Figure 7: Soil Types 19
Figure 8: Vegetation Communities and Water Resources 21
Figure 9: Vegetation Communities and Water Resources 22
Figure 10: Vegetation Communities and Water Resources 23
Figure 11: Vegetation Communities and Water Resources 24
Figure 12: Vegetation Communities and Water Resources 25
Figure 13: Vegetation Communities and Water Resources 26
Figure 14: Vegetation Communities and Water Resources 27
Figure 15: Vegetation Communities and Water Resources 28
Figure 16: Vegetation Communities and Water Resources 29

List of Attachments

Attachment A USFWS Species List (IPaC Report)
Attachment B List of Plants Detected During Field Surveys
Attachment C Site Photos
Attachment D Western Monarch Butterfly Conservation Recommendations

Section 1 | Introduction

1.1 PURPOSE OF ASSESSMENT

In support of the environmental review process, this assessment was prepared to provide information about biological resources within the Action Area. This assessment identifies the biological resources within the Action Area, the regulatory environment affecting such resources, any potential project-related impacts upon these resources, and identifies avoidance and minimization measures to reduce these impacts.

The purpose of this biological assessment is to provide technical information and to review the proposed project in sufficient detail to determine to what extent the proposed project may affect threatened, endangered, or proposed species. The biological assessment is prepared in accordance with legal requirements found in Section 7 (a)(2) of the Endangered Species Act (16 U.S. C 1536(c)). The purpose of a biological assessment is to evaluate the potential effects of the action on listed and proposed species and designated and proposed critical habitat and determine whether any such species or habitat are likely to be adversely affected by the action.

1.2 DESCRIPTION OF THE PROPOSED ACTION AND ACTION AREA

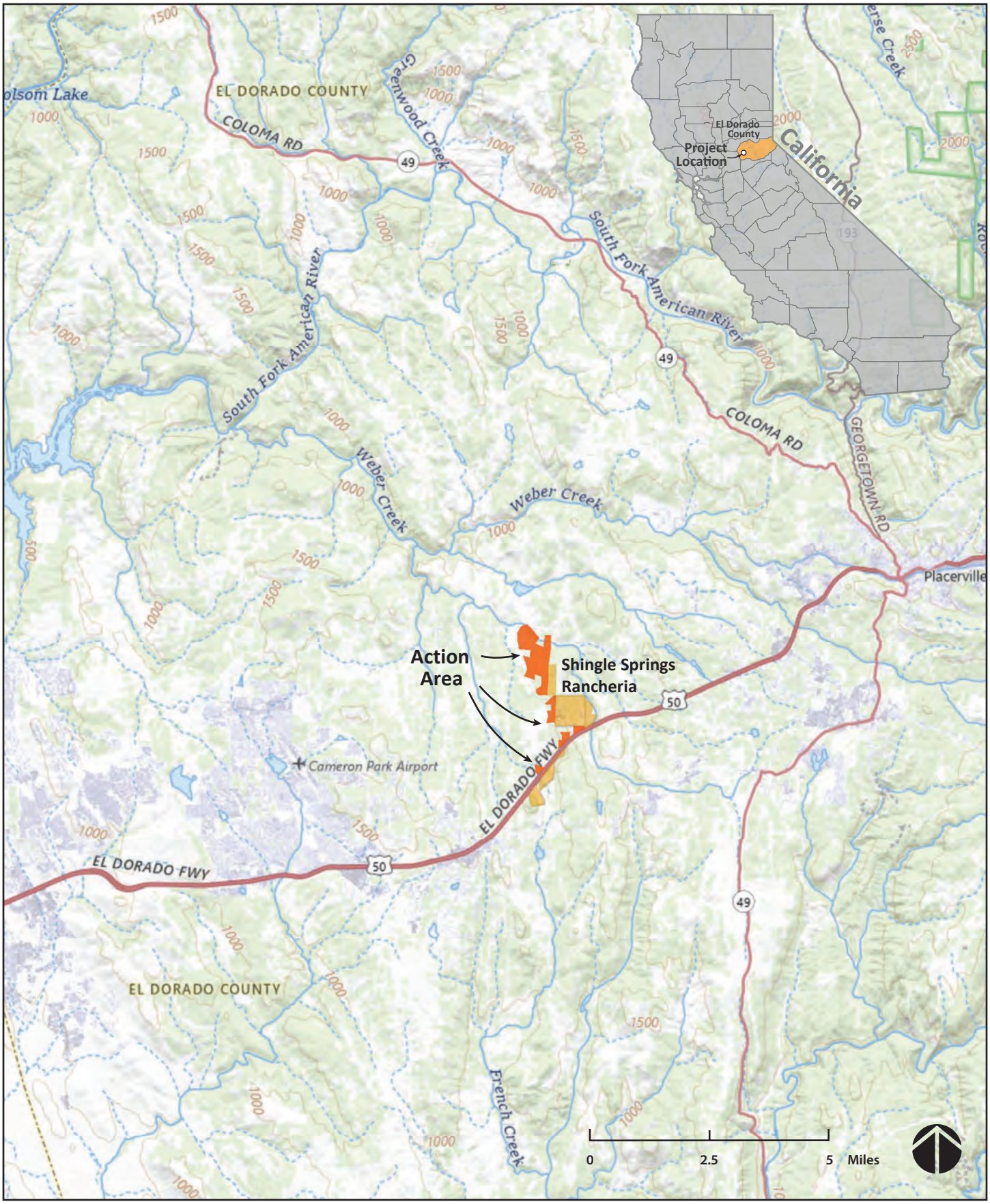
The federal Proposed Action is the acquisition by the Department of the Interior of approximately 295.7 acres (project site) into federal trust status for the Shingle Springs Band of Miwok Indians (Tribe) for housing, commercial development, emergency/safety facilities, and maintenance facilities.

The Action Area is defined as the proposed fee-to-trust parcels, which are located in western El Dorado County, California (**Figure 1**). The Action Area is located adjacent to the existing Shingle Springs Rancheria north of Highway 50, approximately two miles northeast of the town of Shingle Springs, California. The elevation of the Action Area ranges from 1,100 to 1,600 feet above mean sea level. The Action Area is located within Sections 18, 19, 29, 30, and 31 Township 9 and 10 North, Range 10 East, of the Shingle Springs, California 7.5-minute USGS quadrangle. The location of each parcel is shown in **Figure 2**.

Following trust acquisition, the Tribe proposes the development of 132 residential units, approximately 30,000 square feet of commercial uses, an 80,000 square foot arena, a 5,300 square foot multipurpose emergency shelter, a 3,000 square foot maintenance operation building, and associated parking and infrastructure. Thirteen of the parcels have existing single-family homes, which would be retained. The remainder of the parcels are undeveloped with the exception of graded dirt roads and fences. Most of the undeveloped area is oak woodland and chaparral.

1.2.1 Proposed Land Uses

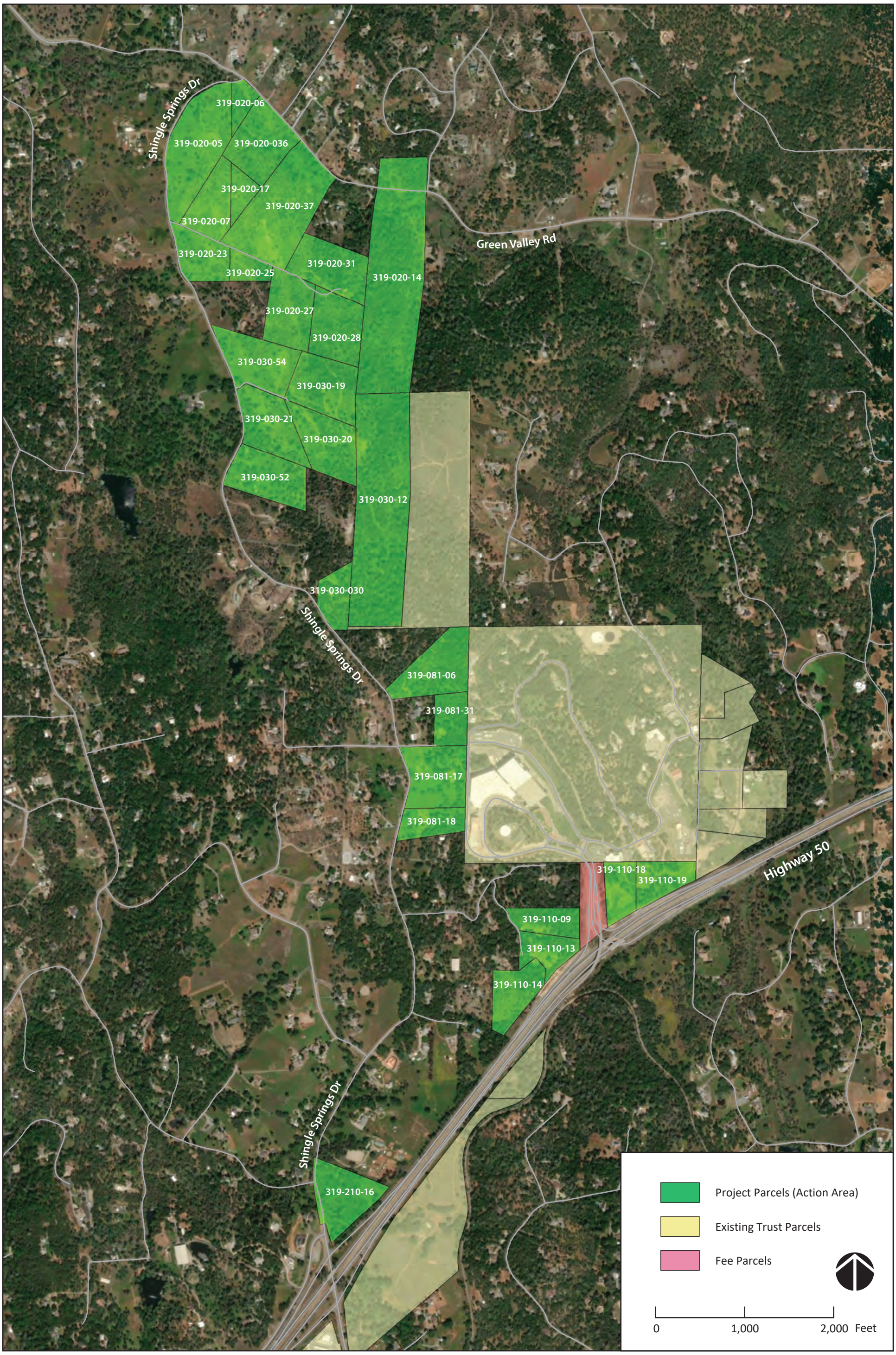
An overview of the proposed land uses is shown in **Figure 3.** The proposed land uses are described below.



Source: USGS, The National Map

FIGURE 1

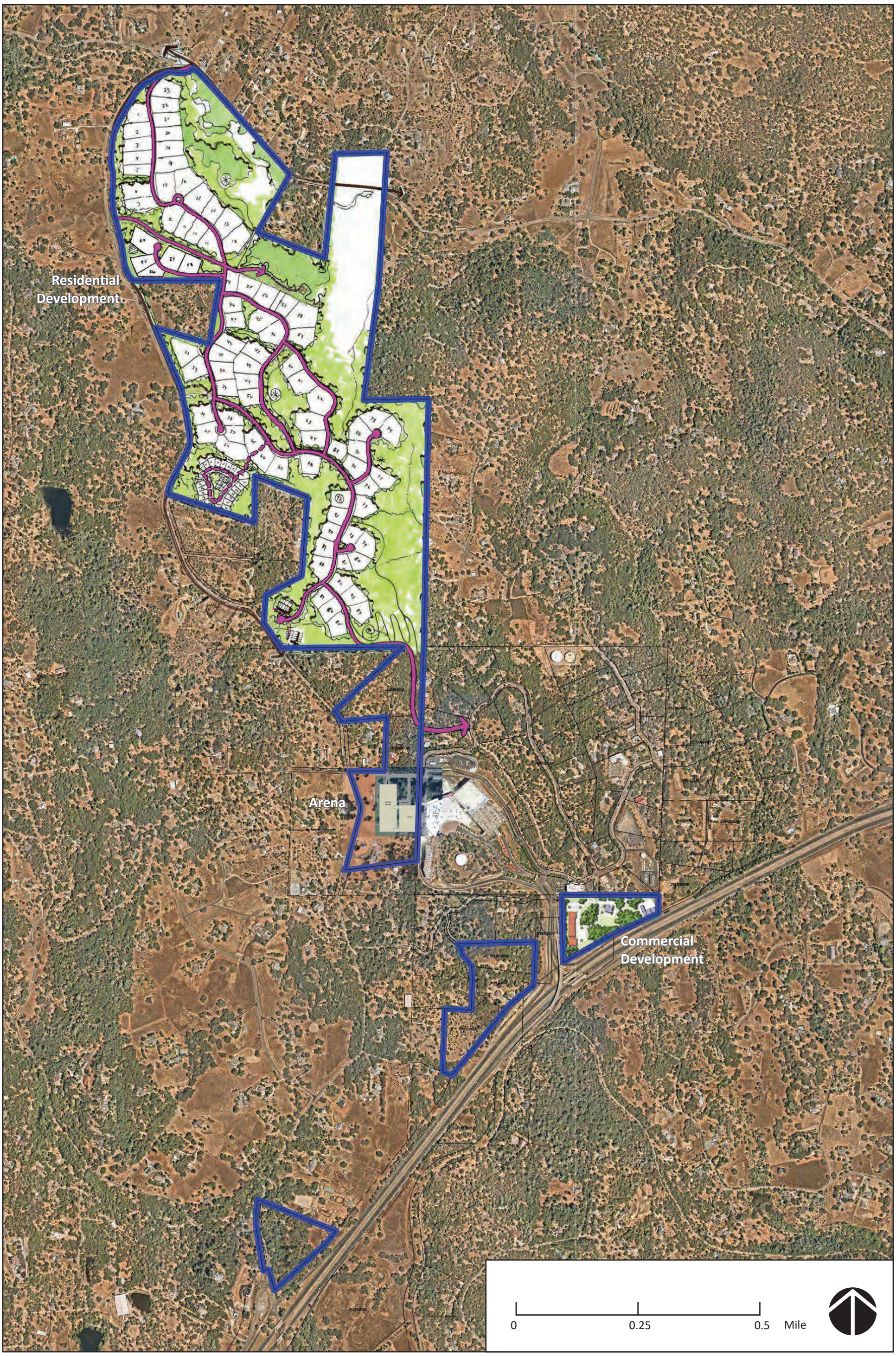
REGIONAL LOCATION



Source: Acorn Environmental

FIGURE 2

PROJECT PARCELS



Source: Kimley-Horn

FIGURE 3

PROPOSED SITE PLAN

Arena and Parking Garage

An arena would be developed west of the existing casino (**Figure 4A**). The arena would be an entirely enclosed venue providing up to approximately 5,000 seats for sporting events and concerts. The approximately 80,000 square foot arena would connect to the casino by an enclosed pedestrian bridge spanning Koto Road. The arena building would have a height of 100 feet above grade. The top of the arena building would be approximately five feet below the top of the existing casino.

The exterior of the arena would be similar to the existing casino building. The exterior walls would be clad with earth tone architectural panels that have horizontal ridges which cast shadows and reduce reflectivity. Exterior lighting would be limited to shielded security lighting consistent with lighting currently provided on the casino.

A parking garage would be developed west of the arena to provide approximately 1,280 parking spaces for events. The parking garage would be constructed of steel reinforced concrete and finished with a natural concrete surface, similar to the existing parking garage east of the casino. Security lighting would provided within the interior of the parking garage (including the top floor), within the stairwells, and on the exterior walls above walkways. All lighting would be shielded to reduce illumination of the surrounding areas. The parking garage would have six levels and a height of approximately 70 feet. The top of the parking garage would be approximately 55 feet below the top of the existing casino and 50 feet below the top of the proposed arena.

The parking garage would be accessed by a new roadway extending from Koto Road. There would be an extension of the roadway to Shingle Springs Drive that would be limited to emergency access only. All patron and service traffic would enter and exit the site via Koto Road and Red Hawk Parkway.

The existing home located near the proposed arena site would be removed. Existing trees and vegetation would be retained to the extent feasible and additional screening trees and vegetation would be planted around the arena and parking garage.

Residential Development

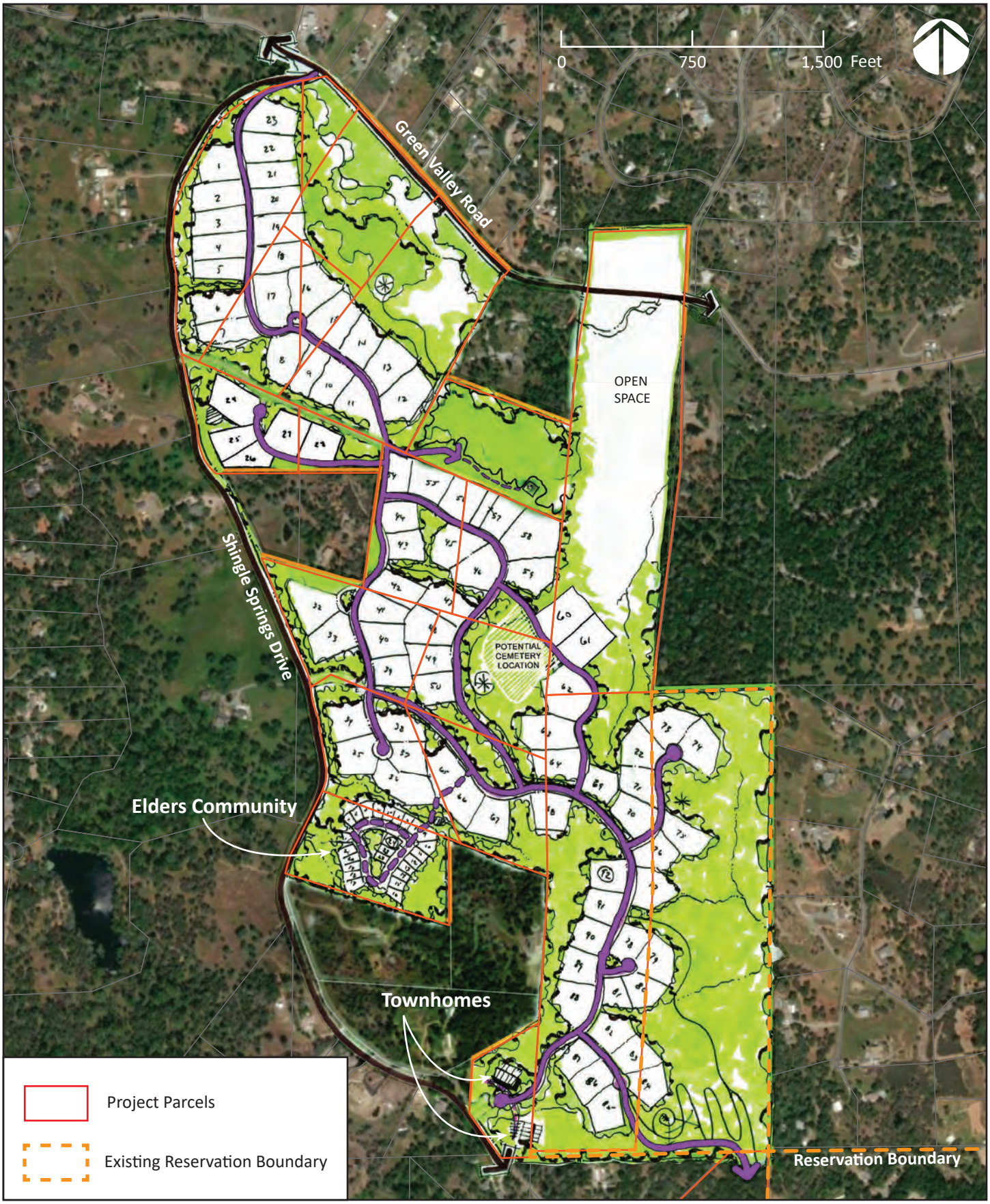
The Tribe has developed preliminary plans for the residential development (**Figure 4B**). Once accepted into trust, the Tribe would complete the final designs of the housing development, including water and wastewater services, access road improvements, and other related infrastructure development in a manner consistent with all applicable laws, agreements, and environmental requirements. Construction of the homes would occur in phases as funds become available. For the purposes of the environmental analysis, it is assumed that up to 15 homes would be developed each year, with 132 homes developed in total. The phasing of residential development would be subject to the extension of supporting water and wastewater services and utilities.

The homes would include 16 townhomes in a clustered development, with four homes per building. The buildings would be surrounded by community gathering space with large backyards. An elders community would be provided with approximately 24 smaller homes and yards for easy maintenance. A community gathering space and elder center would be provided within the clustered development. The remaining 92 homes would be rural residential single-family homes on lots of approximately one acre. Large areas of open space would be provided to avoid areas of steep slopes and to provide recreation opportunities and resource protection.

Source: Kimley-Horn

FIGURE 4A

SITE PLAN DETAIL - ARENA



Source: Kimley-Horn

FIGURE 4B

SITE PLAN DETAIL - RESIDENTIAL DEVELOPMENT PLAN

The homes would be accessed by new and existing roads. Primary access would be through the existing Rancheria and on Green Valley Road. Access to Shingle Springs Drive would be limited to emergency access only. All proposed roadways would be developed consistent with El Dorado County standards with a minimum 18-foot-width.

Utilities would be provided from existing services and extended along the new and existing roads, with utilities installed within or alongside the roadbed.

Commercial Development

Approximately 30,000 square foot of commercial space is proposed south of the existing Shingle Springs Health and Wellness Center (**Figure 4C**). The commercial space would provide space for typical neighborhood-serving retail and commercial businesses. This development would serve the Rancheria and the surrounding community. Access would be provided from Honpie Road by the existing health clinic. Surface parking lots would provide parking on the ground floor of the development and adjacent areas. The development would be limited to two stories with a maximum building height of approximately 45 feet. Existing trees and vegetation would be retained to the extent feasible and additional screening trees and vegetation would be planted around the buildings.

Multipurpose Emergency Shelter

A 5,300 square foot emergency shelter building is proposed east of the proposed commercial development and south of the existing fire station (**Figure 4C**). The building would provide a multipurpose emergency shelter building for the Tribe. Dedicated parking would be provided with access roads extending from the existing health clinic and directly to Honpie Road.

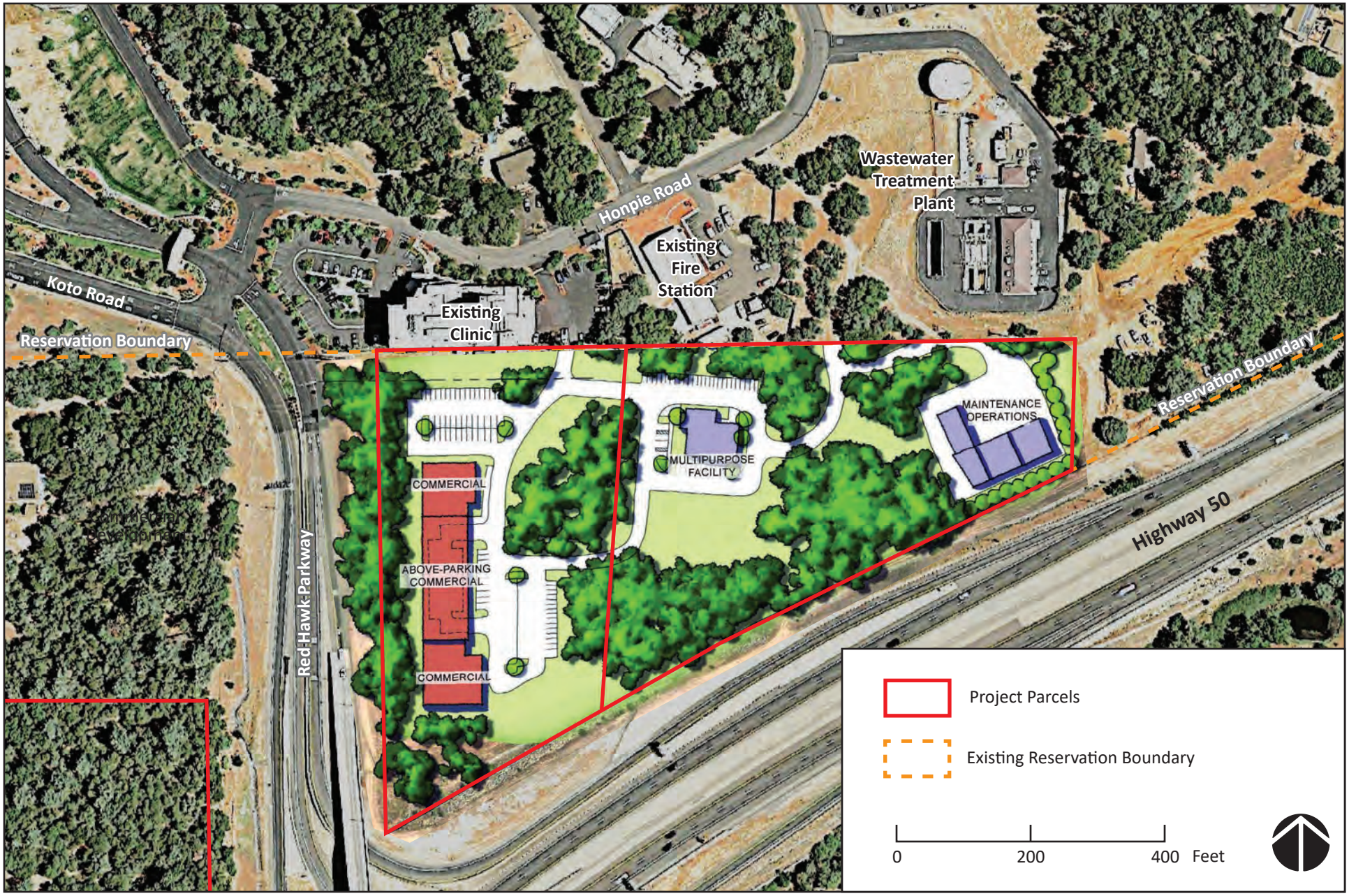
Maintenance Operations Buildings

A maintenance operations area would be provided south of the existing wastewater treatment plant (**Figure 4C**). This area would provide for the relocation of existing maintenance operations located elsewhere on the Rancheria. This area would provide for the relocation of two approximately 3,000 square foot buildings. Access would be provided from Honpie Road.

1.2.2 Water Supply and Wastewater Treatment and Disposal

The existing Rancheria obtains its water supply from the El Dorado Irrigation District (EID). Thirteen of the project parcels are located within the EID service area. The remaining 16 parcels are adjacent to, but not located within EID's existing service area. Existing groundwater wells could be used, and additional wells could be developed to serve individual or multiple homes.

Wastewater treatment and disposal for the proposed arena, commercial development, multipurpose emergency shelter and maintenance buildings would be provided by connection to the existing wastewater treatment and disposal system on the Rancheria. Wastewater treatment and disposal for the proposed homes would be provided by individual septic systems or connection to the existing wastewater treatment and disposal system on the Rancheria.



Source: Kimley-Horn

FIGURE 4C

SITE PLAN DETAIL - SOUTHERN DEVELOPMENT PLAN

1.2.3 Grading and Drainage

Site preparation would include establishing access roads, driveways, building pads, septic fields (optional) and installing utilities. All areas disturbed during construction would be revegetated and all cut slopes would have a slope ratio of 1.5 to 1 (horizontal to vertical) or flatter, and fill slopes would have a slope ratio of 2 to 1 or flatter. These standards would ensure that slopes are stable and would be revegetated, thereby minimizing long-term erosion potential.

Surface runoff from the proposed access roads, and driveways would be directed through biofiltration swales (bioswales) to offset the added impervious area. The bioswales, planted with native grasses, would treat 100% of the runoff. The bioswales would tie into existing drainages and wetland swales to minimize erosion potential and to help maintain the current hydrology of the site. In addition, separate stormwater retention basins would be provided to manage runoff from the arena and parking garage and from the commercial development. The basins would be sized to retain and percolate stormwater on site to avoid any increase in site runoff.

1.3 LISTED SPECIES AND CRITICAL HABITAT

1.3.1 Critical Habitat

There are no critical habitats within, or adjacent to, the Action Area. The nearest critical habitats are for California red-legged frog (Rana draytonii), 17 miles to the east in Weber Creek, and for vernal pool species (Sacramento Orcutt grass, vernal pool fairy shrimp, vernal pool tadpole), 24 miles to the south of the Action Area.

1.3.2 USFWS Species List

A USFWS species list was generated online using the USFWS' IPaC Trust Resource Report System on April 17, 2024 (see **Attachment A**). The following protected resources were identified:

- Reptiles and Amphibians
  - Northwestern pond turtle (*Actinemys marmorata*) proposed threatened
  - California red-legged frog (*Rana draytonii*) threatened
  - Foothill yellow-legged frog (South Sierra Distinct Population Segment; *Rana boylii*) endangered
- Insects
  - Monarch butterfly (*Danaus plexippus*) candidate
- Plants
  - El Dorado Bedstraw (*Galium californicum sierrae*) endangered
  - Layne's Butterweed (*Senecio layeae*) threatened
  - Pine Hill Ceanothus (*Ceanothus roderickii*) endangered
  - Pine Hill Flannelbush (*Fremontodendron californicum decumbens*) endangered
  - Stebbins' Morning-glory (*Calystegia stebbinsii*) endangered

Migratory birds should also be considered. Under the Migratory Bird Treaty Act of 1918 (16 USC §703-711), migratory bird species and their nests and eggs that are on the federal list (50 CFR §10.13) are protected from injury or death, and project-related disturbances must be reduced or eliminated during the nesting cycle.

1.3.3 Historical Occurrences of Listed Species

The CNDDB was queried and any reported occurrences of federally-listed species or special-status species were plotted in relation to the Action Area boundary using GIS software (see **Figure 5**). The CNDDB reported no federally-listed species within the Action Area or directly adjacent to the Action Area. The CNDDB reported 2 special-status species occurrences in the general vicinity the Action Area:

- Jepson's onion (*Allium jepsonii*). The location record is: "S OF GREEN VALLEY RD, 1.1 ROAD MI FROM JUNCTION WITH N SHINGLE (SPRINGS) RD, 1.8 AIR MI NE OF RESCUE. ON ROCK OUTCROPS IN SERPENTINE FOOTHILL PINE CHAPARRAL WOODLAND. 2,107 PLANTS ESTIMATED IN 2007."
- foothill yellow-legged frog (*Rana boylii*). The location record is: "7 MILES WEST AND 1 MILE SOUTH OF PLACERVILLE. 9 COLLECTED ON 14 NOV 1938. ACCORDING TO JENNINGS, RANA BOYLII IS EXTIRPATED FROM THIS VICINITY."

Within a 9-quadrangle buffer of the Action Area, the CNDDB reported the following federally-listed species occurrences in the vicinity of the Action Area, which are also documented in the Exhibits: vernal pool fairy shrimp (*Branchinecta lynchi*); Stebbins' morning-glory (*Calystegia stebbinsii*); Pine Hill ceanothus (*Ceanothus roderickii*); valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*); Pine Hill flannelbush (*Fremontodendron decumbens*); El Dorado bedstraw (*Galium californicum ssp. sierrae*); steelhead - Central Valley DPS (*Oncorhynchus mykiss irideus* pop. 11); Layne's ragwort (*Packera layneae*); California red-legged frog (*Rana draytonii*); and giant gartersnake (*Thamnophis gigas*).

1.4 CONSULTATION TO DATE

In April 2024, a species list was creating by generating an Information for Planning and Conservation (IPaC) report online (at https://ecos.fws.gov/ipac/). This biological assessment may be submitted to the U.S. Bureau of Indian Affairs, who would consult with USFWS before transfer of the subject parcels to federal trust.

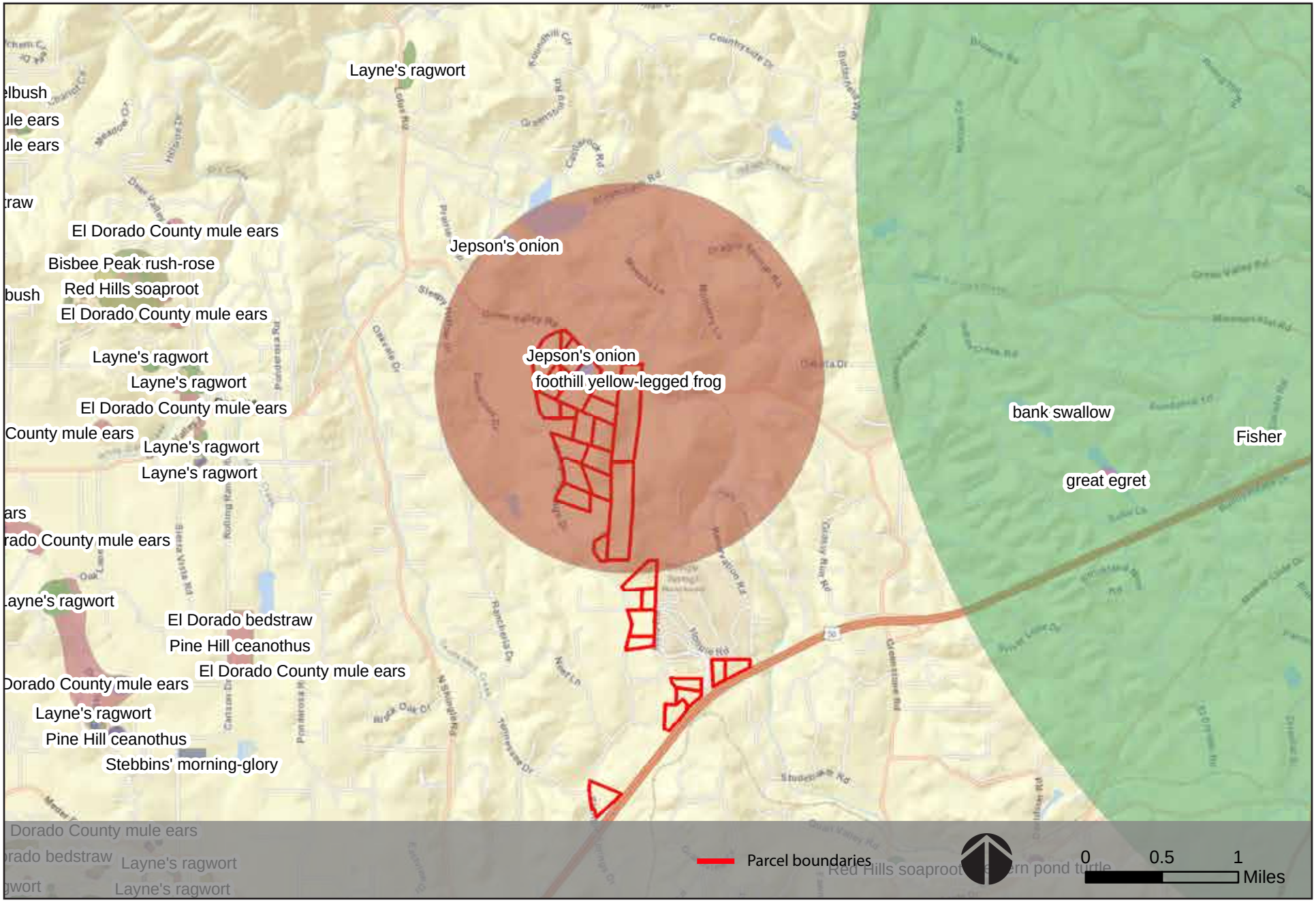


FIGURE 5

CNDDB RECORDS

Section 2 | Methods

2.1 PRELIMINARY DATA GATHERING AND RESEARCH

Prior to conducting the field survey, the following information sources were reviewed:

- Any readily-available previous biological resource studies pertaining to the Action Area or vicinity
- United States Geologic Service (USGS) 7.5 degree-minute topographic quadrangles of the Action Area and vicinity
- Aerial photography of the Action Area
- California Natural Diversity Database (CNDDB), electronically updated monthly by subscription to CDFW
- USFWS species list (IPaC Trust Resources Report)

2.2 FIELD SURVEYS

Consulting biologists G. O. Graening, Ph.D., and Tim Nosal, M.S. conducted biological field assessments on November 9, 13, and 20, 2018. Later, Dr. Graening and Derrek Murray (Environmental Department, Shingle Springs Band of Miwok Indians) conducted biological field assessments on June 21 and 24, 2022. Dr. Graening conducted another biological field assessment on March 21, 2024.

Variable-intensity pedestrian surveys were performed, modified to account for differences in terrain, vegetation density, and visibility. All visible fauna and flora observed were recorded in a field notebook, and identified to the lowest possible taxon. Survey efforts emphasized the search for any special-status species that had documented occurrences in the CNDDB within the vicinity of the Action Area. Habitat types occurring in the Action Area were mapped on aerial photographs, and information on habitat conditions and the suitability of the habitats to support listed species was also recorded. The Action Area was also formally assessed for the presence of potentially-jurisdictional water features, including riparian zones, isolated wetlands and vernal pools, and other biologically-sensitive aquatic habitats.

2.3 MAPPING AND OTHER ANALYSES

Locations of species' occurrences and habitat boundaries within the Action Area were recorded on color aerial photographs, and then digitized to produce the final habitat maps. The boundaries of potentially jurisdictional water resources within the Action Area were identified and measured in the field, and similarly digitized to calculate acreage and to produce informal delineation maps. Geographic analyses were performed using geographical information system software (ArcGIS 10, ESRI, Inc.). Vegetation communities (assemblages of plant species growing in an area of similar biological and environmental factors), were classified by Vegetation Series (distinctive associations of plants, described by dominant species and particular environmental setting) using the CNPS Vegetation Classification system (Sawyer and Keeler-Wolf, 1995). Wetlands and other aquatic habitats were classified using USFWS National Wetlands Inventory Classification System for Wetland and Deepwater Habitats, or "Cowardin class" (Cowardin et al., 1979; USFWS 2007). Informal wetland delineation methods consisted of an abbreviated, visual assessment of the three requisite wetland parameters (hydrophytic vegetation, hydric soils,

hydrologic regime) defined in the US Army Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory, 1987). Wildlife habitats were classified according to the Oregon Natural Area's Program (2015); Kagen (2004); OSU and INR (2018). Species' habitat requirements and life histories were identified using the following sources: ODFW (2018); Baldwin (2012); CDFG (2018); and University of California at Berkeley (2018a,b).

Section 3 | Results of Field Surveys

3.1 ENVIRONMENTAL SETTING

The Action Area is located within the cis-montane Sierra Nevada mountains geographic subregion, which is contained within the Sierra Nevada Mountains geographic subdivision of the larger California Floristic Province (Baldwin et al. 2012). This region has a Mediterranean-type climate, characterized by distinct seasons of hot, dry summers and wet, moderately-cold winters. The Action Area and vicinity is in Climate Zone 7 - California's Gray Pine Belt, defined by hot summers and mild but pronounced winters without severe winter cold or high humidity (Sunset, 2021). The topography is a series of rolling foothills and valleys of the west flank of the Sierra Nevada mountains (**Figure 6**). The elevation ranges from approximately 1,100 feet to 1,600 feet above mean sea level. The general direction of surface runoff in the vicinity of the Action Area is to the northwest towards the South Fork American River (see Exhibits). Locally, drainage flows to Tennessee Creek, Slate Creek, or Dry Creek, depending upon the parcel. Land uses consist primarily of rural residences with private access roads and driveways, homes, and associated outbuildings. Other land uses are commercial (including the Tribe's casino, fuel station, and health center), animal husbandry, pasture, private, federal, and county roadways, and open space.

According to the California Geologic Survey, the surficial geology is of 2 types:

- Unit "um," which is "Ultramafic rocks, mostly serpentine. Minor peridotite, gabbro, and diabase. Chiefly Mesozoic unit 2."
- Unit "m," which is "Undivided pre-Cenozoic metasedimentary and metavolcanic rocks of great variety. Mostly slate, quartzite, hornfels, chert, phyllite, mylonite, schist, gneiss, and minor marble."

Digital soil survey maps from NRCS' SSURGO 2.2 Database were consulted for this study (NRCS 2018), and mapped soil units occurring within the Action Area are as follows: Placer diggings (Prd); Auburn very rocky silt loam (AxD); AxE: Auburn very rocky silt loam; Auburn silt loam (AwD); Sobrante silt loam (SuC); Argonaut gravelly loam (AkC); Serpentine rock land (SaF); and Diamond Springs very fine sandy loam (DfD) (**Figure 7**).

3.2 INVENTORY OF FLORA AND FAUNA FROM FIELD SURVEY

3.2.1 Flora and Fauna Observed During Field Survey

All plants detected during the numerous field surveys of the Action Area are listed in **Attachment B**. All animals sighted during the numerous field surveys of the Action Area are as follows:

> water strider (*Gerris* sp.); darkling beetle (Tenebrionidae); bumblebee (*Bombus* sp.); cricket (Gryllidae); harvester ant (Myrmicinae); Pacific chorus frog (*Pseudacris regilla*); western fence lizard (*Sceloporus occidentalis*); coyote (*Canis latrans*); Northern Pacific rattlesnake (*Crotalus*

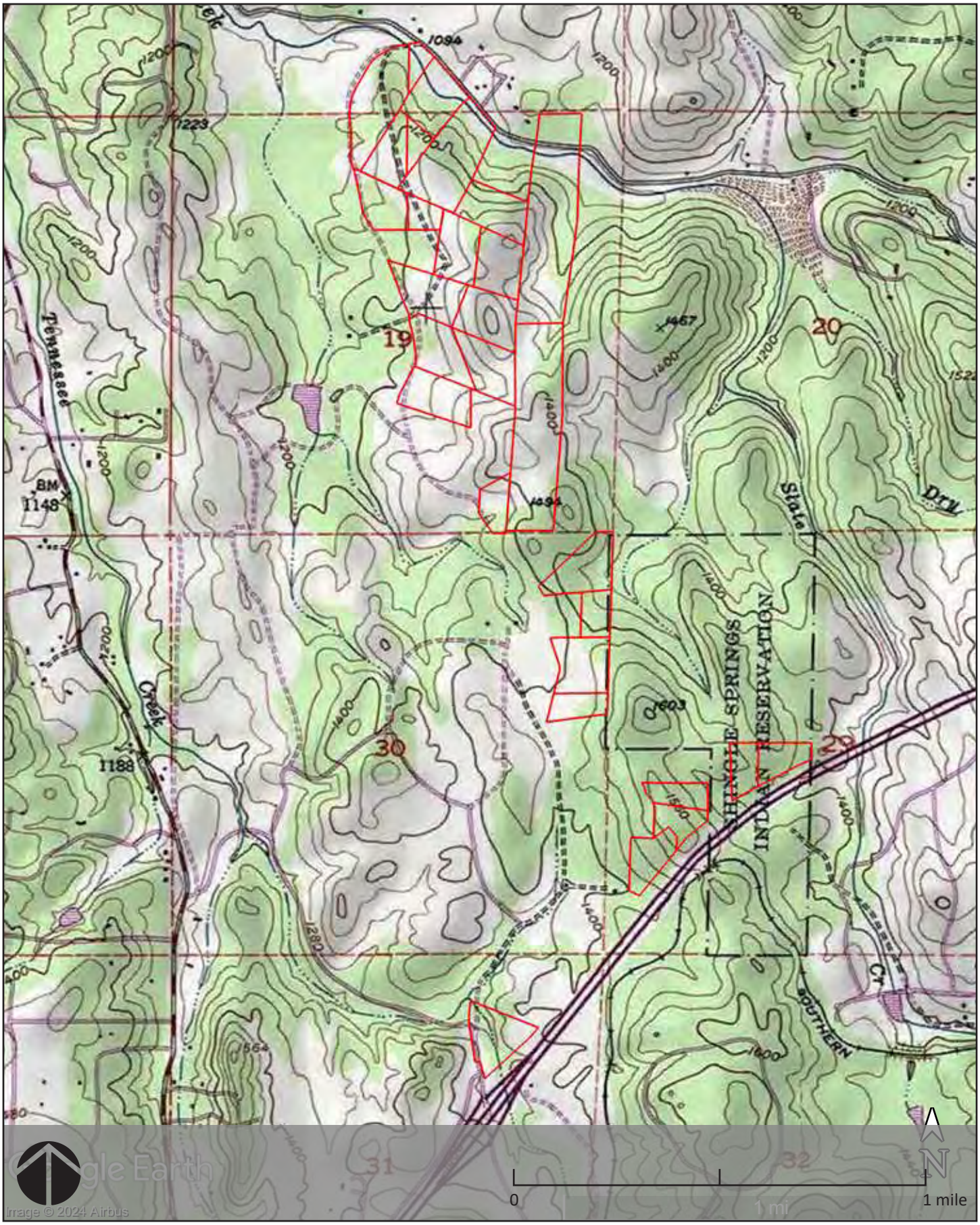


FIGURE 6

REGIONAL TOPOGRAPHY

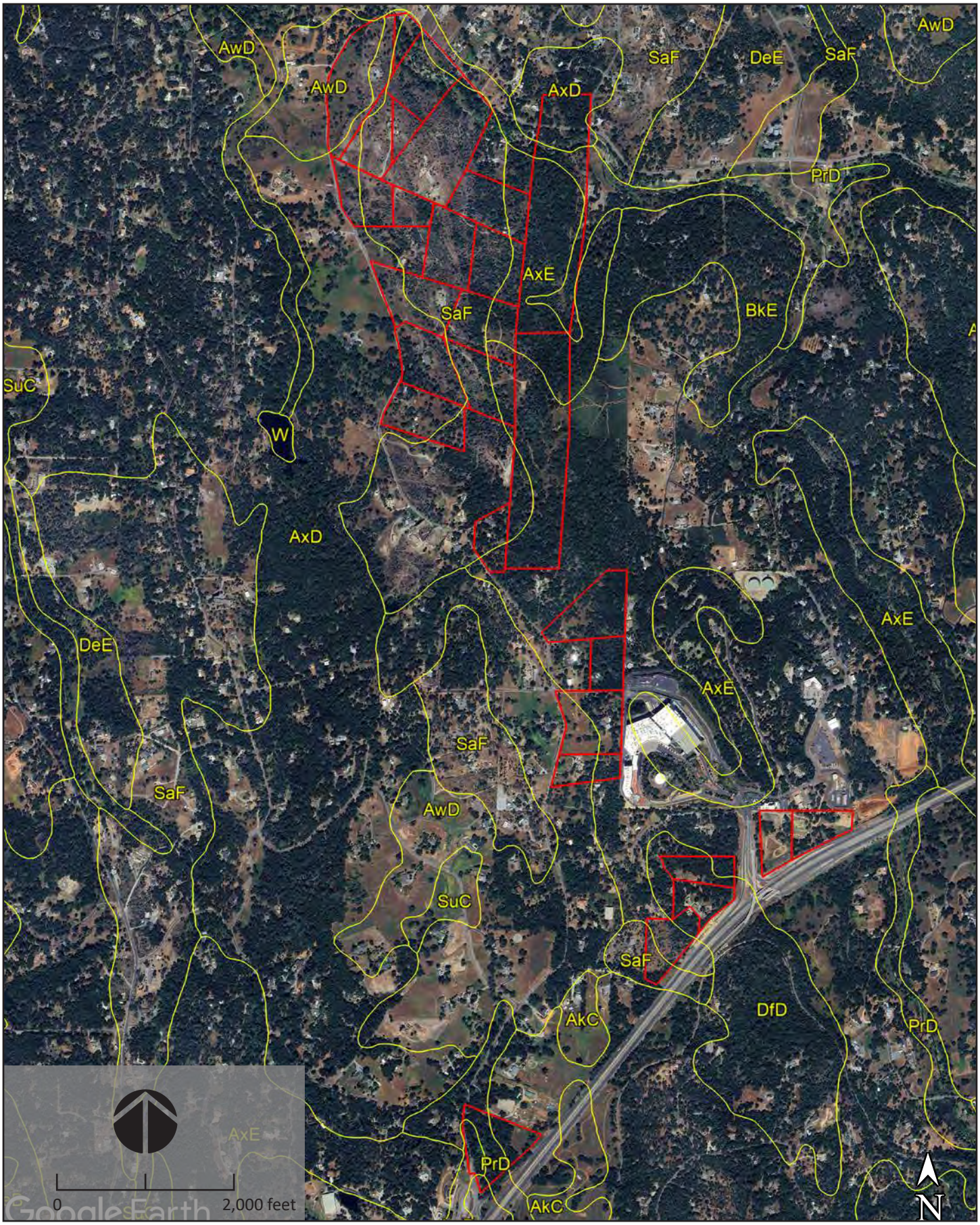


FIGURE 7

SOIL TYPES

oreganus oreganus); black-tailed jackrabbit (*Lepus californicus*); desert cottontail (*Sylvilagus audubonii*); striped skunk (*Mephitis mephitis*); bobcat (*Lynx rufus*); Botta's pocket gopher (*Thomomys bottae*); broad-footed mole (*Scapanus latimanus*); Columbian black-tailed deer (*Odocoileus hemionus columbianus*); dusky-footed wood rat (*Neotoma fuscipes*); gray fox (*Urocyon cinereoargenteus*); tree rat (*Rattus rattus*); vole (*Microtus* sp.); American robin (*Turdus migratorius*); California quail (*Callipepla californica*); California scrub jay (*Aphelocoma californica*); California towhee (*Melozone crissalis*); California towhee (*Melozone crissalis*); northern flicker (*Colaptes auratus*); oak titmouse (*Baeolophus inornatus*); song sparrow (*Melospiza melodia*); spotted towhee (*Pipilo maculatus*); turkey vulture (*Cathartes aura*); acorn woodpecker (*Melanerpes formicivorus*); Nuttall's woodpecker (*Dryobates nuttallii*); American crow (*Corvus brachyrhynchos*); vesper sparrow (*Pooecetes gramineus*); American goldfinch (*Spinus tristis*); Anna's hummingbird (*Calypte anna*); bushtit (*Psaltriparus minimus*); Eurasian collared dove (*Streptopelia decaocto*); great blue heron (*Ardea herodias*); Hutton's vireo (*Vireo huttoni*); mourning dove (*Zenaida macroura*); red shouldered hawk (*Buteo lineatus*); red-tailed hawk (Buteo jamaicensis); red-breasted nuthatch (*Sitta canadensis*); sharp-shinned hawk (*Accipiter striatus*); wood duck (*Aix sponas*); wild turkey (*Meleagris gallopavo*); lark sparrow (*Chondestes grammacus*); wrentit (*Chamaea fasciata*); Canada goose (*Branta canadensis*); European starling (*Sturnus vulgaris*); downy woodpecker (*Picoides pubescens*); house finch (*Haemorhous mexicanus*); red-winged blackbird (*Agelaius phoeniceus*); house sparrow (*Passer domesticus*).

3.2.2 Listed Species Observed During Field Survey

During the field surveys conducted in 2018 through 2024, no federally-listed species were observed within the Action Area. No State-listed species were detected during the field surveys of the Action Area either. During the 2018 surveys, one special-status plant species was detected within the Action Area: Red Hills soaproot (*Chlorogalum grandiflorum*) on APN 319-020-005 at (latitude 38.71504, longitude -120.91918 decimal degrees). California Native Plant Society (CNPS) designates this species as 1B.2, which is "CNPS designated rare or endangered plants in California and elsewhere."

3.3 TERRESTRIAL VEGETATION COMMUNITIES AND WILDLIFE HABITAT TYPES

General vegetation communities occurring within the Action Area were mapped (see **Figure 8** through **16** and see **Attachment C** for site photos). The following terrestrial natural communities occur in the Action Area (as categorized by CDFW 2019):

- 11300 Disturbed Habitat
- 12000 Urban/Developed
- 37.000.00 Chaparral
    - 37.400.00 Chaparral with Oak [*Quercus* spp.] as principal indicator
- 42.000.00 Non-native Grassland
    - 42.020.03 Elymus caput-medusae
    - 42.027.00 Wild Oats and Annual Brome Grasslands
- 45.000.00 Meadow and seeps not dominated by grasses
    - 45.110.00 Carex marsh, meadow
    - 45.200.00 Eleocharis marsh, meadow
- 60.000.00 Riparian and bottomland habitat

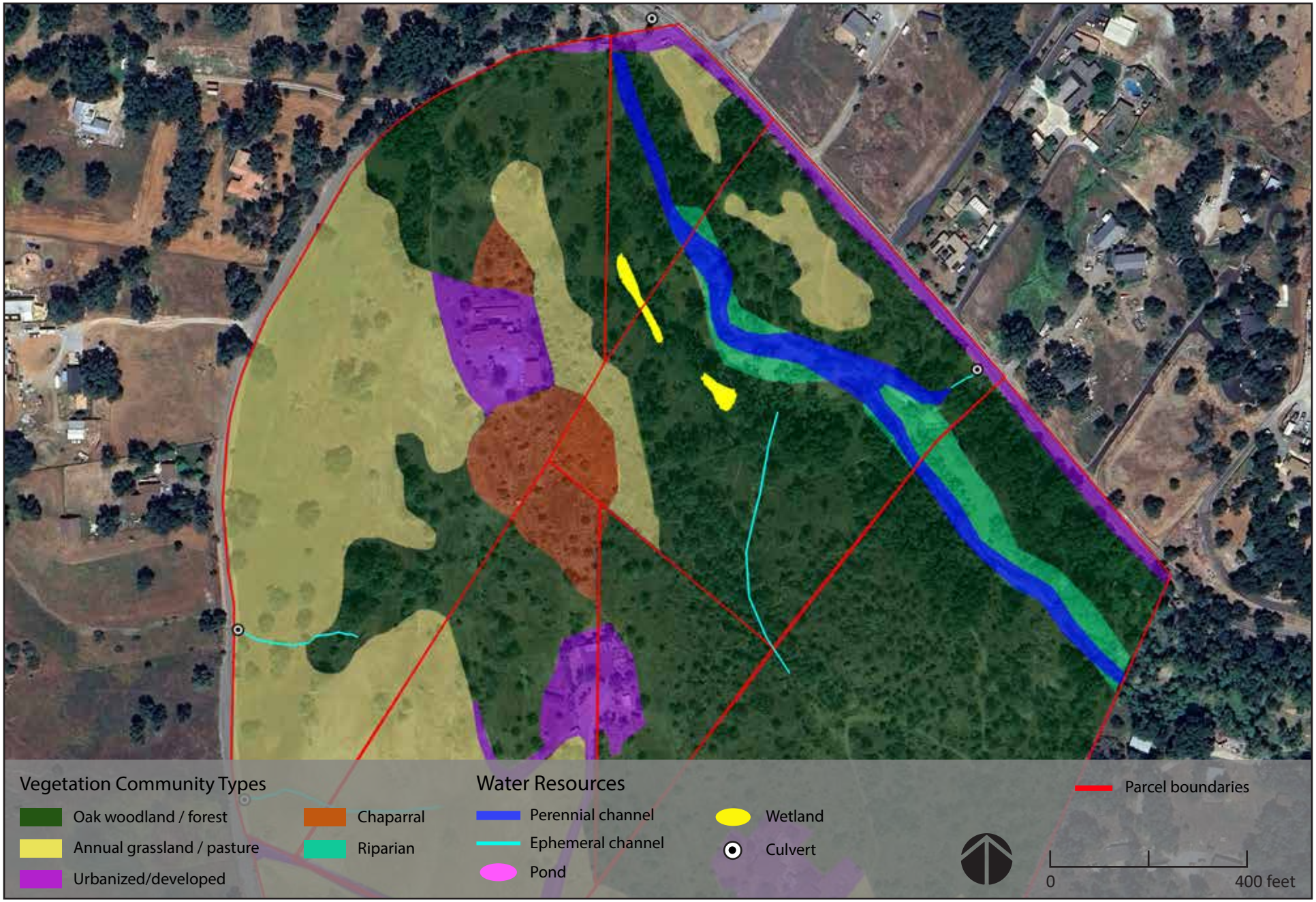


FIGURE 8

VEGETATION COMMUNITIES AND WATER RESOURCES

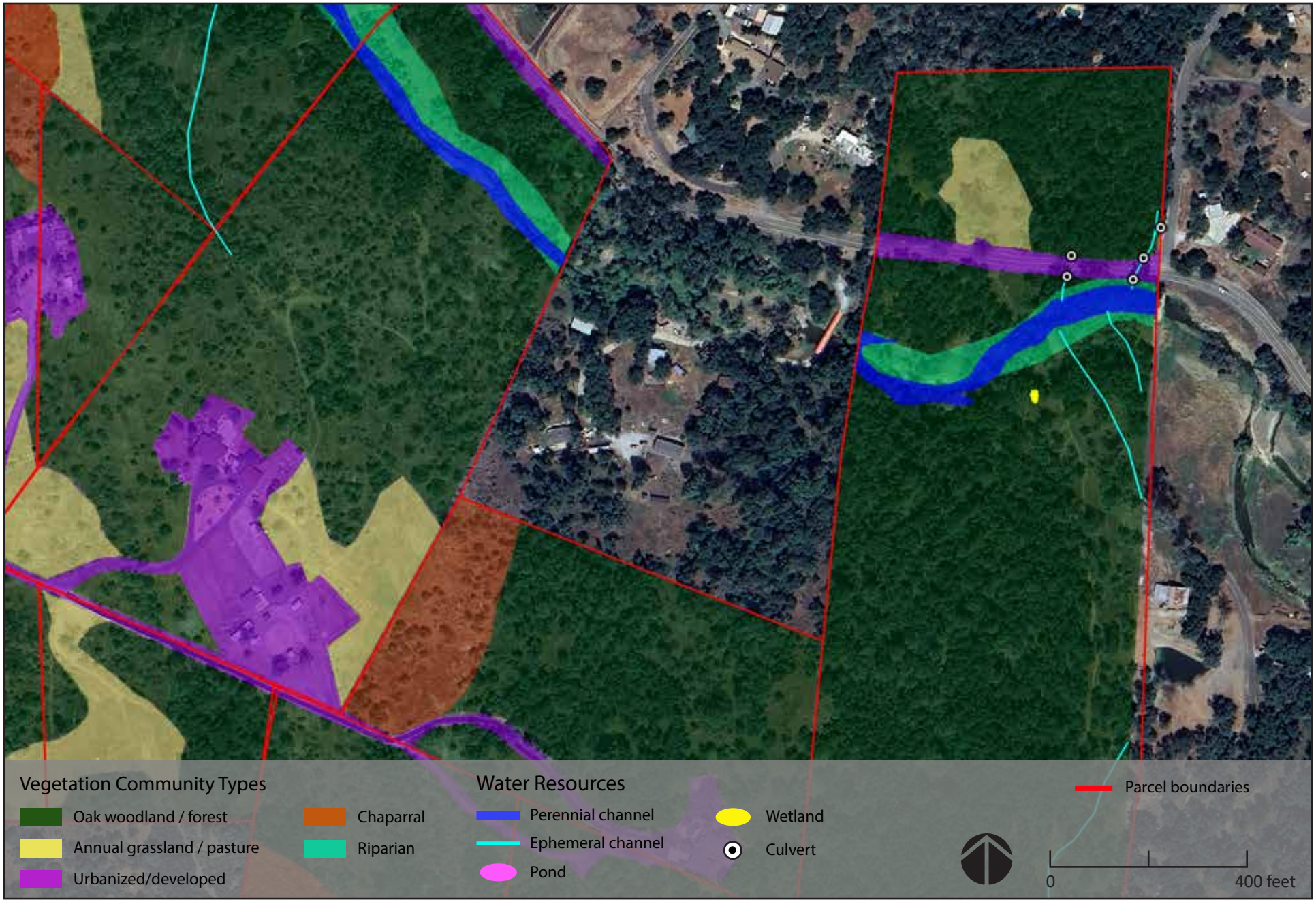


FIGURE 9

VEGETATION COMMUNITIES AND WATER RESOURCES

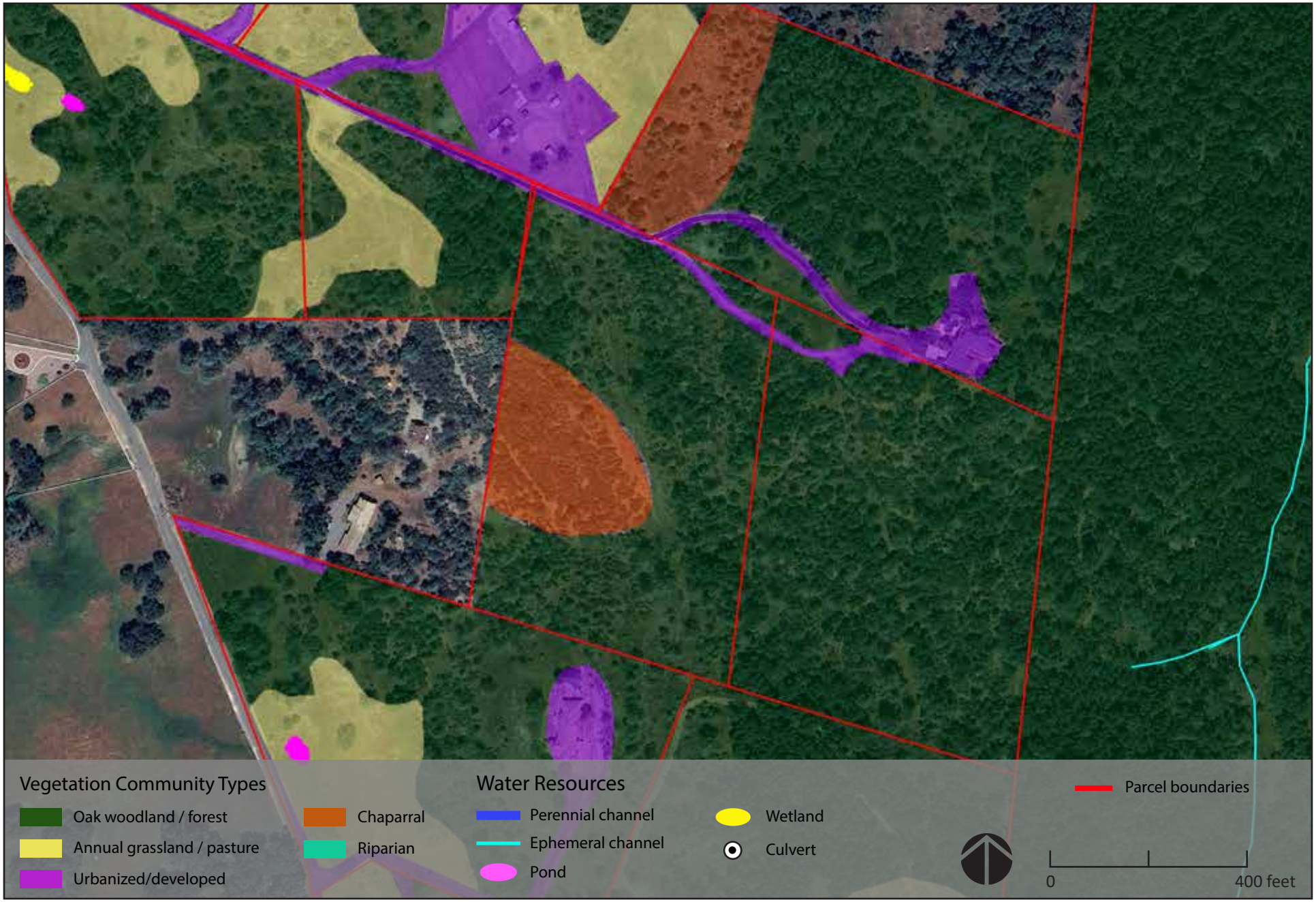


FIGURE 10

VEGETATION COMMUNITIES AND WATER RESOURCES

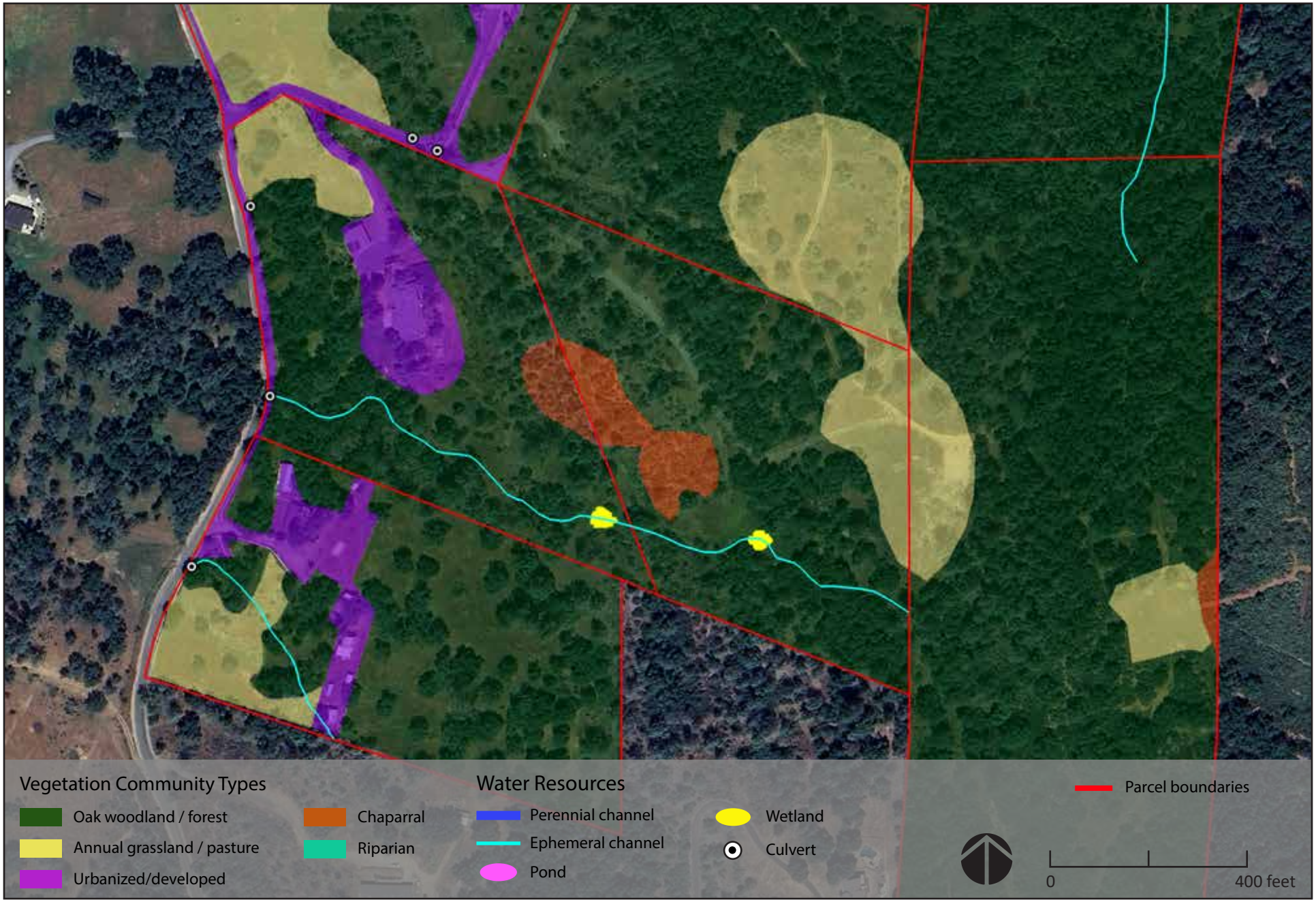


FIGURE 11

VEGETATION COMMUNITIES AND WATER RESOURCES

FIGURE 12

VEGETATION COMMUNITIES AND WATER RESOURCES

FIGURE 13

VEGETATION COMMUNITIES AND WATER RESOURCES

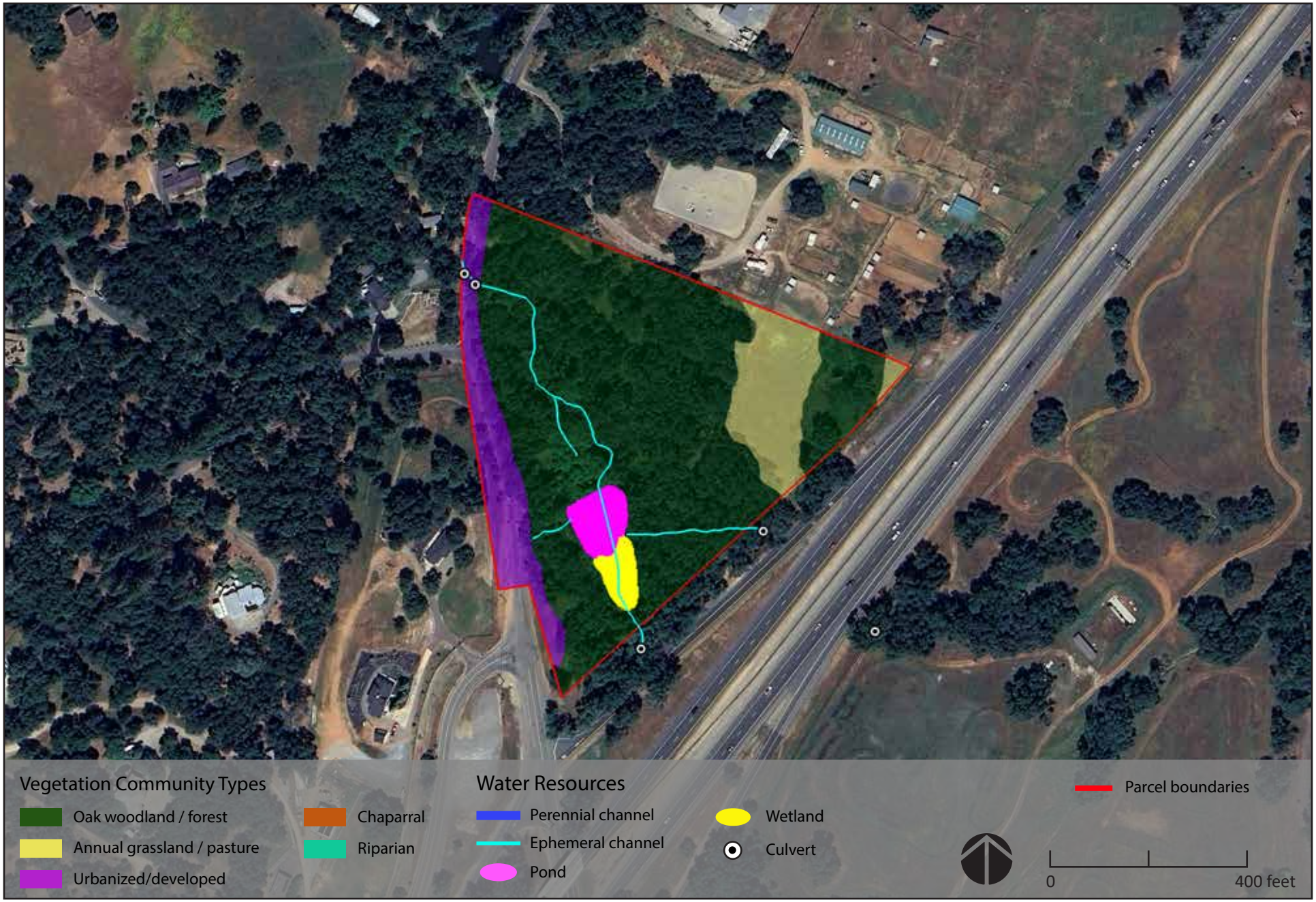


FIGURE 14

VEGETATION COMMUNITIES AND WATER RESOURCES

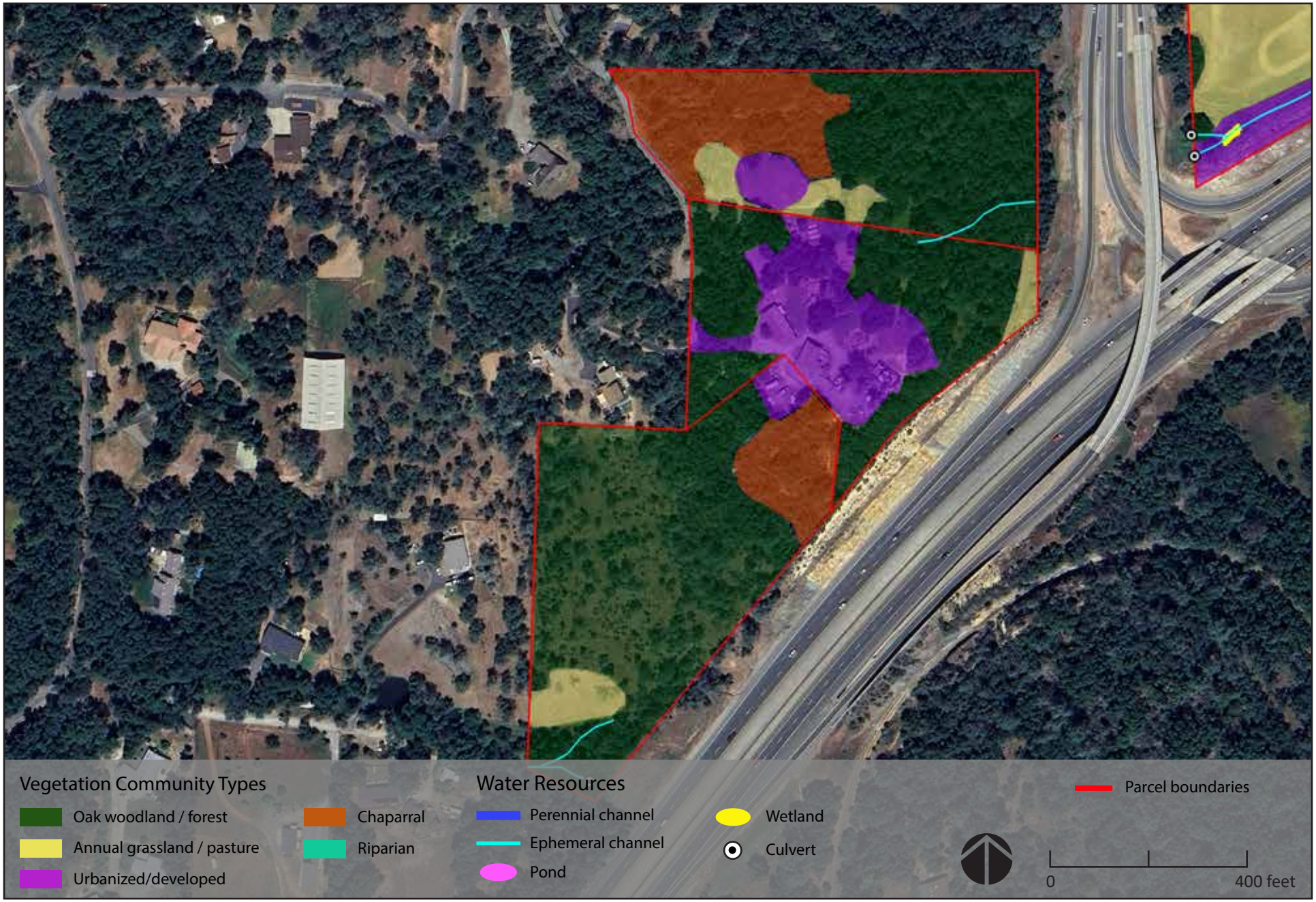


FIGURE 15

VEGETATION COMMUNITIES AND WATER RESOURCES

FIGURE 16

VEGETATION COMMUNITIES AND WATER RESOURCES

- 71.000.00 Oak Woodlands and Forests
    - 71.020.00 Blue oak woodland and forest
    - 71.040.00 Valley oak woodland and forest
    - 71.080.00 Interior live oak woodland and forest

Wildlife habitat types were classified using CDFW's Wildlife Habitat Relationship System. The Action Area contains the following wildlife habitat types: Montane Riparian; Mixed Chaparral; Valley Foothill Riparian; Blue Oak Woodland; Valley Oak Woodland; Annual Grassland; Fresh Emergent Wetland; Riverine; Pasture; Urban; and Barren.

3.4 POTENTIALLY JURISDICTIONAL WATERS / AQUATIC HABITATS

The USFWS National Wetland Inventory (NWI) digital maps were also consulted (Internet database at http://www.fws.gov/wetlands/). Two NWI features were mapped within the Action Area: Tennessee Creek and Dry Creek and associated riverine wetlands.

A preliminary delineation of jurisdictional water bodies was conducted during the field surveys. Based upon USACE criteria, the following features within the Action Area were determined to be potentially subject to USACE jurisdiction (see **Figure 8** through **16**):

- a perennial channel (Dry Creek), varying from 10 to 40 feet in width
- an intermittent channel (Tennessee Creek), varying from 2 to 12 feet in width
- various unnamed ephemeral channels (tributary to Dry Creek or to Tennessee Creek), 1 to 5 feet in width
- various riverine wetlands (freshwater marshes) associated with the channels
- two stock ponds.

No vernal pools were detected within the Action Area.

The Action Area has one minor fishery resource—Dry Creek. However, listed fish species, and migrating fish in general, cannot access Dry Creek because of downstream impoundments (Folsom Dam, Nimbus Dam, etc.).

Section 4 | Federally-Listed Species Assessment

4.1 REPTILES AND AMPHIBIANS

4.1.1 Northwestern pond turtle

Northwestern pond turtle is a species that is proposed for listing under the ESA. It is known to occur in a wide variety of wetland habitats including rivers and streams, lakes, ponds, reservoirs, permanent and ephemeral shallow wetlands, stock ponds, and sewage treatment lagoons (USFWS, 2024). Optimal habitat seems to be characterized by the presence of adequate emergent basking sites, emergent vegetation, and the presence of suitable refugia in the form of undercut banks, submerged vegetation, mud, rocks and logs (USFWS, 2024).

The nearest documented population of northwestern pond turtle is over 17 miles to the east in Weber Creek, according to the CNDDB. Dry Creek, Slate Creek, and Tennessee Creek provide suitable habitat for northwestern pond turtle. The riparian habitat adjacent to Dry Creek and the two ponds within the Action Area may also provide potential habitat. The ephemeral channels within the Action Area do not provide suitable habitat. Northwestern pond turtles have not been detected in the Action Area during any wildlife surveys conducted in 2018, 2022, and 2024.

4.1.2 California red-legged frog

The California red-legged frog is a federally-listed threatened species. The historical range of the California red-legged frog extended from the vicinity of Point Reyes National Seashore in Marin County southward to northwestern Baja California, Mexico and inland to approximately Redding in Shasta County. The frog has sustained a 70 percent reduction in its geographic range (USFWS, 2024). CRLF have been observed in a number of aquatic and terrestrial habitats, including marshes, streams, lakes, reservoirs, ponds and other permanent, or near permanent, sources of water. Although they occur in ephemeral streams or ponds, these frogs thrive in permanent deep-water pools with dense stands of overhanging willows and emergent vegetation. However, they have been observed in a variety of aquatic environments, including stock ponds and artificial pools with little to no vegetation. CRLF are usually observed near water but can move long distances over land between water sources during the rainy season (USFWS, 2024).

There is critical habitat for California red-legged frog 17 miles to the east of the Action Area in Weber Creek. The Action Area is within the Weber Creek watershed. The Action Area is located within the historic range of the California red-legged frog. A review of the CNDDB (2022) did not reveal any reported occurrences of California red-legged frogs within the Action Area or immediate vicinity. The nearest documented population of California red-legged frog is 11 miles to the south in Cosumnes River and over 17 miles to the east in Weber Creek.

Dry Creek, Slate Creek, and Tennessee Creek provide potential habitat for all stages of the life cycle of California red-legged frogs (breeding habitat, dispersal habitat, aestivation habitat). The two ponds within the Action Area may also provide potential breeding, dispersal, and aestivation habitat. The ephemeral

channels within the Action Area do not provide breeding habitat, but do provide potential dispersal habitat. California red-legged frogs have not been detected in the Action Area during any wildlife surveys conducted in 2018, 2022, and 2024. California red-legged frogs have apparently not recolonized the suitable habitat in the Action Area. In general, California red-legged frogs have had a difficult time recovering populations and recolonizing due to multiple factors—predation pressure (e.g. invasive bullfrogs), habitat degradation, and dispersal barriers; these factors are relevant in the Action Area as well.

4.1.3 Foothill yellow-legged frog

The foothill yellow-legged frog is a species complex and scientists recognize several distinct populations. The foothill yellow-legged frog has six geographically and genetically distinct population segments (DPS). The USFWS listed the South Coast DPS and South Sierra DPS as endangered due to a strong pattern of declining stream occupancy, rapid reductions in occupied range and predicted inability to survive a catastrophic event. The North Feather DPS and Central Coast DPS are listed as threatened due to decreasing levels of stream occupancy and the potential for a variety of threats to cause additional declines. The USFWS determined the North Coast DPS and North Sierra DPS are not warranted for listing after data showed high levels of occupancy in streams located throughout their ranges, giving them greater ability to withstand environmental changes and catastrophic events. The Action Area is in the South Sierra DPS.

The foothill yellow-legged frog is a small to medium-sized frog with rough, pebbly skin that is generally mottled gray, olive or brown. The frog gets its name from the yellow shading on its belly and underside of the rear legs (USFWS 2024). The foothill yellow-legged frog lives in foothill and mountain streams from the Pacific Coast to the western slopes of the Sierra Nevada and Cascades mountains, up to approximately 5,000 feet in elevation. The foothill yellow-legged frog occurs in a wide variety of vegetation types including valley-foothill hardwood, valley-foothill hardwood-conifer, valley-foothill riparian, ponderosa pine, mixed conifer, mixed chaparral and wet meadows. The frog is closely associated with streams and is rarely observed far from the water's edge. Breeding stream habitat is typically shallow, rocky and at least partially exposed to direct sunlight (USFWS 2024).

There are no known extant populations within 5 miles of the Action Area. The CNDDB has 3 historical records for foothill yellow-legged frog within 5 miles of the Action Area, but all of these populations are understood to be extirpated, according to CNDDB and herpetologist Dr. Mark Jennings:

- a historical record very near the Action Area, with the CNDDB notes as follows: "7 miles west and 1 mile south of Placerville; 9 collected on 14 Nov 1938; according to Jennings, *Rana boylii* is extirpated from this vicinity."
- a scientific collection in 1952 at the location "Webber Crk at bridge 0.6 mi s Hwy 50, Placerville," and "Webber creek, 2.2 mi WSW Placerville." CNDDB also reports this update: "none detected via Edna on 22 Jun 2017; according to Jennings and Lind, *Rana boylii* is extirpated at this location."
- a scientific collection in 1961 at the location "Highway 49, 2 miles south of the town of El Dorado." CNDDB also reports this update: "none detected via Edna on 24 Jun 2017; according to Jennings, *Rana boylii* is extirpated from this location."

Dry Creek, Slate Creek, and Tennessee Creek provides potential habitat for all stages of the life cycle of foothill yellow-legged frogs (breeding habitat, dispersal habitat, aestivation habitat). The two ponds within the Action Area may also provide potential breeding and aestivation habitat. The ephemeral

channels within the Action Area do not provide breeding habitat, but do provide potential dispersal habitat. Foothill yellow-legged frogs have not been detected in the Action Area during any wildlife surveys conducted in 2018, 2022, and 2024. Foothill yellow-legged frogs have apparently not recolonized the suitable habitat in the Action Area. Similar to California red-legged frogs, foothill yellow-legged frogs have had a difficult time recovering populations and recolonizing due to predation pressure (e.g. invasive bullfrogs), habitat degradation, and dispersal barriers, and these factors are present in the Action Area.

4.2 INSECTS

4.2.1 Monarch butterfly

The monarch is a candidate species and not yet formerly proposed for listing. During the breeding season, monarchs lay their eggs on their obligatory milkweed host plant (primarily plants in the genus *Asclepias*, but also *Cynanchum*, *Funastrum*, *Gonolobus*, and *Matelea*), and larvae emerge after two to five days (USFWS, 2024). Larvae develop through five molts over a period of 9 to 18 days, feeding on milkweed and sequestering toxic chemicals as a defense against predators. The larva then pupates into a chrysalis before emerging 6 to 14 days later as an adult butterfly. There are multiple generations of monarchs produced during the breeding season, with most adult butterflies living approximately two to five weeks; overwintering adults enter into reproductive diapause (suspended reproduction) and live six to nine months (USFWS, 2024).

Monarchs in temperate climates, such as western North America, undergo long-distance migration, and live for an extended period of time. In the fall, monarchs begin migrating to their overwintering sites. This migration can take monarchs distances of over 3,000 km and last for over two months. In early spring (February-March), surviving monarchs break diapause and mate at the overwintering sites before dispersing. The same individuals that undertook the initial southward migration begin flying back through the breeding grounds and their offspring start the cycle of generational migration over again (USFWS, 2024).

The botanical surveys performed in 2022 and 2024 did detect milkweed species (*Asclepias* spp.) in some patches of grassland areas. Within the Action Area, suitable foraging habitat for Monarch butterfly occurs in the grassland habitats, although these habitats occur as small isolated patches. According to USFWS (2023a), the Action Area is within an Early Breeding Zone.

4.3 PLANTS

The federally-listed plant species that occur in the vicinity of the Action Area are those species called the "Pine Hill Endemics", named after the type locality and preserve areas. "Pine Hill Endemics" are specific plants found only in gabbroic soils and only in the areas near Pine Hill (located 4 miles west of the Action Area). The following Pine Hill Endemics are federally listed under the ESA:

- El Dorado bedstraw (*Galium californicum sierrae*)
- Layne's butterweed (*Senecio layneae*)
- Pine Hill ceanothus (*Ceanothus roderickii*)
- Pine Hill flannel bush (*Fremontodendron californicum decumbens*)
- Stebbins' morning glory (*Calystegia stebbinsii*)

However, these Pine Hill Endemics are found only in a special soil type called “Rescue Series.” The Action Area does not contain this soil type, according to USDA. Thus, the Action Area does not contain suitable habitat for El Dorado bedstraw, Layne’s butterweed, Pine Hill ceanothus, Pine Hill flannel bush, or Stebbins' morning glory. Furthermore, these species were not detected in botanical surveys conducted in 2022 and 2024.

Section 5 | Effects Determination

Based on guidance provided by the ESA Section 7 Effects Determination Guidance, possible effects determinations for the Proposed Action are:

- **No effect:** The proposed action will not affect the listed species or critical habitat.
- **May affect but is not likely to adversely affect:** The proposed action will affect a listed species in a way that is discountable, insignificant, or completely beneficial. Discountable effects are extremely unlikely to occur; insignificant effects are impacts small enough that they never reach the scale where a take occurs, and completely beneficial effects are positive effects without any adverse effects to the species.
- **May affect and is likely to adversely affect:** The proposed action will either directly or indirectly, or through its interrelated and interdependent actions, adversely affect a listed species.

These guidelines were used in determining conclusions of this BA and are discussed for the critical habitat and listed species below.

5.1 POTENTIAL ADVERSE EFFECTS UPON CRITICAL HABITAT

There is no federally-designated critical habitat for any listed species within, or adjacent to, the Action Area. The nearest critical habitat is at least 8 miles away. Implementation of the Proposed Action would have No Effect on federally-designated critical habitat.

5.2 POTENTIAL ADVERSE EFFECTS UPON LISTED SPECIES

5.2.1 Northwestern pond turtle

Northwestern pond turtle is not known to occur in the Action Area, and implementation of the Proposed Action is not expected to result in direct take (mortality) of a known population. The portions of the Action Area that contain ponds and perennial channels (i.e. the applicable segments of Dry Creek and Tennessee Creek), and the riparian habitat and riverine wetlands adjacent to those channels, are suitable habitat for this species. Property development and land conversion in these ponds, channels, or riparian or wetland areas could constitute an indirect adverse effect on northwestern pond turtle if the Action Area is within the known dispersal distance of an active population. This is not the case, as the nearest documented population of northwestern pond turtle is over 17 miles away. Observed dispersal distances for the western pond turtle were not greater than 4.3 miles within aquatic habitat, and overland dispersal distances were not greater than 3 miles, according to research compiled by USFWS (USFWS, 2023b). Furthermore the current development plan does not involve any construction or land conversion in ponds and perennial channels or riparian habitat and riverine wetlands. If future impacts to these aquatic habitats is necessary, then the aquatic resource permits required by law would ensure that impacts are minimized and compensatory mitigation for habitat loss is implemented.

It is possible that northwestern pond turtle could migrate into, or colonize, the Action Area between the time of the last wildlife surveys and the beginning of construction. To ensure that northwestern pond turtle is not present in construction areas, avoidance measures were identified: pre-construction surveys, the erection of wildlife exclusion fencing, and worker environmental awareness training. These measures would ensure that there would be no take of northwestern pond turtle during the construction phase. In addition, protective measures have been identified for this project to ensure that aquatic habitats are not degraded during construction activities. With these measures implemented, the Proposed Action would have No Efffect on northwestern pond turtle.

5.2.2 California red-legged frog

California red-legged frog is not known to occur in the Action Area, and implementation of the Proposed Action is not expected to result in direct take (mortality) of a known population. The portions of the Action Area that contain ponds and perennial channels (i.e. the applicable segments of Dry Creek and Tennessee Creek), and the riparian habitat and riverine wetlands adjacent to those channels, are suitable habitat for this species. However, California red-legged frogs have not recolonized this habitat. In general, California red-legged frogs have had a difficult time recovering populations and recolonizing due to predation pressure (e.g. invasive bullfrogs) and habitat degradation.

Property development and land conversion in these ponds, channels, or riparian or wetland areas could constitute an indirect adverse effect on California red-legged frog if the Action Area is within the dispersal distance of an active population. This is not the case, as the nearest documented population of California red-legged frog is over 11 miles away. According to USFWS guidance, all lands within 3 miles of a known CRLF population should be considered suitable dispersal habitat for CRLF because such dispersal distances have been documented. Furthermore the current development plan does not involve any construction or land conversion in ponds and perennial channels or riparian habitat and riverine wetlands. If future impacts to these aquatic habitats is necessary, then the aquatic resource permits required by law would ensure that impacts are minimized and compensatory mitigation for habitat loss is implemented.

It is possible that California red-legged frog could migrate into, or colonize, the Action Area between the time of the last wildlife surveys and the beginning of construction. To ensure that California red-legged frogs are not present in construction areas, avoidance measures were identified: pre-construction surveys, the erection of wildlife exclusion fencing, and worker environmental awareness training. These measures would ensure that there would be no take of California red-legged frogs during the construction phase. In addition, protective measures have been identified for this project to ensure that aquatic habitats are not degraded during construction activities. With these measures implemented, the Proposed Action would have No Effect on California red-legged frog.

5.2.3 Foothill yellow-legged frog

Foothill yellow-legged frog is not known to occur in the Action Area, and implementation of the Proposed Action is not expected to result in direct take (mortality) of a known population. The portions of the Action Area that contain ponds and perennial channels (i.e. the applicable segments of Dry Creek and Tennessee Creek), and the riparian habitat and riverine wetlands adjacent to those channels, are suitable habitat for this species.

Property development and land conversion in these ponds, channels, or riparian or wetland areas could constitute an indirect adverse effect on foothill yellow-legged frog if the Action Area is within the dispersal

distance of an active population. This is not the case, as the nearest documented population of foothill yellow-legged frog is over 10 miles away. Radio telemetry studies document dispersal distances of up to only 4.5 miles (Olson and Davis 2009). Furthermore the current development plan does not involve any construction or land conversion in ponds and perennial channels or riparian habitat and riverine wetlands. If future impacts to these aquatic habitats is necessary, then the aquatic resource permits required by law would ensure that impacts are minimized and compensatory mitigation for habitat loss is implemented.

It is possible that foothill yellow-legged frogs could migrate into, or colonize, the Action Area between the time of the last wildlife surveys and the beginning of construction. To ensure that foothill yellow-legged frogs are not present in construction areas, avoidance measures were identified: pre-construction surveys, the erection of wildlife exclusion fencing, and worker environmental awareness training. These measures would ensure that there would be no take of foothill yellow-legged frogs during the construction phase. In addition, protective measures have been identified for this project to ensure that aquatic habitats are not degraded during construction activities. With these measures implemented, the Proposed Action would have No Efffect on foothill yellow-legged frog.

5.2.4 Monarch Butterfly

There are no known roosting populations in, or near, the Action Area and the Action Area is not in an overwintering zone. Thus, implementation of the Proposed Action is not expected to result in direct take (mortality) of a known population. Potential impacts would be limited to loss of suitable foraging habitat. Biological surveys did detect milkweed host plants for monarch butterfly in some patches of grassland habitats. All of the grassland habitat within the Action Area constitute suitable foraging habitat for monarch butterfly, but the grasslands exist in isolated patches and do not constitute high-value foraging habitat, and these habitats are subject to land management activities (periodic trimming, wildfire control, etc.). Property development and land conversion in the Action Area would impact these patches of grassland habitat. To minimize indirect impacts to monarch butterfly, USFWS (2023) has specific land management recommendations that the Tribe would adopt as avoidance and minimization measures. These land management recommendations would reduce adverse effects on butterflies through the elimination of pesticide use and incompatible landscaping. With the implementation of land management and BMP guidance from USFWS, the Proposed Action would have No Effect on Monarch butterfly.

5.2.5 Pine Hill Endemic Plants

No federally-listed plant species were detected in the Action Area during multiple botanical surveys performed over a 4-year span. The Pine Hill Endemics are found only in a special soil type called “Rescue Series.” The Action Area does not contain this soil type, according to USDA. Thus, the Action Area does not contain suitable habitat for El Dorado bedstraw, Layne’s butterweed, Pine Hill ceanothus, Pine Hill flannel bush, or Stebbins' morning glory. Implementation of the Proposed Action would have No Effect on El Dorado bedstraw, Layne’s butterweed, Pine Hill ceanothus, Pine Hill flannel bush, or Stebbins' morning glory.

5.3 POTENTIAL ADVERSE EFFECTS UPON MIGRATORY BIRDS

Trees, shrubs, and poles within the Action Area provide suitable nesting and perching habitat for migratory birds. The Proposed Action would involve the construction of tribal residences and driveways.

If construction activities are conducted during the nesting season, nesting birds could be directly impacted by removal of trees, and indirectly impacted by noise, vibration, and other construction-related disturbance. Thus, migratory birds may be adversely affected. Avoidance and minimization measures have been identified to address these potential adverse effects to migratory birds.

5.4 AVOIDANCE, MINIMIZATION, AND MITIGATION MEASURES

The following avoidance and minimization measures should be implemented to ensure that there are no adverse effects on listed species.

5.4.1 Aquatic Animal Protection During Construction

If construction activities occur within 100 feet of the channel of Dry Creek, the channel of Tennessee Creek, adjacent riverine wetlands or riparian habitat, or ponds or isolated wetlands, the following measures shall be implemented:

> To ensure that northwestern pond turtle, California red-legged frog, and foothill yellow-legged frog are not present in construction areas, pre-construction clearance surveys shall be conducted by a qualified biologist. If any of these species, or listed species in general, are discovered during the survey, project activities shall not begin until USFWS (and CDFW) have been consulted and avoidance and minimization measures established and then implemented.
>
> Once the pre-construction surveys confirm that no listed animals are present, the construction crew should immediately install animal exclusion fencing to separate construction areas from all of the wetlands and channels. The fencing should be constructed out of plastic weed cloth or construction fabric, should be keyed into the ground, and should be supported by stakes and wire mesh, as needed.
>
> All construction personnel should receive worker environmental awareness training before they enter the construction site. The training program should include, at a minimum, construction best management practices to protect wildlife, descriptions of the focal species (monarch butterflies, CRLF, foothill yellow-legged frog, and northwestern pond turtles), and how to identify and avoid these focal species.

If construction activities require ground disturbance, placement of fill, or removal/conversion of a wetland or channel, the following measures shall be implemented:

> For channels and wetlands subject to federal jurisdiction, a Clean Water Act (CWA) Section 404 permit must be obtained from USACE, and mitigation performed, before jurisdictional water features are disturbed or altered. CWA Section 401 water quality certification would also be necessary if a Section 404 permit is issued.

5.4.2 Protection of Nesting and Migratory Birds During Construction

If construction activities occur during the nesting season (February 1 to August 31), pre-construction surveys for the presence of nesting migratory birds should be conducted by a qualified biologist within

500 feet of proposed construction areas. If active nests are identified in these areas, USFWS and CDFW should be consulted to develop measures to avoid "take" of active nests prior to the initiation of any construction activities. Avoidance measures may include establishment of a buffer zone using construction fencing or the postponement of vegetation removal until after the nesting season, or until after a qualified biologist has determined the young have fledged and are independent of the nest site.

5.4.3 Monarch Butterfly Conservation Recommendations

The Action Area is in a Monarch Butterfly Early Breeding Zone. In this zone, USFWS (2023) recommends implementation of the Western Monarch Butterfly Conservation Recommendations (see **Attachment D**). A brief summary of the applicable recommendations is as follows: establish long-term mowing and weed management protocols that protect monarch butterfly foraging habitat; protect existing milkweed plant populations where possible; facilitate the expansion of native milkweed plant populations; and reduce mowing and herbicide/insecticide applications to the extent possible.

5.4.4 Water Resource Protection

For construction activities disturbing one acre or more, the Tribe shall apply for coverage under and comply with the National Pollutant Discharge Elimination System (NPDES) General Construction Permit from the U.S. Environmental Protection Agency, for construction site runoff during the construction phase. A Stormwater Pollution Prevention Plan (SWPPP) shall be prepared, implemented, and maintained throughout the construction phase of the development, consistent with the General Construction Permit requirements. The SWPPP prepared for the project site shall include, but not be limited to, the following BMPs.

- To the extent feasible, grading activities shall be limited to the immediate area required for construction.
- Temporary erosion control measures (such as silt fences, fiber rolls, vegetated swales, a velocity dissipation structure, staked straw bales, temporary re-vegetation, rock check dams, erosion control blankets, and sediment traps) shall be employed for disturbed areas.
- Construction activities shall be scheduled to minimize land disturbance during peak runoff periods.
- Disturbed areas shall be paved or re-vegetated following construction activities.
- A spill prevention and countermeasure plan shall be developed that identifies proper storage, collection, and disposal measures for potential pollutants (such as fuel, fertilizers, pesticides, etc.) used on site.
- Petroleum products shall be stored, handled, used, and disposed of properly in accordance with provisions of the Clean Water Act (33 USC § 1251 to 1387).
- Construction materials, including topsoil and chemicals, shall be stored, covered, and isolated to prevent runoff losses and contamination of surface and groundwater.
- Fuel and vehicle maintenance areas shall be designed to control runoff.
- Sanitary facilities shall be provided for construction workers.
- Disposal facilities shall be provided for soil wastes, including excess asphalt during construction. Food-related trash shall be stored in closed containers and removed from the site daily.
- Wheel wash or rumble strips and sweeping of paved surfaces shall be used to remove any and all tracked soil.

Section 6 | References

Baldwin, B.G., D.H. Goldman, D.J. Keil, R. Patterson, and T.J. Rosatti, editors. 2012. The Jepson Manual: Vascular Plants of California, second edition, thoroughly revised and expanded. University of California Press, Berkeley, California. 1,600 pp.

Brenzel, K. N., editor. 2007. Sunset Western Garden Book, revised edition. Sunset Publishing Corporation, Menlo, California. 768 pp.

California Department of Fish and Game. 2022. California's Wildlife. California Wildlife Habitat Relationships System, Biogeographic Data Branch, California Department of Fish and Game. Internet database available at http://www.dfg.ca.gov/whdab/html/cawildlife.html.

Cowardin, L. M., V. Carter, and E. T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. Office of Biological Services, U. S. Fish and Wildlife Service, Washington, District of Columbia.

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1. U.S. Army Engineer Waterways Experiment Station. Vicksburg, Mississippi. 92 pp.

Natural Investigations Co. 2021. Aquatic Resource Delineation Report for the Shingle Springs Band of Miwok Indians Gun Range Property Road Improvement Project. 32 pp.

NatureServe. 2021. NatureServe Explorer: An online encyclopedia of life, Version 7.1. NatureServe, Arlington, Virginia. Internet database available at http://www.natureserve.org/explorer.

Olson, D.H., and R.J. Davis. 2009. Conservation Assessment for the Foothill Yellow-legged Frog (Rana boylii) in Oregon. U.S.D.A. Forest Service Region 6 and U.S.D.I. Bureau of Land Management, Interagency Special Status Species Program. Bureau of Land Management, Interagency Special Status Species Program.

Peek, R. A., Yarnell, S. M., and A. J. Lind. 2017. Visual encounter survey protocol for Rana boylii in lotic environments. Center for Watershed Sciences. 9 pp.

Powell, J. A., and C. L. Hogue, 1979. California Insects. University of California Press, Berkeley, California. 388 pp.

Sawyer, J. O., and T. Keeler-Wolf. 1995. A manual of California vegetation. California Native Plant Society, Sacramento, California. Available electronically at http://davisherb.ucdavis.edu/cnpsActiveServer/index.html.

Sibley, D. A. 2003. The Sibley Field Guide to Birds of Western North America. Alfred A. Knopf, Inc., New York, New York.

Stuart, J. D., and J. O. Sawyer. 2001. Trees and Shrubs of California. California Natural History Guides. University of California Press, Berkeley, California. 467 pp.

United States Fish and Wildlife Service. 1999. Mitigation guidelines for the Valley Elderberry Longhorn Beetle, Revised 1999. USFWS, Sacramento Field Office, California. Available electronically at http://www.fws.gov/sacramento/es/documents/velb_conservation.htm.

United States Fish and Wildlife Service. 2005. Revised Guidance on Site Assessments and Field Surveys for California Red-legged Frog. Sacramento Fish and Wildlife Office. 26 pp.

United States Fish and Wildlife Service. 2023a. Western Monarch Butterfly Conservation Recommendations. 7 pp.

United States Fish and Wildlife Service. 2023b. Endangered and Threatened Wildlife and Plants; Threatened Species Status With Section 4(d) Rule for the Northwestern Pond Turtle and Southwestern Pond Turtle. Federal Register 88 FR 68370-68399. Document Number 2023-21685. 30 pp.

United States Fish and Wildlife Service. 2024. Environmental Conservation Online System. Species Accounts. Available at: https://ecos.fws.gov/ecp/species/.

University of California at Berkeley. 2022a. Jepson Online Interchange for California Floristics. Jepson Flora Project, University Herbarium and Jepson Herbarium, University of California at Berkeley. Internet database available at http://ucjeps.berkeley.edu/interchange.html.

University of California at Berkeley. 2022b. CalPhotos. Biodiversity Sciences Technology Group, University of California at Berkeley. Internet database available at http://calphotos.berkeley.edu/.

Section 7 | Qualifications of Authors / Surveyors

G.O. Graening, Ph.D., M.S.E.

G.O. Graening holds a Doctorate in Biological Sciences and a Master of Science in Biological Engineering and is a certified arborist (International Society of Arboriculture). Dr. Graening has 30 years of experience in biological assessment and research. Dr. Graening also served as an adjunct professor of biology at California State University Sacramento for 10 years and was an active researcher in the area of conservation biology and groundwater ecology.

Tim Nosal, M.S.

Timothy R. Nosal holds a B.S. and M.S. in Biological Sciences. Mr. Nosal has statewide experience performing sensitive plant and animal surveys in addition to terrestrial vegetation investigations. Mr. Nosal has over 25 years of experience in environmental assessment and teaching with employers that include California Department of Fish and Wildlife, State Water Resources Control Board, American River College, MTI College, and Pacific Municipal Consultants.

Attachment A

USFWS Species List

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish And Wildlife Office
Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846
Phone: (916) 414-6600 Fax: (916) 414-6713

In Reply Refer To: 04/17/2024 15:31:27 UTC
Project Code: 2024-0078348
Project Name: Shingle Springs Rancheria Fee to Trust

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed, and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through IPaC by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)

(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see Migratory Bird Permit | What We Do | U.S. Fish & Wildlife Service (fws.gov).

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see https://www.fws.gov/library/collections/threats-birds.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/partner/council-conservation-migratory-birds.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Sacramento Fish And Wildlife Office
Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846
(916) 414-6600

PROJECT SUMMARY

Project Code: 2024-0078348
Project Name: Shingle Springs Rancheria Fee to Trust
Project Type: Residential Construction
Project Description: transfer of parcels into federal trust and subsequent development (tribal housing and facilities)
Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@38.70885065,-120.91513467157239,14z

Counties: El Dorado County, California

ENDANGERED SPECIES ACT SPECIES

There is a total of 9 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. 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.

REPTILES

NAME	STATUS
Northwestern Pond Turtle *Actinemys marmorata* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1111	Proposed Threatened

AMPHIBIANS

NAME	STATUS
California Red-legged Frog *Rana draytonii* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2891	Threatened
Foothill Yellow-legged Frog *Rana boylii* Population: South Sierra Distinct Population Segment (South Sierra DPS) No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5133	Endangered

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

FLOWERING PLANTS

NAME	STATUS
El Dorado Bedstraw *Galium californicum ssp. sierrae* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5209	Endangered
Layne's Butterweed *Senecio layneae* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4062	Threatened
Pine Hill Ceanothus *Ceanothus roderickii* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3293	Endangered
Pine Hill Flannelbush *Fremontodendron californicum ssp. decumbens* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4818	Endangered
Stebbins' Morning-glory *Calystegia stebbinsii* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3991	Endangered

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

IPAC USER CONTACT INFORMATION

Agency: Acorn Environmental Inc.
Name: G.O. Graening
Address: 343 Carpenter Hill Road
City: Folsom
State: CA
Zip: 95630
Email ggraening@gmail.com
Phone: 9164525442

Attachment B

List of Plants Detected During Field Surveys

Checklists of Plants Detected During Surveys in 2018, 2022, and 2024

Scientific Name	Common Name
Achillea millefolium	Yarrow
Acmispon americanus	Spanish lotus
Acmispon glaber	Common deerweed
Acmispon wrangelianus	Chilean trefoil
Adenostema fasciculatum	Chamise
Adiantum jordanii	Maidenhair fern
Aegilops triuncialis	Goatgrass
Aesculus californicus	California buckeye
Agrostis capillaris	Colonial bent grass
Agrostis sp.	Bent grass
Aira caryophyllea	Silver hair grass
Alisma triviale	Northern water plantain
Allium serra	Jeweled onion
Anagalis arvensis	Scarlet pimpernel
Anaphalis margaritacea	Western pearly everlasting
Antirrhinum vexillo-calyculatum intermedium	Wiry snapdragon
Arceuthobium campylopodium	Pine dwarf mistletoe
Arctostaphylos viscida	White-leaved manzanita
Artemisia douglasiana	California mugwort
Asclepias cordifolia	Purple milkweed
Asclepias fascicularis	Narrow leaf milkweed
Avena barbata	Slim oat
Avena fatua	Wildoats
Baccharis pilularis	Coyote bush
Bidens frondosa	Sticktight
Brachypodium distachyon	Purple false brome
Brassica nigra	Black mustard
Brassica rapa	Field mustard
Briza maxima	Rattlesnake grass
Briza minor	Little quaking grass
Brodiaea elegans	Harvest brodiaea
Bromus diandrus	Ripgut brome
Bromus hordeaceous	Soft chess
Bromus laevipes	Woodland brome
Bromus madritensis	Foxtail brome
Bromus sterilis	Poverty brome
Calochortus alba	Fairy lanterns
Calycadenia truncata	Rosin weed
Cardamine oligosperma	Western bittercress

Scientific Name	Common Name
Carduus pycnocephalus	Italian thistle
Carex barbarae	Santa Barbara sedge
Castelleja applegatei	Applegate's Indian paintbrush
Castilleja attenuata	Valley tassels
Ceanothus cuneatus	Wedgeleaf ceanothus
Ceanothus lemmonii	Lemon's ceanothus
Ceanothus palmeri	Palmer's ceanothus
Centaurea melitensis	Maltese star thistle
Centaurea solstitialis	Yellow star-thistle
Centaurium tenuiflorum	Slender centuary
Centromadia fitchii	Fitch's spikeweed
Chlorogalum grandiflorum	Red Hills soaproot
Cholorgalum pomeridianum	Wavy-leaved soap plant
Chondrilla juncea	Skeleton weed
Cirsium vulgare	Bull thistle
Clarkia purpurea	Purple clarkia
Claytonia perfoliata	Miner’s lettuce
Collinsia heterophylla	Chinese houses
Convolvulus arvensis	Field bindweed
Croton setiger	Dove weed
Cryptantha clevelandii	Cleveland's cryptantha
Cynodon dactylon	Scutch grass
Cynosurus echioides	Rough dog's-tail
Cyperus eragrostis	Tall flat-sedge
Dactylis glomerata	Orchard grass
Datura stramonium	Jimson weed
Daucus carota	Queen Anne's lace
Daucus pusillus	American wild carrot
Delphinium hansenii ssp. hansenii	Hansen's larkspur
Dichelostemma capitatum	Blue dick's
Dichelostemma congestum	Ookow
Dichelostemma volubile	Twining brodiaea
Dipsacus fullonum	Fullers' teasel
Dittrichia graveolens	Stinkwort
Dudleya sp.	Live forever
Echinochloa colona	Jungle rice
Eleocharis macrostachya	Pale spikerush
Elymus caput-medusae	Medusa-head grass
Elymus elymoides	Squirrel tail grass
Elymus glaucus	Blue wild rye
Elymus glaucus. ssp. glaucus	Blue wild rye
Elymus lanceolatus ssp. lanceolatus	Thick-spike wheat grass

Scientific Name	Common Name
Elymus multisetus	Big squirreltail
Elymus stebbinsii	California wheatgrass
Elymus triticoides	Creeping wildrye
Epilobium brachycarpum	Tall willowherb
Epilobium densiflorum	Dense flowered spike willowherb
Ericameria arborescens	Golden fleece
Erigeron canadensis	Horseweed
Erigeron foliosus var. hartwegii	Hartweg's fleabane
Eriodictyon californicum	Yerba santa
Eriogonum baileyi ssp. baileyi	Bailey's buckwheat
Eriogonum nudum	Naked buckwheat
Eriogonum roseum c.f.	Wand wild buckwheat
Eriophyllum lanatum	Wooly sunflower
Erythranthe guttata	Seep monkey flower
Eschscholzia californica	California poppy
Eupatorium sp.	thoroughwort
Festuca arundinicea	Tall fescue
Festuca macrostachys	Small fescue
Festuca myuros	Rattail fescue
Festuca perennis	Italian rye grass
Frangula californica ssp. tomentosa	Hoary coffeeberry
Galium aparine	Cleavers
Galium nuttallii	Climbing bedstraw
Gastridium phleoides	Nit grass
Geranium molle	Dove's-foot geranium
Grindelia camporum	Great Valley gumplant
Helenium bigelovii	Bigelow's sneezeweed
Helianthus annuus	Hairy-leaved sunflower
Heteromeles arbutifolia	Toyon
Hirschfeldia incana	Shortpod mustard
Holocarpha virgata	Narrow tarplant
Hordeum brachyantherum	Meadow barley
Hordeum murinum	Wall barley
Horkelia sp	Horkelia
Hypericum perfoliatum	Klamath weed
Hypochaeris glabra	Smooth cat's-ear
Juglans hindsii	Northern California black walnut
Juncus dubius	Mariposa rush
Juncus effusus	Common rush
Juncus mexicanus	Mexican rush
Juncus tenuis	Poverty rush
Juncus xiphodes	Iris leaved rush

Scientific Name	Common Name
Keckiella breviflora	Bush beardtongue
Kickxia elatine	Sharp-leaved fluellen
Lactuca saligna	Willowleaf lettuce
Lactuca serriola	Prickly lettuce
Lasthenia gracilis	Common goldfield
Lathyrus nevadensis	Sierra pea
Lemna sp.	Duckweed
Leontodon saxatilis	Hawkbit
Lepidium campestre	Field pepperweed
Leptosiphon bicolor	True Babystars
Limnanthes alba	White meadowfoam
Linum bienne	Pale flax
Lithophragma sp.	Fringecup
Lomatium utriculatum	Common lomatium
Lonicera hispidula	Pink honeysuckle
Lonicera interrupta	Chaparral honeysuckle
Lotus corniculatus	Birds-foot trefoil
Lupinus bicolor	Miniature lupine
Lythrum californicum	California loosestrife
Madia elegans	Common madia
Malva sp	Mallow
Marrubium vulgare	Horehound
Melica californica	Galifornia melicgrass
Melilotus alba	White sweetclover
Melissa officinalis	Lemon balm
Mentha pulegium	Pennyroyal
Mentha spicata	Spearmint
Mimulus aurantiacus	Sticky monkeyflower
Mimulus guttatus	Seep monkeyflower
Pellea mucronata ssp. mucronata	Birds foot fern
Pentagramma triangularis	Goldback fern
Perideridia kelloggii	Kellogg's yampah
Petrorhagia dubia	Windmill pink
Phalaris aquatica	Harding grass
Phoradendron leucarpum ssp. tomentosum	Oak mistletoe
Pinus ponderosa	Ponderosa pine
Pinus sabiniana	Gray pine
Pistacea atlantica	Mt. Atlas mastictree
Plagiobothrys novofulvus	Popcorn flower
Plantago erecta	California plantain
Plantago lanceolata	English plantain
Platystemon californicus	Cream-cups

Scientific Name	Common Name
Poa bulbosa	Bulbous bluegrass
Poa secunda	One-sided bluegrass
Polygala cornuta var. cornuta	Sierra milkwort
Polygonum lapathifolium	Willow weed
Polypogon monspeliensis	Annual rabbitsfoot grass
Populus fremontii	Fremont cottonwood
Poypodium calirhiza	Licorice fern
Prunus cerisifera	Plum
Pseudognaphalium beneolens	Cudweed
Pteridium aquilinum var. pubescens	Western bracken
Quercus douglasii	Blue oak
Quercus kelloggii	California black oak
Quercus lobata	Valley oak
Quercus wislizeni	Interior live-oak
Quercus x Morehus	Oracle oak (natural hybrid)
Ranunculus sp.	Buttercup
Rhamnus ilicifolia	Hollyleaf redberry
Rosa californica	California rose
Rosa gymnocarpa	Wood rose
Rubus armeniacus	Himalayan blackberry
Rubus ursinus	California blackberry
Rumex acetocella	Sheep sorrel
Rumex conglomeratus	Clustered dock
Rumex crispus	Curly dock
Salix exiguua	Sandbar willow
Salix laevigata	Red willow
Salix lasiolepis	Arroyo willow
Salvia sonomensis	Sonoma sage
Sambucus nigra ssp. caerula	Blue elderberry
Sanicula crassicaulis	Pacific sanicle
Scrophularia californica	California bee plant
Secale cereale	Rye
Silene gallica	Common catchfly
Silybum murinum	Milk thistle
Sisymbrium altissimum	Tall tumblemustard
Sisyrhynchium bellum	Blue-eyed grass
Solanum sp.	Nightshade
Solidago elongata	West Coast Canada goldenrod
Sonchus oleraceus	Common sowthistle
Stachys stricta	Sonoma hedgenettle
Stipa cernua	Nodding needlegrass
Stipa lemmonii	Lemmon's needle grass

Scientific Name	Common Name
Stipa miliacea	Smilograss
Streptanthus sp	Jewelflower
Symphoricarpos alba	Common snowberry
Symphoricarpos mollis	Snowberry
Thysanocarpos radicans	Spoke pod
Torilis arvensis	Field hedge parsley
Torilis nodosa	Hedge parsley
Toxicodendron diversilobum	Poison-oak
Tragopogon dubius	Goat's beard
Trichostema lanceolatum	Vinegar weed
Trichostema oblongum	Oblong bluecurls
Trifolium hirtum	Rose clover
Trifolium pratense	Red clover
Trifolium wildenovii	Tomcat clover
Triphysaria pusilla	Little owl's clover
Triteleia hyacinthina	Wild hyacinth
Triteleia laxa	Ithuriel's spear
Triticum aestivum	Wheat
Typha angustifolia	Narrow-leaved cattail
Typha latifolia	Broad-leaved cattail
Verbascum blattaria	Moth mullein
Verbascum thapsus	Common mullein
Veronica americana	American brooklime
Veronica serpyllifolia	Thymeleaf peedwell
Vicia sativa	Common vetch
Vicia villosa	Winter vetch
Vinca major	Periwinkle
Vitis californicus	California grape
Wyethia angustifolia	Narrowleaf mule-ears
Xanthium strumarium	Cocklebur

Attachment C

Site Photographs

Attachment D

Western Monarch Butterfly Conservation Recommendations

U.S. FISH & WILDLIFE SERVICE

February 10, 2023

Western Monarch Butterfly Conservation Recommendations:

Purpose: Section 7(a)(1) of the Endangered Species Act of 1973 (ESA), directs federal agencies to use their authorities to further the purpose of the ESA, by conducting conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary activities that an action agency may undertake to avoid and minimize the adverse effects of a proposed action, implement recovery plans, or to develop information that is useful for the conservation of listed species. The purpose of the following conservation recommendations is to encourage federal agencies to incorporate monarch butterflies into their Environmental Assessments and Biological Assessments associated with Section 7 Biological Opinions, when in consultation with the U.S. Fish & Wildlife Service. These recommendations are organized by habitat zone, so that they may be cut/paste, as applicable and contingent upon project location. There is potential utility for these recommendations beyond Section 7, and they are intended to promote benefits for other pollinators as well.

Background: The western migratory monarch butterfly population has declined by more than 90 percent since the 1980s. An estimated 4.5 million monarchs overwintered on the California coast in the 1980s, whereas in 2022, the population estimate for overwintering monarchs was 335,000 butterflies. The population decline is likely due to multiple stressors across the monarch's range, including the loss and degradation of overwintering habitat; pesticide use, particularly insecticides; loss of breeding and migratory habitat; climate change; parasites and disease. Historically, the majority of western monarchs spent the winter in forested groves near the coast from Mendocino County, California, south into northern Baja California, Mexico. In recent years, monarchs have not clustered in the southern-most or northern-most parts of their overwintering range, and there are year-round residents in some areas of the coast. This resident phenomenon is likely due to a combination of climate change and an abundance of residential-planted non-native, tropical milkweed that is available for monarchs year-round. Migratory western monarchs depart the overwintering sites in mid-winter to early-spring. Throughout the spring and summer, monarchs breed, lay their eggs on milkweed, and migrate across multiple generations within California and other states west of the Rocky Mountains. In an attempt to reverse the severe population decline of western monarch butterflies, and to protect other pollinators as well, we encourage implementation of the conservation recommendations listed below. Please see Figure 1 for suggested areas to focus voluntary conservation actions in California. Western monarch conservation actions outside of California are also important, especially for the larger pollinator community. Recommendations for other western states are addressed in the "All Breeding and Migratory Zones" section of this document.

Please contact Samantha Marcum (samantha_marcum@fws.gov) or Cat Darst (cat_darst@fws.gov) with questions or suggestions on these recommendations.

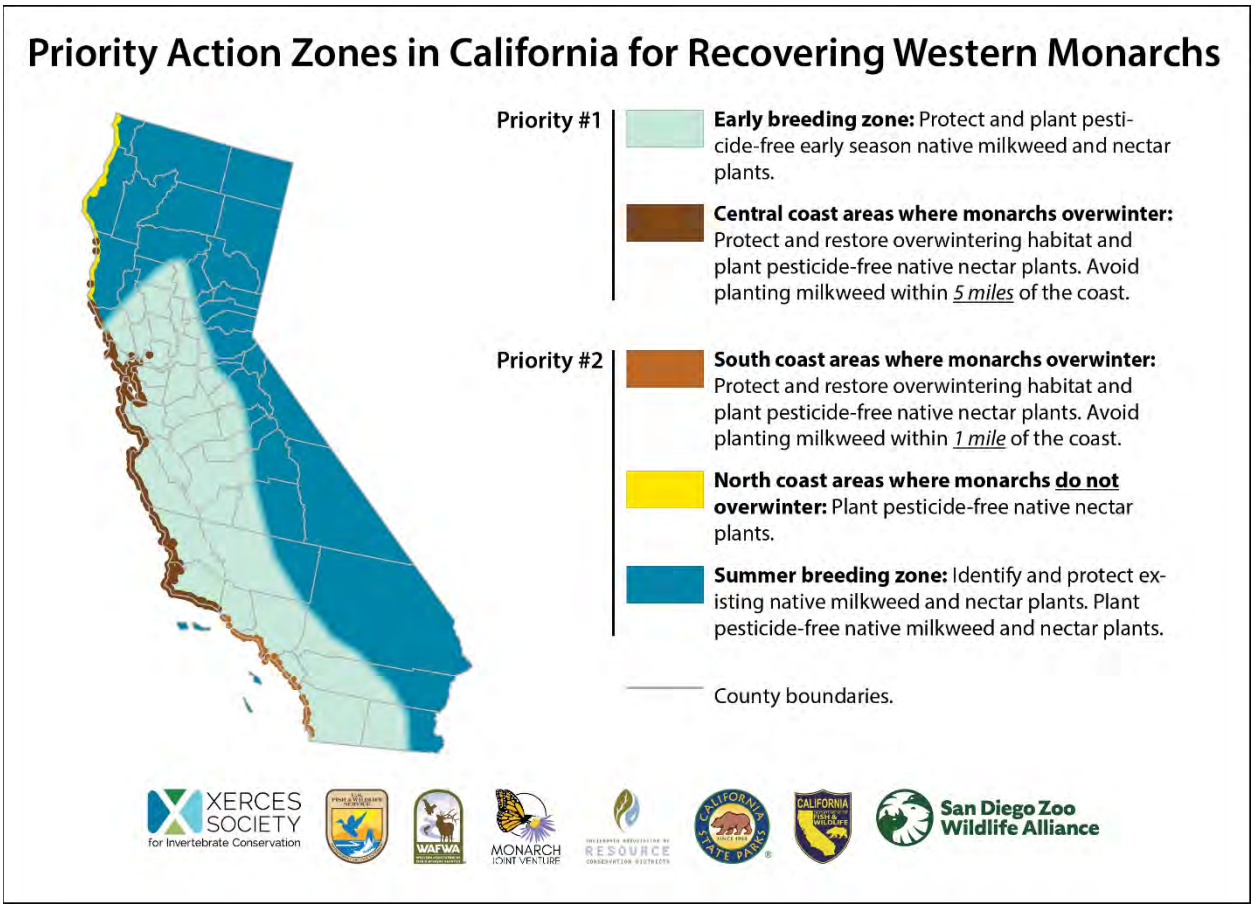


Figure 1. Priority Monarch Habitat Restoration Areas in California.

Coastal California Overwintering Habitat: Western monarchs migrate to the California coast, and cluster in a specific set of forested tree groves during the fall and winter each year. Overwintering sites provide protection from inclement weather and possess suitable vegetation and microclimate conditions for monarchs (e.g., roosting/clustering trees, wind protection, dappled sunlight, nectar sources, water and/or dew for hydration, high humidity, and an absence of freezing temperatures). Overwintering sites consist of a core zone (cluster area), shelter zone (wind protection and outer site boundaries surrounding core zone) and support zone (area within 500 feet of an overwintering site that provides nectar, hydration, and microclimate protection). In the overwintering zone of the coast (i.e., within five miles of the coast from Mendocino County south through Santa Barbara County, and within one mile of the coast from Ventura County south through San Diego County), we recommend the following:

1. Protect, manage, enhance and restore monarch butterfly overwintering sites (Find an Overwintering Site) and surrounding habitat.
2. Use only native, insecticide-free plants for habitat restoration and enhancement actions. If plants are grown via contract, use grow specifications that limit pesticide residues.

Please contact Samantha Marcum (samantha_marcum@fws.gov) or Cat Darst (cat_darst@fws.gov) with questions or suggestions on these recommendations.

3. Conduct overwintering site habitat assessments and develop and implement long-term management plans. Management plan actions may include, but are not limited to:

    a. Enhance habitat within overwintering sites and within 500 feet (support zone) of sites by planting tree species where monarchs are known to cluster (e.g., Monterey pine *(Pinus radiata)*, Monterey cypress *(Cupressus macrocarpa)*, Coast redwood *(Sequoia sempervirens)*, coast live oak *(Quercus agrifolia)*, Douglas fir *(Pseudotsuga menzesii)*, Torrey pine (*Pinus torreyana*), western sycamore *(Platanus racemosa)*, bishop pine *(Pinus muricata)*, as appropriate for location.

    b. Avoid the removal of living trees or shrubs within 500 feet of overwintering sites, except for specific grove enhancement purposes (e.g., if select thinning is recommended to benefit monarchs), and/or for human safety concerns substantiated by a hazard tree assessment. Dead or fallen trees may be removed, chipped, or pile burned within the overwintering site outside of the overwintering season in order to reduce disease and fuels buildup.

    c. Reduce fuel loads and minimize the risk of catastrophic wildfire within overwintering habitat through selective thinning of small diameter (8" or less) trees in the support zone and, in some instances, the shelter zone of overwintering sites. The risks and benefits of fuels management should be assessed on a case-by-case basis for each site.

    d. Conduct management activities (e.g., tree trimming, mowing, burning and grazing) in monarch overwintering sites from March 1-September 30 (outside of estimated timeframe when monarchs are likely present), in coordination with a monarch biologist. Planting trees, shrubs, and forbs (without use of heavy machinery) for restoration is acceptable during the overwintering season.

    e. Enhance nectar sources by planting fall/winter/early spring blooming native forbs, shrubs, or trees within overwintering sites and within five miles of the coast (Nectar Planting Lists).

4. Protect monarchs, other pollinators, and their habitats from pesticides, including insecticides, fungicides and herbicides. Specific recommendations may vary by site.

    a. Avoid the use pesticides within 500 feet of overwintering sites, particularly when monarchs may be present.

    b. Use non-chemical weed and pest prevention and management methods, and monitor pest pressure to minimize reliance on pesticides for managing insects, mites, weeds, and diseases (Cal-IPC Non-chemical BMPs).

    c. If pesticides are used in or adjacent to overwintering habitat, then conduct applications from March 1-September 30, when possible, and adhere to the following guidance to lessen potentially harmful effects:

i. Avoid the use of neonicotinoids or other systemic insecticides, including coated seeds, any time of the year in monarch habitat due to their ecosystem persistence, systemic nature, and toxicity (Xerces Systemic Insecticides List).

ii. Avoid insecticides that target lepidopterans, including biological pesticides (IRAC Lepidoptera Insecticide Mode of Action Classification).

iii. If herbicides are used, apply when plants are more responsive to treatment and when monarchs and other pollinators are less likely to be nectaring on the plants.

iv. Avoid pesticide application to blooming plants when monarchs may be present.

v. Use targeted application methods, avoid large-scale broadcast applications and take precautions to limit off-site movement of pesticides (e.g., drift from wind and discharge from surface water flows).

vi. Protect habitat areas from pesticide drift with a pesticide-free spatial buffer and/or evergreen vegetative buffer of trees with flowers that are not attractive to pollinators. The appropriate width of monarch and pollinator habitat spatial buffers depends on several factors, including weather and wind conditions, but at a minimum, the habitat should be at least 40 feet from ground-based pesticide applications, 60 feet from air-blast sprayers, and 200 feet from aerial applications or any systemic insecticide applications or plants grown from treated seeds.

vii. If pesticides are used for vector control treatments (e.g., mosquitoes), avoid treatment unless monitoring indicates that the species and numbers exceed a public health threshold. For any mosquito treatments, first employ prevention steps such as reducing standing water. Where possible, draw mosquitoes away from sensitive sites (e.g., using dry ice traps) to limit treatment effects in sensitive habitat areas.

5. To assist in maintaining normal migration behavior, do not plant any type of milkweed at or adjacent to overwintering sites.

   a. To minimize the spread of the pathogen *Ophryocystis elektroscirrha* (OE), and to encourage natural monarch migration, do not plant non-native tropical milkweed (*Asclepias curassavica*) anywhere. OE is able to build up on tropical milkweed, because these plants are evergreen, and they do not die back in the winter. OE can be lethal to monarchs.

   b. Remove tropical milkweed and replace with native nectar plants (Nectar Planting Lists).

6. To contribute to regional and population-level assessments, monitor monarchs and assess conditions of overwintering sites during Thanksgiving and New Year's counts. When possible, report when monarchs arrive and depart the overwintering sites each year (Western Monarch Count).

Please contact Samantha Marcum (samantha_marcum@fws.gov) or Cat Darst (cat_darst@fws.gov) with questions or suggestions on these recommendations.

7. To provide benefits for monarchs and other pollinators anywhere along the coast, install a mosaic of native nectar plants that bloom throughout the year (Nectar Planting Lists).

Breeding and Migratory Habitat: Monarch butterflies breed and migrate across multiple generations each year throughout the western U.S. The early breeding zone (i.e., Priority 1 in Figure 1) is an area in California where monarchs likely breed and/or lay their eggs on milkweed after departing the overwintering sites in mid-winter to early spring each year. Early-emerging milkweed species are an important resource for monarchs in the early breeding zone and may be associated with the population trends of western monarchs: these plants are essential to create the next generation of migratory butterflies. For monarch breeding and migratory habitat, we recommend the following:

Priority 1 Zone:

1. Enhance and maintain habitat in the early breeding zone of California, by identifying and protecting existing habitat, planting native, insecticide-free milkweed, including early-emerging species (e.g., *Asclepias vestita, A. californica, A. cordifolia, A. erosa*), and planting native nectar plants that are available to monarchs in late winter, spring and fall (January-April, August-October) (Nectar Planting Lists; Milkweed Seed Finder).

For All Breeding and Migratory Zones:

2. Use only native, insecticide-free plants for habitat restoration and enhancement actions. If plants are grown via contract, use grow specifications that limit harmful pesticide residues.

3. Enhance and maintain habitat in the Priority 2 zone of California (Figure 1, above) and in other western States, by identifying and protecting existing habitat, and planting milkweed species and flowering plants that are appropriate for the location (Nectar Planting Lists; Milkweed Seed Finder).

4. Conduct management activities such as mowing, burning and grazing in monarch breeding and migratory habitat outside of the estimated timeframe when monarchs are likely present, as is feasible (Figure 2, Recommended Management Timing Map, below).

5. Protect monarchs, other pollinators, and their habitats from pesticides, including insecticides, fungicides and herbicides.

    a. Use non-chemical pest prevention and management methods and monitor pest pressure to minimize reliance on pesticides for managing insects, mites, weeds, and diseases. For example, employ non-chemical weed control techniques, when feasible (Cal-IPC Non-chemical BMPs).

    b. If pesticides are used in monarch habitat, lessen their potential for harm by adhering to the following guidance:

i. Avoid the use of neonicotinoids or other systemic insecticides, including coated seeds, any time of the year in monarch habitat due to their ecosystem persistence, systemic nature, and toxicity (Xerces Systemic Insecticides List).

ii. Avoid the application of pesticides on milkweed plants and define buffer zones to protect habitat from nearby areas where pesticides are applied (See ix, below).

iii. Avoid the application of pesticides on blooming plants when adult monarchs may be present, when feasible (Figure 2, Recommended Management Timing Map, below).

iv. Conduct applications outside of the time period when monarchs are expected to be present (Figure 2, Recommended Management Timing Map, below).

v. Avoid insecticides that target lepidopterans, including biological pesticides (IRAC Lepidoptera Insecticide Mode of Action Classification).

vi. Avoid the use of strobilurin fungicides on milkweeds.

vii. If herbicides are used, apply when plants are more responsive to treatment, and when monarchs and other pollinators are less likely to be nectaring on the plants.

viii. Use targeted application methods, avoid large-scale broadcast applications, and take precautions to limit off-site movement (e.g., wind drift, discharge from surface water flows).

ix. Protect habitat areas from pesticide drift with a pesticide-free spatial buffer and/or evergreen vegetative buffer of trees with flowers that are not attractive to pollinators. The appropriate width of monarch and pollinator habitat spatial buffers depends on several factors, including weather and wind conditions, but at a minimum, the habitat should be at least 40 feet from ground-based pesticide applications, 60 feet from air-blast sprayers, and 200 feet from aerial applications or any systemic insecticide applications or plants grown from treated seeds.

x. If pesticides are used for vector control treatments (e.g., mosquitoes), avoid treatment unless monitoring indicates that the species and numbers exceed a public health threshold. For any mosquito treatments, first employ prevention steps such as reducing standing water. Where possible, draw mosquitoes away from sensitive sites (e.g., using dry ice traps) to limit treatment effects in sensitive habitat areas.

6. To minimize the spread of the pathogen *Ophryocystis elektroscirrha* (OE), do not plant non-native tropical milkweed (*Asclepias curassavica*) anywhere. OE can build up on tropical milkweed and infect monarchs, because these plants are evergreen and do not die back in the winter. OE can be lethal to monarchs.

Please contact Samantha Marcum (samantha_marcum@fws.gov) or Cat Darst (cat_darst@fws.gov) with questions or suggestions on these recommendations.

7. Remove tropical milkweed and replace with native milkweed and nectar plants appropriate for the location (Nectar Planting Lists; Milkweed Seed Finder).

8. Report milkweed and monarch observations from all life stages, including breeding butterflies, to the Western Monarch Milkweed Mapper or via the project portal in the iNaturalist smartphone app.

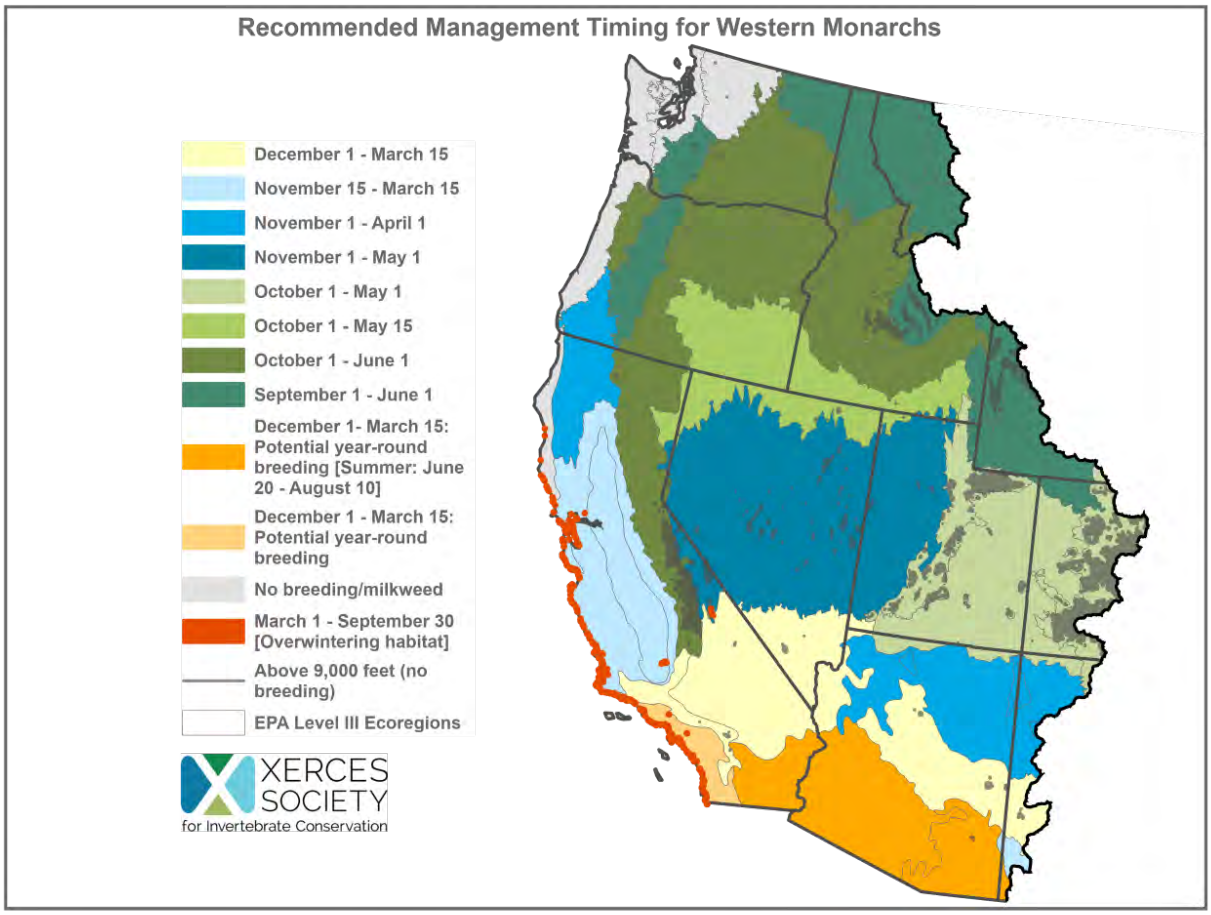


Figure 2. Recommended management windows in the western U.S. by zone.

Notes: The management timing windows illustrated in Figure 2 represent approximate recommendations of timeframes to conduct management actions. These timeframes are based upon the best available current information and may be updated in the future. Each year and site is different, so when possible, please consider surveying milkweed plants for the early life stages of monarchs prior to burning, mowing, grazing or applying pesticides.

Please contact Samantha Marcum (samantha_marcum@fws.gov) or Cat Darst (cat_darst@fws.gov) with questions or suggestions on these recommendations.

Appendix E

Cultural Resources Reports

Confidential Cultural Resources Study is Bound Separately*

*The Cultural Resources Study has been bound separately to protect potentially sensitive information about the location and nature of cultural resources.

Appendix F

Traffic Impact Study

Local Access, Safety, and Circulation Study

SSBMI Mixed Development
El Dorado County, California

DRAFT
July 30, 2024

Prepared for:

Red Hawk Resort & Casino

Prepared by:

Kimley»Horn

555 Capitol Mall, Suite 300
Sacramento, California 95814

Phone: (916) 858-5800

EXECUTIVE SUMMARY

This report documents the results of a local access, safety, and circulation study completed for the Shingle Springs Band of Miwok Indians (SSBMI) mixed development project (the "proposed project" or "project") being completed by the Red Hawk Resort & Casino (the "client"). The project consists of the following primary components:

- Rancheria North Residential Development (currently undeveloped site east of Shingle Springs Drive and south of Green Valley Road)
  - Up to 16 townhomes
  - Up to 24 cluster homes (for senior residents)
  - Up to 92 single-family detached homes
- Arena Development (Sports/Convention Center, located west of the existing casino)
  - Up to 5,000-seats[1]
- Southern Development (undeveloped site east of Red Hawk Parkway and south of Honpie Road)
  - 6,000-square foot (sf) community center
  - Up to 30,000-sf retail uses

This study is intended to satisfy the traffic requirements for Tribal Environmental Assessment (TEA) as part of the Fee to Trust (FTT) process. This study was performed in a manner consistent with El Dorado County's current, published *Guidelines*[2]. The following transportation facilities are included in this evaluation:

Intersections:

1. Koto Road/Red Hawk Parkway at Honpie Road
2. Shingle Springs Drive at Green Valley Road
3. Green Valley Road at Lotus Road
4. Green Valley Road at Greenstone Road
5. Green Valley Road at Missouri Flat Road
6. Missouri Flat Road at El Dorado Road
7. Green Valley Road at N. Shingle Road
8. Green Valley Road at Ponderosa Road
9. Green Valley Road at Deer Valley Road
10. Green Valley Road at Cameron Park Drive/Starbuck Road

Roadway Segments:

1. Green Valley Road, east of Shingle Springs Drive
2. Green Valley Road, west of Shingle Springs Drive

Freeway Facilities:

1. US-50 Mainline
   A. Westbound, west of Casino interchange
   B. Eastbound, between Casino off-ramp and Casino on-ramp
   C. Westbound, between Casino off-ramp and Casino on-ramp
   D. Eastbound, east of Casino interchange
   E. Westbound, east of Casino interchange
2. US-50 Ramps
   F. Eastbound, weave from Shingle Springs Drive
   G. Westbound, merge from Casino
   H. Eastbound, merge from Casino
   I. Westbound, diverge to Casino

[1] Email correspondence with Tyler Bila, Red Hawk Casino, November 22, 2023.
[2] *Transportation Impact Study Guidelines*, El Dorado County – Community Development Agency, November 2014.

This study was conducted for all study facilities for both No Project and Plus Project conditions under Existing (2023) and Cumulative (2043) conditions.

Significant findings of this study include:

- The proposed project is estimated to generate 192 new trips during the AM peak-hour, 1,441 new trips during the PM peak-hour, and 1,401 new trips during the Saturday Midday peak-hour.
- As defined by the County, the addition of the proposed project to the Existing (2023) scenario results in a deficiency at one study intersection, Intersection #1 (Koto Road/Red Hawk Parkway at Honpie Road). This deficiency can be improved to acceptable levels with improvements to the signal timing.
- As defined by the CAMUTCD, Intersection #3 (Green Valley Road at Lotus Road) meets Warrant 3 thresholds for signalization under Existing (2023), Existing (2023) plus Project, Cumulative (2043), and Cumulative (2043) plus Project conditions. As Intersection #3 is found to operate at acceptable levels of delay as defined by the County both with and without the project under all analysis conditions, it is not the sole responsibility of the project to signalize this facility.
- The project contributes a nominal amount (less than or equal to 25-feet) of queueing to a Cumulative (2043) baseline deficiency for the westbound left-turn movement at Intersection #10 (Green Valley Road at Cameron Park Drive/Starbuck Road).
- Collision data provided by the County does not identify safety deficiencies at any study facilities included in this assessment. The project is not anticipated to significantly alter these existing traffic conditions.

TABLE OF CONTENTS

INTRODUCTION 1

PROJECT DESCRIPTION 1

PROJECT AREA ROADWAYS 4

ASSESSMENT OF PROPOSED PROJECT 7
- Proposed Project Trip Generation and Assignment 7

TRANSPORTATION STUDY METHODOLOGY 11
- Level of Service Definitions 11
- Intersection Analysis 11
- Freeway Segment Analysis 11
- Analysis Scenarios 12

EXISTING (2023) CONDITIONS 13

EXISTING (2023) PLUS PROJECT CONDITIONS 17

CUMULATIVE (2043) CONDITIONS 21

CUMULATIVE (2043) PLUS PROJECT CONDITIONS 25

DEFICIENCIES AND IMPROVEMENTS 29
- Standards of Deficiency 29
- Summary of Deficiencies and Improvements 29

OTHER CONSIDERATIONS 31
- Peak-Hour Traffic Signal Warrant Evaluation 31
- Intersection Queuing Evaluation 31
- Study Facility Safety Review 33

CONCLUSIONS 33

APPENDICES
- Traffic Count Data Sheets ..... Appendix A
- Analysis Worksheets for Existing (2023) Conditions ..... Appendix B
- Analysis Worksheets for Existing (2023) plus Proposed Project Conditions ..... Appendix C
- Analysis Worksheets for Cumulative (2043) Conditions ..... Appendix D
- Analysis Worksheets for Cumulative (2043) plus Proposed Project Conditions ..... Appendix E
- Analysis Worksheets for Improved plus Proposed Project Intersection Conditions ..... Appendix F
- Peak-Hour Signal Warrant Reports ..... Appendix G

LIST OF TABLES

Table 1 – Proposed Project Trip Generation 8
Table 2 – Intersection Level of Service Criteria 11
Table 3 – Roadway Segment Level of Service Criteria 12
Table 4 – Freeway Segment Level of Service Criteria 12
Table 5 – Existing (2023) Intersection Levels of Service 15
Table 6 – Existing (2023) Roadway Segment Levels of Service 15
Table 7 – Existing (2023) Freeway Levels of Service 16
Table 8 – Existing (2023) plus Project Intersection Levels of Service 19
Table 9 – Existing (2023) plus Project Roadway Segment Levels of Service 19
Table 10 – Existing (2023) plus Project Freeway Levels of Service 20
Table 11 – Cumulative (2043) Intersection Levels of Service 23
Table 12 – Cumulative (2043) Roadway Segment Levels of Service 23
Table 13 – Cumulative (2043) Freeway Levels of Service 24
Table 14 – Cumulative (2043) plus Project Intersection Levels of Service 27
Table 15 – Cumulative (2043) plus Project Roadway Segment Levels of Service 27
Table 16 – Cumulative (2043) plus Project Freeway Levels of Service 28
Table 17 – Intersection Levels of Service – Existing (2023) plus Project Improved Conditions 30
Table 18 – Traffic Signal Warrant Analysis Results 31
Table 19 – Intersection Queuing Evaluation Results 32
Table 20 – Project Area Sites Selected for Investigation 33

LIST OF FIGURES

Figure 1 – Project Vicinity Map 2
Figure 2 – Project Site Plan 3
Figure 3 – Study Intersections, Traffic Control, and Lane Geometry 5
Figure 4 – Study Freeway Facilities 6
Figure 5 – Project Trip Distribution 9
Figure 6 – Project Trip Assignment 10
Figure 7 – Existing (2023) Peak-Hour Traffic Volumes 14
Figure 8 – Existing (2023) plus Project Peak-Hour Traffic Volumes 18
Figure 9 – Cumulative (2043) Peak-Hour Traffic Volumes 22
Figure 10 – Cumulative (2043) plus Project Traffic Volumes 26

INTRODUCTION

This report documents the results of a local access, safety, and circulation study completed for the Shingle Springs Band of Miwok Indians (SSBMI) mixed development project (the "proposed project" or "project") being completed by Red Hawk Resort & Casino (the "client"). The project proposes to construct a mixture of residential, retail, and recreational land uses. This study is intended to satisfy the traffic requirements for Tribal Environmental Assessment (TEA) as part of the Fee to Trust (FTT) process. This study was performed in a manner consistent with El Dorado County Community *Guidelines*[2]. The remaining sections of this report document the proposed project, analysis methodologies, deficiencies and improvements, and general study conclusions.

PROJECT DESCRIPTION

The proposed project consists of the following primary components:

- Rancheria North Residential Development (currently undeveloped site east of Shingle Springs Drive and south of Green Valley Road)
  - Up to 16 townhomes
  - Up to 24 cluster homes (for senior residents)
  - Up to 92 single-family detached homes
- Arena Development (Sports/Convention Center, located west of the existing casino)
  - Up to 5,000-seats[1]
- Southern Development (undeveloped site east of Red Hawk Parkway and south of Honpie Road)
  - 6,000-square foot (sf) community center
  - Up to 30,000-sf retail uses

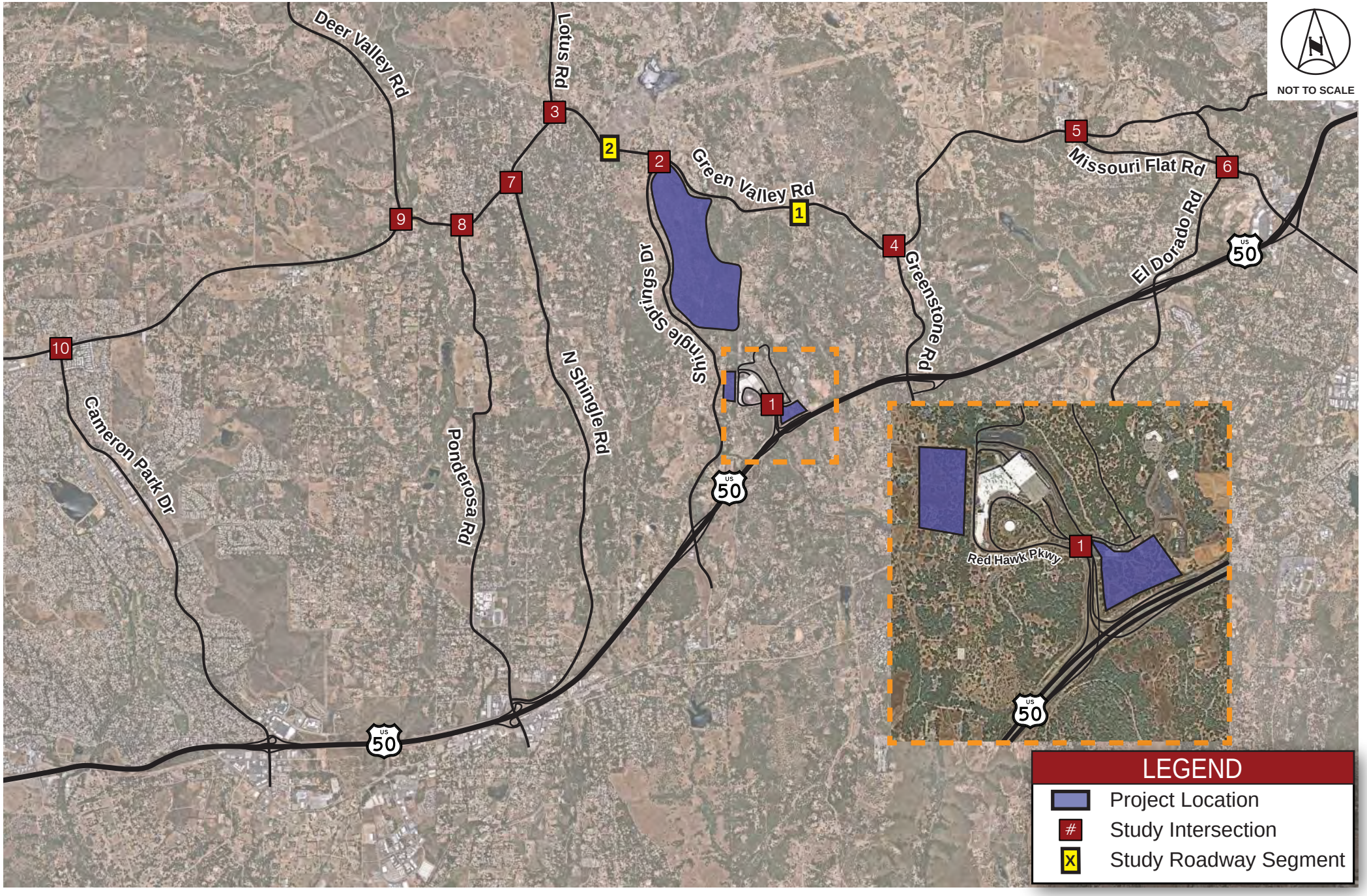
The proposed project development will necessitate the relocation of two (2) approximately 3,000-sf existing tribal maintenance shops. The replacement maintenance operations building is assumed to have a minimal effect on external traffic operations as it will be approximately the same size and provide similar services internal to the tribe as the two existing maintenance shops. The project location and study facilities are shown in **Figure 1** and the project site plan is shown in **Figure 2**. The following transportation facilities are included in this evaluation:

Intersections:

1. Koto Road/Red Hawk Parkway at Honpie Road
2. Shingle Springs Drive at Green Valley Road
3. Green Valley Road at Lotus Road
4. Green Valley Road at Greenstone Road
5. Green Valley Road at Missouri Flat Road
6. Missouri Flat Road at El Dorado Road
7. Green Valley Road at N Shingle Road
8. Green Valley Road at Ponderosa Road
9. Green Valley Road at Deer Valley Road
10. Green Valley Road at Cameron Park Drive/Starbuck Road

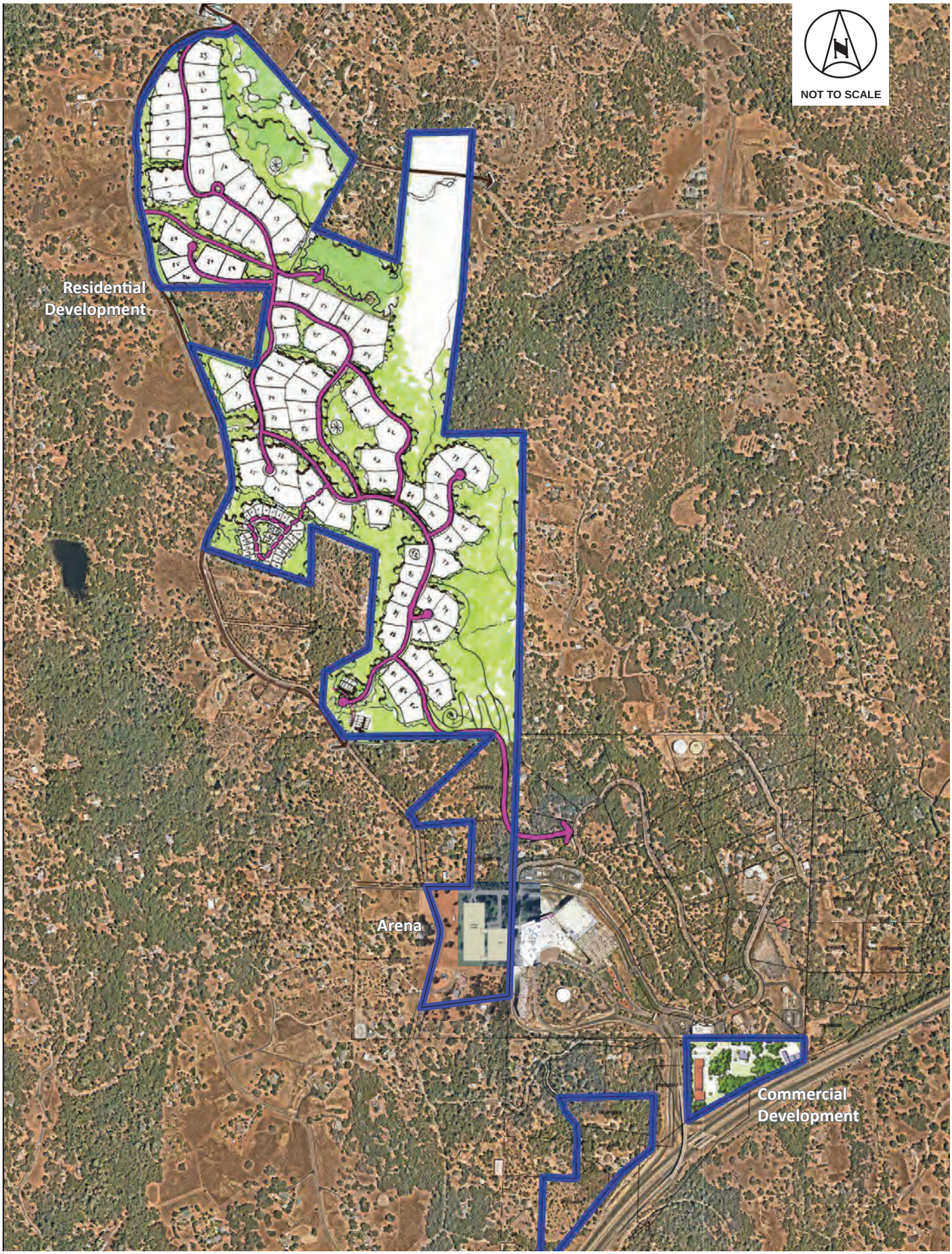
Roadway Segments:

1. Green Valley Road, east of Shingle Springs Drive
2. Green Valley Road, west of Shingle Springs Drive



Kimley»Horn

Figure 1
Project Vicinity Map



Kimley»Horn

Figure 2
Project Site Plan

Freeway Facilities:

1. US-50 Mainline
    A. Westbound, west of Casino interchange
    B. Eastbound, between Casino off-ramp and Casino on-ramp
    C. Westbound, between Casino off-ramp and Casino on-ramp
    D. Eastbound, east of Casino interchange
    E. Westbound, east of Casino interchange

2. US-50 Ramps
    F. Eastbound, weave from Shingle Springs Drive
    G. Westbound, merge from Casino
    H. Eastbound, merge from Casino
    I. Westbound, diverge to Casino

Based on the County's requirements, this study was conducted for the study facilities for both No Project and Plus Project conditions under Existing (2023) and Cumulative (2043) conditions. **Figure 3** illustrates the study intersections, traffic control, and lane configurations. The freeway study facilities are depicted in **Figure 4**.

PROJECT AREA ROADWAYS

The following are descriptions of the primary roadways in the vicinity of the project:

Green Valley Road is an east-west arterial roadway that provides a primary connection between Folsom and Placerville. The two-lane roadway carries approximately 5,000 vehicles per day[3] (vpd) between Missouri Flat Road and Cameron Park Drive in the vicinity of the proposed project location.

Missouri Flat Road is a north-south arterial roadway that provides a primary connection to US-50 for western El Dorado County. North of Plaza Drive, Missouri Flat Road carries approximately 6,000 vpd[3] with one through lane in each direction.

Greenstone Road is a north-south collector roadway that provides a connection to US-50 for western El Dorado County. North of US-50, Greenstone Road carries approximately 2,900 vpd[3] with one through lane in each direction.

N Shingle Road is a north-south arterial roadway that provides a primary connection to US-50 for western El Dorado County. South of Green Valley Road, N Shingle Road carries approximately 5,500 vpd[3] with one through lane in each direction.

Ponderosa Road is a north-south local roadway that provides a connection to US-50 for western El Dorado County. South of Green Valley Road, Ponderosa Road carries approximately 1,300 vpd[3] with one through lane in each direction.

Cameron Park Drive is a north-south arterial roadway that provides a primary connection to US-50 for western El Dorado County. South of Green Valley Road, Cameron Park Drive carries approximately 8,000 vpd[3] with one through lane in each direction.

[3] *Annual Traffic Count Summary*, El Dorado County Department of Transportation, 2022.

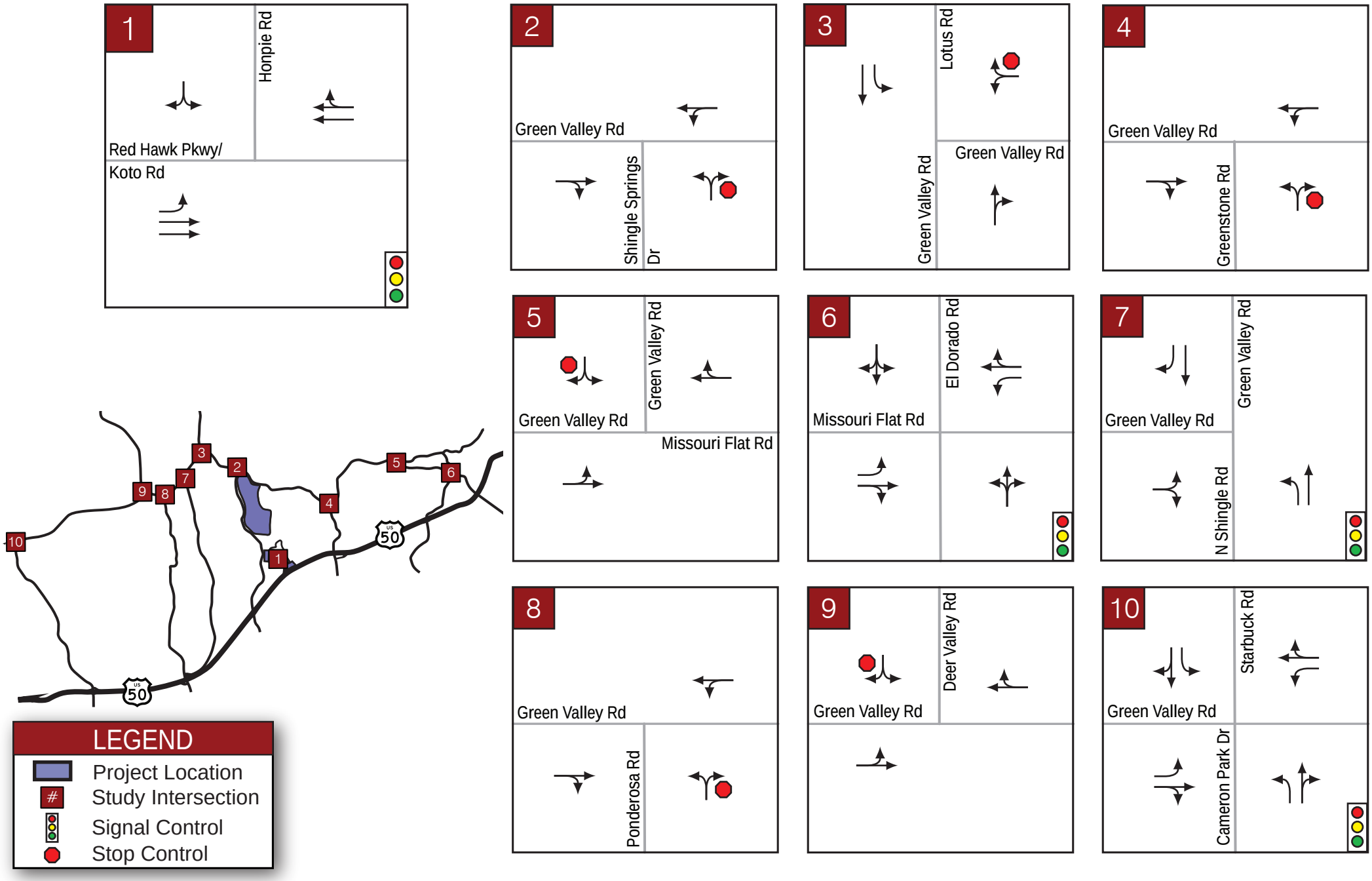
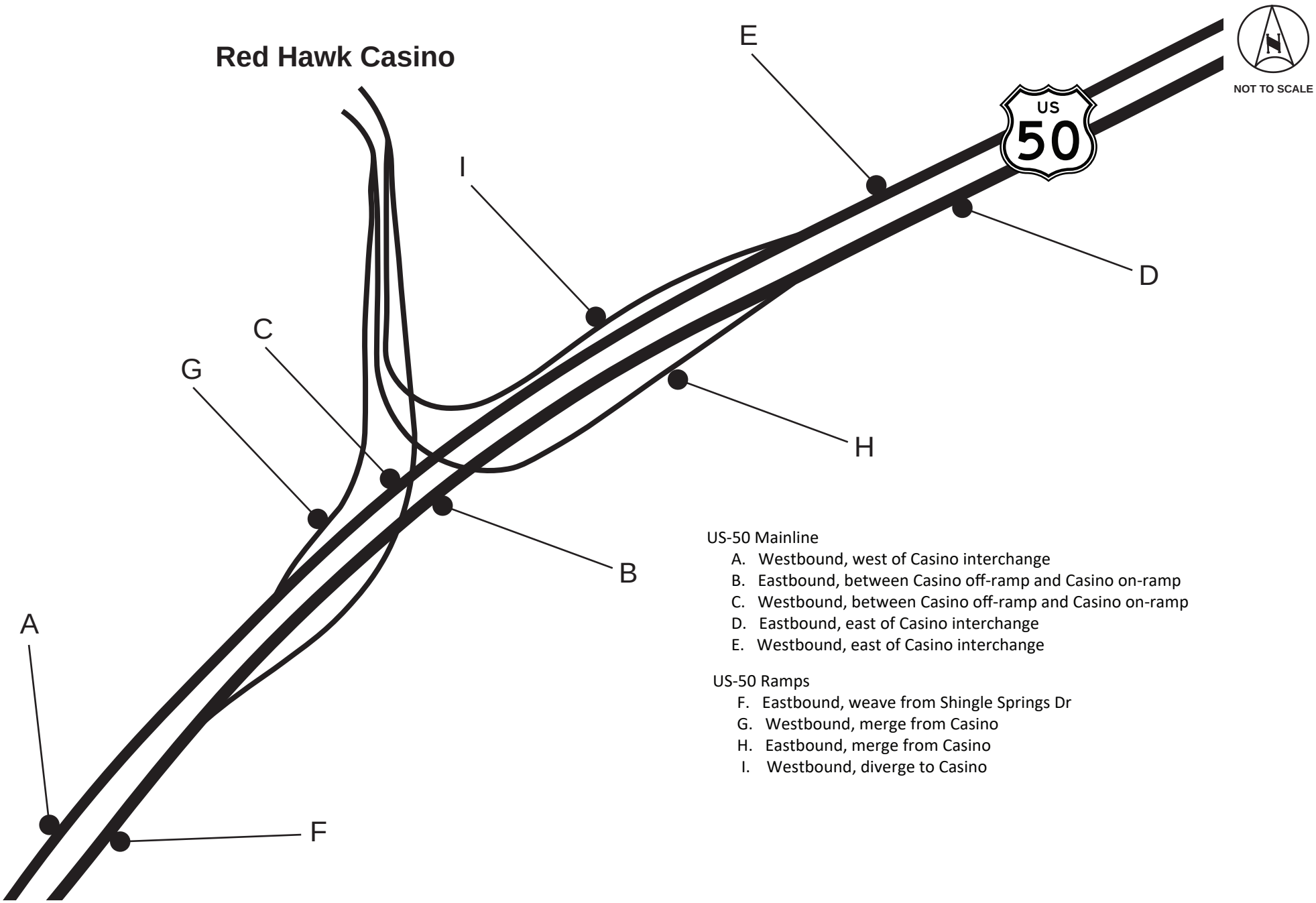


Figure 3
Study Intersections, Traffic Control, and Lane Geometry



US-50 Mainline

A. Westbound, west of Casino interchange
B. Eastbound, between Casino off-ramp and Casino on-ramp
C. Westbound, between Casino off-ramp and Casino on-ramp
D. Eastbound, east of Casino interchange
E. Westbound, east of Casino interchange

US-50 Ramps

F. Eastbound, weave from Shingle Springs Dr
G. Westbound, merge from Casino
H. Eastbound, merge from Casino
I. Westbound, diverge to Casino

Figure 4
Study Freeway Facilties

ASSESSMENT OF PROPOSED PROJECT

Proposed Project Trip Generation and Assignment

The number of trips anticipated to be generated by the proposed project was primarily approximated using data included in the *ITE Trip Generation Manual, 11th Edition* (ITE). As ITE does not provide land use information for an arena, trips were approximated for this land use under the following assumptions:

- A sold-out event for the largest arena seating capacity (5,000 seats[1])
- Arena events are assumed to occur outside of the weekday AM peak-hour
- 35% of arena attendees are expected to arrive at casino prior to the peak-hour. Combined with the 95th-percentile 2023 casino floor headcount data[4] (approximately 1,500 people), this assumption represents a casino floor at approximately 40% capacity (8,000 person capacity[5])
- 75% of non-casino bound arena attendees are assumed to arrive on-site during the peak-hour. The remaining 25% of non-casino bound arena attendees are assumed to arrive either before or after the peak-hour
- The primary direction for arena traffic during the peak-hour is inbound with outbound traffic representing vehicles dropping off attendees
- An average occupancy of 2.5 persons per vehicle was assumed due to the project's relatively distant proximity to large, concentrated population centers

The proposed project trip generation for the weekday, AM and PM peak-hours and Saturday peak-hour is presented in Table 1. As shown in Table 1, assuming a sold out, maximum capacity arena event, the proposed project is estimated to generate 9,596 new weekday trips with 192 new trips occurring during the weekday AM peak-hour, 1,441 new trips occurring during the weekday PM peak-hour, and 1,401 new trips occurring during the Saturday peak-hour.

Project traffic was distributed and assigned to the roadway network based on the project area roadway volumes and engineering judgement. The proposed project trip distribution percentages are provided in Figure 5. The associated assignment of project trips is depicted in Figure 6.

[4] Email correspondence with Tyler Bila, Red Hawk Casino, November 3, 2023.
[5] Email correspondence with Tyler Bila, Red Hawk Casino, December 14, 2023.

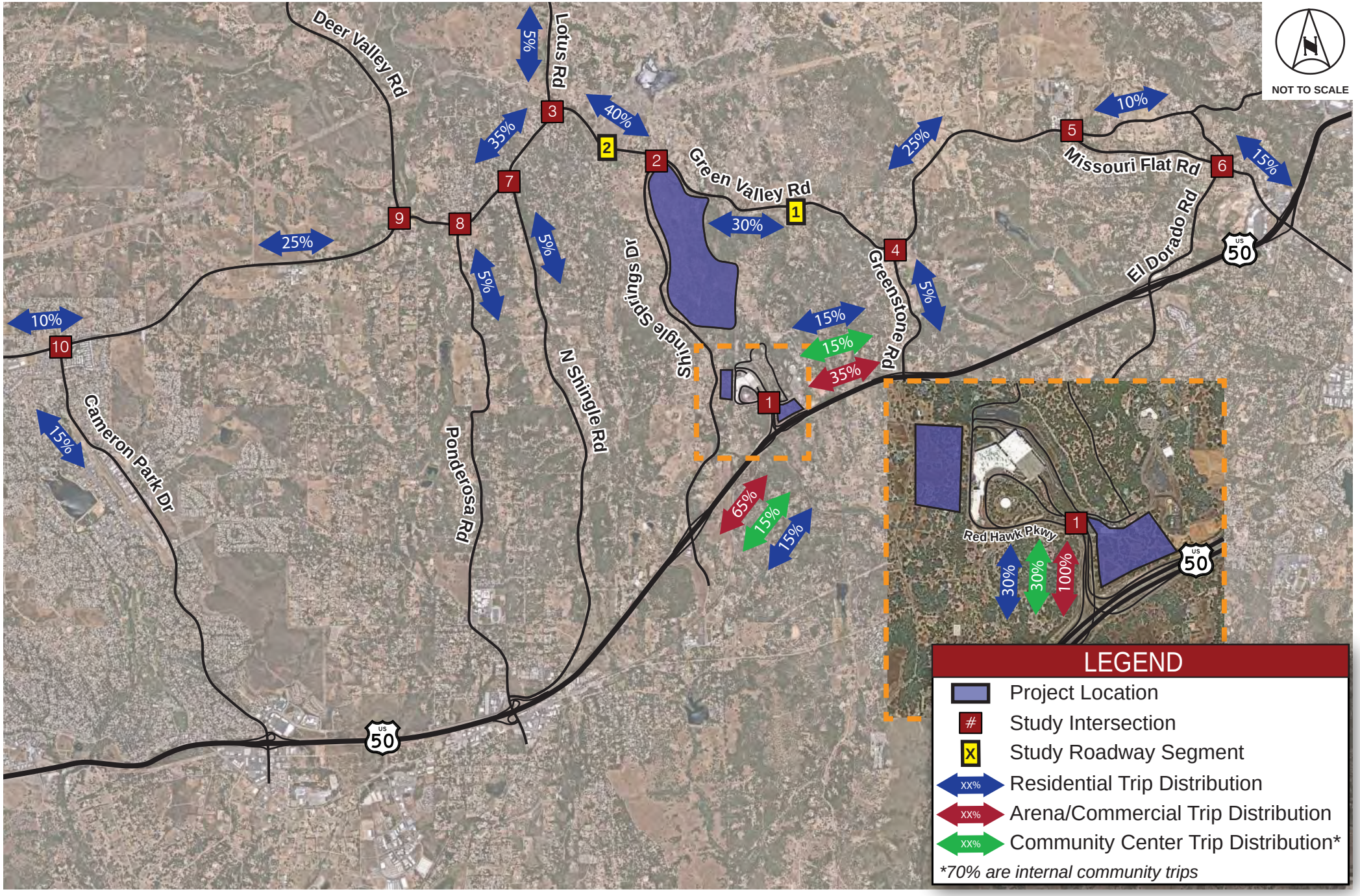
Table 1 – Proposed Project Trip Generation

Land Use (ITE Code)	Qty	Units	Daily Trips	Weekday AM Peak-Hour					Weekday PM Peak-Hour					Saturday Peak-Hour				
				Total Trips	In		Out		Total Trips	In		Out		Total Trips	In		Out	
					%	Trips	%	Trips		%	Trips	%	Trips		%	Trips	%	Trips
Single Family Detached Housing (210)[1]	92	DU*	935	69	25%	17	75%	52	92	63%	58	37%	34	89	54%	48	46%	41
Multifamily Housing (220)[1]	16	DU*	178	28	24%	7	76%	21	27	63%	17	37%	10	27	63%	17	37%	10
Senior Adult Housing - Single-Family (251)[1]	24	DU*	176	13	33%	4	67%	9	15	61%	9	39%	6	9	50%	4	50%	5
Recreational Community Center (495)[1]	6	KSF	173	11	66%	8	34%	3	36	47%	17	53%	19	6	54%	3	50%	3
Strip Retail Plaza (<40k) (822)[1]	30	KSF	1,634	71	60%	42	40%	29	198	50%	99	50%	99	197	51%	101	50%	96
Sports/Convention Center[2]	5,000	Seats	2,600						1,073	91%	975	9%	98	1,073	91%	975	50%	98
Project Trips:			5,696	192		78		114	1,441		1,175		266	1,401		1,148		253

**DU = Dwelling Units*

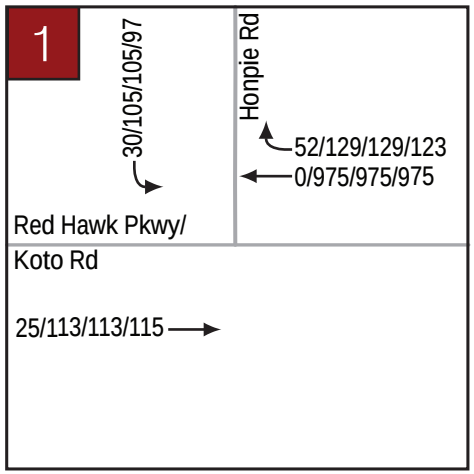
[1] ITE Trip Generation Manual, 11th Edition

[2] Assumed casino and arena trip generation dynamics for sold out event

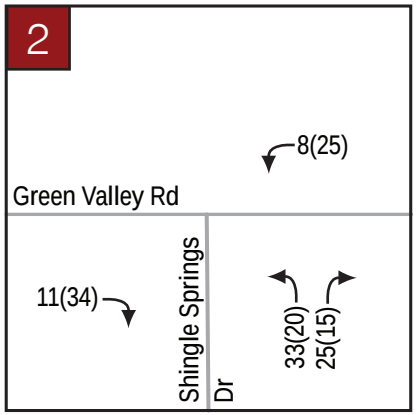


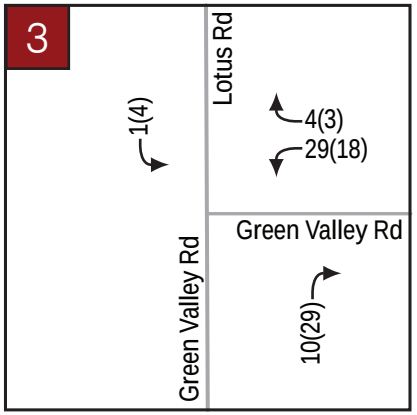
Kimley»Horn

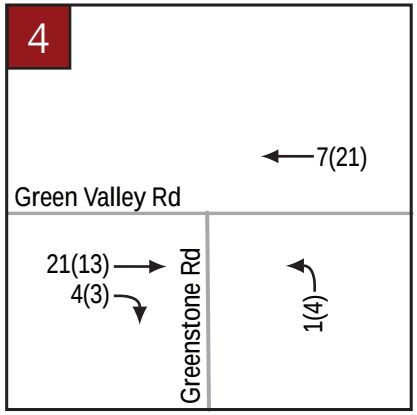
Figure 5
Project Trip Distribution

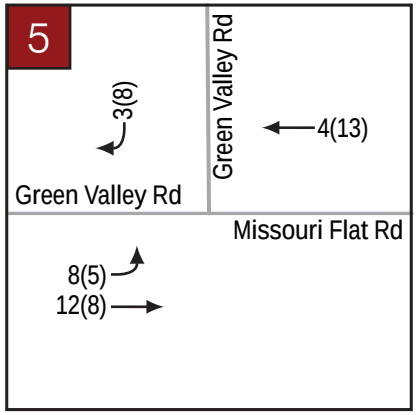


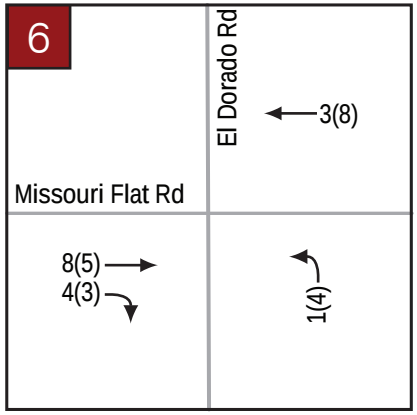
*AM/PM/Friday PM/Saturday Mid

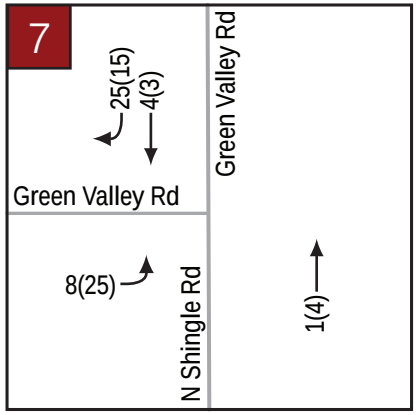


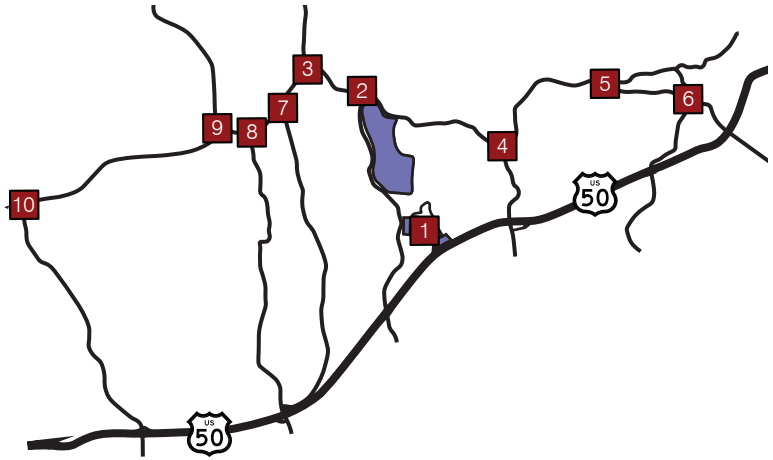


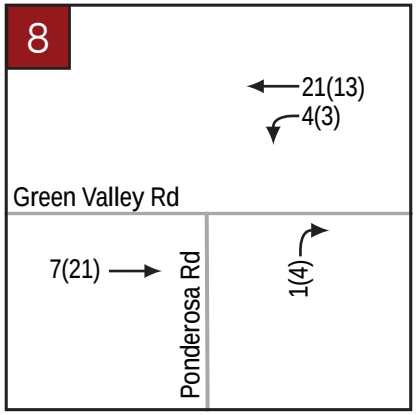


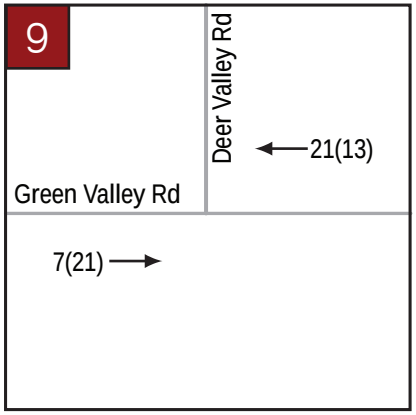


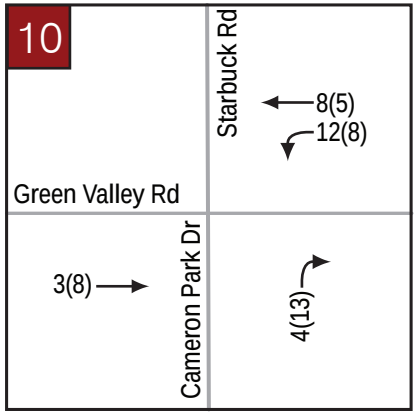












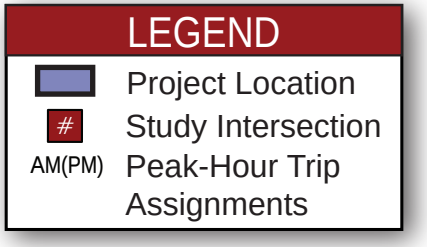


Figure 6
Project Trip Assignment

TRANSPORTATION STUDY METHODOLOGY

This transportation study was performed in accordance with the County's transportation study guidelines[2].

Level of Service Definitions

The level of service (LOS) of a facility is a qualitative measure used to describe operational conditions. LOS ranges from A, which represents minimal delay, to F, which represents heavy delay and a facility that is operating at or near its functional capacity. LOS for this study was determined using methods defined in the *Highway Capacity Manual, 6th Edition* (HCM).

Intersection Analysis

The HCM includes procedures for analyzing side-street stop controlled (SSSC), all-way stop controlled (AWSC), and signalized intersections. The SSSC procedure defines LOS as a function of average control delay for each minor street approach movement. Conversely, the AWSC and signalized intersection procedures define LOS as a function of average control delay for the intersection. Table 2 presents intersection LOS definitions as defined in the HCM.

Table 2 – Intersection Level of Service Criteria

Level of Service (LOS)	Un-Signalized	Signalized
	Average Control Delay* (sec/veh)	Average Control Delay (sec/veh)
A	≤ 10	≤ 10
B	> 10 – 15	> 10 – 20
C	> 15 – 25	> 20 – 35
D	> 25 – 35	> 35 – 55
E	> 35 – 50	> 55 – 80
F	> 50	> 80

Source: Highway Capacity Manual, 6th Edition
* Applied to the worst lane/lane group(s) for SSSC

LOS for the study intersections was determined using the Synchro® traffic analysis software. Synchro 11 uses HCM methodology to analyze intersection delay and LOS. Levels of service for intersections are evaluated against El Dorado County thresholds of LOS D for Rural Regions and LOS E for Community Regions[2].

Roadway Segment Analysis

The HCM also includes procedures for analyzing roadway segments. Table 3 presents roadway segment LOS definitions as defined in the HCM. Roadway segments were assessed using the appropriate two-lane and multi-lane highway designations as defined in the HCM using HCS7 software. Levels of service for roadway segments are evaluated against El Dorado County thresholds of LOS D for Rural Regions and LOS E for Community Regions[2].

Freeway Segment Analysis

The HCM also includes procedures for analyzing freeway segments. The LOS criteria for freeway segments defines LOS as a function of density measured in passenger cars per mile per lane (pc/mi/ln). Table 4 presents freeway segment LOS definitions as defined in the HCM. Freeway segments were assessed using the appropriate functional segment designations as defined in the HCM using HCS7 software. Level of Service E was used as the operational threshold for all Caltrans' freeway facilities.

Table 3 – Roadway Segment Level of Service Criteria

Level of Service (LOS)	Two-Lane Highway*	Multi-Lane Highway*
	Follower Density (followers/mile)	Density (pc/mi/ln)
A	≤ 2.5	≤ 11
B	> 2.5 – 5.0	> 11 – 18
C	> 5.0 – 10.0	> 18 – 26
D	> 10.0 – 15.0	> 26 – 35
E	> 15.0	> 35 – 45
F	Exceeds Capacity (v/c > 1.0)	Exceeds Capacity OR > 45

Source: Highway Capacity Manual, 6th Edition
** LOS definition is for lower speed highways (speed limit less than 50 mph)*

Table 4 – Freeway Segment Level of Service Criteria

Level of Service (LOS)	Basic	Weave	Merge/Diverge
	Density (pc/mi/ln)	Density (pc/mi/ln)	Density (pc/mi/ln)
A	≤ 11	≤ 10	≤ 10
B	> 11 – 18	> 10 – 20	> 10 – 20
C	> 18 – 26	> 20 – 28	> 20 – 28
D	> 26 – 35	> 28 – 35	> 28 – 35
E	> 35 – 45	> 35 – 43	> 35
F	> 45	> 43	Exceeds capacity

Source: Highway Capacity Manual, 6th Edition

Analysis Scenarios

As described in the following sections, the LOS analysis was conducted for the study facilities for the following scenarios: Existing (2023) Conditions, Existing (2023) plus Project Conditions, Cumulative (2043) Conditions, and Cumulative (2043) plus Project Conditions.

EXISTING (2023) CONDITIONS

Existing traffic counts were collected to establish the existing conditions of the study area intersections. Counts representative of typical weekday (Tuesday-Thursday) AM and PM peak-hour conditions were performed on November 2, 2023, and November 16, 2023, between 6-9 AM and 4-7 PM. Counts representative of typical Friday PM peak-hour conditions were performed on November 17, 2023, between 4-7 PM at Intersection #1 (Koto Road/Red Hawk Parkway at Honpie Road). Counts representative of typical Saturday midday conditions were performed on November 18, 2023, between 10 AM-2 PM at Intersection #1 (Koto Road/Red Hawk Parkway at Honpie Road). Twenty-four hour roadway segment counts were collected at study segments along Green Valley Road between November 2 and November 4, 2023. Twenty-four hour roadway segment counts were collected from casino interchange ramps between November 16 and November 18, 2023. To supplement this data collected for freeway analysis, Caltrans PeMS data was used to approximate peak-hour freeway segment volumes.

Existing (2023) Conditions peak-hour traffic volumes are presented in **Figure 7**. The traffic count data sheets are provided in **Appendix A**. Detailed calculations are included in **Appendix B**.

Intersections

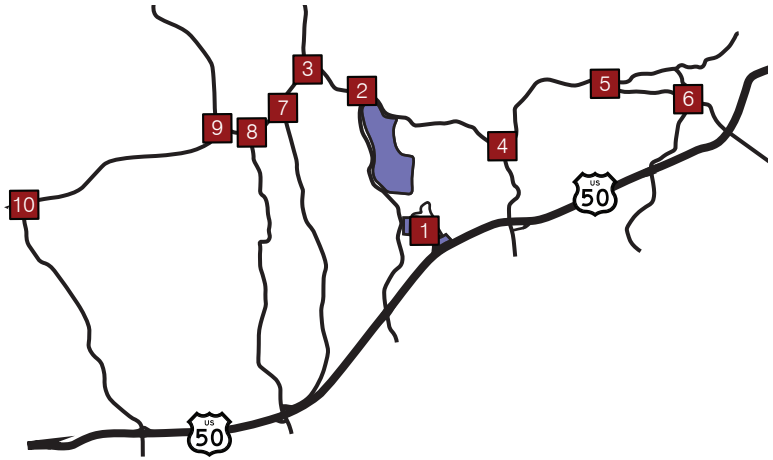
Table 5 presents the intersection operating conditions for this scenario. As indicated in **Table 5**, the study intersections operate from LOS A to LOS C.

Roadway Segments

Table 6 presents the roadway segment operating conditions for this analysis scenario. As indicated in **Table 6**, the study roadway segments operate at LOS A.

Freeway Facilities

Table 7 presents the freeway facilities operating conditions for this analysis scenario. As indicated in **Table 7**, the study freeway facilities operate from LOS B to LOS D.



Kimley»Horn

Figure 7
Existing (2023) Peak-Hour Traffic Volumes

Table 5 – Existing (2023) Intersection Levels of Service

ID	Intersection	Peak Hour	LOS Threshold	Control	Existing (2023)	
					Delay (sec)	LOS
1	Koto Rd/Red Hawk Pkwy at Honpie Rd	AM	D	Signal	8.2	A
		PM			7.5	A
		Fri PM			7.5	A
		Sat Mid			7.3	A
2	Shingle Springs Dr at Green Valley Rd	AM		SSSC	0.4(10.3 NB)	A(B)
		PM			0.4(10.3 NB)	A(B)
3	Green Valley Rd at Lotus Rd	AM		SSSC	3.7(18.9 WB)	A(C)
		PM			5.1(23.3 WB)	A(C)
4	Green Valley Rd at Greenstone Rd	AM		SSSC	3.9(11.6 NB)	A(B)
		PM			4.4(12.2 NB)	A(B)
5	Green Valley Rd at Missouri Flat Rd	AM		SSSC	2.5(15.3 SB)	A(C)
		PM			2.7(12.3 SB)	A(B)
6	Missouri Flat Rd at El Dorado Rd	AM		Signal	14.2	B
		PM			14.6	B
7	Green Valley Rd at N Shingle Rd	AM		Signal	10.5	B
		PM			10.7	B
8	Green Valley Rd at Ponderosa Rd	AM		SSSC	3.5(15.1 NB)	A(C)
		PM			1.6(11.4 NB)	A(B)
9	Green Valley Rd at Deer Valley Rd	AM		SSSC	1.6(13.5 SB)	A(B)
		PM			1.8(11.8 SB)	A(B)
10	Green Valley Rd at Cameron Park Dr/Starbuck Rd	AM	E	Signal	19.7	B
		PM			25.2	C

Notes: **Bold** represents unacceptable operations.
Side Street Stop Controlled (SSSC) reported as intersection delay followed by worst approach's delay.

Table 6 – Existing (2023) Roadway Segment Levels of Service

Segment	Location	LOS Threshold	Peak-Hour	Analysis Direction	Existing (2023)	
					LOS	Density
1	Green Valley Rd, east of Shingle Springs Dr	E	AM	NB	A	0.8
				SB	A	1.7
			PM	NB	A	1.7
				SB	A	1.7
2	Green Valley Rd, west of Shingle Springs Dr		AM	EB	A	1.6
				WB	A	0.6
			PM	EB	A	1.6
				WB	A	1.4

Note: Density is reported as vehicles per mile per lane (veh/mi/lane).

Table 7 – Existing (2023) Freeway Levels of Service

Segment	Location	Analysis Direction	Peak-Hour	Existing (2023)	
				LOS	Density
A	Westbound, West of Casino Interchange	WB	AM	C	21.3
			PM	C	22.2
			Fri PM	C	22.1
			Sat Mid	C	21.8
B	Eastbound, between Casino Off-Ramp and Casino On-Ramp	EB	AM	C	23.9
			PM	C	23.7
			Fri PM	C	23.9
			Sat Mid	C	23.9
C	Westbound, betweeen Casino On-Ramp and Casino On-Ramp	WB	AM	C	21.5
			PM	C	21.6
			Fri PM	C	21.5
			Sat Mid	C	21.5
D	Eastbound, East of Casino Interchange	EB	AM	C	24.7
			PM	D	26.3
			Fri PM	D	26.7
			Sat Mid	D	27.7
E	Westbound, East of Casino Interchange	WB	AM	C	21.5
			PM	C	21.5
			Fri PM	C	21.5
			Sat Mid	C	21.5
F	Eastbound, Weave from Shingle Springs Dr	EB	AM	B	19.4
			PM	B	19.5
			Fri PM	B	19.4
			Sat Mid	B	19.4
G	Westbound, Merge from Casino	WB	AM	C	25.6
			PM	C	29.8
			Fri PM	C	30.0
			Sat Mid	C	31.1
H	Eastbound, Merge from Casino	EB	AM	C	26.2
			PM	C	25.1
			Fri PM	C	25.0
			Sat Mid	C	24.7
I	Westbound, Diverge to Casino	WB	AM	C	23.0
			PM	C	26.0
			Fri PM	C	26.0
			Sat Mid	C	26.0

Note: Density is reported as vehicles per mile per lane (veh/mi/lane).

EXISTING (2023) PLUS PROJECT CONDITIONS

The number of trips anticipated to be generated by the proposed project was derived using data included in the *ITE Trip Generation Manual, 11th Edition* and data provided by the client. These trips were then assigned to the roadway network based on the project area roadway volumes and engineering judgement. Using these volumes, LOS was determined at the study facilities. Existing (2023) plus Project peak-hour traffic volumes are presented in **Figure 8.** Detailed calculations are included in **Appendix C**.

Intersections

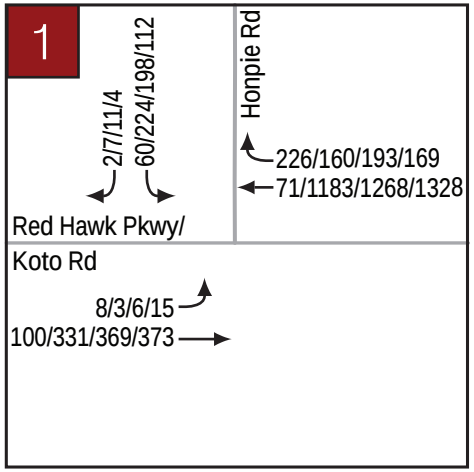
Table 8 presents the intersection operating conditions for this analysis scenario. As indicated in **Table 8**, the study intersections operate from LOS A to LOS F.

Roadway Segments

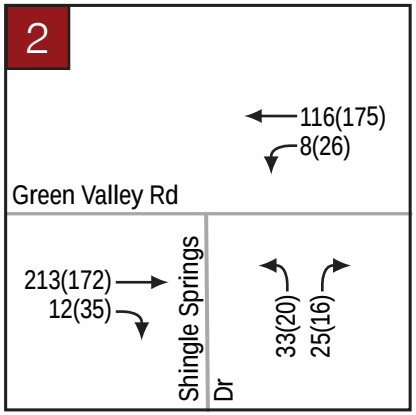
Table 9 presents the roadway segment operating conditions for this analysis scenario. As **Table 9** indicates, the roadway segments operate from LOS A to LOS B.

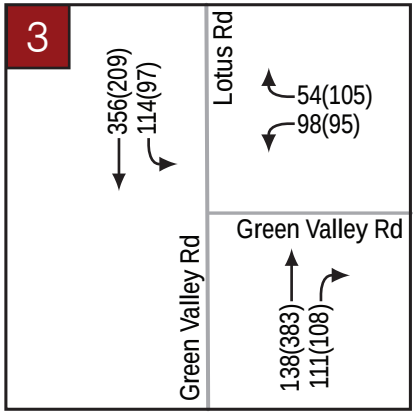
Freeway Facilities

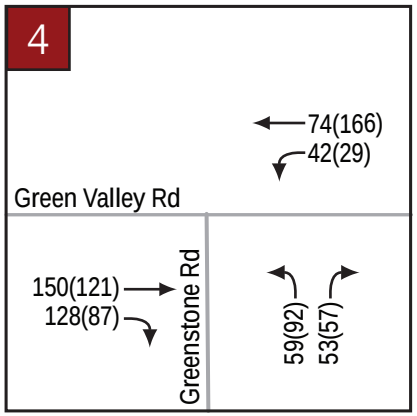
Table 10 presents the freeway facilities operating conditions for this analysis scenario. As indicated in **Table 10**, the study freeway facilities operate from LOS B to LOS D.

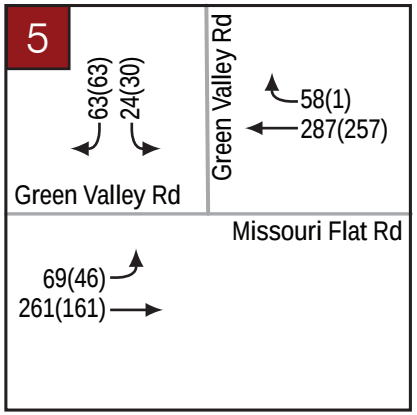


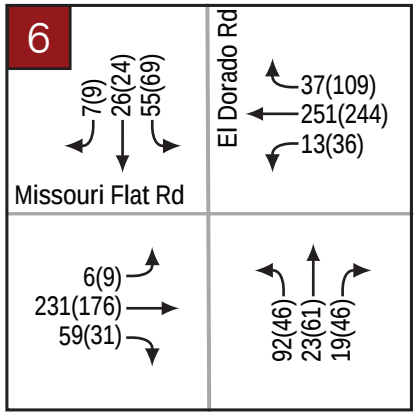
*AM/PM/Friday PM/Saturday Mid

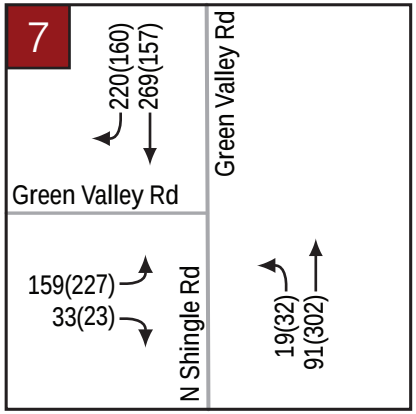


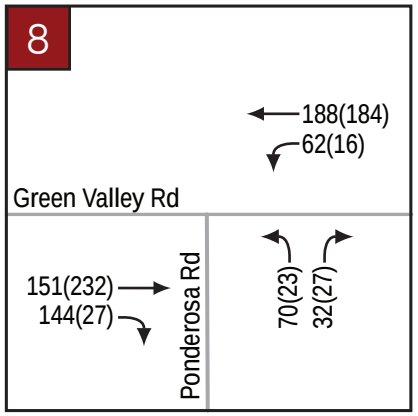


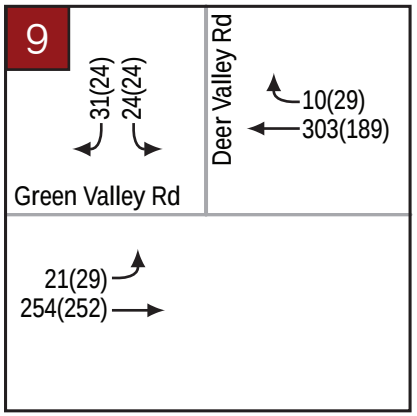


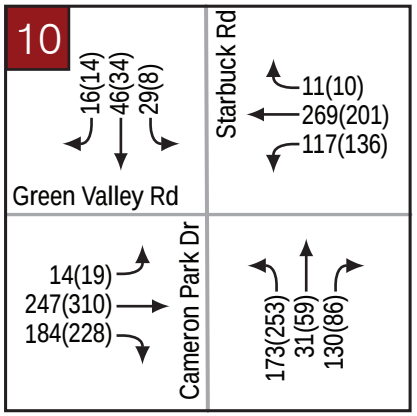


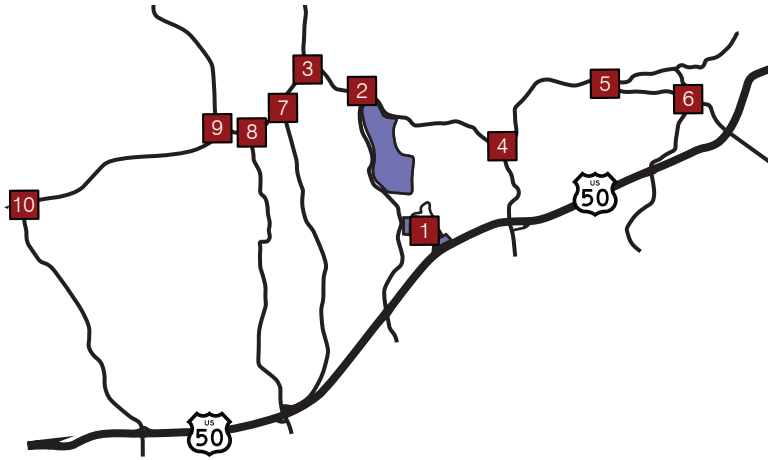












LEGEND

- Project Location
- # Study Intersection
- AM(PM) Peak-Hour Traffic Volumes

Figure 8
Existing (2023) plus Project Peak-Hour Traffic Volumes

Table 8 – Existing (2023) plus Project Intersection Levels of Service

ID	Intersection	Peak Hour	LOS Threshold	Control	Existing (2023)		Existing (2023) plus Project	
					Delay (sec)	LOS	Delay (sec)	LOS
1	Koto Rd/Red Hawk Pkwy at Honpie Rd	AM	D	Signal	8.2	A	8.2	A
		PM			7.5	A	**97.0**	**F**
		Fri PM			7.5	A	**126.7**	**F**
		Sat Mid			7.3	A	**107.4**	**F**
2	Shingle Springs Dr at Green Valley Rd	AM		SSSC	0.4(10.3 NB)	A(B)	1.6(11.0 NB)	A(B)
		PM			0.4(10.3 NB)	A(B)	1.5(11.4 NB)	A(B)
3	Green Valley Rd at Lotus Rd	AM		SSSC	3.7(18.9 WB)	A(C)	5.1(23.3 WB)	A(C)
		PM			5.1(23.3 WB)	A(C)	6.8(30.0 WB)	A(D)
4	Green Valley Rd at Greenstone Rd	AM		SSSC	3.9(11.6 NB)	A(B)	3.8(11.9 NB)	A(B)
		PM			4.4(12.2 NB)	A(B)	4.5(12.9 NB)	A(B)
5	Green Valley Rd at Missouri Flat Rd	AM		SSSC	2.5(15.3 SB)	A(C)	2.6(15.8 SB)	A(C)
		PM			2.7(12.3 SB)	A(B)	2.9(13.3 SB)	A(B)
6	Missouri Flat Rd at El Dorado Rd	AM		Signal	14.2	B	14.3	B
		PM			14.6	B	16.3	B
7	Green Valley Rd at N Shingle Rd	AM		Signal	10.5	B	10.7	B
		PM			10.7	B	10.4	B
8	Green Valley Rd at Ponderosa Rd	AM		SSSC	3.5(15.1 NB)	A(C)	3.5(15.9 NB)	A(C)
		PM			1.6(11.4 NB)	A(B)	1.6(12.0 NB)	A(B)
9	Green Valley Rd at Deer Valley Rd	AM		SSSC	1.6(13.5 SB)	A(B)	1.6(14.0 SB)	A(B)
		PM			1.8(11.8 SB)	A(B)	1.6(12.5 SB)	A(B)
10	Green Valley Rd at Cameron Park Dr/Starbuck Rd	AM	E	Signal	19.7	B	20.4	C
		PM			25.2	C	36.5	D

Notes: **Bold** represents unacceptable operations. Shaded represents a project induced deficiency.
Side Street Stop Controlled (SSSC) reported as intersection delay followed by worst approach's delay.

Table 9 – Existing (2023) plus Project Roadway Segment Levels of Service

Segment	Location	LOS Threshold	Peak-Hour	Analysis Direction	Existing (2023)		Existing (2023) plus Project	
					LOS	Density	LOS	Density
1	Green Valley Rd, east of Shingle Springs Dr	E	AM	NB	A	0.8	A	0.9
				SB	A	1.7	B	2.1
			PM	NB	A	1.7	B	2.0
				SB	A	1.7	A	1.9
2	Green Valley Rd, west of Shingle Springs Dr		AM	EB	A	1.6	A	1.8
				WB	A	0.6	A	0.9
			PM	EB	A	1.6	B	2.0
				WB	A	1.4	A	1.7

Note: Density is reported as vehicles per mile per lane (veh/mi/lane).

Table 10 – Existing (2023) plus Project Freeway Levels of Service

Segment	Location	Analysis Direction	Peak-Hour	Existing (2023)		Existing (2023) plus Project	
				LOS	Density	LOS	Density
A	Westbound, West of Casino Interchange	WB	AM	C	21.3	C	21.6
			PM	C	22.2	C	23.0
			Fri PM	C	22.1	C	22.9
			Sat Mid	C	21.8	C	22.6
B	Eastbound, between Casino Off-Ramp and Casino On-Ramp	EB	AM	C	23.9	C	23.9
			PM	C	23.7	C	23.9
			Fri PM	C	23.9	C	23.9
			Sat Mid	C	23.9	C	23.9
C	Westbound, betweeen Casino On-Ramp and Casino On-Ramp	WB	AM	C	21.5	C	21.5
			PM	C	21.6	C	21.6
			Fri PM	C	21.5	C	21.5
			Sat Mid	C	21.5	C	21.5
D	Eastbound, East of Casino Interchange	EB	AM	C	24.7	C	25.1
			PM	D	26.3	D	28.3
			Fri PM	D	26.7	D	28.4
			Sat Mid	D	27.7	D	29.5
E	Westbound, East of Casino Interchange	WB	AM	C	21.5	C	21.7
			PM	C	21.5	C	25.7
			Fri PM	C	21.5	C	25.7
			Sat Mid	C	21.5	C	25.6
F	Eastbound, Weave from Shingle Springs Dr	EB	AM	B	19.4	B	19.8
			PM	B	19.5	D	28.7
			Fri PM	B	19.4	D	28.7
			Sat Mid	B	19.4	D	27.6
G	Westbound, Merge from Casino	WB	AM	C	25.6	C	28.5
			PM	C	29.8	D	31.6
			Fri PM	C	30.0	D	31.7
			Sat Mid	C	31.1	D	32.7
H	Eastbound, Merge from Casino	EB	AM	C	26.2	C	24.4
			PM	C	25.1	C	25.9
			Fri PM	C	25.0	C	25.9
			Sat Mid	C	24.7	C	25.5
I	Westbound, Diverge to Casino	WB	AM	C	23.0	C	26.2
			PM	C	26.0	C	30.6
			Fri PM	C	26.0	C	30.7
			Sat Mid	C	26.0	C	30.6

Note: Density is reported as vehicles per mile per lane (veh/mi/lane).

CUMULATIVE (2043) CONDITIONS

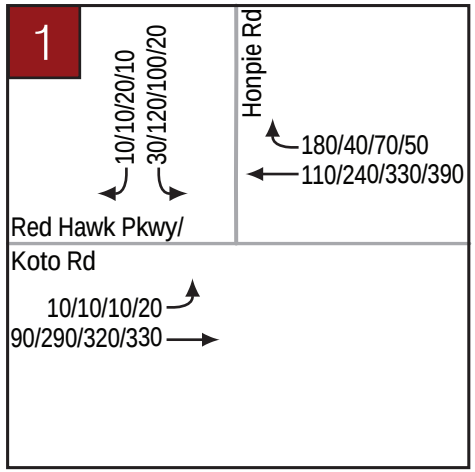
The number of trips anticipated in the Cumulative condition was derived using the existing traffic counts collected during 2023 and data obtained from the El Dorado County Transportation Demand Model (TDM). The County TDM contains two scenarios: Existing (2018) and Future (2040). The differences between the Existing (2018) and Future (2040) scenario volumes on model links and nodes were used to develop annual growth rates for study intersection turning movements that could then be applied to "grow" the existing 2023 counts and assess a Cumulative (2043) scenario for the study intersections and roadway segments.

Using these volumes, LOS was determined at the study facilities. Cumulative (2043) peak-hour traffic volumes are presented in **Figure 9.** Per the County Capital Improvement Program (CIP), there are no projects anticipated to be implemented within the study facilities. Detailed calculations are included in **Appendix D**.

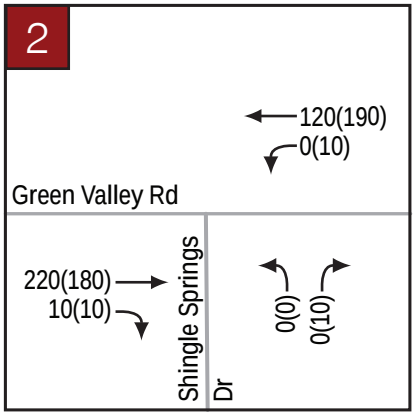
Intersections
Table 11 presents the intersection operating conditions for this scenario. As indicated in **Table 11**, the study intersections operate from LOS A to LOS D.

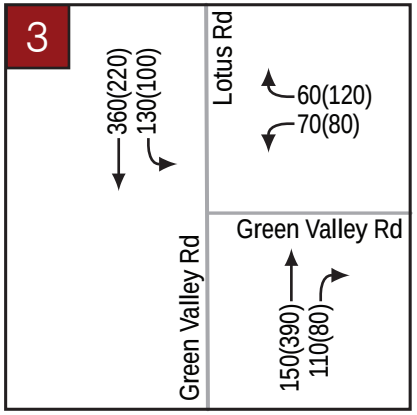
Roadway Segments
Table 12 presents the roadway segment operating conditions for this analysis scenario. As indicated in **Table 12**, the roadway segments operate at LOS A.

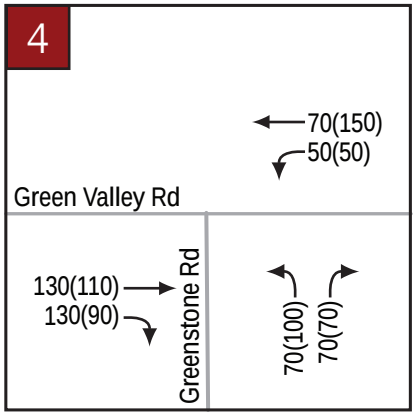
Freeway Facilities
Table 13 presents the freeway facilities operating conditions for this analysis scenario. As indicated in **Table 13**, the study freeway facilities operate from LOS C to LOS D.

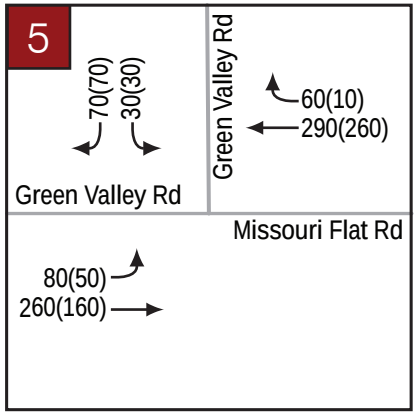


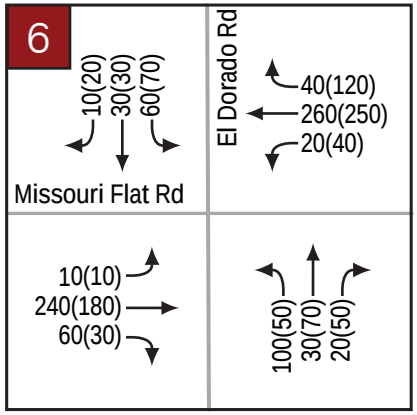
*AM/PM/Friday PM/Saturday Mid

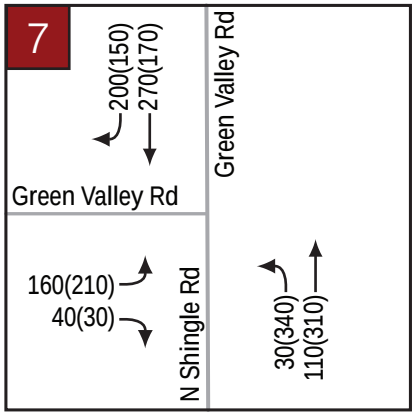


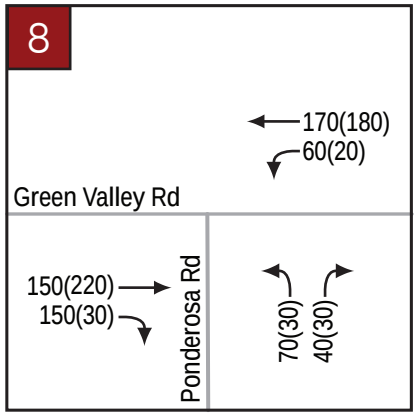


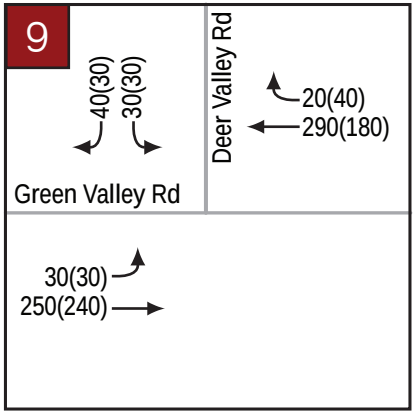


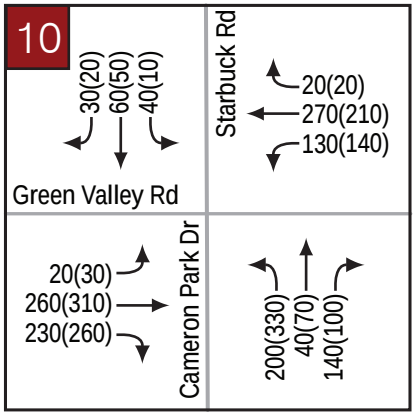


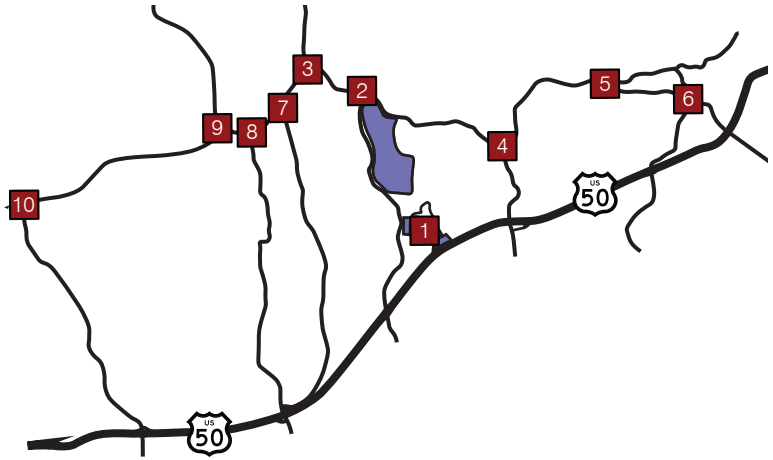












LEGEND

- Project Location
- # Study Intersection
- AM(PM) Peak-Hour Traffic Volumes

Figure 9
Cumulative (2043) Peak-Hour Traffic Volumes

Table 11 – Cumulative (2043) Intersection Levels of Service

ID	Intersection	Peak Hour	LOS Threshold	Control	Cumulative (2043)	
					Delay (sec)	LOS
1	Koto Rd/Red Hawk Pkwy at Honpie Rd	AM	D	Signal	8.1	A
		PM			7.3	A
		Fri PM			7.3	A
		Sat Mid			7.2	A
2	Shingle Springs Dr at Green Valley Rd	AM		SSSC	0.4(10.3 NB)	A(B)
		PM			0.6(10.1 NB)	A(B)
3	Green Valley Rd at Lotus Rd	AM		SSSC	4.0(18.9 WB)	A(C)
		PM			5.8(24.2 WB)	A(C)
4	Green Valley Rd at Greenstone Rd	AM		SSSC	3.9(11.8 NB)	A(B)
		PM			4.5(12.8 NB)	A(B)
5	Green Valley Rd at Missouri Flat Rd	AM		SSSC	2.6(13.9 SB)	A(B)
		PM			2.7(11.9 SB)	A(B)
6	Missouri Flat Rd at El Dorado Rd	AM		Signal	13.6	B
		PM			15.1	B
7	Green Valley Rd at N Shingle Rd	AM		Signal	11.0	B
		PM			10.5	B
8	Green Valley Rd at Ponderosa Rd	AM		SSSC	3.1(13.5 NB)	A(B)
		PM			1.7(11.4 NB)	A(B)
9	Green Valley Rd at Deer Valley Rd	AM		SSSC	1.7(12.7 SB)	A(B)
		PM			1.7(11.6 SB)	A(B)
10	Green Valley Rd at Cameron Park Dr/Starbuck Rd	AM	E	Signal	21.0	C
		PM			35.6	D

Notes: **Bold** represents unacceptable operations.
Side Street Stop Controlled (SSSC) reported as intersection delay followed by worst approach's delay.

Table 12 – Cumulative (2043) Roadway Segment Levels of Service

Segment	Location	LOS Threshold	Peak-Hour	Analysis Direction	Cumulative (2043)	
					LOS	Density
1	Green Valley Rd, east of Shingle Springs Dr	E	AM	NB	A	0.7
				SB	A	1.8
			PM	NB	A	1.5
				SB	A	1.6
2	Green Valley Rd, west of Shingle Springs Dr		AM	EB	A	1.6
				WB	A	0.6
			PM	EB	A	1.5
				WB	A	1.4

Note: Density is reported as vehicles per mile per lane (veh/mi/lane).

Table 13 – Cumulative (2043) Freeway Levels of Service

Segment	Location	Analysis Direction	Peak-Hour	Cumulative (2043)	
				LOS	Density
A	Westbound, West of Casino Interchange	WB	AM	C	21.3
			PM	C	25.9
			Fri PM	C	25.8
			Sat Mid	C	25.5
B	Eastbound, between Casino Off-Ramp and Casino On-Ramp	EB	AM	D	30.8
			PM	D	26.2
			Fri PM	C	25.8
			Sat Mid	D	26.2
C	Westbound, betweeen Casino On-Ramp and Casino On-Ramp	WB	AM	C	21.5
			PM	C	25.3
			Fri PM	C	25.2
			Sat Mid	C	25.2
D	Eastbound, East of Casino Interchange	EB	AM	D	32.0
			PM	D	29.3
			Fri PM	D	29.4
			Sat Mid	D	30.9
E	Westbound, East of Casino Interchange	WB	AM	C	21.5
			PM	C	25.1
			Fri PM	C	25.2
			Sat Mid	C	25.2
F	Eastbound, Weave from Shingle Springs Dr	EB	AM	C	24.3
			PM	C	20.7
			Fri PM	C	21.1
			Sat Mid	C	20.7
G	Westbound, Merge from Casino	WB	AM	D	35.2
			PM	D	28.8
			Fri PM	D	32.7
			Sat Mid	D	34.1
H	Eastbound, Merge from Casino	EB	AM	C	26.2
			PM	D	28.8
			Fri PM	D	28.8
			Sat Mid	D	28.4
I	Westbound, Diverge to Casino	WB	AM	C	26.0
			PM	C	29.5
			Fri PM	C	29.5
			Sat Mid	C	29.5

Note: Density is reported as vehicles per mile per lane (veh/mi/lane).

CUMULATIVE (2043) PLUS PROJECT CONDITIONS

The number of trips anticipated to be generated by the proposed project was derived using data included in the *ITE Trip Generation Manual, 11th Edition* and data provided by the client. These trips were then assigned to the roadway network based on the project area roadway volumes, general knowledge of the project area traffic patterns, and engineering judgement Using these volumes, LOS was determined at the study facilities. Cumulative (2043) plus Project peak-hour traffic volumes are presented in **Figure 10.** Detailed calculations are included in **Appendix E**.

Intersections

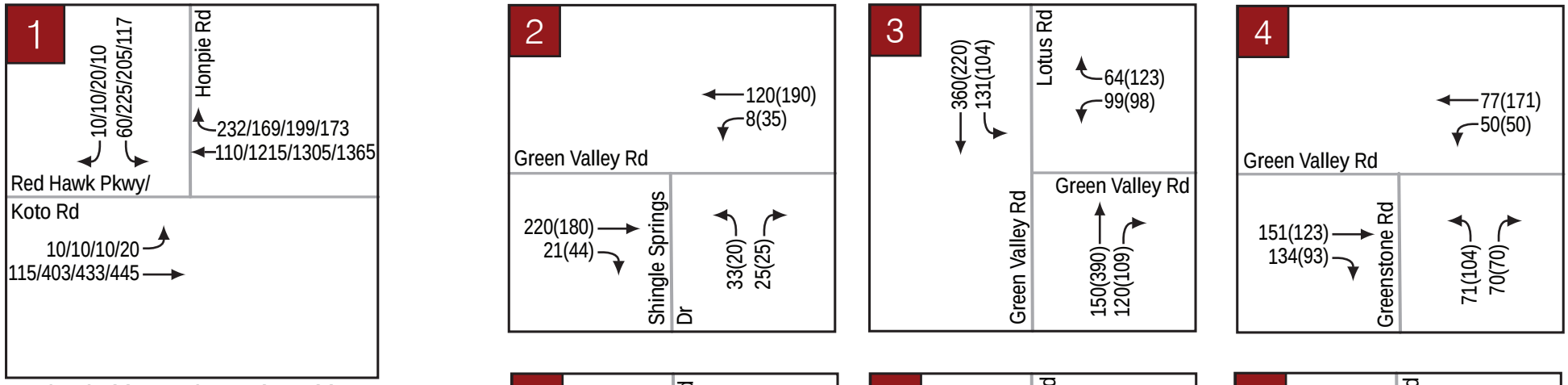
Table 14 presents the intersection operating conditions for this scenario. As indicated in **Table 14**, the study intersections operate from LOS A to LOS D.

Roadway Segments

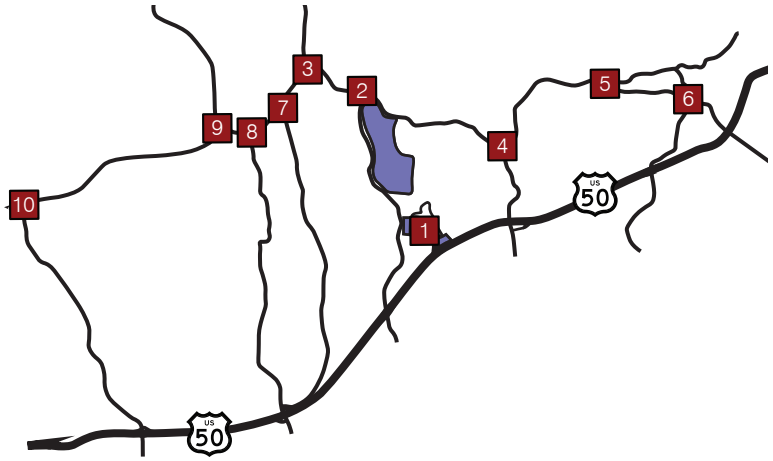
Table 15 presents the roadway segment operating conditions for this analysis scenario. As indicated in **Table 15**, the roadway segments operate from LOS A to LOS B.

Freeway Facilities

Table 16 presents the freeway facilities operating conditions for this analysis scenario. As indicated in **Table 16**, the study freeway facilities operate from LOS C to LOS D.



*AM/PM/Friday PM/Saturday Mid



LEGEND

- Project Location
- # Study Intersection
- AM(PM) Peak-Hour Traffic Volumes

Kimley»Horn

Figure 10
Cumulative (2043) plus Project Peak-Hour Traffic Volumes

Table 14 – Cumulative (2043) plus Project Intersection Levels of Service

ID	Intersection	Peak Hour	LOS Threshold	Control	Cumulative (2043)		Cumulative (2043) plus Project	
					Delay (sec)	LOS	Delay (sec)	LOS
1	Koto Rd/Red Hawk Pkwy at Honpie Rd	AM	D	Signal	8.1	A	8.1	A
		PM			7.3	A	22.9	C
		Fri PM			7.3	A	35.0	C
		Sat Mid			7.2	A	27.0	C
2	Shingle Springs Dr at Green Valley Rd	AM		SSSC	0.4(10.3 NB)	A(B)	1.6(10.9 NB)	A(B)
		PM			0.6(10.1 NB)	A(B)	1.5(11.1 NB)	A(B)
3	Green Valley Rd at Lotus Rd	AM		SSSC	4.0(18.9 WB)	A(C)	5.3(23.4 WB)	A(C)
		PM			5.8(24.2 WB)	A(C)	7.4(30.5 WB)	A(D)
4	Green Valley Rd at Greenstone Rd	AM		SSSC	3.9(11.8 NB)	A(B)	3.8(12.1 NB)	A(B)
		PM			4.5(12.8 NB)	A(B)	4.5(13.4 NB)	A(B)
5	Green Valley Rd at Missouri Flat Rd	AM		SSSC	2.6(13.9 SB)	A(B)	2.7(14.2 SB)	A(B)
		PM			2.7(11.9 SB)	A(B)	2.9(12.2 SB)	A(B)
6	Missouri Flat Rd at El Dorado Rd	AM		Signal	13.6	B	13.7	B
		PM			15.1	B	15.2	B
7	Green Valley Rd at N Shingle Rd	AM		Signal	11.0	B	11.1	B
		PM			10.5	B	10.9	B
8	Green Valley Rd at Ponderosa Rd	AM		SSSC	3.1(13.5 NB)	A(B)	3.1(14.0 NB)	A(B)
		PM			1.7(11.4 NB)	A(B)	1.7(11.7 NB)	A(B)
9	Green Valley Rd at Deer Valley Rd	AM		SSSC	1.7(12.7 SB)	A(B)	1.7(13.0 SB)	A(B)
		PM			1.7(11.6 SB)	A(B)	1.6(11.9 SB)	A(B)
10	Green Valley Rd at Cameron Park Dr/Starbuck Rd	AM	E	Signal	21.0	C	21.4	C
		PM			35.6	D	37.5	D

Notes: **Bold** represents unacceptable operations.
Side Street Stop Controlled (SSSC) reported as intersection delay followed by worst approach's delay.

Table 15 – Cumulative (2043) plus Project Roadway Segment Levels of Service

Segment	Location	LOS Threshold	Peak-Hour	Analysis Direction	Cumulative Year (2043)		Cumulative (2043) plus Project	
					LOS	Density	LOS	Density
1	Green Valley Rd, east of Shingle Springs Dr	E	AM	NB	A	0.7	A	0.8
				SB	A	1.8	B	2.2
			PM	NB	A	1.5	A	1.8
				SB	A	1.6	A	1.8
2	Green Valley Rd, west of Shingle Springs Dr		AM	EB	A	1.6	A	1.7
				WB	A	0.6	A	0.9
			PM	EB	A	1.5	A	1.9
				WB	A	1.4	A	1.6

Note: Density is reported as vehicles per mile per lane (veh/mi/lane).

Table 16 – Cumulative (2043) plus Project Freeway Levels of Service

Segment	Location	Analysis Direction	Peak-Hour	Cumulative (2043)		Cumulative (2043) plus Project	
				LOS	Density	LOS	Density
A	Westbound, West of Casino Interchange	WB	AM	C	21.3	D	31.2
			PM	C	25.9	D	26.9
			Fri PM	C	25.8	D	26.8
			Sat Mid	C	25.5	D	26.4
B	Eastbound, between Casino Off-Ramp and Casino On-Ramp	EB	AM	D	30.8	D	30.8
			PM	D	26.2	D	26.2
			Fri PM	C	25.8	C	25.8
			Sat Mid	D	26.2	D	26.2
C	Westbound, betweeen Casino On-Ramp and Casino On-Ramp	WB	AM	C	21.5	D	31.5
			PM	C	25.3	C	25.3
			Fri PM	C	25.2	C	25.2
			Sat Mid	C	25.2	C	25.2
D	Eastbound, East of Casino Interchange	EB	AM	D	32	D	32.5
			PM	D	29.3	D	31.2
			Fri PM	D	29.4	D	31.5
			Sat Mid	D	30.9	D	33.0
E	Westbound, East of Casino Interchange	WB	AM	C	21.5	D	31.2
			PM	C	25.1	D	30.0
			Fri PM	C	25.2	D	30.0
			Sat Mid	C	25.2	D	30.0
F	Eastbound, Weave from Shingle Springs Dr	EB	AM	C	24.3	C	24.6
			PM	C	20.7	D	30.3
			Fri PM	C	21.1	D	30.0
			Sat Mid	C	20.7	D	30.2
G	Westbound, Merge from Casino	WB	AM	D	35.2	D	35.6
			PM	D	28.8	D	34.5
			Fri PM	D	32.7	D	34.7
			Sat Mid	D	34.1	D	36.0
H	Eastbound, Merge from Casino	EB	AM	C	26.2	D	33.8
			PM	D	28.8	D	29.8
			Fri PM	D	28.8	D	29.7
			Sat Mid	D	28.4	D	29.3
I	Westbound, Diverge to Casino	WB	AM	C	26	D	34.4
			PM	C	29.5	C	34.2
			Fri PM	C	29.5	C	34.2
			Sat Mid	C	29.5	C	34.2

Note: Density is reported as vehicles per mile per lane (veh/mi/lane).

DEFICIENCIES AND IMPROVEMENTS

Standards of Deficiency

El Dorado County's *Transportation and Circulation Element*[6] was referenced to identify deficiencies at the study area intersections and roadway segments. The following criteria were used:

> "*Level of Service (LOS) for County-maintained roads and state highways within the unincorporated areas of the county shall not be worse than LOS E in the Community Regions or LOS D in the Rural Centers and Rural Regions…"* (El Dorado County General Plan Policy TC-Xd[6]) All study facilities are located within the Cameron Park Community Region, which maintain an acceptable LOS of E.
>
> *If a project causes the peak hour LOS or volume/capacity ratio on a county road or state highway that would otherwise meet the County standards (without the project) to exceed the values listed in the above text (El Dorado County General Plan Policy TC-Xd[6]), then the impact* [deficiency] *shall be considered significant.*
>
> *If any county road or state highway fails to meet the above listed county standards (El Dorado County General Plan Policy TC-Xd) for peak hour LOS or volume/capacity ratios without the proposed project, and the project will worsen conditions on the road or highway, then the impact* [deficiency] *shall be considered significant. The term, worsen is defined for the purpose of this paragraph according to General Plan Policy TC-Xe[6] as follows:*
>
> "*A. A 2 percent increase in traffic during the a.m. peak hour, p.m. peak hour, or daily, or*
> *B. The addition of 100 or more daily trips, or*
> *C. The addition of 10 or more trips during the a.m. peak hour or the p.m. peak hour*"

Additionally, the County's standards[6] specify the following regarding improvement:

> *"When a project identifies an impact* [deficiency] *on the County's roadway network for a scenario with or without the project, a separate analysis must be done to identify what improvements are needed for mitigation* [improvement] *and when the improvements must be in place. The timing of the proposed mitigation* [improvement] *must be in compliance with General Plan Policy TC-Xf:*
>
> *For all other discretionary projects that worsen (defined as a project that triggers Policy TC-Xe [A} or [B] or [C]) traffic on the County road system, the County shall do one of the following:*
>
> > *(1) condition the project to construct all road improvements necessary to maintain or attain Level of Service standards as detailed in this Transportation and Circulation Element; or*
> > *(2) ensure the construction of the necessary road improvements are included in the County's 20-year CIP."*

The Caltrans District 3's standard of significance was applied to the US-50 interchange with Redhawk Parkway. Caltrans has established a LOS E threshold for freeway segment facilities in this area.

Summary of Deficiencies and Improvements

<u>Existing (2023) plus Project Conditions</u>

As reflected in **Table 8** the addition of the proposed project results in one (1) intersection deficiency as defined by the County. The following is a discussion of each deficiency and its associated improvement. Analysis worksheets for this scenario are provided in **Appendix F**.

[6] *El Dorado County General Plan, Transportation and Circulation Element*, July 2004.

Deficiencies:

D1. Intersection #1, Koto Road/Redhawk Parkway at Honpie Road

As shown in Table 8, this intersection operates at LOS A during the AM, PM, Friday PM, and Saturday Midday peak-hour without the project. Table 8 also shows that the intersection deteriorates to LOS F during the PM, Friday PM, and Saturday Midday peak-hour with the addition of the project.

Improvements:

I1. Intersection #1, Koto Road/Redhawk Parkway at Honpie Road

The deficiency at this intersection during the PM, Friday PM, Saturday Midday peak-hour can be improved by optimizing signal timing. As shown in Table 17, this improvement results in the intersection operating at LOS C during the PM and Friday PM peak-hours and at LOS B during the Saturday Midday peak-hour.

Table 17 – Intersection Levels of Service – Existing (2023) plus Project Improved Conditions

ID	Intersection	Peak Hour	LOS Threshold	Control	Existing (2023)		Existing (2023) plus Project		Existing (2023) plus Project - Improved	
					Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
1	Koto Rd/Red Hawk Pkwy at Honpie Rd	AM	D	Signal	8.2	A	8.2	A	-	-
		PM			7.5	A	**97.0**	**F**	21.0	C
		Fri PM			7.5	A	**126.7**	**F**	25.0	C
		Sat Mid			7.3	A	**107.4**	**F**	16.2	B

Notes: **Bold** represents unacceptable operations. Shaded represents a project induced deficiency.
Side Street Stop Controlled (SSSC) reported as intersection delay followed by worst approach's delay.

OTHER CONSIDERATIONS

Peak-Hour Traffic Signal Warrant Evaluation

A planning level assessment of the need for traffic signalization was performed for the un-signalized study intersections. This evaluation was performed consistently with the peak-hour warrant methodologies noted in Section 4C of the *California Manual on Uniform Traffic Control Devices (CAMUTCD)*, dated March 30, 2021. A summary of the peak-hour warrant results is presented in Table 18.

Table 18 – Traffic Signal Warrant Analysis Results

ID	Intersection	Analysis Scenario			
		Existing (2023)	Existing (2023) plus Project	Cumulative (2043)	Cumulative (2043) plus Project
2	Shingle Springs Dr at Green Valley Rd	No/No	No/No	No/No	No/No
3	Green Valley Rd at Lotus Rd	No/Yes	Yes/Yes	Yes/Yes	Yes/Yes
4	Green Valley Rd at Greenstone Rd	No/No	No/No	No/No	No/No
5	Green Valley Rd at Missouri Flat Rd	No/No	No/No	No/No	No/No
8	Green Valley Rd at Ponderosa Rd	No/No	No/No	No/No	No/No
9	Green Valley Rd at Deer Valley Rd	No/No	No/No	No/No	No/No

Results are presented in **AM / PM format**, locations where a signal is warranted during a peak hour are shaded
Note: Peak-hour warrant is satisfied if Condition A or B is satisfied

As shown in Table 18, the peak-hour signal warrant is satisfied under various analysis scenarios at Green Valley Road and Lotus Road (Intersection #3). While this intersection satisfies the CAMUTCD Warrant 3, it operates within the LOS threshold. The CAMUTCD also states:

> *"The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal."*

As Intersection #3 is found to operate at acceptable levels of delay per County standards[2] both with and without the project under Existing and Cumulative conditions, it is not the sole responsibility of the project to signalize this facility. Detailed results of this analysis are presented in Appendix G.

Intersection Queuing Evaluation

A queuing study was conducted to evaluate the capacity of the existing turn lanes at the study intersections. Synchro reports were used to conduct the queuing analysis. The 95th percentile vehicle queues were compared against the existing vehicle storage lengths at select intersection movements to determine if the queues are anticipated to exceed their available storage. Results of the queuing evaluation are presented in Table 19. Analysis sheets that include the anticipated vehicle queues are presented in Appendices B-E.

As presented in Table 19 the addition of the proposed project adds modest amounts of additional queuing. Shaded cells in the table represent conditions where the reported queue exceeds available vehicle storage capacity by more than one car length (25-feet). The addition of the proposed project results in the following:

- The westbound left-turn queue at Green Valley Road and Cameron Park Drive/Starbuck Road (Intersection #10) will exceed the available storage capacity during both the AM and PM peak-hours under Cumulative (2043) scenarios with and without the project.

Table 19 – Intersection Queuing Evaluation Results

Intersection / Analysis Scenario	Movement	AM Peak-Hour		PM Peak-Hour	
		Available Storage (ft)	95th % Queue (ft)	Available Storage (ft)	95th % Queue (ft)
#1 Koto Rd/Redhawk Pkwy at Honpie Rd	SBTR				
Existing (2023)			20		50
Existing (2023) plus Project			30		110
Cumulative (2043)			20		60
Cumulative (2043) plus Project			35		120
	WBT				
Existing (2023)			15		45
Existing (2023) plus Project			20		445
Cumulative (2043)			30		50
Cumulative (2043) plus Project			30		460
	EBT				
Existing (2023)			10		30
Existing (2023) plus Project			15		50
Cumulative (2043)			10		35
Cumulative (2043) plus Project			15		60
#7 Green Valley Rd at N Shingle Rd	SBR				
Existing (2023)		225	35	225	35
Existing (2023) plus Project			40		35
Cumulative (2043)			40		35
Cumulative (2043) plus Project			40		40
	EBL				
Existing (2023)		-	90	-	125
Existing (2023) plus Project			95		135
Cumulative (2043)			105		135
Cumulative (2043) plus Project			110		150
#10 Green Valley Rd at Cameron Park Dr/Starbuck Rd	WBL				
Existing (2023)		150	135	150	165
Existing (2023) plus Project			145		170
Cumulative (2043)			190		240
Cumulative (2043) plus Project			215		255

Notes: For approaches with dual lanes, the longest queue length is reported. Shaded cell indicates queue exceeds storage by > 25' (one vehicle length)

Study Facility Safety Review

In accordance with the County's *Guidelines*[2], the following aspects of the project were evaluated:

1. ***Existence of any current traffic problems in the local area such as a high-crash location, non-standard intersection or roadway, or an intersection in need of a traffic signal***

   The County's 2021 *Annual Collision Location Study*[7] (ACLS) provides data on facilities (i.e., intersections and roadway segments) throughout the County during a three-year period between January 1, 2019, and December 31, 2021. According to the ACLS, these sites experiencing three or more incidents during this time frame were selected for investigation and determination of corrective action(s). Table 20 provides a summary of project analysis facilities included in the ACLS and their identified recommended actions.

Table 20 – Project Area Sites Selected for Investigation

Site #	Location Description	Accident Rate+	Identified Action
29	Missouri Flat Rd, near Plaza Dr	0.95	None Required

Source: *Annual Collision Location Study 2021*, County of El Dorado Department of Transportation, April 20, 2022
+ # Accidents per Million Vehicles (MV) for single sites (intersections/curves), # Accidents per Million Vehicle Miles (MVM) for roadway sections.

One County facility in proximity to the project site is included in the ACLS with a recommendation of "…does not require further review at this time. However, this site will continue to be monitored and any subsequent increase in the frequency of accidents may necessitate further review and analysis."

CONCLUSIONS

Significant findings of this study include:

- The proposed project is estimated to generate 192 new trips during the AM peak-hour, 1,441 new trips during the PM peak-hour, and 1,401 new trips during the Saturday Midday peak-hour.
- As defined by the County, the addition of the proposed project to the Existing (2023) scenario results in a deficiency at one study intersection, Intersection #1 (Koto Road/Red Hawk Parkway at Honpie Road). This deficiency can be improved to acceptable levels with improvements to the signal timing.
- As defined by the CAMUTCD, Intersection #3 (Green Valley Road at Lotus Road) meets Warrant 3 thresholds for signalization under Existing (2023), Existing (2023) plus Project, Cumulative (2043), and Cumulative (2043) plus Project conditions. As Intersection #3 is found to operate at acceptable levels of delay as defined by the County both with and without the project under all analysis conditions, it is not the sole responsibility of the project to signalize this facility.
- The project contributes a nominal amount (less than or equal to 25-feet) of queueing to a Cumulative (2043) baseline deficiency for the westbound left-turn movement at Intersection #10 (Green Valley Road at Cameron Park Drive/Starbuck Road).
- Collision data provided by the County does not identify safety deficiencies at any study facilities included in this assessment. The project is not anticipated to significantly alter these existing traffic conditions.

[7] *2021 Annual Collision Location Study*, County of El Dorado Department of Transportation, April 20, 2022.

Appendix A

Traffic Count Data Sheets

National Data & Surveying Services

Intersection Turning Movement Count

Location: Honpie Rd & Red Hawk Pkwy/Koto Rd
City: Placerville
Control: Signalized

Project ID: 23-070150-001
Date: 11/16/2023

Data - Total

NS/EW Streets:	Honpie Rd				Honpie Rd				Red Hawk Pkwy/Koto Rd				Red Hawk Pkwy/Koto Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	0.5	0.5	0	1	2	0	0	0	1.5	0.5	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
6:00 AM	0	0	0	0	3	0	0	0	0	17	0	0	0	12	8	0	40
6:15 AM	0	0	0	0	4	0	0	0	0	8	0	1	0	5	10	0	28
6:30 AM	0	0	0	0	1	0	0	0	0	11	0	0	0	11	20	0	43
6:45 AM	0	0	0	0	1	0	2	0	1	7	0	0	0	21	36	0	68
7:00 AM	0	0	0	0	10	0	0	0	0	21	0	1	0	21	20	0	73
7:15 AM	0	0	0	0	3	0	1	0	2	16	0	0	0	16	27	0	65
7:30 AM	0	0	0	0	5	0	0	0	1	13	0	1	0	12	39	0	71
7:45 AM	0	0	0	0	5	0	0	0	0	12	0	1	0	18	75	0	111
8:00 AM	0	0	0	0	5	0	0	0	2	28	0	1	0	15	35	0	86
8:15 AM	0	0	0	0	13	0	1	0	0	19	0	1	0	15	29	0	78
8:30 AM	0	0	0	0	7	0	1	0	3	16	0	0	0	23	35	0	85
8:45 AM	0	0	0	0	15	0	2	0	4	12	0	2	0	20	47	0	102
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	72	0	7	0	13	180	0	8	0	189	381	0	850
APPROACH %'s :					91.14%	0.00%	8.86%	0.00%	6.47%	89.55%	0.00%	3.98%	0.00%	33.16%	66.84%	0.00%	
PEAK HR :	07:45 AM - 08:45 AM																TOTAL
PEAK HR VOL :	0	0	0	0	30	0	2	0	5	75	0	3	0	71	174	0	360
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.577	0.000	0.500	0.000	0.417	0.670	0.000	0.750	0.000	0.772	0.580	0.000	0.811
					0.571				0.669				0.659				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	0.5	0.5	0	1	2	0	0	0	1.5	0.5	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	0	0	29	0	0	0	1	89	0	0	0	43	10	0	172
4:15 PM	0	0	0	0	14	0	1	0	0	64	0	1	0	46	6	0	132
4:30 PM	0	0	0	0	24	0	1	0	1	51	0	0	0	46	10	0	133
4:45 PM	0	0	0	0	23	0	3	0	0	56	0	0	0	54	8	0	144
5:00 PM	0	0	0	0	58	0	2	0	0	47	0	1	0	62	7	1	178
5:15 PM	0	0	0	0	13	0	0	0	0	54	0	2	0	49	13	0	131
5:30 PM	0	0	0	0	15	0	1	0	2	42	0	1	0	54	18	0	133
5:45 PM	0	0	0	0	10	0	0	0	0	42	0	0	0	56	12	0	120
6:00 PM	0	0	0	0	9	0	0	0	1	50	0	1	0	54	6	0	121
6:15 PM	0	0	0	0	9	0	0	0	0	34	0	1	0	68	10	0	122
6:30 PM	0	0	0	0	5	0	0	0	2	44	0	0	0	61	5	0	117
6:45 PM	0	0	0	0	8	0	0	0	1	37	0	5	0	40	5	0	96
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	217	0	8	0	8	610	0	12	0	633	110	1	1599
APPROACH %'s :					96.44%	0.00%	3.56%	0.00%	1.27%	96.83%	0.00%	1.90%	0.00%	85.08%	14.78%	0.13%	
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	0	0	0	0	119	0	7	0	1	218	0	2	0	208	31	1	587
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.513	0.000	0.583	0.000	0.250	0.852	0.000	0.500	0.000	0.839	0.775	0.250	0.824
					0.525				0.850				0.857				

National Data & Surveying Services

Intersection Turning Movement Count

Location: Shingle Springs Dr & Green Valley Rd
City: Placerville
Control: No Control

Project ID: 23-070150-002
Date: 11/2/2023

Data - Total

NS/EW Streets:	Shingle Springs Dr				Shingle Springs Dr				Green Valley Rd				Green Valley Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
6:00 AM	0	0	0	0	0	0	0	0	0	10	0	0	0	8	0	0	18
6:15 AM	0	0	0	0	0	0	0	0	0	15	0	0	0	8	0	0	23
6:30 AM	1	0	0	0	0	0	0	0	0	28	0	0	0	11	0	0	40
6:45 AM	0	0	1	0	0	0	0	0	0	14	0	0	0	16	0	0	31
7:00 AM	2	0	0	0	0	0	0	0	0	22	0	0	0	26	0	0	50
7:15 AM	2	0	1	0	0	0	0	0	0	34	1	0	0	26	0	0	64
7:30 AM	1	0	0	1	0	0	0	0	0	35	0	0	0	21	0	0	58
7:45 AM	0	0	0	0	0	0	0	0	0	60	1	0	0	31	0	0	92
8:00 AM	0	0	0	0	0	0	0	0	0	51	0	0	0	24	0	0	75
8:15 AM	0	0	0	0	0	0	0	0	0	49	0	0	0	26	0	0	75
8:30 AM	0	0	0	0	0	0	0	0	0	53	0	0	0	35	0	0	88
8:45 AM	0	0	0	1	0	0	0	0	0	40	0	0	0	25	0	0	66
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	6	0	2	2	0	0	0	0	0	411	2	0	0	257	0	0	680
APPROACH %'s :	60.00%	0.00%	20.00%	20.00%					0.00%	99.52%	0.48%	0.00%	0.00%	100.00%	0.00%	0.00%	
PEAK HR :	07:45 AM - 08:45 AM																TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0	213	1	0	0	116	0	0	330
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.888	0.250	0.000	0.000	0.829	0.000	0.000	0.897
										0.877				0.829			

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	0	0	0	0	0	0	0	38	0	0	0	39	0	0	77
4:15 PM	0	0	0	0	0	0	0	0	0	35	1	0	0	51	0	0	87
4:30 PM	0	0	0	0	0	0	0	0	0	49	0	0	1	36	0	0	86
4:45 PM	0	0	0	0	0	0	0	0	0	44	1	0	0	52	0	0	97
5:00 PM	0	0	1	0	0	0	0	0	0	35	0	0	0	44	0	0	80
5:15 PM	0	0	0	0	0	0	0	0	0	44	0	0	0	43	0	0	87
5:30 PM	0	0	1	0	0	0	0	0	0	20	3	0	0	39	0	0	63
5:45 PM	0	0	0	0	0	0	0	0	0	25	0	0	1	40	0	0	66
6:00 PM	0	0	0	0	0	0	0	0	0	19	0	0	0	28	0	0	47
6:15 PM	0	0	1	0	0	0	0	0	0	22	0	0	0	30	0	0	53
6:30 PM	1	0	0	0	0	0	0	0	0	17	0	0	0	11	0	0	29
6:45 PM	0	0	0	0	0	0	0	0	0	17	0	0	0	25	0	0	42
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	1	0	3	0	0	0	0	0	0	365	5	0	2	438	0	0	814
APPROACH %'s :	25.00%	0.00%	75.00%	0.00%					0.00%	98.65%	1.35%	0.00%	0.45%	99.55%	0.00%	0.00%	
PEAK HR :	04:30 PM - 05:30 PM																TOTAL
PEAK HR VOL :	0	0	1	0	0	0	0	0	0	172	1	0	1	175	0	0	350
PEAK HR FACTOR :	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.878	0.250	0.000	0.250	0.841	0.000	0.000	0.902
			0.250							0.883				0.846			

National Data & Surveying Services

Intersection Turning Movement Count

Location: Latus Rd/Green Valley Rd & Green Valley Rd
City: Placerville
Control: 1-Way Stop(WB)

Project ID: 23-070150-003
Date: 11/2/2023

Data - Total

NS/EW Streets:	Latus Rd/Green Valley Rd				Latus Rd/Green Valley Rd				Green Valley Rd				Green Valley Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	1	1	0	0	0	0	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
6:00 AM	0	19	3	0	8	43	0	0	0	0	0	0	3	0	5	0	81
6:15 AM	0	15	5	0	10	56	0	0	0	0	0	0	3	0	6	0	95
6:30 AM	0	30	4	0	22	53	0	0	0	0	0	0	5	0	7	0	121
6:45 AM	0	21	10	0	7	57	0	0	0	0	0	0	7	0	9	0	111
7:00 AM	0	30	12	0	12	74	0	0	0	0	0	0	15	0	9	0	152
7:15 AM	0	29	13	0	21	84	0	0	0	0	0	0	19	0	12	0	178
7:30 AM	0	23	20	0	15	86	0	0	0	0	0	0	12	0	9	0	165
7:45 AM	0	30	28	0	32	101	0	0	0	0	0	0	16	0	17	0	224
8:00 AM	0	30	23	0	31	106	0	0	0	0	0	0	15	0	12	0	217
8:15 AM	0	39	22	0	27	63	0	0	0	0	0	0	19	0	8	0	178
8:30 AM	0	39	28	0	23	86	0	0	0	0	0	0	19	0	13	0	208
8:45 AM	0	35	25	0	23	67	0	0	0	0	0	0	19	0	13	0	182
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	340	193	0	231	876	0	0	0	0	0	0	152	0	120	0	1912
APPROACH %'s :	0.00%	63.79%	36.21%	0.00%	20.87%	79.13%	0.00%	0.00%					55.88%	0.00%	44.12%	0.00%	
PEAK HR :	07:45 AM - 08:45 AM																TOTAL
PEAK HR VOL :	0	138	101	0	113	356	0	0	0	0	0	0	69	0	50	0	827
PEAK HR FACTOR :	0.000	0.885	0.902	0.000	0.883	0.840	0.000	0.000	0.000	0.000	0.000	0.000	0.908	0.000	0.735	0.000	0.923
	0.892				0.856								0.902				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	1	1	0	0	0	0	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	82	24	0	16	57	0	0	0	0	0	0	18	0	26	0	223
4:15 PM	0	78	22	0	21	36	0	0	0	0	0	0	16	0	30	0	203
4:30 PM	0	85	18	0	29	49	0	0	0	0	0	0	22	0	20	0	223
4:45 PM	0	89	21	0	23	56	0	0	0	0	0	0	20	0	29	0	238
5:00 PM	0	97	15	0	23	45	0	0	0	0	0	0	19	0	28	0	227
5:15 PM	0	112	25	0	18	59	0	0	0	0	0	0	16	0	25	0	255
5:30 PM	0	90	14	0	9	49	0	0	0	0	0	0	20	0	22	0	204
5:45 PM	0	70	17	0	8	42	0	0	0	0	0	0	22	0	18	0	177
6:00 PM	0	59	11	0	9	34	0	0	0	0	0	0	15	0	13	0	141
6:15 PM	0	70	8	0	13	30	0	0	0	0	0	0	13	0	16	0	150
6:30 PM	0	48	9	0	9	34	0	0	0	0	0	0	7	0	8	0	115
6:45 PM	0	53	10	0	7	21	0	0	0	0	0	0	10	0	16	0	117
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	933	194	0	185	512	0	0	0	0	0	0	198	0	251	0	2273
APPROACH %'s :	0.00%	82.79%	17.21%	0.00%	26.54%	73.46%	0.00%	0.00%					44.10%	0.00%	55.90%	0.00%	
PEAK HR :	04:30 PM - 05:30 PM																TOTAL
PEAK HR VOL :	0	383	79	0	93	209	0	0	0	0	0	0	77	0	102	0	943
PEAK HR FACTOR :	0.000	0.855	0.790	0.000	0.802	0.886	0.000	0.000	0.000	0.000	0.000	0.000	0.875	0.000	0.879	0.000	0.925
	0.843				0.956								0.913				

National Data & Surveying Services

Intersection Turning Movement Count

Location: Greenstone Rd & Green Valley Rd
City: Placerville
Control: 1-Way Stop(NB)

Project ID: 23-070150-004
Date: 11/2/2023

Data - Total

NS/EW Streets:	Greenstone Rd				Greenstone Rd				Green Valley Rd				Green Valley Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
6:00 AM	2	0	0	0	0	0	0	0	0	3	5	0	5	6	0	0	21
6:15 AM	3	0	2	0	0	0	0	0	0	11	9	0	7	5	0	0	37
6:30 AM	5	0	0	0	0	0	0	0	0	10	20	0	10	6	0	0	51
6:45 AM	11	0	4	0	0	0	0	0	0	8	21	0	7	12	0	0	63
7:00 AM	11	0	0	0	0	0	0	0	0	12	13	0	5	13	0	0	54
7:15 AM	8	0	2	0	0	0	0	0	0	13	35	0	15	17	0	0	90
7:30 AM	8	0	9	0	0	0	0	0	0	19	31	0	13	14	0	0	94
7:45 AM	9	0	11	0	0	0	0	0	0	33	31	0	9	21	0	0	114
8:00 AM	15	0	11	0	0	0	0	0	0	28	32	0	14	14	0	0	114
8:15 AM	12	0	15	0	0	0	0	0	0	24	38	0	6	16	0	0	111
8:30 AM	22	0	16	0	0	0	0	0	0	44	23	0	13	16	0	0	134
8:45 AM	8	0	8	0	0	0	0	0	0	21	24	0	18	21	0	0	100
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	114	0	78	0	0	0	0	0	0	226	282	0	122	161	0	0	983
APPROACH %'s :	59.38%	0.00%	40.63%	0.00%					0.00%	44.49%	55.51%	0.00%	43.11%	56.89%	0.00%	0.00%	
PEAK HR :	07:45 AM - 08:45 AM																TOTAL
PEAK HR VOL :	58	0	53	0	0	0	0	0	0	129	124	0	42	67	0	0	473
PEAK HR FACTOR :	0.659	0.000	0.828	0.000	0.000	0.000	0.000	0.000	0.000	0.733	0.816	0.000	0.750	0.798	0.000	0.000	0.882
	0.730								0.944				0.908				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	17	0	10	0	0	0	0	0	0	39	16	0	14	25	0	0	121
4:15 PM	16	0	9	0	0	0	0	0	0	23	16	0	9	38	0	0	111
4:30 PM	18	0	9	0	0	0	0	0	0	21	30	0	10	35	0	0	123
4:45 PM	23	0	7	0	0	0	0	0	0	25	22	0	6	41	0	0	124
5:00 PM	22	0	18	0	0	0	0	0	0	35	16	0	6	33	0	0	130
5:15 PM	25	0	23	0	0	0	0	0	0	27	16	0	7	36	0	0	134
5:30 PM	17	0	11	0	0	0	0	0	0	18	12	0	5	29	0	0	92
5:45 PM	22	0	6	0	1	0	0	0	0	17	6	0	2	28	0	0	82
6:00 PM	12	0	13	0	0	0	0	0	0	11	12	0	5	21	0	0	74
6:15 PM	12	0	2	0	0	0	0	0	0	13	11	0	5	20	0	0	63
6:30 PM	5	0	3	0	0	0	0	0	0	9	16	0	4	15	1	0	53
6:45 PM	12	0	8	0	0	0	0	0	0	12	6	0	2	14	0	0	54
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	201	0	119	0	1	0	0	0	0	250	179	0	75	335	1	0	1161
APPROACH %'s :	62.81%	0.00%	37.19%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	58.28%	41.72%	0.00%	18.25%	81.51%	0.24%	0.00%	
PEAK HR :	04:30 PM - 05:30 PM																TOTAL
PEAK HR VOL :	88	0	57	0	0	0	0	0	0	108	84	0	29	145	0	0	511
PEAK HR FACTOR :	0.880	0.000	0.620	0.000	0.000	0.000	0.000	0.000	0.000	0.771	0.700	0.000	0.725	0.884	0.000	0.000	0.953
	0.755								0.941				0.926				

National Data & Surveying Services

Intersection Turning Movement Count

Location: Green Valley Rd & Missouri Flat Rd/Green Valley Rd
City: Placerville
Control: 1-Way Stop(SB)

Project ID: 23-070150-005
Date: 11/2/2023

Data - Total

NS/EW Streets:	Green Valley Rd				Green Valley Rd				Missouri Flat Rd/Green Valley Rd				Missouri Flat Rd/Green Valley Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
6:00 AM	0	0	0	0	0	0	1	0	2	7	0	0	0	8	2	0	20
6:15 AM	0	0	0	0	0	0	2	0	4	12	0	0	0	12	0	0	30
6:30 AM	0	0	0	0	0	0	3	0	3	16	0	0	0	14	1	0	37
6:45 AM	0	0	0	0	1	0	6	0	5	11	0	0	0	9	2	0	34
7:00 AM	0	0	0	0	0	0	3	0	3	15	0	0	0	15	0	0	36
7:15 AM	0	0	0	0	0	0	5	0	6	18	0	0	0	37	6	0	72
7:30 AM	0	0	0	0	0	0	8	0	8	27	0	0	0	22	8	0	73
7:45 AM	0	0	0	0	1	0	10	0	17	30	0	0	0	47	10	0	115
8:00 AM	0	0	0	0	3	0	13	0	14	32	0	0	0	53	10	0	125
8:15 AM	0	0	0	0	4	0	14	0	9	47	0	0	0	53	11	0	138
8:30 AM	0	0	0	0	3	0	19	0	17	77	0	0	0	97	12	0	225
8:45 AM	0	0	0	0	14	0	14	0	21	93	0	0	0	80	25	0	247
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	26	0	98	0	109	385	0	0	0	447	87	0	1152
APPROACH %'s :					20.97%	0.00%	79.03%	0.00%	22.06%	77.94%	0.00%	0.00%	0.00%	83.71%	16.29%	0.00%	
PEAK HR :	08:00 AM - 09:00 AM																TOTAL
PEAK HR VOL :	0	0	0	0	24	0	60	0	61	249	0	0	0	283	58	0	735
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.429	0.000	0.789	0.000	0.726	0.669	0.000	0.000	0.000	0.729	0.580	0.000	0.744
					0.750				0.680				0.782				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	0	0	5	0	10	0	18	57	0	0	0	51	2	0	143
4:15 PM	0	0	0	0	2	0	11	0	9	34	0	0	0	55	2	1	114
4:30 PM	0	0	0	0	10	0	18	0	8	34	0	0	0	53	1	0	124
4:45 PM	0	0	0	0	5	0	13	0	13	31	0	0	0	58	0	0	120
5:00 PM	0	0	0	0	14	0	13	0	12	43	0	0	0	56	0	0	138
5:15 PM	0	0	0	0	1	0	11	0	8	45	0	0	0	77	0	0	142
5:30 PM	0	0	0	0	2	0	15	0	10	35	0	0	0	37	2	0	101
5:45 PM	0	0	0	0	0	0	11	0	6	30	0	0	0	25	5	0	77
6:00 PM	0	0	0	0	1	0	3	0	3	19	0	0	0	36	0	0	62
6:15 PM	0	0	0	0	3	0	6	0	5	29	0	0	0	25	3	0	71
6:30 PM	0	0	0	0	1	0	8	0	5	45	0	0	0	17	0	1	77
6:45 PM	0	0	0	0	0	0	3	0	2	19	0	0	0	25	0	0	49
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	44	0	122	0	99	421	0	0	0	515	15	2	1218
APPROACH %'s :					26.51%	0.00%	73.49%	0.00%	19.04%	80.96%	0.00%	0.00%	0.00%	96.80%	2.82%	0.38%	
PEAK HR :	04:30 PM - 05:30 PM																TOTAL
PEAK HR VOL :	0	0	0	0	30	0	55	0	41	153	0	0	0	244	1	0	524
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.536	0.000	0.764	0.000	0.788	0.850	0.000	0.000	0.000	0.792	0.250	0.000	0.923
					0.759				0.882				0.795				

National Data & Surveying Services

Intersection Turning Movement Count

Location: El Dorado Rd & Missouri Flat Rd
City: Placerville
Control: Signalized

Project ID: 23-070150-006
Date: 11/2/2023

Data - Total

NS/EW Streets:	El Dorado Rd				El Dorado Rd				Missouri Flat Rd				Missouri Flat Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	1	1	0	0	1	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
6:00 AM	1	1	1	0	1	0	0	0	0	5	1	0	0	8	2	0	20
6:15 AM	3	1	4	0	3	2	1	0	0	14	2	0	0	11	2	0	43
6:30 AM	3	1	7	0	3	3	0	0	0	13	3	0	3	11	5	0	52
6:45 AM	2	1	10	0	5	4	0	0	1	12	3	0	0	8	5	0	51
7:00 AM	1	2	5	0	3	4	0	0	0	19	4	0	3	17	3	0	61
7:15 AM	9	10	6	0	6	6	0	0	0	19	6	0	3	39	6	0	110
7:30 AM	12	5	7	0	7	4	0	0	0	27	7	0	2	30	10	0	111
7:45 AM	19	3	7	0	17	10	0	0	4	31	7	0	5	47	5	0	155
8:00 AM	10	2	3	0	8	9	0	0	3	30	11	0	4	43	8	0	131
8:15 AM	16	7	4	0	18	8	3	0	1	47	10	0	1	55	9	0	179
8:30 AM	32	8	6	0	16	3	1	0	0	67	9	0	4	82	13	0	241
8:45 AM	33	6	6	0	13	6	3	0	2	79	25	0	4	68	7	0	252
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	141	47	66	0	100	59	8	0	11	363	88	0	29	419	75	0	1406
APPROACH %'s :	55.51%	18.50%	25.98%	0.00%	59.88%	35.33%	4.79%	0.00%	2.38%	78.57%	19.05%	0.00%	5.54%	80.11%	14.34%	0.00%	
PEAK HR :	08:00 AM - 09:00 AM																TOTAL
PEAK HR VOL :	91	23	19	0	55	26	7	0	6	223	55	0	13	248	37	0	803
PEAK HR FACTOR :	0.689	0.719	0.792	0.000	0.764	0.722	0.583	0.000	0.500	0.706	0.550	0.000	0.813	0.756	0.712	0.000	0.797
	0.723				0.759				0.670				0.753				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	1	1	0	0	1	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	5	11	11	0	20	9	1	0	6	55	15	0	11	57	33	0	234
4:15 PM	12	19	7	0	12	7	2	0	0	36	9	0	9	53	30	0	196
4:30 PM	5	14	15	0	23	7	3	0	1	43	5	0	9	51	25	0	201
4:45 PM	10	19	8	0	11	7	0	0	4	31	5	0	15	55	25	0	190
5:00 PM	12	17	12	0	13	7	3	0	1	49	14	0	6	54	29	0	217
5:15 PM	15	11	11	0	22	3	3	0	3	48	4	0	6	76	30	0	232
5:30 PM	8	7	11	0	19	3	1	0	1	37	7	0	2	33	29	0	158
5:45 PM	5	15	6	0	21	6	2	0	0	36	4	0	4	39	22	0	160
6:00 PM	5	9	4	0	16	4	2	0	3	27	4	0	7	52	24	0	157
6:15 PM	3	7	10	0	11	4	0	0	0	26	2	0	6	47	19	0	135
6:30 PM	2	7	6	0	7	3	1	0	1	45	4	0	5	21	15	0	117
6:45 PM	4	5	4	0	5	3	0	0	0	22	5	0	3	27	12	0	90
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	86	141	105	0	180	63	18	0	20	455	78	0	83	565	293	0	2087
APPROACH %'s :	25.90%	42.47%	31.63%	0.00%	68.97%	24.14%	6.90%	0.00%	3.62%	82.28%	14.10%	0.00%	8.82%	60.04%	31.14%	0.00%	
PEAK HR :	04:30 PM - 05:30 PM																TOTAL
PEAK HR VOL :	42	61	46	0	69	24	9	0	9	171	28	0	36	236	109	0	840
PEAK HR FACTOR :	0.700	0.803	0.767	0.000	0.750	0.857	0.750	0.000	0.563	0.872	0.500	0.000	0.600	0.776	0.908	0.000	0.905
	0.909				0.773				0.813				0.850				

National Data & Surveying Services

Intersection Turning Movement Count

Location: N Shingle Rd & Green Valley Rd
City: Rescue
Control: Signalized

Project ID: 23-070150-007
Date: 11/2/2023

Data - Total

NS/EW Streets:	N Shingle Rd				N Shingle Rd				Green Valley Rd				Green Valley Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	1	1	0	0	0	1	1	0	1	0	1	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
6:00 AM	1	18	0	0	0	37	14	0	5	0	1	0	0	0	0	0	76
6:15 AM	0	14	0	0	0	46	20	0	7	0	2	0	0	0	0	0	89
6:30 AM	7	19	0	0	0	49	15	0	13	0	2	0	0	0	0	0	105
6:45 AM	4	14	0	0	0	48	22	0	14	0	4	0	0	0	0	0	106
7:00 AM	4	16	0	0	0	58	30	0	28	0	5	0	0	0	0	0	141
7:15 AM	6	22	0	0	0	66	45	0	20	0	8	0	0	0	0	0	167
7:30 AM	6	16	0	0	0	64	48	0	32	0	10	0	0	0	0	0	176
7:45 AM	3	19	0	0	0	79	51	0	37	0	10	0	0	0	0	0	199
8:00 AM	4	19	0	0	0	70	55	0	33	0	10	0	0	0	0	0	191
8:15 AM	3	24	0	0	0	52	36	0	40	0	7	0	0	0	0	0	162
8:30 AM	9	28	0	0	0	64	53	0	41	0	6	0	0	0	0	0	201
8:45 AM	13	28	0	0	0	46	45	0	38	0	16	0	0	0	0	0	186
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	60	237	0	0	0	679	434	0	308	0	81	0	0	0	0	0	1799
APPROACH %'s :	20.20%	79.80%	0.00%	0.00%	0.00%	61.01%	38.99%	0.00%	79.18%	0.00%	20.82%	0.00%					
PEAK HR :	07:45 AM - 08:45 AM																TOTAL
PEAK HR VOL :	19	90	0	0	0	265	195	0	151	0	33	0	0	0	0	0	753
PEAK HR FACTOR :	0.528	0.804	0.000	0.000	0.000	0.839	0.886	0.000	0.921	0.000	0.825	0.000	0.000	0.000	0.000	0.000	0.937
	0.736				0.885				0.979								

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	1	1	0	0	0	1	1	0	1	0	1	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	5	55	0	0	0	31	44	0	66	0	5	0	0	0	0	0	206
4:15 PM	4	61	0	0	0	19	35	0	51	0	6	0	0	0	0	0	176
4:30 PM	6	64	0	0	0	34	41	0	42	0	5	0	0	0	0	0	192
4:45 PM	13	71	0	0	0	38	41	0	51	0	6	0	0	0	0	0	220
5:00 PM	10	75	0	0	0	34	32	0	50	0	3	0	0	0	0	0	204
5:15 PM	5	78	0	0	0	43	39	0	63	0	10	0	0	0	0	0	238
5:30 PM	4	74	0	0	0	39	33	0	38	0	4	0	0	0	0	0	192
5:45 PM	5	57	0	0	0	33	34	0	32	0	3	0	0	0	0	0	164
6:00 PM	10	37	0	0	0	24	31	0	41	0	7	0	0	0	0	0	150
6:15 PM	8	52	0	0	0	19	25	0	32	0	2	0	0	0	0	0	138
6:30 PM	3	34	0	0	0	21	25	0	22	0	3	0	0	0	0	0	108
6:45 PM	7	37	0	0	0	15	18	0	31	0	7	0	0	0	0	0	115
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	80	695	0	0	0	350	398	0	519	0	61	0	0	0	0	0	2103
APPROACH %'s :	10.32%	89.68%	0.00%	0.00%	0.00%	46.79%	53.21%	0.00%	89.48%	0.00%	10.52%	0.00%					
PEAK HR :	04:45 PM - 05:45 PM																TOTAL
PEAK HR VOL :	32	298	0	0	0	154	145	0	202	0	23	0	0	0	0	0	854
PEAK HR FACTOR :	0.615	0.955	0.000	0.000	0.000	0.895	0.884	0.000	0.802	0.000	0.575	0.000	0.000	0.000	0.000	0.000	0.897
	0.971				0.912				0.771								

National Data & Surveying Services

Intersection Turning Movement Count

Location: Ponderosa Rd & Green Valley Rd
City: Rescue
Control: 1-Way Stop(NB)

Project ID: 23-070150-008
Date: 11/2/2023

Data - Total

NS/EW Streets:	Ponderosa Rd				Ponderosa Rd				Green Valley Rd				Green Valley Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
6:00 AM	0	0	0	0	0	0	0	0	0	6	2	0	0	15	0	0	23
6:15 AM	3	0	0	0	0	0	0	0	0	9	1	0	0	18	0	0	31
6:30 AM	2	0	0	0	0	0	0	0	0	13	1	0	0	19	0	0	35
6:45 AM	3	0	0	0	0	0	0	0	0	17	4	0	1	26	0	0	51
7:00 AM	5	0	1	0	0	0	0	0	0	31	4	0	0	35	0	0	76
7:15 AM	1	0	1	0	0	0	0	0	0	30	3	0	1	45	0	0	81
7:30 AM	3	0	4	0	0	0	0	0	0	28	9	0	8	54	0	0	106
7:45 AM	3	0	4	0	0	0	0	0	0	40	36	0	21	41	0	0	145
8:00 AM	8	0	8	0	0	0	0	0	0	38	55	0	22	42	0	0	173
8:15 AM	26	0	8	0	0	0	0	0	0	34	44	0	10	28	0	0	150
8:30 AM	33	0	11	0	0	0	0	0	0	32	9	0	5	56	0	0	146
8:45 AM	9	0	4	0	0	0	0	0	0	51	10	0	2	65	0	0	141
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	96	0	41	0	0	0	0	0	0	329	178	0	70	444	0	0	1158
APPROACH %'s :	70.07%	0.00%	29.93%	0.00%					0.00%	64.89%	35.11%	0.00%	13.62%	86.38%	0.00%	0.00%	
PEAK HR :	07:45 AM - 08:45 AM																TOTAL
PEAK HR VOL :	70	0	31	0	0	0	0	0	0	144	144	0	58	167	0	0	614
PEAK HR FACTOR :	0.530	0.000	0.705	0.000	0.000	0.000	0.000	0.000	0.000	0.900	0.655	0.000	0.659	0.746	0.000	0.000	0.887
	0.574								0.774				0.879				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	9	0	8	0	0	0	0	0	0	64	7	0	3	47	0	0	138
4:15 PM	9	0	8	0	0	0	0	0	0	47	9	0	1	38	0	0	112
4:30 PM	1	0	3	0	0	0	0	0	0	52	4	0	2	41	0	0	103
4:45 PM	4	0	4	0	0	0	0	0	0	48	7	0	7	45	0	0	115
5:00 PM	2	0	3	0	0	0	0	0	0	57	8	0	5	41	0	0	116
5:15 PM	3	0	5	0	0	0	0	0	0	64	6	0	2	39	0	0	119
5:30 PM	9	0	7	0	0	0	0	0	0	33	5	0	5	30	0	0	89
5:45 PM	6	0	5	0	0	0	0	0	0	32	8	0	4	35	0	0	90
6:00 PM	5	0	6	0	0	0	0	0	0	45	4	0	3	38	0	0	101
6:15 PM	2	0	3	0	0	0	0	0	0	30	8	0	0	31	0	0	74
6:30 PM	2	0	0	0	0	0	0	0	0	29	9	0	3	29	0	0	72
6:45 PM	3	0	1	0	0	0	0	0	0	35	4	0	1	22	0	0	66
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	55	0	53	0	0	0	0	0	0	536	79	0	36	436	0	0	1195
APPROACH %'s :	50.93%	0.00%	49.07%	0.00%					0.00%	87.15%	12.85%	0.00%	7.63%	92.37%	0.00%	0.00%	
PEAK HR :	04:00 PM - 05:00 PM																TOTAL
PEAK HR VOL :	23	0	23	0	0	0	0	0	0	211	27	0	13	171	0	0	468
PEAK HR FACTOR :	0.639	0.000	0.719	0.000	0.000	0.000	0.000	0.000	0.000	0.824	0.750	0.000	0.464	0.910	0.000	0.000	0.848
	0.676								0.838				0.885				

National Data & Surveying Services

Intersection Turning Movement Count

Location: Deer Valley Rd & Green Valley Rd
City: Rescue
Control: 1-Way Stop(SB)

Project ID: 23-070150-009
Date: 11/2/2023

Data - Total

NS/EW Streets:	Deer Valley Rd				Deer Valley Rd				Green Valley Rd				Green Valley Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
6:00 AM	0	0	0	0	2	0	2	0	0	5	0	0	0	18	0	0	27
6:15 AM	0	0	0	0	1	0	1	0	0	8	0	0	0	24	1	0	35
6:30 AM	0	0	0	0	1	0	2	0	0	10	0	0	0	17	1	0	31
6:45 AM	0	0	0	0	3	0	5	0	2	15	0	0	0	31	2	0	58
7:00 AM	0	0	0	0	3	0	7	0	6	30	0	0	0	35	10	0	91
7:15 AM	0	0	0	0	3	0	7	0	4	25	0	0	0	47	5	0	91
7:30 AM	1	0	0	0	4	0	9	0	1	24	0	0	1	61	1	0	102
7:45 AM	1	0	0	0	13	0	5	0	4	67	0	0	0	41	4	0	135
8:00 AM	0	0	0	0	9	0	5	0	2	75	0	0	0	61	2	0	154
8:15 AM	0	0	0	0	5	0	4	0	2	69	0	0	0	48	3	0	131
8:30 AM	0	0	0	0	8	0	14	0	4	36	0	0	0	94	3	0	159
8:45 AM	0	0	0	0	2	0	8	0	13	67	0	0	0	79	2	0	171
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	2	0	0	0	54	0	69	0	38	431	0	0	1	556	34	0	1185
APPROACH %'s :	100.00%	0.00%	0.00%	0.00%	43.90%	0.00%	56.10%	0.00%	8.10%	91.90%	0.00%	0.00%	0.17%	94.08%	5.75%	0.00%	
PEAK HR :	08:00 AM - 09:00 AM																TOTAL
PEAK HR VOL :	0	0	0	0	24	0	31	0	21	247	0	0	0	282	10	0	615
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.667	0.000	0.554	0.000	0.404	0.823	0.000	0.000	0.000	0.750	0.833	0.000	0.899
					0.625				0.838				0.753				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	1	0	11	0	7	0	9	67	0	0	0	54	7	0	156
4:15 PM	0	0	0	0	3	0	8	0	4	47	1	0	0	42	9	0	114
4:30 PM	0	0	0	0	5	0	7	0	9	55	0	0	0	39	5	0	120
4:45 PM	0	0	0	0	5	0	2	0	7	62	1	0	0	41	8	0	126
5:00 PM	2	1	0	0	2	0	9	0	4	68	1	0	0	35	5	0	127
5:15 PM	0	0	0	0	3	0	4	0	5	71	0	0	0	43	4	0	130
5:30 PM	0	0	0	0	3	0	3	0	8	39	1	0	0	31	5	0	90
5:45 PM	0	0	0	0	5	0	2	0	7	33	0	0	0	39	5	0	91
6:00 PM	0	0	0	0	3	0	3	0	6	52	0	0	0	30	6	0	100
6:15 PM	0	0	0	0	3	0	5	0	6	37	0	0	0	27	4	0	82
6:30 PM	0	1	0	0	2	1	1	0	7	41	0	0	0	30	2	0	85
6:45 PM	0	0	0	0	1	0	3	0	7	37	0	0	0	23	3	0	74
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	2	2	1	0	46	1	54	0	79	609	4	0	0	434	63	0	1295
APPROACH %'s :	40.00%	40.00%	20.00%	0.00%	45.54%	0.99%	53.47%	0.00%	11.42%	88.01%	0.58%	0.00%	0.00%	87.32%	12.68%	0.00%	
PEAK HR :	04:00 PM - 05:00 PM																TOTAL
PEAK HR VOL :	0	0	1	0	24	0	24	0	29	231	2	0	0	176	29	0	516
PEAK HR FACTOR :	0.000	0.000	0.250	0.000	0.545	0.000	0.750	0.000	0.806	0.862	0.500	0.000	0.000	0.815	0.806	0.000	0.827
		0.250				0.667				0.862				0.840			

National Data & Surveying Services

Intersection Turning Movement Count

Location: Cameron Park Dr & Green Valley Rd
City: Cameron Park
Control: Signalized

Project ID: 23-070150-010
Date: 11/2/2023

Data - Total

NS/EW Streets:	Cameron Park Dr				Cameron Park Dr				Green Valley Rd				Green Valley Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	1	1	0	0	1	0.5	0.5	0	1	0.5	0.5	0	1	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
6:00 AM	16	0	2	0	1	5	2	0	0	6	5	0	5	22	0	0	64
6:15 AM	19	0	3	0	0	6	0	0	0	10	10	0	6	39	0	0	93
6:30 AM	23	0	1	0	0	4	2	0	0	13	9	0	3	40	0	0	95
6:45 AM	23	3	7	0	1	7	5	0	0	15	22	0	8	48	1	0	140
7:00 AM	39	0	8	0	0	7	2	0	1	31	28	0	11	53	0	0	180
7:15 AM	53	4	4	0	1	7	2	0	3	23	25	0	14	54	1	0	191
7:30 AM	61	4	10	0	2	17	8	0	2	39	56	0	15	94	0	0	308
7:45 AM	57	5	15	0	3	17	6	0	7	68	65	0	28	70	0	0	341
8:00 AM	44	12	14	0	6	14	5	0	2	74	68	0	12	54	1	0	306
8:15 AM	48	10	17	0	7	5	4	0	6	55	43	1	19	50	1	0	266
8:30 AM	46	3	44	0	11	8	6	0	2	64	41	0	19	69	4	0	317
8:45 AM	35	6	51	0	5	19	1	0	3	51	32	0	55	88	5	0	351
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	464	47	176	0	37	116	43	0	26	449	404	1	195	681	13	0	2652
APPROACH %'s :	67.54%	6.84%	25.62%	0.00%	18.88%	59.18%	21.94%	0.00%	2.95%	51.02%	45.91%	0.11%	21.93%	76.60%	1.46%	0.00%	
PEAK HR :	08:00 AM - 09:00 AM																TOTAL
PEAK HR VOL :	173	31	126	0	29	46	16	0	13	244	184	1	105	261	11	0	1240
PEAK HR FACTOR :	0.901	0.646	0.618	0.000	0.659	0.605	0.667	0.000	0.542	0.824	0.676	0.250	0.477	0.741	0.550	0.000	0.883
	0.887				0.910				0.767				0.637				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	1	1	0	0	1	0.5	0.5	0	1	0.5	0.5	0	1	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	62	11	16	0	0	12	6	0	2	71	42	0	21	57	2	0	302
4:15 PM	45	14	18	0	4	6	4	0	9	69	47	0	15	47	3	0	281
4:30 PM	60	16	11	0	4	10	1	0	4	82	46	0	39	35	5	0	313
4:45 PM	70	14	19	0	0	3	4	0	4	71	53	0	22	44	1	0	305
5:00 PM	65	17	19	0	3	9	3	0	6	71	61	0	38	70	0	0	362
5:15 PM	58	12	24	0	1	12	6	0	5	78	68	0	29	47	4	0	344
5:30 PM	58	9	16	0	3	5	4	0	4	50	72	0	15	25	2	0	263
5:45 PM	50	15	21	0	1	8	3	0	7	56	46	0	21	38	4	0	270
6:00 PM	44	14	26	0	1	11	4	0	7	66	45	0	5	33	2	0	258
6:15 PM	52	7	19	0	1	7	4	0	4	45	46	0	10	36	2	0	233
6:30 PM	48	8	21	0	0	8	2	0	8	58	55	0	10	36	4	0	258
6:45 PM	41	11	16	0	1	2	2	0	5	34	45	1	8	18	2	0	186
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	653	148	226	0	19	93	43	0	65	751	626	1	233	486	31	0	3375
APPROACH %'s :	63.58%	14.41%	22.01%	0.00%	12.26%	60.00%	27.74%	0.00%	4.50%	52.04%	43.38%	0.07%	31.07%	64.80%	4.13%	0.00%	
PEAK HR :	04:30 PM - 05:30 PM																TOTAL
PEAK HR VOL :	253	59	73	0	8	34	14	0	19	302	228	0	128	196	10	0	1324
PEAK HR FACTOR :	0.904	0.868	0.760	0.000	0.500	0.708	0.583	0.000	0.792	0.921	0.838	0.000	0.821	0.700	0.500	0.000	0.914
	0.934				0.737				0.909				0.773				

National Data & Surveying Services

Intersection Turning Movement Count

Location: Honpie Rd & Red Hawk Pkwy/Koto Rd
City: Placerville
Control: Signalized

Project ID: 23-070150-001
Date: 11/17/2023

Total

NS/EW Streets:	Honpie Rd				Honpie Rd				Red Hawk Pkwy/Koto Rd				Red Hawk Pkwy/Koto Rd				
PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	0.5	0.5	0	1	2	0	0	0	1.5	0.5	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
5:00 PM	0	0	0	0	50	0	7	0	1	73	0	0	0	67	11	0	209
5:15 PM	0	0	0	0	15	0	1	0	1	63	0	2	0	52	12	0	146
5:30 PM	0	0	0	0	18	0	1	0	0	62	0	1	0	94	26	0	202
5:45 PM	0	0	0	0	10	0	2	0	0	58	0	1	0	80	15	0	166
6:00 PM	0	0	0	0	11	0	0	0	1	65	0	1	0	86	6	0	170
6:15 PM	0	0	0	0	9	0	0	0	0	46	0	1	0	96	9	0	161
6:30 PM	0	0	0	0	2	0	0	0	0	65	0	3	0	84	11	0	165
6:45 PM	0	0	0	0	1	0	3	0	1	48	0	1	0	95	11	0	160
7:00 PM	0	0	0	0	3	0	0	0	0	65	0	4	0	77	3	0	152
7:15 PM	0	0	0	0	0	0	1	0	1	47	0	2	0	75	4	0	130
7:30 PM	0	0	0	0	2	0	0	0	0	51	0	2	0	78	11	0	144
7:45 PM	0	0	0	0	2	0	1	0	0	68	0	2	0	49	8	0	130
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	123	0	16	0	5	711	0	20	0	933	127	0	1935
APPROACH %'s :					88.49%	0.00%	11.51%	0.00%	0.68%	96.60%	0.00%	2.72%	0.00%	88.02%	11.98%	0.00%	
PEAK HR :	05:00 PM - 06:00 PM																TOTAL
PEAK HR VOL :	0	0	0	0	93	0	11	0	2	256	0	4	0	293	64	0	723
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.465	0.000	0.393	0.000	0.500	0.877	0.000	0.500	0.000	0.779	0.615	0.000	0.865
						0.456				0.885				0.744			

National Data & Surveying Services

Intersection Turning Movement Count

Location: Honpie Rd & Red Hawk Pkwy/Koto Rd
City: Placerville
Control: Signalized

Project ID: 23-070150-001
Date: 11/18/2023

Total

NS/EW Streets:	Honpie Rd				Honpie Rd				Red Hawk Pkwy/Koto Rd				Red Hawk Pkwy/Koto Rd				
NOON	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	0.5	0.5	0	1	2	0	0	0	1.5	0.5	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
10:00 AM	0	0	0	0	3	0	0	0	4	37	0	3	0	57	8	0	112
10:15 AM	0	0	0	0	1	0	0	0	5	36	0	2	0	80	12	0	136
10:30 AM	0	0	0	0	1	0	3	0	4	30	0	0	0	86	11	0	135
10:45 AM	0	0	0	0	6	0	4	0	2	42	0	3	0	98	11	0	166
11:00 AM	0	0	0	0	11	0	1	0	0	40	0	0	0	77	10	0	139
11:15 AM	0	0	0	0	5	0	1	0	3	40	0	2	0	93	19	0	163
11:30 AM	0	0	0	0	4	0	1	0	2	40	0	2	0	80	15	0	144
11:45 AM	0	0	0	0	6	0	1	0	1	52	0	1	0	83	15	0	159
12:00 PM	0	0	0	0	4	0	2	0	1	49	0	0	0	78	10	0	144
12:15 PM	0	0	0	0	5	0	0	0	3	59	0	1	0	88	25	0	181
12:30 PM	0	0	0	0	6	0	0	0	1	50	0	1	0	87	8	0	153
12:45 PM	0	0	0	0	3	0	1	0	1	54	0	2	0	93	17	0	171
1:00 PM	0	0	0	0	2	0	1	0	3	58	0	3	0	88	7	0	162
1:15 PM	0	0	0	0	1	0	1	0	2	68	0	1	0	80	15	0	168
1:30 PM	0	0	0	0	6	0	1	0	3	57	0	2	0	94	10	0	173
1:45 PM	0	0	0	0	6	0	1	0	1	75	0	0	0	91	14	0	188
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	70	0	18	0	36	787	0	23	0	1353	207	0	2494
APPROACH %'s :					79.55%	0.00%	20.45%	0.00%	4.26%	93.03%	0.00%	2.72%	0.00%	86.73%	13.27%	0.00%	
PEAK HR :	01:00 PM - 02:00 PM																TOTAL
PEAK HR VOL :	0	0	0	0	15	0	4	0	9	258	0	6	0	353	46	0	691
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.625	0.000	1.000	0.000	0.750	0.860	0.000	0.500	0.000	0.939	0.767	0.000	0.919
						0.679				0.898				0.950			

Prepared by National Data & Surveying Services

VOLUME

Green Valley Rd S/O Tiny Ln

Day: Thursday
Date: 11/02/2023

City: Placerville
Project #: CA23_070151_004

DAILY TOTALS	NB	SB	EB	WB	Total
	1,815	1,979	0	0	3,794

DAILY TOTALS

15-Minutes Interval

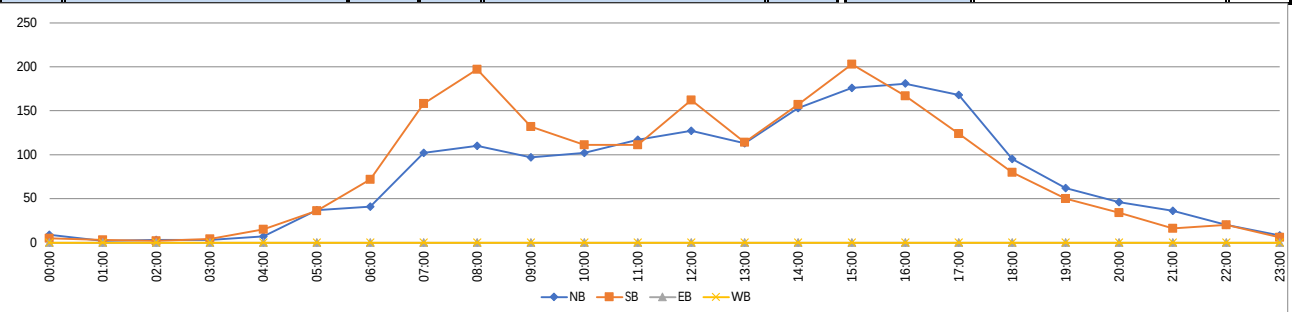
TIME	NB	SB	EB	WB	TOTAL	TIME	NB	SB	EB	WB	TOTAL
00:00	2	3			5	12:00	28	28			56
00:15	5	0			5	12:15	39	41			80
00:30	2	1			3	12:30	29	54			83
00:45	0	1			1	12:45	31	39			70
01:00	1	1			2	13:00	26	18			44
01:15	0	1			1	13:15	35	30			65
01:30	0	1			1	13:30	25	29			54
01:45	1	0			1	13:45	27	37			64
02:00	1	0			1	14:00	24	33			57
02:15	0	1			1	14:15	43	37			80
02:30	1	0			1	14:30	40	42			82
02:45	1	1			2	14:45	46	45			91
03:00	3	0			3	15:00	36	44			80
03:15	0	1			1	15:15	37	46			83
03:30	0	1			1	15:30	44	53			97
03:45	0	2			2	15:45	59	60			119
04:00	1	2			3	16:00	37	37			74
04:15	4	4			8	16:15	53	38			91
04:30	2	3			5	16:30	37	48			85
04:45	0	6			6	16:45	54	44			98
05:00	8	6			14	17:00	44	37			81
05:15	7	10			17	17:15	42	44			86
05:30	8	10			18	17:30	41	17			58
05:45	14	10			24	17:45	41	26			67
06:00	9	11			20	18:00	29	20			49
06:15	7	14			21	18:15	30	23			53
06:30	11	32			43	18:30	13	18			31
06:45	14	15			29	18:45	23	19			42
07:00	25	23			48	19:00	20	17			37
07:15	26	37			63	19:15	18	10			28
07:30	22	37			59	19:30	14	10			24
07:45	29	61			90	19:45	10	13			23
08:00	24	52			76	20:00	8	7			15
08:15	26	49			75	20:15	15	8			23
08:30	35	54			89	20:30	12	10			22
08:45	25	42			67	20:45	11	9			20
09:00	37	38			75	21:00	6	3			9
09:15	19	28			47	21:15	16	5			21
09:30	23	35			58	21:30	6	4			10
09:45	18	31			49	21:45	8	4			12
10:00	20	19			39	22:00	5	5			10
10:15	26	28			54	22:15	8	6			14
10:30	28	32			60	22:30	3	7			10
10:45	28	32			60	22:45	4	2			6
11:00	21	28			49	23:00	4	1			5
11:15	28	21			49	23:15	2	0			2
11:30	33	29			62	23:30	2	4			6
11:45	35	33			68	23:45	0	1			1
TOTALS	630	846	0	0	1476	TOTALS	1185	1133	0	0	2318
SPLIT %	43%	57%	0%	0%	39%	SPLIT %	51%	49%	0%	0%	61%

Hourly Intervals

TIME		NB	SB	EB	WB	TOTAL
00:00	01:00	9	5			14
01:00	02:00	2	3			5
02:00	03:00	3	2			5
03:00	04:00	3	4			7
04:00	05:00	7	15			22
05:00	06:00	37	36			73
06:00	07:00	41	72			113
07:00	08:00	102	158			260
08:00	09:00	110	197			307
09:00	10:00	97	132			229
10:00	11:00	102	111			213
11:00	12:00	117	111			228
12:00	13:00	127	162			289
13:00	14:00	113	114			227
14:00	15:00	153	157			310
15:00	16:00	176	203			379
16:00	17:00	181	167			348
17:00	18:00	168	124			292
18:00	19:00	95	80			175
19:00	20:00	62	50			112
20:00	21:00	46	34			80
21:00	22:00	36	16			52
22:00	23:00	20	20			40
23:00	00:00	8	6			14

STATISTICS

	NB	SB	EB	WB	TOTAL
Peak Period	00:00	to	12:00		
Volume	630	846			1476
Peak Hour	8:15	7:45			7:45
Peak Volume	123	216			330
Peak Hour Factor	0.831	0.885			0.917
Peak Period	12:00	to	00:00		
Volume	1185	1133			2318
Peak Hour	15:30	15:00			15:30
Peak Volume	193	203			381
Peak Hour Factor	0.818	0.846			0.800
Peak Period	07:00	to	09:00		
Volume	212	355			567
Peak Hour	7:45	7:45			7:45
Peak Volume	114	216			330
Peak Hour Factor	0.814	0.885			0.917
Peak Period	16:00	to	18:00		
Volume	349	291			640
Peak Hour	16:15	16:30			16:15
Peak Volume	188	173			355
Peak Hour Factor	0.870	0.901			0.906



Prepared by National Data & Surveying Services

VOLUME

Green Valley Rd Bet. Lotus Rd & Shingle Springs Dr

Day: Thursday
Date: 11/02/2023

City: Placerville
Project #: CA23_070151_005

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	1,951	1,814	3,765

DAILY TOTALS

15-Minutes Interval

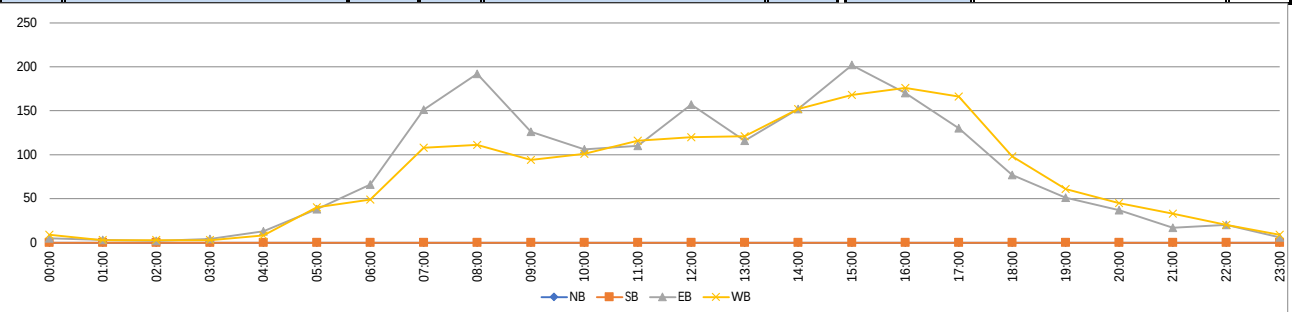
TIME	NB	SB	EB	WB	TOTAL	TIME	NB	SB	EB	WB	TOTAL
00:00			3	2	5	12:00			33	29	62
00:15			0	5	5	12:15			39	37	76
00:30			1	2	3	12:30			49	30	79
00:45			1	0	1	12:45			36	24	60
01:00			1	2	3	13:00			22	32	54
01:15			1	0	1	13:15			28	37	65
01:30			1	0	1	13:30			27	24	51
01:45			0	1	1	13:45			39	28	67
02:00			0	1	1	14:00			33	24	57
02:15			1	0	1	14:15			36	41	77
02:30			0	0	0	14:30			38	41	79
02:45			1	2	3	14:45			45	46	91
03:00			0	3	3	15:00			43	37	80
03:15			1	0	1	15:15			44	30	74
03:30			1	0	1	15:30			59	45	104
03:45			2	0	2	15:45			56	56	112
04:00			2	1	3	16:00			42	37	79
04:15			3	5	8	16:15			33	54	87
04:30			3	2	5	16:30			49	36	85
04:45			5	0	5	16:45			46	49	95
05:00			7	8	15	17:00			39	48	87
05:15			10	8	18	17:15			42	40	82
05:30			10	8	18	17:30			24	38	62
05:45			11	16	27	17:45			25	40	65
06:00			9	12	21	18:00			19	30	49
06:15			14	8	22	18:15			22	29	51
06:30			29	13	42	18:30			19	12	31
06:45			14	16	30	18:45			17	27	44
07:00			22	27	49	19:00			17	20	37
07:15			34	29	63	19:15			11	17	28
07:30			35	22	57	19:30			9	14	23
07:45			60	30	90	19:45			14	10	24
08:00			50	25	75	20:00			7	8	15
08:15			49	26	75	20:15			7	14	21
08:30			54	33	87	20:30			13	11	24
08:45			39	27	66	20:45			10	12	22
09:00			36	33	69	21:00			6	6	12
09:15			27	21	48	21:15			4	14	18
09:30			32	24	56	21:30			3	5	8
09:45			31	16	47	21:45			4	8	12
10:00			16	20	36	22:00			5	5	10
10:15			28	25	53	22:15			7	8	15
10:30			31	25	56	22:30			6	3	9
10:45			31	31	62	22:45			2	4	6
11:00			28	18	46	23:00			1	4	5
11:15			22	29	51	23:15			0	3	3
11:30			28	34	62	23:30			4	2	6
11:45			32	35	67	23:45			1	0	1
TOTALS	0	0	816	645	1461	TOTALS	0	0	1135	1169	2304
SPLIT %	0%	0%	56%	44%	39%	SPLIT %	0%	0%	49%	51%	61%

Hourly Intervals

TIME		NB	SB	EB	WB	TOTAL
00:00	01:00			5	9	14
01:00	02:00			3	3	6
02:00	03:00			2	3	5
03:00	04:00			4	3	7
04:00	05:00			13	8	21
05:00	06:00			38	40	78
06:00	07:00			66	49	115
07:00	08:00			151	108	259
08:00	09:00			192	111	303
09:00	10:00			126	94	220
10:00	11:00			106	101	207
11:00	12:00			110	116	226
12:00	13:00			157	120	277
13:00	14:00			116	121	237
14:00	15:00			152	152	304
15:00	16:00			202	168	370
16:00	17:00			170	176	346
17:00	18:00			130	166	296
18:00	19:00			77	98	175
19:00	20:00			51	61	112
20:00	21:00			37	45	82
21:00	22:00			17	33	50
22:00	23:00			20	20	40
23:00	00:00			6	9	15

STATISTICS

	NB	SB	EB	WB	TOTAL
Peak Period	00:00	to	12:00		
Volume			816	645	1461
Peak Hour			7:45	8:15	7:45
Peak Volume			213	119	327
Peak Hour Factor			0.888	0.902	0.908
Peak Period	12:00	to	00:00		
Volume			1135	1169	2304
Peak Hour			15:00	15:30	15:30
Peak Volume			202	192	382
Peak Hour Factor			0.856	0.857	0.853
Peak Period	07:00	to	09:00		
Volume			343	219	562
Peak Hour			7:45	7:45	7:45
Peak Volume			213	114	327
Peak Hour Factor			0.888	0.864	0.908
Peak Period	16:00	to	18:00		
Volume			300	342	642
Peak Hour			16:30	16:15	16:15
Peak Volume			176	187	354
Peak Hour Factor			0.898	0.866	0.932



Appendix B

Analysis Worksheets for Existing (2023) Conditions

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	11	107	350	46
v/c Ratio	0.03	0.09	0.33	0.09
Control Delay	10.6	5.1	3.8	8.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	10.6	5.1	3.8	8.7
Queue Length 50th (ft)	1	3	3	3
Queue Length 95th (ft)	8	7	15	17
Internal Link Dist (ft)		628	1141	286
Turn Bay Length (ft)	300			
Base Capacity (vph)	374	3375	2466	1380
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.03	0.03	0.14	0.03

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	75	71	174	30	2
Future Volume (veh/h)	8	75	71	174	30	2
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	11	107	101	249	43	3
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	26	1629	479	427	313	22
Arrive On Green	0.01	0.46	0.27	0.27	0.19	0.19
Sat Flow, veh/h	1781	3647	1870	1585	1619	113
Grp Volume(v), veh/h	11	107	101	249	47	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1777	1585	1769	0
Q Serve(g_s), s	0.2	0.4	1.1	3.5	0.6	0.0
Cycle Q Clear(g_c), s	0.2	0.4	1.1	3.5	0.6	0.0
Prop In Lane	1.00			1.00	0.91	0.06
Lane Grp Cap(c), veh/h	26	1629	479	427	342	0
V/C Ratio(X)	0.42	0.07	0.21	0.58	0.14	0.00
Avail Cap(c_a), veh/h	345	3780	1237	1104	1266	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	12.6	3.9	7.3	8.2	8.6	0.0
Incr Delay (d2), s/veh	10.4	0.0	0.2	1.3	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.1	0.3	0.8	0.2	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	23.0	3.9	7.5	9.4	8.8	0.0
LnGrp LOS	C	A	A	A	A	A
Approach Vol, veh/h		118	350		47	
Approach Delay, s/veh		5.7	8.9		8.8	
Approach LOS		A	A		A	

Timer - Assigned Phs		4		6	7	8
Phs Duration (G+Y+Rc), s		16.4		9.5	4.9	11.5
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		27.5		18.5	5.0	18.0
Max Q Clear Time (g_c+I1), s		2.4		2.6	2.2	5.5
Green Ext Time (p_c), s		0.6		0.1	0.0	1.7

Intersection Summary	
HCM 6th Ctrl Delay	8.2
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	213	1	5	116	5	5
Future Vol, veh/h	213	1	5	116	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	83	83	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	242	1	6	140	5	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	243	0	395	243
Stage 1	-	-	-	-	243	-
Stage 2	-	-	-	-	152	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1323	-	610	796
Stage 1	-	-	-	-	797	-
Stage 2	-	-	-	-	876	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1323	-	607	796
Mov Cap-2 Maneuver	-	-	-	-	607	-
Stage 1	-	-	-	-	797	-
Stage 2	-	-	-	-	872	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	10.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	689	-	-	1323	-
HCM Lane V/C Ratio	0.016	-	-	0.005	-
HCM Control Delay (s)	10.3	-	-	7.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-

Intersection	
Int Delay, s/veh	3.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	69	50	138	101	113	356
Future Vol, veh/h	69	50	138	101	113	356
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	245	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	89	89	86	86
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	77	56	155	113	131	414

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	888	212	0	0	268	0
Stage 1	212	-	-	-	-	-
Stage 2	676	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	314	828	-	-	1296	-
Stage 1	823	-	-	-	-	-
Stage 2	505	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	282	828	-	-	1296	-
Mov Cap-2 Maneuver	282	-	-	-	-	-
Stage 1	823	-	-	-	-	-
Stage 2	454	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	18.9	0	1.9
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	390	1296	-
HCM Lane V/C Ratio	-	-	0.339	0.101	-
HCM Control Delay (s)	-	-	18.9	8.1	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	1.5	0.3	-

Intersection	
Int Delay, s/veh	3.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	129	124	42	67	58	53
Future Vol, veh/h	129	124	42	67	58	53
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	91	91	73	73
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	137	132	46	74	79	73

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	269	0	369	203
Stage 1	-	-	-	-	203	-
Stage 2	-	-	-	-	166	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1295	-	631	838
Stage 1	-	-	-	-	831	-
Stage 2	-	-	-	-	863	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1295	-	608	838
Mov Cap-2 Maneuver	-	-	-	-	608	-
Stage 1	-	-	-	-	831	-
Stage 2	-	-	-	-	831	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3	11.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	700	-	-	1295	-
HCM Lane V/C Ratio	0.217	-	-	0.036	-
HCM Control Delay (s)	11.6	-	-	7.9	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.8	-	-	0.1	-

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	61	249	283	58	24	60
Future Vol, veh/h	61	249	283	58	24	60
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	70	70	78	78	75	75
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	87	356	363	74	32	80

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	437	0	-	0	930	400
Stage 1	-	-	-	-	400	-
Stage 2	-	-	-	-	530	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1123	-	-	-	297	650
Stage 1	-	-	-	-	677	-
Stage 2	-	-	-	-	590	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1123	-	-	-	268	650
Mov Cap-2 Maneuver	-	-	-	-	268	-
Stage 1	-	-	-	-	611	-
Stage 2	-	-	-	-	590	-

Approach	EB	WB	SB
HCM Control Delay, s	1.7	0	15.3
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1123	-	-	-	462
HCM Lane V/C Ratio	0.078	-	-	-	0.242
HCM Control Delay (s)	8.5	0	-	-	15.3
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.3	-	-	-	0.9

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	9	398	17	380	184	115
v/c Ratio	0.05	0.56	0.08	0.53	0.47	0.34
Control Delay	33.8	20.4	33.3	19.7	26.3	28.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.8	20.4	33.3	19.7	26.3	28.1
Queue Length 50th (ft)	2	89	4	85	44	28
Queue Length 95th (ft)	16	208	25	215	118	94
Internal Link Dist (ft)		403		299	115	124
Turn Bay Length (ft)	290		285			
Base Capacity (vph)	713	1386	892	1503	727	722
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.29	0.02	0.25	0.25	0.16

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	223	55	13	248	37	91	23	19	55	26	7
Future Volume (veh/h)	6	223	55	13	248	37	91	23	19	55	26	7
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	9	319	79	17	331	49	126	32	26	72	34	9
Peak Hour Factor	0.70	0.70	0.70	0.75	0.75	0.75	0.72	0.72	0.72	0.76	0.76	0.76
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	17	439	109	31	496	73	171	43	35	106	50	13
Arrive On Green	0.01	0.30	0.30	0.02	0.31	0.31	0.14	0.14	0.14	0.09	0.09	0.09
Sat Flow, veh/h	1781	1447	358	1781	1592	236	1209	307	249	1120	529	140
Grp Volume(v), veh/h	9	0	398	17	0	380	184	0	0	115	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1806	1781	0	1828	1765	0	0	1789	0	0
Q Serve(g_s), s	0.2	0.0	7.1	0.3	0.0	6.5	3.6	0.0	0.0	2.2	0.0	0.0
Cycle Q Clear(g_c), s	0.2	0.0	7.1	0.3	0.0	6.5	3.6	0.0	0.0	2.2	0.0	0.0
Prop In Lane	1.00		0.20	1.00		0.13	0.68		0.14	0.63		0.08
Lane Grp Cap(c), veh/h	17	0	548	31	0	569	250	0	0	170	0	0
V/C Ratio(X)	0.53	0.00	0.73	0.55	0.00	0.67	0.74	0.00	0.00	0.68	0.00	0.00
Avail Cap(c_a), veh/h	986	0	1999	1233	0	2024	977	0	0	990	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	17.8	0.0	11.2	17.6	0.0	10.8	14.9	0.0	0.0	15.8	0.0	0.0
Incr Delay (d2), s/veh	17.5	0.0	1.4	10.8	0.0	1.0	1.6	0.0	0.0	4.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	2.0	0.2	0.0	1.8	1.1	0.0	0.0	0.9	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	35.3	0.0	12.6	28.4	0.0	11.8	16.5	0.0	0.0	20.5	0.0	0.0
LnGrp LOS	D	A	B	C	A	B	B	A	A	C	A	A
Approach Vol, veh/h		407			397			184			115	
Approach Delay, s/veh		13.1			12.5			16.5			20.5	
Approach LOS		B			B			B			C	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	4.3	16.2		8.6	4.6	16.0		6.9
Change Period (Y+Rc), s	4.0	5.0		3.5	4.0	5.0		3.5
Max Green Setting (Gmax), s	20.0	40.0		20.0	25.0	40.0		20.0
Max Q Clear Time (g_c+I1), s	2.2	8.5		5.6	2.3	9.1		4.2
Green Ext Time (p_c), s	0.0	1.7		0.5	0.0	1.9		0.4

Intersection Summary	
HCM 6th Ctrl Delay	14.2
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	154	34	26	122	298	219
v/c Ratio	0.31	0.07	0.13	0.12	0.30	0.23
Control Delay	15.3	6.8	22.2	7.1	10.6	2.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.3	6.8	22.2	7.1	10.6	2.9
Queue Length 50th (ft)	21	0	4	13	36	0
Queue Length 95th (ft)	90	17	24	32	139	35
Internal Link Dist (ft)	437			333	416	
Turn Bay Length (ft)		60	230			225
Base Capacity (vph)	1399	1258	703	1863	1761	1508
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.03	0.04	0.07	0.17	0.15

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	151	33	19	90	265	195
Future Volume (veh/h)	151	33	19	90	265	195
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	154	34	26	122	298	219
Peak Hour Factor	0.98	0.98	0.74	0.74	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	313	279	34	933	592	502
Arrive On Green	0.18	0.18	0.02	0.50	0.32	0.32
Sat Flow, veh/h	1781	1585	1781	1870	1870	1585
Grp Volume(v), veh/h	154	34	26	122	298	219
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1870	1870	1585
Q Serve(g_s), s	2.5	0.6	0.5	1.1	4.2	3.6
Cycle Q Clear(g_c), s	2.5	0.6	0.5	1.1	4.2	3.6
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	313	279	34	933	592	502
V/C Ratio(X)	0.49	0.12	0.76	0.13	0.50	0.44
Avail Cap(c_a), veh/h	1641	1460	820	2584	2584	2190
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	12.1	11.3	15.9	4.4	9.0	8.8
Incr Delay (d2), s/veh	1.9	0.3	11.7	0.1	1.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	0.6	0.3	0.2	0.9	0.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	14.0	11.6	27.6	4.5	10.1	9.8
LnGrp LOS	B	B	C	A	B	A
Approach Vol, veh/h	188			148	517	
Approach Delay, s/veh	13.6			8.5	10.0	
Approach LOS	B			A	A	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		21.5		11.0	5.9	15.6
Change Period (Y+Rc), s		5.3		5.3	5.3	5.3
Max Green Setting (Gmax), s		45.0		30.0	15.0	45.0
Max Q Clear Time (g_c+I1), s		3.1		4.5	2.5	6.2
Green Ext Time (p_c), s		1.0		1.0	0.0	4.1

Intersection Summary	
HCM 6th Ctrl Delay	10.5
HCM 6th LOS	B

Intersection	
Int Delay, s/veh	3.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	144	144	58	167	70	31
Future Vol, veh/h	144	144	58	167	70	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	77	77	88	88	70	70
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	187	187	66	190	100	44

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	374	0	603	281
Stage 1	-	-	-	-	281	-
Stage 2	-	-	-	-	322	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1184	-	462	758
Stage 1	-	-	-	-	767	-
Stage 2	-	-	-	-	735	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1184	-	433	758
Mov Cap-2 Maneuver	-	-	-	-	433	-
Stage 1	-	-	-	-	767	-
Stage 2	-	-	-	-	689	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.1	15.1
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	499	-	-	1184	-
HCM Lane V/C Ratio	0.289	-	-	0.056	-
HCM Control Delay (s)	15.1	-	-	8.2	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	1.2	-	-	0.2	-

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	21	247	282	10	24	31
Future Vol, veh/h	21	247	282	10	24	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	84	84	75	75	70	70
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	25	294	376	13	34	44

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	389	0	-	0	727	383
Stage 1	-	-	-	-	383	-
Stage 2	-	-	-	-	344	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1170	-	-	-	391	664
Stage 1	-	-	-	-	689	-
Stage 2	-	-	-	-	718	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1170	-	-	-	381	664
Mov Cap-2 Maneuver	-	-	-	-	381	-
Stage 1	-	-	-	-	671	-
Stage 2	-	-	-	-	718	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	13.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1170	-	-	-	501
HCM Lane V/C Ratio	0.021	-	-	-	0.157
HCM Control Delay (s)	8.1	0	-	-	13.5
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.6

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	18	556	150	389	194	177	32	69
v/c Ratio	0.16	0.87	0.63	0.42	0.65	0.32	0.25	0.33
Control Delay	47.7	40.9	50.2	18.1	45.7	9.7	47.9	35.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.7	40.9	50.2	18.1	45.7	9.7	47.9	35.2
Queue Length 50th (ft)	9	227	72	97	93	14	16	27
Queue Length 95th (ft)	31	#458	132	226	201	65	54	74
Internal Link Dist (ft)		484		464		352		157
Turn Bay Length (ft)	265		150		90		50	
Base Capacity (vph)	351	941	351	1030	585	695	351	391
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.59	0.43	0.38	0.33	0.25	0.09	0.18

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	244	184	105	261	11	173	31	126	29	46	16
Future Volume (veh/h)	14	244	184	105	261	11	173	31	126	29	46	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	18	317	239	150	373	16	194	35	142	32	51	18
Peak Hour Factor	0.77	0.77	0.77	0.70	0.70	0.70	0.89	0.89	0.89	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	23	364	274	191	822	35	243	61	249	38	99	35
Arrive On Green	0.01	0.37	0.37	0.11	0.46	0.46	0.14	0.19	0.19	0.02	0.07	0.07
Sat Flow, veh/h	1781	990	746	1781	1780	76	1781	323	1311	1781	1320	466
Grp Volume(v), veh/h	18	0	556	150	0	389	194	0	177	32	0	69
Grp Sat Flow(s),veh/h/ln	1781	0	1736	1781	0	1857	1781	0	1634	1781	0	1786
Q Serve(g_s), s	0.6	0.0	16.7	4.6	0.0	8.0	5.9	0.0	5.5	1.0	0.0	2.1
Cycle Q Clear(g_c), s	0.6	0.0	16.7	4.6	0.0	8.0	5.9	0.0	5.5	1.0	0.0	2.1
Prop In Lane	1.00		0.43	1.00		0.04	1.00		0.80	1.00		0.26
Lane Grp Cap(c), veh/h	23	0	638	191	0	857	243	0	311	38	0	133
V/C Ratio(X)	0.77	0.00	0.87	0.78	0.00	0.45	0.80	0.00	0.57	0.85	0.00	0.52
Avail Cap(c_a), veh/h	477	0	1084	477	0	1324	794	0	583	477	0	478
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.6	0.0	16.5	24.4	0.0	10.3	23.4	0.0	20.6	27.4	0.0	25.0
Incr Delay (d2), s/veh	17.9	0.0	1.9	2.7	0.0	0.1	2.3	0.0	0.6	17.5	0.0	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	5.3	1.8	0.0	2.3	2.4	0.0	1.9	0.6	0.0	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	45.5	0.0	18.4	27.0	0.0	10.4	25.7	0.0	21.2	44.8	0.0	26.1
LnGrp LOS	D	A	B	C	A	B	C	A	C	D	A	C
Approach Vol, veh/h		574			539			371			101	
Approach Delay, s/veh		19.3			15.0			23.6			32.1	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.5	25.9	11.2	9.5	4.2	31.2	4.7	16.0
Change Period (Y+Rc), s	3.5	5.3	3.5	5.3	3.5	5.3	3.5	* 5.3
Max Green Setting (Gmax), s	15.0	35.0	25.0	15.0	15.0	40.0	15.0	* 20
Max Q Clear Time (g_c+I1), s	6.6	18.7	7.9	4.1	2.6	10.0	3.0	7.5
Green Ext Time (p_c), s	0.1	1.9	0.1	0.1	0.0	1.2	0.0	0.5

Intersection Summary	
HCM 6th Ctrl Delay	19.7
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	4	256	278	180
v/c Ratio	0.01	0.21	0.26	0.22
Control Delay	13.0	6.6	8.3	8.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	13.0	6.6	8.3	8.9
Queue Length 50th (ft)	1	10	10	14
Queue Length 95th (ft)	6	27	44	49
Internal Link Dist (ft)		628	1141	286
Turn Bay Length (ft)	300			
Base Capacity (vph)	379	3304	2583	1337
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.01	0.08	0.11	0.13

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	218	208	31	119	7
Future Volume (veh/h)	3	218	208	31	119	7
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	4	256	242	36	170	10
Peak Hour Factor	0.85	0.85	0.86	0.86	0.70	0.70
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	10	1434	642	94	354	21
Arrive On Green	0.01	0.40	0.21	0.21	0.21	0.21
Sat Flow, veh/h	1781	3647	3202	457	1662	98
Grp Volume(v), veh/h	4	256	137	141	181	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1777	1788	1770	0
Q Serve(g_s), s	0.1	1.1	1.6	1.6	2.1	0.0
Cycle Q Clear(g_c), s	0.1	1.1	1.6	1.6	2.1	0.0
Prop In Lane	1.00			0.26	0.94	0.06
Lane Grp Cap(c), veh/h	10	1434	367	369	377	0
V/C Ratio(X)	0.41	0.18	0.37	0.38	0.48	0.00
Avail Cap(c_a), veh/h	379	4163	1362	1371	1395	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	11.6	4.5	8.0	8.0	8.1	0.0
Incr Delay (d2), s/veh	25.2	0.1	0.6	0.6	0.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.1	0.4	0.4	0.6	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	36.9	4.6	8.6	8.7	9.0	0.0
LnGrp LOS	D	A	A	A	A	A
Approach Vol, veh/h		260	278		181	
Approach Delay, s/veh		5.1	8.7		9.0	
Approach LOS		A	A		A	

Timer - Assigned Phs			4		6	7	8
Phs Duration (G+Y+Rc), s			14.0		9.5	4.6	9.3
Change Period (Y+Rc), s			4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s			27.5		18.5	5.0	18.0
Max Q Clear Time (g_c+I1), s			3.1		4.1	2.1	3.6
Green Ext Time (p_c), s			1.6		0.4	0.0	1.3

Intersection Summary	
HCM 6th Ctrl Delay	7.5
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	172	5	5	175	5	5
Future Vol, veh/h	172	5	5	175	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	85	85	70	70
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	195	6	6	206	7	7

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	201	0	416	198
Stage 1	-	-	-	-	198	-
Stage 2	-	-	-	-	218	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1371	-	593	843
Stage 1	-	-	-	-	835	-
Stage 2	-	-	-	-	818	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1371	-	590	843
Mov Cap-2 Maneuver	-	-	-	-	590	-
Stage 1	-	-	-	-	835	-
Stage 2	-	-	-	-	814	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	10.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	694	-	-	1371	-
HCM Lane V/C Ratio	0.021	-	-	0.004	-
HCM Control Delay (s)	10.3	-	-	7.6	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	5.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	77	102	383	79	93	209
Future Vol, veh/h	77	102	383	79	93	209
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	245	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	91	91	84	84	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	85	112	456	94	97	218

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	915	503	0	0	550	0
Stage 1	503	-	-	-	-	-
Stage 2	412	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	303	569	-	-	1020	-
Stage 1	607	-	-	-	-	-
Stage 2	669	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	274	569	-	-	1020	-
Mov Cap-2 Maneuver	274	-	-	-	-	-
Stage 1	607	-	-	-	-	-
Stage 2	605	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	23.3	0	2.7
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	389	1020	-
HCM Lane V/C Ratio	-	-	0.506	0.095	-
HCM Control Delay (s)	-	-	23.3	8.9	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	2.8	0.3	-

Intersection	
Int Delay, s/veh	4.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	108	84	29	145	88	57
Future Vol, veh/h	108	84	29	145	88	57
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	93	93	76	76
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	115	89	31	156	116	75

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	204	0	378	160
Stage 1	-	-	-	-	160	-
Stage 2	-	-	-	-	218	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1368	-	624	885
Stage 1	-	-	-	-	869	-
Stage 2	-	-	-	-	818	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1368	-	608	885
Mov Cap-2 Maneuver	-	-	-	-	608	-
Stage 1	-	-	-	-	869	-
Stage 2	-	-	-	-	798	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.3	12.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	693	-	-	1368	-
HCM Lane V/C Ratio	0.275	-	-	0.023	-
HCM Control Delay (s)	12.2	-	-	7.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	1.1	-	-	0.1	-

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	41	153	244	1	30	55
Future Vol, veh/h	41	153	244	1	30	55
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	80	80	76	76
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	47	174	305	1	39	72

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	306	0	-	0	574	306
Stage 1	-	-	-	-	306	-
Stage 2	-	-	-	-	268	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1255	-	-	-	480	734
Stage 1	-	-	-	-	747	-
Stage 2	-	-	-	-	777	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1255	-	-	-	460	734
Mov Cap-2 Maneuver	-	-	-	-	460	-
Stage 1	-	-	-	-	716	-
Stage 2	-	-	-	-	777	-

Approach	EB	WB	SB
HCM Control Delay, s	1.7	0	12.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1255	-	-	-	606
HCM Lane V/C Ratio	0.037	-	-	-	0.185
HCM Control Delay (s)	8	0	-	-	12.3
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.7

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	11	246	42	406	164	133
v/c Ratio	0.06	0.39	0.19	0.53	0.46	0.39
Control Delay	34.9	21.8	33.1	18.6	27.1	29.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.9	21.8	33.1	18.6	27.1	29.3
Queue Length 50th (ft)	3	69	13	88	44	38
Queue Length 95th (ft)	22	162	54	276	137	108
Internal Link Dist (ft)		403		299	115	124
Turn Bay Length (ft)	290		285			
Base Capacity (vph)	695	1362	868	1421	712	701
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.18	0.05	0.29	0.23	0.19

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	171	28	36	236	109	42	61	46	69	24	9
Future Volume (veh/h)	9	171	28	36	236	109	42	61	46	69	24	9
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	11	211	35	42	278	128	46	67	51	90	31	12
Peak Hour Factor	0.81	0.81	0.81	0.85	0.85	0.85	0.91	0.91	0.91	0.77	0.77	0.77
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	21	449	74	68	380	175	62	91	69	125	43	17
Arrive On Green	0.01	0.29	0.29	0.04	0.31	0.31	0.13	0.13	0.13	0.10	0.10	0.10
Sat Flow, veh/h	1781	1564	259	1781	1212	558	490	714	544	1205	415	161
Grp Volume(v), veh/h	11	0	246	42	0	406	164	0	0	133	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1824	1781	0	1770	1748	0	0	1781	0	0
Q Serve(g_s), s	0.2	0.0	4.0	0.8	0.0	7.4	3.3	0.0	0.0	2.6	0.0	0.0
Cycle Q Clear(g_c), s	0.2	0.0	4.0	0.8	0.0	7.4	3.3	0.0	0.0	2.6	0.0	0.0
Prop In Lane	1.00		0.14	1.00		0.32	0.28		0.31	0.68		0.09
Lane Grp Cap(c), veh/h	21	0	523	68	0	555	222	0	0	185	0	0
V/C Ratio(X)	0.53	0.00	0.47	0.62	0.00	0.73	0.74	0.00	0.00	0.72	0.00	0.00
Avail Cap(c_a), veh/h	989	0	2025	1236	0	1965	970	0	0	989	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	17.7	0.0	10.6	17.1	0.0	11.0	15.2	0.0	0.0	15.6	0.0	0.0
Incr Delay (d2), s/veh	14.9	0.0	0.5	6.6	0.0	1.4	1.8	0.0	0.0	5.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	1.1	0.4	0.0	2.0	1.0	0.0	0.0	1.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	32.7	0.0	11.1	23.7	0.0	12.4	17.0	0.0	0.0	20.8	0.0	0.0
LnGrp LOS	C	A	B	C	A	B	B	A	A	C	A	A
Approach Vol, veh/h		257			448			164			133	
Approach Delay, s/veh		12.0			13.5			17.0			20.8	
Approach LOS		B			B			B			C	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	4.4	16.3		8.1	5.4	15.3		7.2
Change Period (Y+Rc), s	4.0	5.0		3.5	4.0	5.0		3.5
Max Green Setting (Gmax), s	20.0	40.0		20.0	25.0	40.0		20.0
Max Q Clear Time (g_c+I1), s	2.2	9.4		5.3	2.8	6.0		4.6
Green Ext Time (p_c), s	0.0	1.9		0.4	0.0	1.1		0.5

Intersection Summary	
HCM 6th Ctrl Delay	14.6
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	262	30	33	307	169	159
v/c Ratio	0.47	0.06	0.17	0.39	0.26	0.24
Control Delay	17.0	9.6	24.8	10.2	14.1	4.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.0	9.6	24.8	10.2	14.1	4.3
Queue Length 50th (ft)	38	2	6	45	23	0
Queue Length 95th (ft)	121	16	36	108	89	34
Internal Link Dist (ft)	437			333	416	
Turn Bay Length (ft)		60	230			225
Base Capacity (vph)	1293	1162	646	1860	1715	1469
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.03	0.05	0.17	0.10	0.11

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	202	23	32	298	154	145
Future Volume (veh/h)	202	23	32	298	154	145
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	262	30	33	307	169	159
Peak Hour Factor	0.77	0.77	0.97	0.97	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	407	362	43	796	429	363
Arrive On Green	0.23	0.23	0.02	0.43	0.23	0.23
Sat Flow, veh/h	1781	1585	1781	1870	1870	1585
Grp Volume(v), veh/h	262	30	33	307	169	159
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1870	1870	1585
Q Serve(g_s), s	4.1	0.5	0.6	3.5	2.3	2.6
Cycle Q Clear(g_c), s	4.1	0.5	0.6	3.5	2.3	2.6
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	407	362	43	796	429	363
V/C Ratio(X)	0.64	0.08	0.77	0.39	0.39	0.44
Avail Cap(c_a), veh/h	1742	1550	871	2743	2743	2325
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	10.7	9.3	14.9	6.1	10.0	10.1
Incr Delay (d2), s/veh	2.7	0.2	10.4	0.5	0.9	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	0.5	0.3	0.7	0.6	0.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	13.4	9.5	25.3	6.5	11.0	11.4
LnGrp LOS	B	A	C	A	B	B
Approach Vol, veh/h	292			340	328	
Approach Delay, s/veh	13.0			8.4	11.2	
Approach LOS	B			A	B	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		18.4		12.3	6.0	12.3
Change Period (Y+Rc), s		5.3		5.3	5.3	5.3
Max Green Setting (Gmax), s		45.0		30.0	15.0	45.0
Max Q Clear Time (g_c+I1), s		5.5		6.1	2.6	4.6
Green Ext Time (p_c), s		3.0		1.6	0.0	2.4

Intersection Summary	
HCM 6th Ctrl Delay	10.7
HCM 6th LOS	B

Intersection	
Int Delay, s/veh	1.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	211	27	13	171	23	23
Future Vol, veh/h	211	27	13	171	23	23
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	89	89	70	70
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	251	32	15	192	33	33

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	283	0	489	267
Stage 1	-	-	-	-	267	-
Stage 2	-	-	-	-	222	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1279	-	538	772
Stage 1	-	-	-	-	778	-
Stage 2	-	-	-	-	815	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1279	-	531	772
Mov Cap-2 Maneuver	-	-	-	-	531	-
Stage 1	-	-	-	-	778	-
Stage 2	-	-	-	-	804	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	11.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	629	-	-	1279	-
HCM Lane V/C Ratio	0.104	-	-	0.011	-
HCM Control Delay (s)	11.4	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	29	231	176	29	24	24
Future Vol, veh/h	29	231	176	29	24	24
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	86	86	84	84	70	70
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	34	269	210	35	34	34

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	245	0	-	0	565	228
Stage 1	-	-	-	-	228	-
Stage 2	-	-	-	-	337	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1321	-	-	-	486	811
Stage 1	-	-	-	-	810	-
Stage 2	-	-	-	-	723	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1321	-	-	-	471	811
Mov Cap-2 Maneuver	-	-	-	-	471	-
Stage 1	-	-	-	-	786	-
Stage 2	-	-	-	-	723	-

Approach	EB	WB	SB
HCM Control Delay, s	0.9	0	11.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1321	-	-	-	596
HCM Lane V/C Ratio	0.026	-	-	-	0.115
HCM Control Delay (s)	7.8	0	-	-	11.8
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.4

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	21	583	166	268	272	141	11	65
v/c Ratio	0.20	0.91	0.69	0.29	0.78	0.23	0.11	0.33
Control Delay	50.9	47.4	55.9	17.7	52.2	15.8	50.6	36.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.9	47.4	55.9	17.7	52.2	15.8	50.6	36.8
Queue Length 50th (ft)	12	280	91	71	149	36	6	28
Queue Length 95th (ft)	42	#679	164	180	285	90	22	56
Internal Link Dist (ft)		484		464		352		157
Turn Bay Length (ft)	265		150		90		50	
Base Capacity (vph)	315	847	315	968	526	659	315	354
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.69	0.53	0.28	0.52	0.21	0.03	0.18

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	19	302	228	128	196	10	253	59	73	8	34	14
Future Volume (veh/h)	19	302	228	128	196	10	253	59	73	8	34	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	21	332	251	166	255	13	272	63	78	11	46	19
Peak Hour Factor	0.91	0.91	0.91	0.77	0.77	0.77	0.93	0.93	0.93	0.74	0.74	0.74
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	26	369	279	207	839	43	320	181	224	15	84	35
Arrive On Green	0.01	0.37	0.37	0.12	0.48	0.48	0.18	0.24	0.24	0.01	0.07	0.07
Sat Flow, veh/h	1781	989	747	1781	1764	90	1781	760	941	1781	1257	519
Grp Volume(v), veh/h	21	0	583	166	0	268	272	0	141	11	0	65
Grp Sat Flow(s),veh/h/ln	1781	0	1736	1781	0	1854	1781	0	1701	1781	0	1777
Q Serve(g_s), s	0.8	0.0	21.1	6.1	0.0	5.9	9.9	0.0	4.6	0.4	0.0	2.4
Cycle Q Clear(g_c), s	0.8	0.0	21.1	6.1	0.0	5.9	9.9	0.0	4.6	0.4	0.0	2.4
Prop In Lane	1.00		0.43	1.00		0.05	1.00		0.55	1.00		0.29
Lane Grp Cap(c), veh/h	26	0	649	207	0	881	320	0	405	15	0	119
V/C Ratio(X)	0.81	0.00	0.90	0.80	0.00	0.30	0.85	0.00	0.35	0.74	0.00	0.55
Avail Cap(c_a), veh/h	401	0	911	401	0	1112	668	0	510	401	0	400
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	32.8	0.0	19.7	28.7	0.0	10.7	26.5	0.0	21.1	33.0	0.0	30.2
Incr Delay (d2), s/veh	19.7	0.0	7.2	2.7	0.0	0.1	2.5	0.0	0.2	23.6	0.0	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	8.1	2.5	0.0	1.9	4.1	0.0	1.7	0.3	0.0	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	52.5	0.0	26.9	31.5	0.0	10.8	29.0	0.0	21.3	56.6	0.0	31.6
LnGrp LOS	D	A	C	C	A	B	C	A	C	E	A	C
Approach Vol, veh/h		604			434			413			76	
Approach Delay, s/veh		27.8			18.7			26.4			35.2	
Approach LOS		C			B			C			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.3	30.2	15.5	9.8	4.5	37.0	4.1	21.2
Change Period (Y+Rc), s	3.5	5.3	3.5	5.3	3.5	5.3	3.5	* 5.3
Max Green Setting (Gmax), s	15.0	35.0	25.0	15.0	15.0	40.0	15.0	* 20
Max Q Clear Time (g_c+I1), s	8.1	23.1	11.9	4.4	2.8	7.9	2.4	6.6
Green Ext Time (p_c), s	0.1	1.8	0.2	0.1	0.0	0.8	0.0	0.4

Intersection Summary	
HCM 6th Ctrl Delay	25.2
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	7	301	415	149
v/c Ratio	0.02	0.23	0.36	0.29
Control Delay	14.0	6.3	8.2	10.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	14.0	6.3	8.2	10.4
Queue Length 50th (ft)	1	12	15	11
Queue Length 95th (ft)	9	30	60	45
Internal Link Dist (ft)		628	1141	286
Turn Bay Length (ft)	300			
Base Capacity (vph)	341	3278	2409	1259
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.02	0.09	0.17	0.12

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	256	293	64	93	11
Future Volume (veh/h)	6	256	293	64	93	11
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	7	301	341	74	133	16
Peak Hour Factor	0.85	0.85	0.86	0.86	0.70	0.70
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	17	1584	751	161	309	37
Arrive On Green	0.01	0.45	0.26	0.26	0.20	0.20
Sat Flow, veh/h	1781	3647	3004	624	1559	188
Grp Volume(v), veh/h	7	301	207	208	150	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1777	1758	1759	0
Q Serve(g_s), s	0.1	1.3	2.5	2.5	1.9	0.0
Cycle Q Clear(g_c), s	0.1	1.3	2.5	2.5	1.9	0.0
Prop In Lane	1.00			0.35	0.89	0.11
Lane Grp Cap(c), veh/h	17	1584	458	454	348	0
V/C Ratio(X)	0.41	0.19	0.45	0.46	0.43	0.00
Avail Cap(c_a), veh/h	353	3869	1266	1253	1288	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	12.4	4.2	7.9	7.9	8.9	0.0
Incr Delay (d2), s/veh	15.4	0.1	0.7	0.7	0.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.2	0.6	0.6	0.6	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	27.8	4.3	8.6	8.6	9.7	0.0
LnGrp LOS	C	A	A	A	A	A
Approach Vol, veh/h		308	415		150	
Approach Delay, s/veh		4.8	8.6		9.7	
Approach LOS		A	A		A	

Timer - Assigned Phs		4		6	7	8
Phs Duration (G+Y+Rc), s		15.8		9.5	4.7	11.0
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		27.5		18.5	5.0	18.0
Max Q Clear Time (g_c+I1), s		3.3		3.9	2.1	4.5
Green Ext Time (p_c), s		1.9		0.3	0.0	2.0

Intersection Summary	
HCM 6th Ctrl Delay	7.5
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	18	304	463	27
v/c Ratio	0.05	0.22	0.38	0.06
Control Delay	12.5	5.1	7.5	9.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	12.5	5.1	7.5	9.9
Queue Length 50th (ft)	2	10	15	2
Queue Length 95th (ft)	15	21	58	14
Internal Link Dist (ft)		628	1141	286
Turn Bay Length (ft)	300			
Base Capacity (vph)	358	3320	2546	1307
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.05	0.09	0.18	0.02

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	15	258	353	46	15	4
Future Volume (veh/h)	15	258	353	46	15	4
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	18	304	410	53	21	6
Peak Hour Factor	0.85	0.85	0.86	0.86	0.70	0.70
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	42	1656	858	110	249	71
Arrive On Green	0.02	0.47	0.27	0.27	0.19	0.19
Sat Flow, veh/h	1781	3647	3261	407	1304	372
Grp Volume(v), veh/h	18	304	229	234	28	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1777	1797	1738	0
Q Serve(g_s), s	0.3	1.3	2.8	2.9	0.3	0.0
Cycle Q Clear(g_c), s	0.3	1.3	2.8	2.9	0.3	0.0
Prop In Lane	1.00			0.23	0.75	0.21
Lane Grp Cap(c), veh/h	42	1656	481	487	331	0
V/C Ratio(X)	0.43	0.18	0.48	0.48	0.08	0.00
Avail Cap(c_a), veh/h	340	3727	1220	1234	1226	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	12.6	4.1	8.0	8.0	8.7	0.0
Incr Delay (d2), s/veh	6.9	0.1	0.7	0.7	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.2	0.7	0.8	0.1	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	19.5	4.1	8.7	8.7	8.8	0.0
LnGrp LOS	B	A	A	A	A	A
Approach Vol, veh/h		322	463		28	
Approach Delay, s/veh		5.0	8.7		8.8	
Approach LOS		A	A		A	

Timer - Assigned Phs			4		6	7	8
Phs Duration (G+Y+Rc), s			16.7		9.5	5.1	11.6
Change Period (Y+Rc), s			4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s			27.5		18.5	5.0	18.0
Max Q Clear Time (g_c+I1), s			3.3		2.3	2.3	4.9
Green Ext Time (p_c), s			2.0		0.0	0.0	2.3

Intersection Summary	
HCM 6th Ctrl Delay	7.3
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

HCS7 Two-Lane Highway Report

Project Information

Analyst	Kimley-Horn	Date	12/18/2023
Agency		Analysis Year	Existing (2023)
Jurisdiction	El Dorado County	Time Period Analyzed	AM Peak-Hour
Project Description	Red Hawk Casino - Seg 1. Green Valley Rd E/O Shingle Springs Dr NB	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	0
Speed Limit, mi/h	55	Access Point Density, pts/mi	14.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	148	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.83	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.09

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	53.7
Speed Slope Coefficient	3.47252	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34499	PF Power Coefficient	0.74378
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	0.8
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	52.8

Vehicle Results

Average Speed, mi/h	52.8	Percent Followers, %	27.8
Segment Travel Time, minutes	1.14	Followers Density, followers/mi/ln	0.8
Vehicle LOS	A		

Copyright © 2023 University of Florida. All Rights Reserved.

HCS7 Two-Lane Highway Report

Project Information

Analyst	Kimley-Horn	Date	12/18/2023
Agency		Analysis Year	Existing (2023)
Jurisdiction	El Dorado County	Time Period Analyzed	PM Peak-Hour
Project Description	Red Hawk Casino - Seg 1. Green Valley Rd E/O Shingle Springs Dr NB	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	0
Speed Limit, mi/h	55	Access Point Density, pts/mi	14.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	235	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.82	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.14

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	53.7
Speed Slope Coefficient	3.47252	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34499	PF Power Coefficient	0.74378
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	1.7
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	52.2

Vehicle Results

Average Speed, mi/h	52.2	Percent Followers, %	36.8
Segment Travel Time, minutes	1.15	Followers Density, followers/mi/ln	1.7
Vehicle LOS	A		

Copyright © 2023 University of Florida. All Rights Reserved.

HCS7 Two-Lane Highway Report

Project Information

Analyst	Kimley-Horn	Date	12/18/2023
Agency		Analysis Year	Existing (2023)
Jurisdiction	El Dorado County	Time Period Analyzed	AM Peak-Hour
Project Description	Red Hawk Casino - Seg 1. Green Valley Rd E/O Shingle Springs Dr SB	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	0
Speed Limit, mi/h	55	Access Point Density, pts/mi	14.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	243	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.89	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.14

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	53.7
Speed Slope Coefficient	3.47252	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34499	PF Power Coefficient	0.74378
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	1.7
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	52.2

Vehicle Results

Average Speed, mi/h	52.2	Percent Followers, %	37.4
Segment Travel Time, minutes	1.15	Followers Density, followers/mi/ln	1.7
Vehicle LOS	A		

Copyright © 2023 University of Florida. All Rights Reserved.

HCS7 Two-Lane Highway Report

Project Information

Analyst	Kimley-Horn	Date	12/18/2023
Agency		Analysis Year	Existing (2023)
Jurisdiction	El Dorado County	Time Period Analyzed	PM Peak-Hour
Project Description	Red Hawk Casino - Seg 1. Green Valley Rd E/O Shingle Springs Dr SB	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	0
Speed Limit, mi/h	55	Access Point Density, pts/mi	14.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	239	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.85	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.14

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	53.7
Speed Slope Coefficient	3.47252	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34499	PF Power Coefficient	0.74378
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	1.7
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	52.2

Vehicle Results

Average Speed, mi/h	52.2	Percent Followers, %	37.1
Segment Travel Time, minutes	1.15	Followers Density, followers/mi/ln	1.7
Vehicle LOS	A		

Copyright © 2023 University of Florida. All Rights Reserved.

HCS7 Two-Lane Highway Report

Project Information

Analyst	Kimley-Horn	Date	12/18/2023
Agency		Analysis Year	Existing (2023)
Jurisdiction	El Dorado County	Time Period Analyzed	AM Peak-Hour
Project Description	Red Hawk Casino - Seg 2. Green Valley Rd W/O Shingle Springs Dr EB	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	0
Speed Limit, mi/h	55	Access Point Density, pts/mi	6.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	239	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.89	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.14

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	55.7
Speed Slope Coefficient	3.58092	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.33105	PF Power Coefficient	0.74935
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	1.6
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	54.2

Vehicle Results

Average Speed, mi/h	54.2	Percent Followers, %	36.6
Segment Travel Time, minutes	1.11	Followers Density, followers/mi/ln	1.6
Vehicle LOS	A		

Copyright © 2023 University of Florida. All Rights Reserved.

HCS7 Two-Lane Highway Report

Project Information

Analyst	Kimley-Horn	Date	12/18/2023
Agency		Analysis Year	Existing (2023)
Jurisdiction	El Dorado County	Time Period Analyzed	PM Peak-Hour
Project Description	Red Hawk Casino - Seg 2. Green Valley Rd W/O Shingle Springs Dr EB	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	0
Speed Limit, mi/h	55	Access Point Density, pts/mi	6.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	235	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.86	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.14

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	55.7
Speed Slope Coefficient	3.58092	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.33105	PF Power Coefficient	0.74935
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	1.6
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	54.2

Vehicle Results

Average Speed, mi/h	54.2	Percent Followers, %	36.2
Segment Travel Time, minutes	1.11	Followers Density, followers/mi/ln	1.6
Vehicle LOS	A		

Copyright © 2023 University of Florida. All Rights Reserved.

HCS7 Two-Lane Highway Report

Project Information

Analyst	Kimley-Horn	Date	12/18/2023
Agency		Analysis Year	Existing (2023)
Jurisdiction	El Dorado County	Time Period Analyzed	AM Peak-Hour
Project Description	Red Hawk Casino - Seg 2. Green Valley Rd W/O Shingle Springs Dr WB	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	0
Speed Limit, mi/h	55	Access Point Density, pts/mi	6.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	132	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.90	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.08

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	55.7
Speed Slope Coefficient	3.58092	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.33105	PF Power Coefficient	0.74935
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	0.6
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	54.9

Vehicle Results

Average Speed, mi/h	54.9	Percent Followers, %	25.3
Segment Travel Time, minutes	1.09	Followers Density, followers/mi/ln	0.6
Vehicle LOS	A		

Copyright © 2023 University of Florida. All Rights Reserved.

HCS7 Two-Lane Highway Report

Project Information

Analyst	Kimley-Horn	Date	12/18/2023
Agency		Analysis Year	Existing (2023)
Jurisdiction	El Dorado County	Time Period Analyzed	PM Peak-Hour
Project Description	Red Hawk Casino - Seg 2. Green Valley Rd W/O Shingle Springs Dr WB	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	0
Speed Limit, mi/h	55	Access Point Density, pts/mi	6.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	223	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.86	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.13

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	55.7
Speed Slope Coefficient	3.58092	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.33105	PF Power Coefficient	0.74935
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	1.4
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	54.2

Vehicle Results

Average Speed, mi/h	54.2	Percent Followers, %	35.1
Segment Travel Time, minutes	1.11	Followers Density, followers/mi/ln	1.4
Vehicle LOS	A		

Copyright © 2023 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	5	Segment Name	WB West of Casino Ramps
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	2400	Percent Grade, %	-3.40
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	0.60
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2464	Heavy Vehicle Adjustment Factor (f_{HV})	0.931
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1438
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	30	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	70	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.24	Volume-to-Capacity Ratio (v/c)	0.62

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	67.2
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	21.3
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	3	Segment Name	EB between Ramps
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	3100	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2749	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1584
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.68

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	66.2
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	23.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	3	Segment Name	WB between Ramps
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	2000	Percent Grade, %	5.50
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	0.20
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2421	Heavy Vehicle Adjustment Factor (f_{HV})	0.907
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1450
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	30	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	70	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.70	Volume-to-Capacity Ratio (v/c)	0.62

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	66.1
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	21.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	5	Segment Name	EB post-Casino
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	3780	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2821	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1626
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.70

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	65.8
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	24.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	1	Segment Name	WB East of Casino Ramps
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	2150	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2514	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1449
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.62

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	67.3
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	21.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Weaving Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	2	Segment Name	EB Weave Shingle Springs Dr
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

Number of Lanes (N), ln	3	Segment Type	Freeway
Segment Length (L_S), ft	300	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Specific Grade	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	3.40	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.50	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000
Proportion of CAVs in Traffic Stream	0	Final Capacity Adjustment Factor (CAF)	0.968

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	2645	104	8	82
Peak Hour Factor (PHF)	0.92	0.92	0.92	0.92
Total Trucks, %	6.00	6.00	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.870	0.943	0.943	0.893
Flow Rate (v_i), pc/h	3305	120	9	100
Weaving Flow Rate (v_W), pc/h	220	Ideal Conditions Capacity (c_{IFL}), pc/h/ln		2382
Non-Weaving Flow Rate (v_{NW}), pc/h	3314	Density-Based Capacity ($c_{IWL} \times N \times f_{HV}$), veh/h		5664
Total Flow Rate (v), pc/h	3534	Demand Flow-Based Capacity ($c_{IW} \times f_{HV}$), veh/h		33806
Volume Ratio (VR)	0.062	Weaving Area Capacity (c_W), veh/h		5664
Minimum Lane Change Rate (LC_{MIN}), lc/h	220	Adjusted Weaving Area Capacity (c_{WA}), veh/h		5483
Maximum Weaving Length (L_{MAX}), ft	3175	Volume-to-Capacity Ratio (v/c)		0.56

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	50	Average Weaving Speed (S_W), mi/h	55.0
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	267	Average Non-Weaving Speed (S_{NW}), mi/h	61.0
Weaving Lane Change Rate (LC_W), lc/h	220	Average Speed (S), mi/h	60.6
Weaving Lane Change Rate (LC_{All}), lc/h	487	Density (D), pc/mi/ln	19.4

Weaving Intensity Factor (W)	0.331	Level of Service (LOS)	B

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Merge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	4	Segment Name	EB Casino On-ramp_EB post-Casino
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	350	900
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	-5.50	-5.50
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2749	72
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.931	0.931
Flow Rate (v_i), pc/h	3209	84
Capacity (c_{md}), pc/h	4700	2000
Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.72	0.04

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	58.6
Flow in Lanes 1 and 2 (v_{12}), pc/h	3209	Outer Lanes Freeway Speed (S_O), mi/h	68.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3293	Ramp Junction Speed (S), mi/h	58.6
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	28.1

Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	25.6

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Merge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	4	Segment Name	WB Casino On-ramp
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	340	400
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2421	43
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.943	0.943
Flow Rate (v_i), pc/h	2791	50
Capacity (c_{md}), pc/h	4700	2000
Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.62	0.03

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	58.7
Flow in Lanes 1 and 2 (v_{12}), pc/h	2791	Outer Lanes Freeway Speed (S_O), mi/h	68.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	2841	Ramp Junction Speed (S), mi/h	58.7
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	24.2
Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	25.2

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Diverge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	2	Segment Name	WB Casino Off-ramp
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	160	1000
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	5.50	5.50
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2514	93
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.931	0.931
Flow Rate (v_i), pc/h	2935	109
Capacity (c_{md}), pc/h	4700	2000
Initial Adjusted Capacity (c_{mda}), pc/h	4550	-
Final Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.65	0.06

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	56.4
Flow in Lanes 1 and 2 (v_{12}), pc/h	2935	Outer Lanes Freeway Speed (S_O), mi/h	74.8
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Ramp Junction Speed (S), mi/h	56.4
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	26.0

Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	20.5

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	5	Segment Name	WB West of Casino Ramps
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	2400	Percent Grade, %	-3.40
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	0.50
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2547	Heavy Vehicle Adjustment Factor (f_{HV})	0.931
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1487
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	30	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	70	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.24	Volume-to-Capacity Ratio (v/c)	0.64

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	67.1
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	22.2
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	3	Segment Name	EB between Ramps
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	3100	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2732	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1574
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.68

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	66.3
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	23.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	3	Segment Name	WB between Ramps
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	2000	Percent Grade, %	5.50
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	0.20
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2425	Heavy Vehicle Adjustment Factor (f_{HV})	0.907
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1453
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	30	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	70	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.70	Volume-to-Capacity Ratio (v/c)	0.63

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	66.1
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	21.6
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	5	Segment Name	EB post-Casino
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	3780	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2962	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1707
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.73

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	64.8
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	26.3
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	1	Segment Name	WB East of Casino Ramps
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	2150	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2514	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1449
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.62

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	67.3
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	21.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Weaving Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	2	Segment Name	EB Weave Shingle Springs Dr
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	3	Segment Type	Freeway
Segment Length (L_S), ft	300	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Specific Grade	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	3.40	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.50	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000
Proportion of CAVs in Traffic Stream	0	Final Capacity Adjustment Factor (CAF)	0.968

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	2628	104	8	99
Peak Hour Factor (PHF)	0.92	0.92	0.92	0.92
Total Trucks, %	6.00	6.00	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.870	0.943	0.943	0.893
Flow Rate (v_i), pc/h	3283	120	9	121
Weaving Flow Rate (v_W), pc/h	241	Ideal Conditions Capacity (c_{IFL}), pc/h/ln		2382
Non-Weaving Flow Rate (v_{NW}), pc/h	3292	Density-Based Capacity ($c_{IWL} \times N \times f_{HV}$), veh/h		5655
Total Flow Rate (v), pc/h	3533	Demand Flow-Based Capacity ($c_{IW} \times f_{HV}$), veh/h		30828
Volume Ratio (VR)	0.068	Weaving Area Capacity (c_W), veh/h		5655
Minimum Lane Change Rate (LC_{MIN}), lc/h	241	Adjusted Weaving Area Capacity (c_{WA}), veh/h		5474
Maximum Weaving Length (L_{MAX}), ft	3232	Volume-to-Capacity Ratio (v/c)		0.56

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	49	Average Weaving Speed (S_W), mi/h	54.7
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	263	Average Non-Weaving Speed (S_{NW}), mi/h	60.8
Weaving Lane Change Rate (LC_W), lc/h	241	Average Speed (S), mi/h	60.3
Weaving Lane Change Rate (LC_{All}), lc/h	504	Density (D), pc/mi/ln	19.5

Weaving Intensity Factor (W)	0.340	Level of Service (LOS)	B

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Merge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	4	Segment Name	EB Casino On-ramp_EB post-Casino
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	350	900
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	-5.50	-5.50
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2732	230
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.931	0.931
Flow Rate (v_i), pc/h	3190	269
Capacity (c_{md}), pc/h	4700	2000
Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.76	0.14

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	58.1
Flow in Lanes 1 and 2 (v_{12}), pc/h	3190	Outer Lanes Freeway Speed (S_O), mi/h	68.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3459	Ramp Junction Speed (S), mi/h	58.1
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	29.8

Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	26.8

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Merge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	4	Segment Name	WB Casino On-ramp
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	340	400
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2425	122
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.943	0.943
Flow Rate (v_i), pc/h	2795	141
Capacity (c_{md}), pc/h	4700	2000
Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.65	0.07

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	58.6
Flow in Lanes 1 and 2 (v_{12}), pc/h	2795	Outer Lanes Freeway Speed (S_O), mi/h	68.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	2936	Ramp Junction Speed (S), mi/h	58.6
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	25.1
Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	25.9

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Diverge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	2	Segment Name	WB Casino Off-ramp
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	160	1000
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	5.50	5.50
Segment Type / Ramp Type	Highway/CD Roadway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2514	89
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.931	0.931
Flow Rate (v_i), pc/h	2935	104
Capacity (c_{md}), pc/h	4400	2000
Initial Adjusted Capacity (c_{mda}), pc/h	4259	-
Final Adjusted Capacity (c_{mda}), pc/h	4259	1936
Volume-to-Capacity Ratio (v/c)	0.69	0.05

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	56.4
Flow in Lanes 1 and 2 (v_{12}), pc/h	2935	Outer Lanes Freeway Speed (S_O), mi/h	74.8
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Ramp Junction Speed (S), mi/h	56.4
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	26.0

Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	20.5

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	5	Segment Name	WB West of Casino Ramps
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	2400	Percent Grade, %	-3.40
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	0.60
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2541	Heavy Vehicle Adjustment Factor (f_{HV})	0.931
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1484
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	30	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	70	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.24	Volume-to-Capacity Ratio (v/c)	0.64

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	67.1
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	22.1
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	3	Segment Name	EB between Ramps
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	3100	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2749	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1584
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.68

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	66.2
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	23.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	3	Segment Name	WB between Ramps
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	2000	Percent Grade, %	5.50
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	0.20
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2417	Heavy Vehicle Adjustment Factor (f_{HV})	0.907
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1448
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	30	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	70	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.70	Volume-to-Capacity Ratio (v/c)	0.62

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	66.1
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	21.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	5	Segment Name	EB post-Casino
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	3780	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2990	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1723
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.74

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	64.5
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	26.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	1	Segment Name	WB East of Casino Ramps
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	2150	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2514	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1449
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.62

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	67.3
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	21.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Weaving Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	2	Segment Name	EB Weave Shingle Springs Dr
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	3	Segment Type	Freeway
Segment Length (L_S), ft	300	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Specific Grade	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	3.40	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.50	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000
Proportion of CAVs in Traffic Stream	0	Final Capacity Adjustment Factor (CAF)	0.968

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	2645	104	8	82
Peak Hour Factor (PHF)	0.92	0.92	0.92	0.92
Total Trucks, %	6.00	6.00	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.870	0.943	0.943	0.893
Flow Rate (v_i), pc/h	3305	120	9	100
Weaving Flow Rate (v_W), pc/h	220	Ideal Conditions Capacity (c_{IFL}), pc/h/ln		2382
Non-Weaving Flow Rate (v_{NW}), pc/h	3314	Density-Based Capacity ($c_{IWL} \times N \times f_{HV}$), veh/h		5664
Total Flow Rate (v), pc/h	3534	Demand Flow-Based Capacity ($c_{IW} \times f_{HV}$), veh/h		33806
Volume Ratio (VR)	0.062	Weaving Area Capacity (c_W), veh/h		5664
Minimum Lane Change Rate (LC_{MIN}), lc/h	220	Adjusted Weaving Area Capacity (c_{WA}), veh/h		5483
Maximum Weaving Length (L_{MAX}), ft	3175	Volume-to-Capacity Ratio (v/c)		0.56

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	50	Average Weaving Speed (S_W), mi/h	55.0
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	267	Average Non-Weaving Speed (S_{NW}), mi/h	61.0
Weaving Lane Change Rate (LC_W), lc/h	220	Average Speed (S), mi/h	60.6
Weaving Lane Change Rate (LC_{All}), lc/h	487	Density (D), pc/mi/ln	19.4

Weaving Intensity Factor (W)	0.331	Level of Service (LOS)	B

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Merge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	4	Segment Name	EB Casino On-ramp_EB post-Casino
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	350	900
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	-5.50	-5.50
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2749	241
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.931	0.931
Flow Rate (v_i), pc/h	3209	281
Capacity (c_{md}), pc/h	4700	2000
Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.77	0.15

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	58.1
Flow in Lanes 1 and 2 (v_{12}), pc/h	3209	Outer Lanes Freeway Speed (S_O), mi/h	68.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3490	Ramp Junction Speed (S), mi/h	58.1
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	30.0

Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	27.0

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Merge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	4	Segment Name	WB Casino On-ramp
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	340	400
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2417	124
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.943	0.943
Flow Rate (v_i), pc/h	2786	143
Capacity (c_{md}), pc/h	4700	2000
Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.64	0.07

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	58.6
Flow in Lanes 1 and 2 (v_{12}), pc/h	2786	Outer Lanes Freeway Speed (S_O), mi/h	68.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	2929	Ramp Junction Speed (S), mi/h	58.6
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	25.0
Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	25.8

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Diverge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	2	Segment Name	WB Casino Off-ramp
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	160	1000
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	5.50	5.50
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2514	97
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.931	0.931
Flow Rate (v_i), pc/h	2935	113
Capacity (c_{md}), pc/h	4700	2000
Initial Adjusted Capacity (c_{mda}), pc/h	4550	-
Final Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.65	0.06

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	56.4
Flow in Lanes 1 and 2 (v_{12}), pc/h	2935	Outer Lanes Freeway Speed (S_O), mi/h	74.8
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Ramp Junction Speed (S), mi/h	56.4
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	26.0

Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	20.5

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	5	Segment Name	WB West of Casino Ramps
Analysis Period Number	1	Segment Analysis Period	12:00-12:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	2400	Percent Grade, %	-3.40
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	0.50
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2511	Heavy Vehicle Adjustment Factor (f_{HV})	0.931
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1466
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	30	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	70	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.24	Volume-to-Capacity Ratio (v/c)	0.63

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	67.2
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	21.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	3	Segment Name	EB between Ramps
Analysis Period Number	1	Segment Analysis Period	12:00-12:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	3100	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2749	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1584
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.68

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	66.2
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	23.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	3	Segment Name	WB between Ramps
Analysis Period Number	1	Segment Analysis Period	12:00-12:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	2000	Percent Grade, %	5.50
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	0.20
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2413	Heavy Vehicle Adjustment Factor (f_{HV})	0.907
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1446
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	30	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	70	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.70	Volume-to-Capacity Ratio (v/c)	0.62

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	66.1
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	21.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	5	Segment Name	EB post-Casino
Analysis Period Number	1	Segment Analysis Period	12:00-12:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	3780	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	3073	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1771
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.76

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	63.9
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	27.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	1	Segment Name	WB East of Casino Ramps
Analysis Period Number	1	Segment Analysis Period	12:00-12:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	2150	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2514	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1449
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.62

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	67.3
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	21.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Weaving Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	2	Segment Name	EB Weave Shingle Springs Dr
Analysis Period Number	1	Segment Analysis Period	12:00-12:15

Geometric Data

Number of Lanes (N), ln	3	Segment Type	Freeway
Segment Length (L_S), ft	300	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Specific Grade	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	3.40	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.50	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000
Proportion of CAVs in Traffic Stream	0	Final Capacity Adjustment Factor (CAF)	0.968

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	2645	104	8	82
Peak Hour Factor (PHF)	0.92	0.92	0.92	0.92
Total Trucks, %	6.00	6.00	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.870	0.943	0.943	0.893
Flow Rate (v_i), pc/h	3305	120	9	100

Weaving Flow Rate (v_W), pc/h	220	Ideal Conditions Capacity (c_{IFL}), pc/h/ln	2382
Non-Weaving Flow Rate (v_{NW}), pc/h	3314	Density-Based Capacity ($c_{IWL} \times N \times f_{HV}$), veh/h	5664
Total Flow Rate (v), pc/h	3534	Demand Flow-Based Capacity ($c_{IW} \times f_{HV}$), veh/h	33806
Volume Ratio (VR)	0.062	Weaving Area Capacity (c_W), veh/h	5664
Minimum Lane Change Rate (LC_{MIN}), lc/h	220	Adjusted Weaving Area Capacity (c_{WA}), veh/h	5483
Maximum Weaving Length (L_{MAX}), ft	3175	Volume-to-Capacity Ratio (v/c)	0.56

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	50	Average Weaving Speed (S_W), mi/h	55.0
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	267	Average Non-Weaving Speed (S_{NW}), mi/h	61.0
Weaving Lane Change Rate (LC_W), lc/h	220	Average Speed (S), mi/h	60.6

Weaving Lane Change Rate (LC_{All}), lc/h	487	Density (D), pc/mi/ln	19.4
Weaving Intensity Factor (W)	0.331	Level of Service (LOS)	B

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Merge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	4	Segment Name	EB Casino On-ramp_EB post-Casino
Analysis Period Number	1	Segment Analysis Period	12:00-12:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	350	900
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	-5.50	-5.50
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2749	324
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.931	0.931
Flow Rate (v_i), pc/h	3209	378
Capacity (c_{md}), pc/h	4700	2000
Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.79	0.20

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	57.7
Flow in Lanes 1 and 2 (v_{12}), pc/h	3209	Outer Lanes Freeway Speed (S_O), mi/h	68.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3587	Ramp Junction Speed (S), mi/h	57.7
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	31.1

Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	27.7

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Merge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	4	Segment Name	WB Casino On-ramp
Analysis Period Number	1	Segment Analysis Period	12:00-12:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	340	400
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2413	98
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.943	0.943
Flow Rate (v_i), pc/h	2781	113
Capacity (c_{md}), pc/h	4700	2000
Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.64	0.06

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	58.7
Flow in Lanes 1 and 2 (v_{12}), pc/h	2781	Outer Lanes Freeway Speed (S_O), mi/h	68.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	2894	Ramp Junction Speed (S), mi/h	58.7
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	24.7

Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	25.6

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Diverge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	2	Segment Name	WB Casino Off-ramp
Analysis Period Number	1	Segment Analysis Period	12:00-12:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Deceleration Length (LD), ft	160	1000
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	5.50	5.50
Segment Type / Ramp Type	Highway/CD Roadway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2514	101
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.931	0.931
Flow Rate (v_i), pc/h	2935	118
Capacity (c_{md}), pc/h	4400	2000
Initial Adjusted Capacity (c_{mda}), pc/h	4259	-
Final Adjusted Capacity (c_{mda}), pc/h	4259	1936
Volume-to-Capacity Ratio (v/c)	0.69	0.06

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	56.4
Flow in Lanes 1 and 2 (v_{12}), pc/h	2935	Outer Lanes Freeway Speed (S_O), mi/h	74.8
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Ramp Junction Speed (S), mi/h	56.4

Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	26.0
Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	20.5

Copyright © 2024 University of Florida. All Rights Reserved.

Appendix C

Analysis Worksheets for
Existing (2023) plus Proposed Project Conditions

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	11	143	424	89
v/c Ratio	0.03	0.12	0.37	0.18
Control Delay	12.0	5.4	3.6	9.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	12.0	5.4	3.6	9.6
Queue Length 50th (ft)	1	5	3	6
Queue Length 95th (ft)	9	11	16	30
Internal Link Dist (ft)		628	1141	286
Turn Bay Length (ft)	300			
Base Capacity (vph)	374	3328	2467	1385
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.03	0.04	0.17	0.06

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	100	71	226	60	2
Future Volume (veh/h)	8	100	71	226	60	2
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	11	143	101	323	86	3
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	26	1757	564	503	306	11
Arrive On Green	0.01	0.49	0.32	0.32	0.18	0.18
Sat Flow, veh/h	1781	3647	1870	1585	1696	59
Grp Volume(v), veh/h	11	143	101	323	90	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1777	1585	1775	0
Q Serve(g_s), s	0.2	0.6	1.1	4.8	1.2	0.0
Cycle Q Clear(g_c), s	0.2	0.6	1.1	4.8	1.2	0.0
Prop In Lane	1.00			1.00	0.96	0.03
Lane Grp Cap(c), veh/h	26	1757	564	503	320	0
V/C Ratio(X)	0.42	0.08	0.18	0.64	0.28	0.00
Avail Cap(c_a), veh/h	322	3529	1155	1030	1186	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	13.5	3.7	6.8	8.1	9.8	0.0
Incr Delay (d2), s/veh	10.4	0.0	0.2	1.4	0.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.1	0.3	1.2	0.4	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	24.0	3.7	7.0	9.5	10.3	0.0
LnGrp LOS	C	A	A	A	B	A
Approach Vol, veh/h		154	424		90	
Approach Delay, s/veh		5.2	8.9		10.3	
Approach LOS		A	A		B	

Timer - Assigned Phs		4		6	7	8
Phs Duration (G+Y+Rc), s		18.2		9.5	4.9	13.3
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		27.5		18.5	5.0	18.0
Max Q Clear Time (g_c+I1), s		2.6		3.2	2.2	6.8
Green Ext Time (p_c), s		0.8		0.2	0.0	2.1

Intersection Summary	
HCM 6th Ctrl Delay	8.2
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

Intersection	
Int Delay, s/veh	1.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	213	12	8	116	33	25
Future Vol, veh/h	213	12	8	116	33	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	83	83	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	242	14	10	140	36	27

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	256	0	409	249
Stage 1	-	-	-	-	249	-
Stage 2	-	-	-	-	160	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1309	-	599	790
Stage 1	-	-	-	-	792	-
Stage 2	-	-	-	-	869	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1309	-	594	790
Mov Cap-2 Maneuver	-	-	-	-	594	-
Stage 1	-	-	-	-	792	-
Stage 2	-	-	-	-	862	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	11
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	665	-	-	1309	-
HCM Lane V/C Ratio	0.095	-	-	0.007	-
HCM Control Delay (s)	11	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-

Intersection	
Int Delay, s/veh	5.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	98	54	138	111	114	356
Future Vol, veh/h	98	54	138	111	114	356
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	245	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	89	89	86	86
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	109	60	155	125	133	414

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	898	218	0	0	280	0
Stage 1	218	-	-	-	-	-
Stage 2	680	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	310	822	-	-	1283	-
Stage 1	818	-	-	-	-	-
Stage 2	503	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	278	822	-	-	1283	-
Mov Cap-2 Maneuver	278	-	-	-	-	-
Stage 1	818	-	-	-	-	-
Stage 2	451	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	23.3	0	2
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	363	1283	-
HCM Lane V/C Ratio	-	-	0.465	0.103	-
HCM Control Delay (s)	-	-	23.3	8.1	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	2.4	0.3	-

Intersection	
Int Delay, s/veh	3.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	150	128	42	74	59	53
Future Vol, veh/h	150	128	42	74	59	53
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	91	91	73	73
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	160	136	46	81	81	73

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	296	0	401	228
Stage 1	-	-	-	-	228	-
Stage 2	-	-	-	-	173	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1265	-	605	811
Stage 1	-	-	-	-	810	-
Stage 2	-	-	-	-	857	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1265	-	582	811
Mov Cap-2 Maneuver	-	-	-	-	582	-
Stage 1	-	-	-	-	810	-
Stage 2	-	-	-	-	824	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.9	11.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	672	-	-	1265	-
HCM Lane V/C Ratio	0.228	-	-	0.036	-
HCM Control Delay (s)	11.9	-	-	8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.9	-	-	0.1	-

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	69	261	287	58	24	63
Future Vol, veh/h	69	261	287	58	24	63
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	70	70	78	78	75	75
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	99	373	368	74	32	84

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	442	0	-	0	976	405
Stage 1	-	-	-	-	405	-
Stage 2	-	-	-	-	571	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1118	-	-	-	279	646
Stage 1	-	-	-	-	673	-
Stage 2	-	-	-	-	565	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1118	-	-	-	248	646
Mov Cap-2 Maneuver	-	-	-	-	248	-
Stage 1	-	-	-	-	598	-
Stage 2	-	-	-	-	565	-

Approach	EB	WB	SB
HCM Control Delay, s	1.8	0	15.8
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1118	-	-	-	448
HCM Lane V/C Ratio	0.088	-	-	-	0.259
HCM Control Delay (s)	8.5	0	-	-	15.8
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.3	-	-	-	1

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	9	414	17	384	186	115
v/c Ratio	0.05	0.58	0.09	0.53	0.48	0.35
Control Delay	34.5	20.6	33.9	19.6	27.0	28.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.5	20.6	33.9	19.6	27.0	28.7
Queue Length 50th (ft)	2	95	5	87	46	28
Queue Length 95th (ft)	16	217	26	217	122	95
Internal Link Dist (ft)		403		299	115	124
Turn Bay Length (ft)	290		285			
Base Capacity (vph)	702	1366	878	1489	716	711
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.30	0.02	0.26	0.26	0.16

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	231	59	13	251	37	92	23	19	55	26	7
Future Volume (veh/h)	6	231	59	13	251	37	92	23	19	55	26	7
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	9	330	84	17	335	49	128	32	26	72	34	9
Peak Hour Factor	0.70	0.70	0.70	0.75	0.75	0.75	0.72	0.72	0.72	0.76	0.76	0.76
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	17	448	114	31	510	75	174	43	35	105	50	13
Arrive On Green	0.01	0.31	0.31	0.02	0.32	0.32	0.14	0.14	0.14	0.09	0.09	0.09
Sat Flow, veh/h	1781	1438	366	1781	1595	233	1215	304	247	1120	529	140
Grp Volume(v), veh/h	9	0	414	17	0	384	186	0	0	115	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1804	1781	0	1828	1765	0	0	1789	0	0
Q Serve(g_s), s	0.2	0.0	7.6	0.3	0.0	6.7	3.7	0.0	0.0	2.3	0.0	0.0
Cycle Q Clear(g_c), s	0.2	0.0	7.6	0.3	0.0	6.7	3.7	0.0	0.0	2.3	0.0	0.0
Prop In Lane	1.00		0.20	1.00		0.13	0.69		0.14	0.63		0.08
Lane Grp Cap(c), veh/h	17	0	563	31	0	584	252	0	0	168	0	0
V/C Ratio(X)	0.53	0.00	0.74	0.55	0.00	0.66	0.74	0.00	0.00	0.68	0.00	0.00
Avail Cap(c_a), veh/h	967	0	1958	1208	0	1984	958	0	0	971	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	18.2	0.0	11.3	18.0	0.0	10.8	15.1	0.0	0.0	16.2	0.0	0.0
Incr Delay (d2), s/veh	17.6	0.0	1.4	10.9	0.0	0.9	1.6	0.0	0.0	4.9	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	2.1	0.2	0.0	1.8	1.2	0.0	0.0	0.9	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	35.7	0.0	12.7	28.8	0.0	11.7	16.7	0.0	0.0	21.0	0.0	0.0
LnGrp LOS	D	A	B	C	A	B	B	A	A	C	A	A
Approach Vol, veh/h		423			401			186			115	
Approach Delay, s/veh		13.2			12.5			16.7			21.0	
Approach LOS		B			B			B			C	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	4.4	16.8		8.8	4.6	16.5		7.0
Change Period (Y+Rc), s	4.0	5.0		3.5	4.0	5.0		3.5
Max Green Setting (Gmax), s	20.0	40.0		20.0	25.0	40.0		20.0
Max Q Clear Time (g_c+I1), s	2.2	8.7		5.7	2.3	9.6		4.3
Green Ext Time (p_c), s	0.0	1.8		0.5	0.0	1.9		0.4

Intersection Summary		
HCM 6th Ctrl Delay		14.3
HCM 6th LOS		B

Notes

User approved pedestrian interval to be less than phase max green.

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	162	34	26	123	302	247
v/c Ratio	0.34	0.08	0.14	0.14	0.37	0.30
Control Delay	15.8	6.9	22.6	7.2	11.4	3.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.8	6.9	22.6	7.2	11.4	3.1
Queue Length 50th (ft)	22	0	4	13	37	0
Queue Length 95th (ft)	94	18	24	33	140	37
Internal Link Dist (ft)	437			333	416	
Turn Bay Length (ft)		60	230			225
Base Capacity (vph)	1287	1160	643	1863	1759	1508
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.03	0.04	0.07	0.17	0.16

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	159	33	19	91	269	220
Future Volume (veh/h)	159	33	19	91	269	220
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	162	34	26	123	302	247
Peak Hour Factor	0.98	0.98	0.74	0.74	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	315	280	34	940	604	512
Arrive On Green	0.18	0.18	0.02	0.50	0.32	0.32
Sat Flow, veh/h	1781	1585	1781	1870	1870	1585
Grp Volume(v), veh/h	162	34	26	123	302	247
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1870	1870	1585
Q Serve(g_s), s	2.7	0.6	0.5	1.2	4.3	4.1
Cycle Q Clear(g_c), s	2.7	0.6	0.5	1.2	4.3	4.1
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	315	280	34	940	604	512
V/C Ratio(X)	0.51	0.12	0.76	0.13	0.50	0.48
Avail Cap(c_a), veh/h	1617	1439	809	2547	2547	2159
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	12.3	11.4	16.1	4.4	9.0	9.0
Incr Delay (d2), s/veh	2.1	0.3	11.8	0.1	1.0	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	0.0	0.3	0.2	1.0	0.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	14.4	11.7	27.9	4.5	10.1	10.1
LnGrp LOS	B	B	C	A	B	B
Approach Vol, veh/h	196			149	549	
Approach Delay, s/veh	13.9			8.6	10.1	
Approach LOS	B			A	B	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		21.9		11.1	5.9	16.0
Change Period (Y+Rc), s		5.3		5.3	5.3	5.3
Max Green Setting (Gmax), s		45.0		30.0	15.0	45.0
Max Q Clear Time (g_c+I1), s		3.2		4.7	2.5	6.3
Green Ext Time (p_c), s		1.1		1.0	0.0	4.4

Intersection Summary	
HCM 6th Ctrl Delay	10.7
HCM 6th LOS	B

Intersection	
Int Delay, s/veh	3.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	151	144	62	188	70	32
Future Vol, veh/h	151	144	62	188	70	32
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	77	77	88	88	70	70
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	196	187	70	214	100	46

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	383	0	644	290
Stage 1	-	-	-	-	290	-
Stage 2	-	-	-	-	354	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1175	-	437	749
Stage 1	-	-	-	-	759	-
Stage 2	-	-	-	-	710	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1175	-	407	749
Mov Cap-2 Maneuver	-	-	-	-	407	-
Stage 1	-	-	-	-	759	-
Stage 2	-	-	-	-	662	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2	15.9
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	475	-	-	1175	-
HCM Lane V/C Ratio	0.307	-	-	0.06	-
HCM Control Delay (s)	15.9	-	-	8.3	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	1.3	-	-	0.2	-

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	21	254	303	10	24	31
Future Vol, veh/h	21	254	303	10	24	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	84	84	75	75	70	70
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	25	302	404	13	34	44

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	417	0	-	0	763	411
Stage 1	-	-	-	-	411	-
Stage 2	-	-	-	-	352	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1142	-	-	-	372	641
Stage 1	-	-	-	-	669	-
Stage 2	-	-	-	-	712	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1142	-	-	-	362	641
Mov Cap-2 Maneuver	-	-	-	-	362	-
Stage 1	-	-	-	-	652	-
Stage 2	-	-	-	-	712	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	14
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1142	-	-	-	480
HCM Lane V/C Ratio	0.022	-	-	-	0.164
HCM Control Delay (s)	8.2	0	-	-	14
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.6

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	18	560	167	400	194	181	32	69
v/c Ratio	0.16	0.88	0.65	0.43	0.66	0.33	0.26	0.33
Control Delay	48.3	41.9	50.7	18.1	46.9	9.7	48.7	35.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.3	41.9	50.7	18.1	46.9	9.7	48.7	35.9
Queue Length 50th (ft)	9	238	83	102	96	15	16	28
Queue Length 95th (ft)	31	#464	145	234	201	65	54	74
Internal Link Dist (ft)		484		464		352		157
Turn Bay Length (ft)	265		150		90		50	
Base Capacity (vph)	342	918	342	1022	571	684	342	382
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.61	0.49	0.39	0.34	0.26	0.09	0.18

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	247	184	117	269	11	173	31	130	29	46	16
Future Volume (veh/h)	14	247	184	117	269	11	173	31	130	29	46	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	18	321	239	167	384	16	194	35	146	32	51	18
Peak Hour Factor	0.77	0.77	0.77	0.70	0.70	0.70	0.89	0.89	0.89	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	23	366	273	211	844	35	243	60	248	38	97	34
Arrive On Green	0.01	0.37	0.37	0.12	0.47	0.47	0.14	0.19	0.19	0.02	0.07	0.07
Sat Flow, veh/h	1781	996	741	1781	1783	74	1781	316	1317	1781	1320	466
Grp Volume(v), veh/h	18	0	560	167	0	400	194	0	181	32	0	69
Grp Sat Flow(s),veh/h/ln	1781	0	1737	1781	0	1857	1781	0	1633	1781	0	1786
Q Serve(g_s), s	0.6	0.0	17.4	5.3	0.0	8.4	6.1	0.0	5.9	1.0	0.0	2.2
Cycle Q Clear(g_c), s	0.6	0.0	17.4	5.3	0.0	8.4	6.1	0.0	5.9	1.0	0.0	2.2
Prop In Lane	1.00		0.43	1.00		0.04	1.00		0.81	1.00		0.26
Lane Grp Cap(c), veh/h	23	0	639	211	0	879	243	0	308	38	0	131
V/C Ratio(X)	0.78	0.00	0.88	0.79	0.00	0.46	0.80	0.00	0.59	0.85	0.00	0.53
Avail Cap(c_a), veh/h	462	0	1050	462	0	1283	769	0	564	462	0	463
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	28.5	0.0	17.1	24.8	0.0	10.2	24.2	0.0	21.4	28.2	0.0	25.8
Incr Delay (d2), s/veh	18.2	0.0	2.7	2.5	0.0	0.1	2.3	0.0	0.7	17.2	0.0	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	5.7	2.1	0.0	2.4	2.5	0.0	2.1	0.6	0.0	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	46.7	0.0	19.8	27.4	0.0	10.4	26.5	0.0	22.1	45.4	0.0	27.1
LnGrp LOS	D	A	B	C	A	B	C	A	C	D	A	C
Approach Vol, veh/h		578			567			375			101	
Approach Delay, s/veh		20.6			15.4			24.4			32.9	
Approach LOS		C			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.3	26.6	11.4	9.6	4.3	32.7	4.7	16.2
Change Period (Y+Rc), s	3.5	5.3	3.5	5.3	3.5	5.3	3.5	* 5.3
Max Green Setting (Gmax), s	15.0	35.0	25.0	15.0	15.0	40.0	15.0	* 20
Max Q Clear Time (g_c+I1), s	7.3	19.4	8.1	4.2	2.6	10.4	3.0	7.9
Green Ext Time (p_c), s	0.1	1.9	0.1	0.1	0.0	1.3	0.0	0.5

Intersection Summary	
HCM 6th Ctrl Delay	20.4
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	4	473	1919	330
v/c Ratio	0.02	0.28	1.23	0.62
Control Delay	20.0	7.5	127.2	18.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	20.0	7.5	127.2	18.5
Queue Length 50th (ft)	1	30	~287	58
Queue Length 95th (ft)	7	49	#442	109
Internal Link Dist (ft)		628	1141	286
Turn Bay Length (ft)	300			
Base Capacity (vph)	218	2402	1560	809
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.02	0.20	1.23	0.41

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	331	1183	160	224	7
Future Volume (veh/h)	3	331	1183	160	224	7
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	4	473	1690	229	320	10
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	10	1935	1360	180	411	13
Arrive On Green	0.01	0.54	0.43	0.43	0.24	0.24
Sat Flow, veh/h	1781	3647	3247	418	1716	54
Grp Volume(v), veh/h	4	473	936	983	331	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1777	1795	1775	0
Q Serve(g_s), s	0.1	2.9	18.0	18.0	7.3	0.0
Cycle Q Clear(g_c), s	0.1	2.9	18.0	18.0	7.3	0.0
Prop In Lane	1.00			0.23	0.97	0.03
Lane Grp Cap(c), veh/h	10	1935	766	774	425	0
V/C Ratio(X)	0.41	0.24	1.22	1.27	0.78	0.00
Avail Cap(c_a), veh/h	213	2342	766	774	787	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	20.7	5.0	11.9	11.9	14.8	0.0
Incr Delay (d2), s/veh	25.8	0.1	111.1	131.4	3.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.7	28.7	33.3	2.9	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	46.5	5.1	123.0	143.2	17.9	0.0
LnGrp LOS	D	A	F	F	B	A
Approach Vol, veh/h		477	1919		331	
Approach Delay, s/veh		5.4	133.4		17.9	
Approach LOS		A	F		B	

Timer - Assigned Phs	4	6	7	8
Phs Duration (G+Y+Rc), s	27.2	14.5	4.7	22.5
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	27.5	18.5	5.0	18.0
Max Q Clear Time (g_c+I1), s	4.9	9.3	2.1	20.0
Green Ext Time (p_c), s	3.2	0.7	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	97.0
HCM 6th LOS	F

Notes

User approved volume balancing among the lanes for turning movement.

Intersection	
Int Delay, s/veh	1.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	172	35	26	175	20	16
Future Vol, veh/h	172	35	26	175	20	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	83	83	70	70
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	195	40	31	211	29	23

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	235	0	488	215
Stage 1	-	-	-	-	215	-
Stage 2	-	-	-	-	273	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1332	-	539	825
Stage 1	-	-	-	-	821	-
Stage 2	-	-	-	-	773	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1332	-	525	825
Mov Cap-2 Maneuver	-	-	-	-	525	-
Stage 1	-	-	-	-	821	-
Stage 2	-	-	-	-	753	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1	11.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	626	-	-	1332	-
HCM Lane V/C Ratio	0.082	-	-	0.024	-
HCM Control Delay (s)	11.3	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-

Intersection	
Int Delay, s/veh	6.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	95	105	383	108	97	209
Future Vol, veh/h	95	105	383	108	97	209
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	245	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	89	89	86	86
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	106	117	430	121	113	243

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	960	491	0	0	551	0
Stage 1	491	-	-	-	-	-
Stage 2	469	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	285	578	-	-	1019	-
Stage 1	615	-	-	-	-	-
Stage 2	630	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	253	578	-	-	1019	-
Mov Cap-2 Maneuver	253	-	-	-	-	-
Stage 1	615	-	-	-	-	-
Stage 2	560	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	30	0	2.8
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	359	1019	-
HCM Lane V/C Ratio	-	-	0.619	0.111	-
HCM Control Delay (s)	-	-	30	9	-
HCM Lane LOS	-	-	D	A	-
HCM 95th %tile Q(veh)	-	-	4	0.4	-

Intersection	
Int Delay, s/veh	4.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	121	87	29	166	92	57
Future Vol, veh/h	121	87	29	166	92	57
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	91	91	73	73
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	129	93	32	182	126	78

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	222	0	422	176
Stage 1	-	-	-	-	176	-
Stage 2	-	-	-	-	246	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1347	-	588	867
Stage 1	-	-	-	-	855	-
Stage 2	-	-	-	-	795	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1347	-	573	867
Mov Cap-2 Maneuver	-	-	-	-	573	-
Stage 1	-	-	-	-	855	-
Stage 2	-	-	-	-	774	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.2	12.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	658	-	-	1347	-
HCM Lane V/C Ratio	0.31	-	-	0.024	-
HCM Control Delay (s)	12.9	-	-	7.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	1.3	-	-	0.1	-

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	46	161	257	1	30	63
Future Vol, veh/h	46	161	257	1	30	63
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	70	70	78	78	75	75
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	66	230	329	1	40	84

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	330	0	-	0	692	330
Stage 1	-	-	-	-	330	-
Stage 2	-	-	-	-	362	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1229	-	-	-	410	712
Stage 1	-	-	-	-	728	-
Stage 2	-	-	-	-	704	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1229	-	-	-	385	712
Mov Cap-2 Maneuver	-	-	-	-	385	-
Stage 1	-	-	-	-	683	-
Stage 2	-	-	-	-	704	-

Approach	EB	WB	SB
HCM Control Delay, s	1.8	0	13.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1229	-	-	-	559
HCM Lane V/C Ratio	0.053	-	-	-	0.222
HCM Control Delay (s)	8.1	0	-	-	13.3
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.8

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	13	295	48	470	213	135
v/c Ratio	0.08	0.52	0.23	0.68	0.56	0.42
Control Delay	38.6	24.5	36.8	23.0	31.3	33.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.6	24.5	36.8	23.0	31.3	33.3
Queue Length 50th (ft)	5	96	17	123	67	45
Queue Length 95th (ft)	22	162	55	274	145	115
Internal Link Dist (ft)		403		299	115	124
Turn Bay Length (ft)	290		285			
Base Capacity (vph)	616	1251	770	1331	632	621
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.24	0.06	0.35	0.34	0.22

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	176	31	36	244	109	46	61	46	69	24	9
Future Volume (veh/h)	9	176	31	36	244	109	46	61	46	69	24	9
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	13	251	44	48	325	145	64	85	64	91	32	12
Peak Hour Factor	0.70	0.70	0.70	0.75	0.75	0.75	0.72	0.72	0.72	0.76	0.76	0.76
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	24	484	85	73	417	186	85	113	85	126	44	17
Arrive On Green	0.01	0.31	0.31	0.04	0.34	0.34	0.16	0.16	0.16	0.11	0.11	0.11
Sat Flow, veh/h	1781	1550	272	1781	1225	547	526	698	526	1201	422	158
Grp Volume(v), veh/h	13	0	295	48	0	470	213	0	0	135	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1821	1781	0	1772	1749	0	0	1782	0	0
Q Serve(g_s), s	0.3	0.0	5.6	1.1	0.0	10.0	4.9	0.0	0.0	3.1	0.0	0.0
Cycle Q Clear(g_c), s	0.3	0.0	5.6	1.1	0.0	10.0	4.9	0.0	0.0	3.1	0.0	0.0
Prop In Lane	1.00		0.15	1.00		0.31	0.30		0.30	0.67		0.09
Lane Grp Cap(c), veh/h	24	0	569	73	0	602	283	0	0	187	0	0
V/C Ratio(X)	0.54	0.00	0.52	0.66	0.00	0.78	0.75	0.00	0.00	0.72	0.00	0.00
Avail Cap(c_a), veh/h	845	0	1729	1057	0	1682	830	0	0	846	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	20.7	0.0	11.9	19.9	0.0	12.5	16.9	0.0	0.0	18.3	0.0	0.0
Incr Delay (d2), s/veh	13.6	0.0	0.5	7.4	0.0	1.7	1.5	0.0	0.0	5.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	1.7	0.5	0.0	2.9	1.6	0.0	0.0	1.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.2	0.0	12.4	27.3	0.0	14.2	18.4	0.0	0.0	23.4	0.0	0.0
LnGrp LOS	C	A	B	C	A	B	B	A	A	C	A	A
Approach Vol, veh/h		308			518			213			135	
Approach Delay, s/veh		13.3			15.4			18.4			23.4	
Approach LOS		B			B			B			C	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	4.6	19.3		10.3	5.7	18.2		7.9
Change Period (Y+Rc), s	4.0	5.0		3.5	4.0	5.0		3.5
Max Green Setting (Gmax), s	20.0	40.0		20.0	25.0	40.0		20.0
Max Q Clear Time (g_c+I1), s	2.3	12.0		6.9	3.1	7.6		5.1
Green Ext Time (p_c), s	0.0	2.3		0.5	0.1	1.3		0.5

Intersection Summary	
HCM 6th Ctrl Delay	16.3
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	232	23	43	408	176	180
v/c Ratio	0.45	0.05	0.22	0.47	0.25	0.25
Control Delay	17.6	9.8	24.8	10.6	13.5	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.6	9.8	24.8	10.6	13.5	4.0
Queue Length 50th (ft)	38	1	9	62	23	0
Queue Length 95th (ft)	133	17	35	107	90	34
Internal Link Dist (ft)	437			333	416	
Turn Bay Length (ft)		60	230			225
Base Capacity (vph)	1231	1106	615	1863	1719	1474
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.02	0.07	0.22	0.10	0.12

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	227	23	32	302	157	160
Future Volume (veh/h)	227	23	32	302	157	160
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	232	23	43	408	176	180
Peak Hour Factor	0.98	0.98	0.74	0.74	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	361	321	53	842	462	392
Arrive On Green	0.20	0.20	0.03	0.45	0.25	0.25
Sat Flow, veh/h	1781	1585	1781	1870	1870	1585
Grp Volume(v), veh/h	232	23	43	408	176	180
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1870	1870	1585
Q Serve(g_s), s	3.6	0.4	0.7	4.7	2.4	2.9
Cycle Q Clear(g_c), s	3.6	0.4	0.7	4.7	2.4	2.9
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	361	321	53	842	462	392
V/C Ratio(X)	0.64	0.07	0.80	0.48	0.38	0.46
Avail Cap(c_a), veh/h	1748	1556	874	2754	2754	2334
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.2	9.9	14.7	5.9	9.6	9.8
Incr Delay (d2), s/veh	3.0	0.1	9.9	0.7	0.8	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.4	0.4	0.8	0.6	0.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	14.2	10.0	24.7	6.6	10.4	11.1
LnGrp LOS	B	B	C	A	B	B
Approach Vol, veh/h	255			451	356	
Approach Delay, s/veh	13.8			8.3	10.8	
Approach LOS	B			A	B	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		19.1		11.5	6.2	12.8
Change Period (Y+Rc), s		5.3		5.3	5.3	5.3
Max Green Setting (Gmax), s		45.0		30.0	15.0	45.0
Max Q Clear Time (g_c+I1), s		6.7		5.6	2.7	4.9
Green Ext Time (p_c), s		4.2		1.3	0.0	2.6

Intersection Summary	
HCM 6th Ctrl Delay	10.4
HCM 6th LOS	B

Intersection	
Int Delay, s/veh	1.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	232	27	16	184	23	27
Future Vol, veh/h	232	27	16	184	23	27
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	77	77	88	88	70	70
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	301	35	18	209	33	39

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	336	0	564	319
Stage 1	-	-	-	-	319	-
Stage 2	-	-	-	-	245	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1223	-	487	722
Stage 1	-	-	-	-	737	-
Stage 2	-	-	-	-	796	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1223	-	479	722
Mov Cap-2 Maneuver	-	-	-	-	479	-
Stage 1	-	-	-	-	737	-
Stage 2	-	-	-	-	782	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	12
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	585	-	-	1223	-
HCM Lane V/C Ratio	0.122	-	-	0.015	-
HCM Control Delay (s)	12	-	-	8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.4	-	-	0	-

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	29	252	189	29	24	24
Future Vol, veh/h	29	252	189	29	24	24
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	84	84	75	75	70	70
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	35	300	252	39	34	34

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	291	0	-	0	642	272
Stage 1	-	-	-	-	272	-
Stage 2	-	-	-	-	370	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1271	-	-	-	438	767
Stage 1	-	-	-	-	774	-
Stage 2	-	-	-	-	699	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1271	-	-	-	424	767
Mov Cap-2 Maneuver	-	-	-	-	424	-
Stage 1	-	-	-	-	748	-
Stage 2	-	-	-	-	699	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	12.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1271	-	-	-	546
HCM Lane V/C Ratio	0.027	-	-	-	0.126
HCM Control Delay (s)	7.9	0	-	-	12.5
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.4

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	25	699	194	301	284	163	9	52
v/c Ratio	0.24	1.02	0.77	0.31	0.82	0.28	0.10	0.29
Control Delay	52.3	71.3	61.8	17.9	57.3	15.9	50.8	35.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.3	71.3	61.8	17.9	57.3	15.9	50.8	35.2
Queue Length 50th (ft)	14	~430	109	83	160	43	5	21
Queue Length 95th (ft)	40	#680	169	182	#310	98	24	58
Internal Link Dist (ft)		484		464		352		157
Turn Bay Length (ft)	265		150		90		50	
Base Capacity (vph)	287	775	287	962	478	616	287	326
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.90	0.68	0.31	0.59	0.26	0.03	0.16

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	19	310	228	136	201	10	253	59	86	8	34	14
Future Volume (veh/h)	19	310	228	136	201	10	253	59	86	8	34	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	25	403	296	194	287	14	284	66	97	9	37	15
Peak Hour Factor	0.77	0.77	0.77	0.70	0.70	0.70	0.89	0.89	0.89	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	30	420	309	231	942	46	324	156	230	12	68	28
Arrive On Green	0.02	0.42	0.42	0.13	0.53	0.53	0.18	0.23	0.23	0.01	0.05	0.05
Sat Flow, veh/h	1781	1002	736	1781	1769	86	1781	684	1005	1781	1265	513
Grp Volume(v), veh/h	25	0	699	194	0	301	284	0	163	9	0	52
Grp Sat Flow(s),veh/h/ln	1781	0	1738	1781	0	1855	1781	0	1689	1781	0	1778
Q Serve(g_s), s	1.1	0.0	31.9	8.7	0.0	7.4	12.7	0.0	6.7	0.4	0.0	2.3
Cycle Q Clear(g_c), s	1.1	0.0	31.9	8.7	0.0	7.4	12.7	0.0	6.7	0.4	0.0	2.3
Prop In Lane	1.00		0.42	1.00		0.05	1.00		0.60	1.00		0.29
Lane Grp Cap(c), veh/h	30	0	729	231	0	988	324	0	386	12	0	96
V/C Ratio(X)	0.84	0.00	0.96	0.84	0.00	0.30	0.88	0.00	0.42	0.74	0.00	0.54
Avail Cap(c_a), veh/h	327	0	744	327	0	988	544	0	413	327	0	326
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	40.1	0.0	23.1	34.7	0.0	10.7	32.6	0.0	26.9	40.6	0.0	37.7
Incr Delay (d2), s/veh	20.0	0.0	22.9	9.1	0.0	0.1	4.4	0.0	0.3	28.0	0.0	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.0	15.6	4.1	0.0	2.5	5.6	0.0	2.6	0.3	0.0	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	60.1	0.0	45.9	43.8	0.0	10.7	37.0	0.0	27.2	68.5	0.0	39.5
LnGrp LOS	E	A	D	D	A	B	D	A	C	E	A	D
Approach Vol, veh/h		724			495			447			61	
Approach Delay, s/veh		46.4			23.7			33.4			43.8	
Approach LOS		D			C			C			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.1	39.6	18.4	9.7	4.9	48.9	4.1	24.0
Change Period (Y+Rc), s	3.5	5.3	3.5	5.3	3.5	5.3	3.5	* 5.3
Max Green Setting (Gmax), s	15.0	35.0	25.0	15.0	15.0	40.0	15.0	* 20
Max Q Clear Time (g_c+I1), s	10.7	33.9	14.7	4.3	3.1	9.4	2.4	8.7
Green Ext Time (p_c), s	0.1	0.4	0.2	0.1	0.0	0.9	0.0	0.4

Intersection Summary	
HCM 6th Ctrl Delay	36.5
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	9	527	2087	299
v/c Ratio	0.04	0.31	1.32	0.58
Control Delay	20.0	7.4	165.6	17.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	20.0	7.4	165.6	17.6
Queue Length 50th (ft)	2	32	~321	51
Queue Length 95th (ft)	11	54	#494	97
Internal Link Dist (ft)		628	1141	286
Turn Bay Length (ft)	300			
Base Capacity (vph)	222	2440	1583	822
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.04	0.22	1.32	0.36

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	369	1268	193	198	11
Future Volume (veh/h)	6	369	1268	193	198	11
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	9	527	1811	276	283	16
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	21	1984	1356	201	373	21
Arrive On Green	0.01	0.56	0.44	0.44	0.22	0.22
Sat Flow, veh/h	1781	3647	3197	461	1670	94
Grp Volume(v), veh/h	9	527	1017	1070	300	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1777	1787	1770	0
Q Serve(g_s), s	0.2	3.2	18.0	18.0	6.5	0.0
Cycle Q Clear(g_c), s	0.2	3.2	18.0	18.0	6.5	0.0
Prop In Lane	1.00			0.26	0.94	0.05
Lane Grp Cap(c), veh/h	21	1984	777	781	395	0
V/C Ratio(X)	0.43	0.27	1.31	1.37	0.76	0.00
Avail Cap(c_a), veh/h	216	2373	777	781	795	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	20.2	4.7	11.6	11.6	15.0	0.0
Incr Delay (d2), s/veh	13.0	0.1	148.4	174.7	3.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.7	36.9	42.8	2.6	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	33.2	4.8	160.0	186.3	18.0	0.0
LnGrp LOS	C	A	F	F	B	A
Approach Vol, veh/h		536	2087		300	
Approach Delay, s/veh		5.3	173.5		18.0	
Approach LOS		A	F		B	

Timer - Assigned Phs		4		6	7	8
Phs Duration (G+Y+Rc), s		27.5		13.7	5.0	22.5
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		27.5		18.5	5.0	18.0
Max Q Clear Time (g_c+I1), s		5.2		8.5	2.2	20.0
Green Ext Time (p_c), s		3.6		0.7	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	126.7
HCM 6th LOS	F

Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	21	533	2138	166
v/c Ratio	0.09	0.29	1.25	0.40
Control Delay	18.2	5.8	135.7	15.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	18.2	5.8	135.7	15.7
Queue Length 50th (ft)	4	26	~290	26
Queue Length 95th (ft)	17	43	#446	58
Internal Link Dist (ft)		628	1141	286
Turn Bay Length (ft)	300			
Base Capacity (vph)	239	2630	1706	885
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.09	0.20	1.25	0.19

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	15	373	1328	169	112	4
Future Volume (veh/h)	15	373	1328	169	112	4
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	21	533	1897	241	160	6
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	47	2184	1497	186	255	10
Arrive On Green	0.03	0.61	0.47	0.47	0.15	0.15
Sat Flow, veh/h	1781	3647	3274	395	1700	64
Grp Volume(v), veh/h	21	533	1042	1096	167	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1777	1799	1774	0
Q Serve(g_s), s	0.4	2.6	18.0	18.0	3.4	0.0
Cycle Q Clear(g_c), s	0.4	2.6	18.0	18.0	3.4	0.0
Prop In Lane	1.00			0.22	0.96	0.04
Lane Grp Cap(c), veh/h	47	2184	836	847	266	0
V/C Ratio(X)	0.45	0.24	1.25	1.29	0.63	0.00
Avail Cap(c_a), veh/h	233	2556	836	847	858	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	18.3	3.3	10.1	10.1	15.2	0.0
Incr Delay (d2), s/veh	6.7	0.1	120.4	141.3	2.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.4	32.3	37.6	1.3	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	25.0	3.4	130.5	151.4	17.7	0.0
LnGrp LOS	C	A	F	F	B	A
Approach Vol, veh/h		554	2138		167	
Approach Delay, s/veh		4.2	141.2		17.7	
Approach LOS		A	F		B	

Timer - Assigned Phs	4	6	7	8
Phs Duration (G+Y+Rc), s	28.0	10.2	5.5	22.5
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	27.5	18.5	5.0	18.0
Max Q Clear Time (g_c+I1), s	4.6	5.4	2.4	20.0
Green Ext Time (p_c), s	3.7	0.4	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	107.4
HCM 6th LOS	F

Notes

User approved volume balancing among the lanes for turning movement.

HCS7 Two-Lane Highway Report

Project Information

Analyst	Kimley-Horn	Date	12/18/2023
Agency		Analysis Year	Existing (2023) plus Project
Jurisdiction	El Dorado County	Time Period Analyzed	AM Peak-Hour
Project Description	Red Hawk Casino - Seg 1. Green Valley Rd E/O Shingle Springs Dr NB	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	0
Speed Limit, mi/h	55	Access Point Density, pts/mi	14.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	158	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.83	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.09

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	53.7
Speed Slope Coefficient	3.47252	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34499	PF Power Coefficient	0.74378
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	0.9
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	52.7

Vehicle Results

Average Speed, mi/h	52.7	Percent Followers, %	28.9
Segment Travel Time, minutes	1.14	Followers Density, followers/mi/ln	0.9
Vehicle LOS	A		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS7 Two-Lane Highway Report

Project Information

Analyst	Kimley-Horn	Date	12/18/2023
Agency		Analysis Year	Existing (2023) plus Project
Jurisdiction	El Dorado County	Time Period Analyzed	PM Peak-Hour
Project Description	Red Hawk Casino - Seg 1. Green Valley Rd E/O Shingle Springs Dr NB	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	0
Speed Limit, mi/h	55	Access Point Density, pts/mi	14.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	266	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.82	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.16

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	53.7
Speed Slope Coefficient	3.47252	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34499	PF Power Coefficient	0.74378
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	2.0
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	52.1

Vehicle Results

Average Speed, mi/h	52.1	Percent Followers, %	39.5
Segment Travel Time, minutes	1.15	Followers Density, followers/mi/ln	2.0
Vehicle LOS	B		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS7 Two-Lane Highway Report

Project Information

Analyst	Kimley-Horn	Date	12/18/2023
Agency		Analysis Year	Existing (2023) plus Project
Jurisdiction	El Dorado County	Time Period Analyzed	AM Peak-Hour
Project Description	Red Hawk Casino - Seg 1. Green Valley Rd E/O Shingle Springs Dr SB	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	0
Speed Limit, mi/h	55	Access Point Density, pts/mi	14.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	271	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.89	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.16

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	53.7
Speed Slope Coefficient	3.47252	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34499	PF Power Coefficient	0.74378
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	2.1
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	52.1

Vehicle Results

Average Speed, mi/h	52.1	Percent Followers, %	39.9
Segment Travel Time, minutes	1.15	Followers Density, followers/mi/ln	2.1
Vehicle LOS	B		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS7 Two-Lane Highway Report

Project Information

Analyst	Kimley-Horn	Date	12/18/2023
Agency		Analysis Year	Existing (2023) plus Project
Jurisdiction	El Dorado County	Time Period Analyzed	PM Peak-Hour
Project Description	Red Hawk Casino - Seg 1. Green Valley Rd E/O Shingle Springs Dr SB	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	0
Speed Limit, mi/h	55	Access Point Density, pts/mi	14.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	256	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.85	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.15

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	53.7
Speed Slope Coefficient	3.47252	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34499	PF Power Coefficient	0.74378
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	1.9
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	52.1

Vehicle Results

Average Speed, mi/h	52.1	Percent Followers, %	38.7
Segment Travel Time, minutes	1.15	Followers Density, followers/mi/ln	1.9
Vehicle LOS	A		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS7 Two-Lane Highway Report

Project Information

Analyst	Kimley-Horn	Date	12/18/2023
Agency		Analysis Year	Existing (2023) plus Project
Jurisdiction	El Dorado County	Time Period Analyzed	AM Peak-Hour
Project Description	Red Hawk Casino - Seg 2. Green Valley Rd W/O Shingle Springs Dr EB	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	0
Speed Limit, mi/h	55	Access Point Density, pts/mi	6.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	252	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.89	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.15

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	55.7
Speed Slope Coefficient	3.58092	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.33105	PF Power Coefficient	0.74935
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	1.8
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	54.1

Vehicle Results

Average Speed, mi/h	54.1	Percent Followers, %	37.7
Segment Travel Time, minutes	1.11	Followers Density, followers/mi/ln	1.8
Vehicle LOS	A		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS7 Two-Lane Highway Report

Project Information

Analyst	Kimley-Horn	Date	12/18/2023
Agency		Analysis Year	Existing (2023) plus Project
Jurisdiction	El Dorado County	Time Period Analyzed	PM Peak-Hour
Project Description	Red Hawk Casino - Seg 2. Green Valley Rd W/O Shingle Springs Dr EB	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	0
Speed Limit, mi/h	55	Access Point Density, pts/mi	6.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	274	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.86	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.16

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	55.7
Speed Slope Coefficient	3.58092	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.33105	PF Power Coefficient	0.74935
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	2.0
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	54.0

Vehicle Results

Average Speed, mi/h	54.0	Percent Followers, %	39.7
Segment Travel Time, minutes	1.11	Followers Density, followers/mi/ln	2.0
Vehicle LOS	B		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS7 Two-Lane Highway Report

Project Information

Analyst	Kimley-Horn	Date	12/18/2023
Agency		Analysis Year	Existing (2023) plus Project
Jurisdiction	El Dorado County	Time Period Analyzed	AM Peak-Hour
Project Description	Red Hawk Casino - Seg 2. Green Valley Rd W/O Shingle Springs Dr WB	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	0
Speed Limit, mi/h	55	Access Point Density, pts/mi	6.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	169	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.90	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.10

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	55.7
Speed Slope Coefficient	3.58092	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.33105	PF Power Coefficient	0.74935
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	0.9
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	54.6

Vehicle Results

Average Speed, mi/h	54.6	Percent Followers, %	29.6
Segment Travel Time, minutes	1.10	Followers Density, followers/mi/ln	0.9
Vehicle LOS	A		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS7 Two-Lane Highway Report

Project Information

Analyst	Kimley-Horn	Date	12/18/2023
Agency		Analysis Year	Existing (2023) plus Project
Jurisdiction	El Dorado County	Time Period Analyzed	PM Peak-Hour
Project Description	Red Hawk Casino - Seg 2. Green Valley Rd W/O Shingle Springs Dr WB	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	0
Speed Limit, mi/h	55	Access Point Density, pts/mi	6.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	247	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.86	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.15

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	55.7
Speed Slope Coefficient	3.58092	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.33105	PF Power Coefficient	0.74935
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	1.7
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	54.1

Vehicle Results

Average Speed, mi/h	54.1	Percent Followers, %	37.3
Segment Travel Time, minutes	1.11	Followers Density, followers/mi/ln	1.7
Vehicle LOS	A		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	5	Segment Name	WB West of Casino Ramps
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	2400	Percent Grade, %	-3.40
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	0.60
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2487	Heavy Vehicle Adjustment Factor (f_{HV})	0.931
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1452
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	30	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	70	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.24	Volume-to-Capacity Ratio (v/c)	0.63

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	67.2
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	21.6
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	3	Segment Name	EB between Ramps
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	3100	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2749	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1584
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.68

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	66.2
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	23.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	3	Segment Name	WB between Ramps
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	2000	Percent Grade, %	5.50
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	0.20
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2421	Heavy Vehicle Adjustment Factor (f_{HV})	0.907
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1450
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	30	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	70	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.70	Volume-to-Capacity Ratio (v/c)	0.62

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	66.1
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	21.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	5	Segment Name	EB post-Casino
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	3780	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2853	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1644
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.71

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	65.5
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	25.1
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	1	Segment Name	WB East of Casino Ramps
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	2150	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2534	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1460
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.63

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	67.3
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	21.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Weaving Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	2	Segment Name	EB Weave Shingle Springs Dr
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

Number of Lanes (N), ln	3	Segment Type	Freeway
Segment Length (L_S), ft	300	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Specific Grade	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	3.40	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.50	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000
Proportion of CAVs in Traffic Stream	0	Final Capacity Adjustment Factor (CAF)	0.968

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	2645	104	8	115
Peak Hour Factor (PHF)	0.92	0.92	0.92	0.92
Total Trucks, %	6.00	6.00	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.870	0.943	0.943	0.893
Flow Rate (v_i), pc/h	3305	120	9	140
Weaving Flow Rate (v_W), pc/h	260	Ideal Conditions Capacity (c_{IFL}), pc/h/ln		2382
Non-Weaving Flow Rate (v_{NW}), pc/h	3314	Density-Based Capacity (c_{IWL} × N × f_{HV}), veh/h		5645
Total Flow Rate (v), pc/h	3574	Demand Flow-Based Capacity (c_{IW} × f_{HV}), veh/h		28719
Volume Ratio (VR)	0.073	Weaving Area Capacity (c_W), veh/h		5645
Minimum Lane Change Rate (LC_{MIN}), lc/h	260	Adjusted Weaving Area Capacity (c_{WA}), veh/h		5464
Maximum Weaving Length (L_{MAX}), ft	3280	Volume-to-Capacity Ratio (v/c)		0.57

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	50	Average Weaving Speed (S_W), mi/h	54.3
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	267	Average Non-Weaving Speed (S_{NW}), mi/h	60.6
Weaving Lane Change Rate (LC_W), lc/h	260	Average Speed (S), mi/h	60.1

Weaving Lane Change Rate (LC_{All}), lc/h	527	Density (D), pc/mi/ln	19.8
Weaving Intensity Factor (W)	0.353	Level of Service (LOS)	B

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Merge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	4	Segment Name	EB Casino On-ramp_EB post-Casino
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	350	900
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	-5.50	-5.50
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2749	104
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.931	0.931
Flow Rate (v_i), pc/h	3209	121
Capacity (c_{md}), pc/h	4700	2000
Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.73	0.06

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	58.5
Flow in Lanes 1 and 2 (v_{12}), pc/h	3209	Outer Lanes Freeway Speed (S_O), mi/h	68.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3330	Ramp Junction Speed (S), mi/h	58.5
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	28.5

Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	25.8

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Merge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	4	Segment Name	WB Casino On-ramp
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	340	400
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2421	66
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.943	0.943
Flow Rate (v_i), pc/h	2791	76
Capacity (c_{md}), pc/h	4700	2000
Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.63	0.04

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	58.7
Flow in Lanes 1 and 2 (v_{12}), pc/h	2791	Outer Lanes Freeway Speed (S_O), mi/h	68.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	2867	Ramp Junction Speed (S), mi/h	58.7
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	24.4
Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	25.4

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Diverge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	2	Segment Name	WB Casino Off-ramp
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	160	1000
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	5.50	5.50
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2534	113
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.931	0.931
Flow Rate (v_i), pc/h	2958	132
Capacity (c_{md}), pc/h	4700	2000
Initial Adjusted Capacity (c_{mda}), pc/h	4550	-
Final Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.65	0.07

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	56.4
Flow in Lanes 1 and 2 (v_{12}), pc/h	2958	Outer Lanes Freeway Speed (S_O), mi/h	74.8
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Ramp Junction Speed (S), mi/h	56.4
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	26.2

Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	20.7

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	5	Segment Name	WB West of Casino Ramps
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	2400	Percent Grade, %	-3.40
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	0.50
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2626	Heavy Vehicle Adjustment Factor (f_{HV})	0.931
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1533
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	30	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	70	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.24	Volume-to-Capacity Ratio (v/c)	0.66

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	66.7
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	23.0
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	3	Segment Name	EB between Ramps
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	3100	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2749	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1584
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.68

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	66.2
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	23.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	3	Segment Name	WB between Ramps
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	2000	Percent Grade, %	5.50
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	0.20
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2425	Heavy Vehicle Adjustment Factor (f_{HV})	0.907
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1453
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	30	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	70	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.70	Volume-to-Capacity Ratio (v/c)	0.63

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	66.0
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	21.6
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	5	Segment Name	EB post-Casino
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	3780	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	3117	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1796
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.77

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	63.5
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	28.3
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	1	Segment Name	WB East of Casino Ramps
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	2150	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2905	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1674
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.72

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	65.2
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	25.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Weaving Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	2	Segment Name	EB Weave Shingle Springs Dr
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	3	Segment Type	Freeway
Segment Length (L_S), ft	300	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Specific Grade	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	3.40	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.50	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000
Proportion of CAVs in Traffic Stream	0	Final Capacity Adjustment Factor (CAF)	0.968

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	2645	104	8	795
Peak Hour Factor (PHF)	0.92	0.92	0.92	0.92
Total Trucks, %	6.00	6.00	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.870	0.943	0.943	0.893
Flow Rate (v_i), pc/h	3305	120	9	968
Weaving Flow Rate (v_W), pc/h	1088	Ideal Conditions Capacity (c_{IFL}), pc/h/ln		2382
Non-Weaving Flow Rate (v_{NW}), pc/h	3314	Density-Based Capacity ($c_{IWL} \times N \times f_{HV}$), veh/h		5318
Total Flow Rate (v), pc/h	4402	Demand Flow-Based Capacity ($c_{IW} \times f_{HV}$), veh/h		8523
Volume Ratio (VR)	0.247	Weaving Area Capacity (c_W), veh/h		5318
Minimum Lane Change Rate (LC_{MIN}), lc/h	1088	Adjusted Weaving Area Capacity (c_{WA}), veh/h		5148
Maximum Weaving Length (L_{MAX}), ft	5022	Volume-to-Capacity Ratio (v/c)		0.75

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	50	Average Weaving Speed (S_W), mi/h	45.5
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	267	Average Non-Weaving Speed (S_{NW}), mi/h	53.3
Weaving Lane Change Rate (LC_W), lc/h	1088	Average Speed (S), mi/h	51.1

Weaving Lane Change Rate (LC_{All}), lc/h	1355	Density (D), pc/mi/ln	28.7
Weaving Intensity Factor (W)	0.743	Level of Service (LOS)	D

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Merge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	4	Segment Name	EB Casino On-ramp_EB post-Casino
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	350	900
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	-5.50	-5.50
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2749	368
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.931	0.931
Flow Rate (v_i), pc/h	3209	430
Capacity (c_{md}), pc/h	4700	2000
Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.80	0.22

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	57.5
Flow in Lanes 1 and 2 (v_{12}), pc/h	3209	Outer Lanes Freeway Speed (S_O), mi/h	68.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3639	Ramp Junction Speed (S), mi/h	57.5
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	31.6

Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	28.1

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Merge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	4	Segment Name	WB Casino On-ramp
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	340	400
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2425	201
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.943	0.943
Flow Rate (v_i), pc/h	2795	232
Capacity (c_{md}), pc/h	4700	2000
Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.67	0.12

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	58.4
Flow in Lanes 1 and 2 (v_{12}), pc/h	2795	Outer Lanes Freeway Speed (S_O), mi/h	68.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3027	Ramp Junction Speed (S), mi/h	58.4
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	25.9
Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	26.5

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Diverge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	2	Segment Name	WB Casino Off-ramp
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	160	1000
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	5.50	5.50
Segment Type / Ramp Type	Highway/CD Roadway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2905	480
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.931	0.931
Flow Rate (v_i), pc/h	3392	560
Capacity (c_{md}), pc/h	4400	2000
Initial Adjusted Capacity (c_{mda}), pc/h	4259	-
Final Adjusted Capacity (c_{mda}), pc/h	4259	1936
Volume-to-Capacity Ratio (v/c)	0.80	0.29

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	55.4
Flow in Lanes 1 and 2 (v_{12}), pc/h	3392	Outer Lanes Freeway Speed (S_O), mi/h	74.8
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Ramp Junction Speed (S), mi/h	55.4
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	30.6

Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	24.4

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	5	Segment Name	WB West of Casino Ramps
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	2400	Percent Grade, %	-3.40
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	0.60
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2620	Heavy Vehicle Adjustment Factor (f_{HV})	0.931
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1530
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	30	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	70	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.24	Volume-to-Capacity Ratio (v/c)	0.66

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	66.7
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	22.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	3	Segment Name	EB between Ramps
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	3100	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2749	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1584
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.68

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	66.2
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	23.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	3	Segment Name	WB between Ramps
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	2000	Percent Grade, %	5.50
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	0.20
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2417	Heavy Vehicle Adjustment Factor (f_{HV})	0.907
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1448
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	30	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	70	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.70	Volume-to-Capacity Ratio (v/c)	0.62

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	66.0
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	21.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	5	Segment Name	EB post-Casino
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	3780	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	3128	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1803
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.78

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	63.4
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	28.4
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	1	Segment Name	WB East of Casino Ramps
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	2150	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2905	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1674
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.72

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	65.2
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	25.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Weaving Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	2	Segment Name	EB Weave Shingle Springs Dr
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	3	Segment Type	Freeway
Segment Length (L_S), ft	300	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Specific Grade	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	3.40	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.50	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000
Proportion of CAVs in Traffic Stream	0	Final Capacity Adjustment Factor (CAF)	0.968

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	2645	104	8	795
Peak Hour Factor (PHF)	0.92	0.92	0.92	0.92
Total Trucks, %	6.00	6.00	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.870	0.943	0.943	0.893
Flow Rate (v_i), pc/h	3305	120	9	968
Weaving Flow Rate (v_W), pc/h	1088	Ideal Conditions Capacity (c_{IFL}), pc/h/ln		2382
Non-Weaving Flow Rate (v_{NW}), pc/h	3314	Density-Based Capacity ($c_{IWL} \times N \times f_{HV}$), veh/h		5318
Total Flow Rate (v), pc/h	4402	Demand Flow-Based Capacity ($c_{IW} \times f_{HV}$), veh/h		8523
Volume Ratio (VR)	0.247	Weaving Area Capacity (c_W), veh/h		5318
Minimum Lane Change Rate (LC_{MIN}), lc/h	1088	Adjusted Weaving Area Capacity (c_{WA}), veh/h		5148
Maximum Weaving Length (L_{MAX}), ft	5022	Volume-to-Capacity Ratio (v/c)		0.75

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	50	Average Weaving Speed (S_W), mi/h	45.5
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	267	Average Non-Weaving Speed (S_{NW}), mi/h	53.3
Weaving Lane Change Rate (LC_W), lc/h	1088	Average Speed (S), mi/h	51.1

Weaving Lane Change Rate (LC_{All}), lc/h	1355	Density (D), pc/mi/ln	28.7
Weaving Intensity Factor (W)	0.743	Level of Service (LOS)	D

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Merge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	4	Segment Name	EB Casino On-ramp_EB post-Casino
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	350	900
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	-5.50	-5.50
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2749	379
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.931	0.931
Flow Rate (v_i), pc/h	3209	442
Capacity (c_{md}), pc/h	4700	2000
Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.80	0.23

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	57.5
Flow in Lanes 1 and 2 (v_{12}), pc/h	3209	Outer Lanes Freeway Speed (S_O), mi/h	68.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3651	Ramp Junction Speed (S), mi/h	57.5
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	31.7

Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	28.2

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Merge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	4	Segment Name	WB Casino On-ramp
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	340	400
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2417	203
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.943	0.943
Flow Rate (v_i), pc/h	2786	234
Capacity (c_{md}), pc/h	4700	2000
Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.66	0.12

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	58.4
Flow in Lanes 1 and 2 (v_{12}), pc/h	2786	Outer Lanes Freeway Speed (S_O), mi/h	68.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3020	Ramp Junction Speed (S), mi/h	58.4
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	25.9
Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	26.5

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Diverge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	2	Segment Name	WB Casino Off-ramp
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	160	1000
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	5.50	5.50
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2905	488
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.931	0.931
Flow Rate (v_i), pc/h	3392	570
Capacity (c_{md}), pc/h	4700	2000
Initial Adjusted Capacity (c_{mda}), pc/h	4550	-
Final Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.75	0.29

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	55.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	3392	Outer Lanes Freeway Speed (S_O), mi/h	74.8
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Ramp Junction Speed (S), mi/h	55.3
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	30.7

Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	24.4

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	5	Segment Name	WB West of Casino Ramps
Analysis Period Number	1	Segment Analysis Period	12:00-12:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	2400	Percent Grade, %	-3.40
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	0.50
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2588	Heavy Vehicle Adjustment Factor (f_{HV})	0.931
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1511
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	30	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	70	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.24	Volume-to-Capacity Ratio (v/c)	0.65

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	66.9
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	22.6
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	3	Segment Name	EB between Ramps
Analysis Period Number	1	Segment Analysis Period	12:00-12:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	3100	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2749	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1584
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.68

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	66.2
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	23.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	3	Segment Name	WB between Ramps
Analysis Period Number	1	Segment Analysis Period	12:00-12:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	2000	Percent Grade, %	5.50
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	0.20
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2413	Heavy Vehicle Adjustment Factor (f_{HV})	0.907
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1446
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	30	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	70	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.70	Volume-to-Capacity Ratio (v/c)	0.62

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	66.0
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	21.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	5	Segment Name	EB post-Casino
Analysis Period Number	1	Segment Analysis Period	12:00-12:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	3780	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	3208	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1849
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.80

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	62.6
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	29.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	1	Segment Name	WB East of Casino Ramps
Analysis Period Number	1	Segment Analysis Period	12:00-12:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	2150	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2901	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1672
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.72

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	65.2
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	25.6
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Weaving Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	2	Segment Name	EB Weave Shingle Springs Dr
Analysis Period Number	1	Segment Analysis Period	12:00-12:15

Geometric Data

Number of Lanes (N), ln	3	Segment Type	Freeway
Segment Length (L_S), ft	300	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Specific Grade	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	3.40	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.50	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000
Proportion of CAVs in Traffic Stream	0	Final Capacity Adjustment Factor (CAF)	0.968

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	2645	104	8	792
Peak Hour Factor (PHF)	0.92	0.92	0.92	0.92
Total Trucks, %	6.00	6.00	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.870	0.943	0.943	0.893
Flow Rate (v_i), pc/h	3305	120	9	964
Weaving Flow Rate (v_W), pc/h	1084	Ideal Conditions Capacity (c_{IFL}), pc/h/ln		2382
Non-Weaving Flow Rate (v_{NW}), pc/h	3314	Density-Based Capacity ($c_{IWL} \times N \times f_{HV}$), veh/h		5321
Total Flow Rate (v), pc/h	4398	Demand Flow-Based Capacity ($c_{IW} \times f_{HV}$), veh/h		8558
Volume Ratio (VR)	0.246	Weaving Area Capacity (c_W), veh/h		5321
Minimum Lane Change Rate (LC_{MIN}), lc/h	1084	Adjusted Weaving Area Capacity (c_{WA}), veh/h		5151
Maximum Weaving Length (L_{MAX}), ft	5012	Volume-to-Capacity Ratio (v/c)		0.75

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	50	Average Weaving Speed (S_W), mi/h	45.6
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	267	Average Non-Weaving Speed (S_{NW}), mi/h	53.4
Weaving Lane Change Rate (LC_W), lc/h	1084	Average Speed (S), mi/h	51.2

Weaving Lane Change Rate (LC_{All}), lc/h	1351	Density (D), pc/mi/ln	28.6
Weaving Intensity Factor (W)	0.741	Level of Service (LOS)	D

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Merge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	4	Segment Name	EB Casino On-ramp_EB post-Casino
Analysis Period Number	1	Segment Analysis Period	12:00-12:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	350	900
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	-5.50	-5.50
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2749	459
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.931	0.931
Flow Rate (v_i), pc/h	3209	536
Capacity (c_{md}), pc/h	4700	2000
Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.82	0.28

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	57.1
Flow in Lanes 1 and 2 (v_{12}), pc/h	3209	Outer Lanes Freeway Speed (S_O), mi/h	68.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3745	Ramp Junction Speed (S), mi/h	57.1
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	32.8

Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	28.9

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Merge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	4	Segment Name	WB Casino On-ramp
Analysis Period Number	1	Segment Analysis Period	12:00-12:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	340	400
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2413	175
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.943	0.943
Flow Rate (v_i), pc/h	2781	202
Capacity (c_{md}), pc/h	4700	2000
Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.66	0.10

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	58.5
Flow in Lanes 1 and 2 (v_{12}), pc/h	2781	Outer Lanes Freeway Speed (S_O), mi/h	68.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	2983	Ramp Junction Speed (S), mi/h	58.5
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	25.5

Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	26.2

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Diverge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Existing plus Project Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	2	Segment Name	WB Casino Off-ramp
Analysis Period Number	1	Segment Analysis Period	12:00-12:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	160	1000
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	5.50	5.50
Segment Type / Ramp Type	Highway/CD Roadway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2901	488
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.931	0.931
Flow Rate (v_i), pc/h	3387	570
Capacity (c_{md}), pc/h	4400	2000
Initial Adjusted Capacity (c_{mda}), pc/h	4259	-
Final Adjusted Capacity (c_{mda}), pc/h	4259	1936
Volume-to-Capacity Ratio (v/c)	0.80	0.29

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	55.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	3387	Outer Lanes Freeway Speed (S_O), mi/h	74.8
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Ramp Junction Speed (S), mi/h	55.3

Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	30.6
Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	24.4

Copyright © 2024 University of Florida. All Rights Reserved.

Appendix D

Analysis Worksheets for Cumulative (2043) Conditions

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	11	98	316	44
v/c Ratio	0.03	0.09	0.31	0.08
Control Delay	10.7	5.0	4.3	7.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	10.7	5.0	4.3	7.8
Queue Length 50th (ft)	1	3	4	2
Queue Length 95th (ft)	10	9	27	20
Internal Link Dist (ft)		628	1141	286
Turn Bay Length (ft)	300			
Base Capacity (vph)	367	3376	2451	1336
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.03	0.03	0.13	0.03

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	90	110	180	30	10
Future Volume (veh/h)	10	90	110	180	30	10
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	11	98	120	196	33	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	26	1541	421	375	257	86
Arrive On Green	0.01	0.43	0.24	0.24	0.20	0.20
Sat Flow, veh/h	1781	3647	1870	1585	1269	423
Grp Volume(v), veh/h	11	98	120	196	45	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1777	1585	1731	0
Q Serve(g_s), s	0.2	0.4	1.4	2.7	0.5	0.0
Cycle Q Clear(g_c), s	0.2	0.4	1.4	2.7	0.5	0.0
Prop In Lane	1.00			1.00	0.73	0.24
Lane Grp Cap(c), veh/h	26	1541	421	375	350	0
V/C Ratio(X)	0.42	0.06	0.29	0.52	0.13	0.00
Avail Cap(c_a), veh/h	360	3954	1294	1154	1295	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	12.1	4.1	7.7	8.2	8.1	0.0
Incr Delay (d2), s/veh	10.3	0.0	0.4	1.1	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.1	0.3	0.6	0.1	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	22.4	4.1	8.1	9.3	8.2	0.0
LnGrp LOS	C	A	A	A	A	A
Approach Vol, veh/h		109	316		45	
Approach Delay, s/veh		5.9	8.9		8.2	
Approach LOS		A	A		A	

Timer - Assigned Phs			4		6	7	8
Phs Duration (G+Y+Rc), s			15.2		9.5	4.9	10.4
Change Period (Y+Rc), s			4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s			27.5		18.5	5.0	18.0
Max Q Clear Time (g_c+I1), s			2.4		2.5	2.2	4.7
Green Ext Time (p_c), s			0.5		0.1	0.0	1.6

Intersection Summary	
HCM 6th Ctrl Delay	8.1
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	220	10	5	120	5	5
Future Vol, veh/h	220	10	5	120	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	239	11	5	130	5	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	250	0	385	245
Stage 1	-	-	-	-	245	-
Stage 2	-	-	-	-	140	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1316	-	618	794
Stage 1	-	-	-	-	796	-
Stage 2	-	-	-	-	887	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1316	-	616	794
Mov Cap-2 Maneuver	-	-	-	-	616	-
Stage 1	-	-	-	-	796	-
Stage 2	-	-	-	-	883	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	10.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	694	-	-	1316	-
HCM Lane V/C Ratio	0.016	-	-	0.004	-
HCM Control Delay (s)	10.3	-	-	7.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-

Intersection	
Int Delay, s/veh	4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	70	60	150	110	130	360
Future Vol, veh/h	70	60	150	110	130	360
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	245	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	76	65	163	120	141	391

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	896	223	0	0	283	0
Stage 1	223	-	-	-	-	-
Stage 2	673	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	311	817	-	-	1279	-
Stage 1	814	-	-	-	-	-
Stage 2	507	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	277	817	-	-	1279	-
Mov Cap-2 Maneuver	277	-	-	-	-	-
Stage 1	814	-	-	-	-	-
Stage 2	451	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	18.9	0	2.2
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	399	1279	-
HCM Lane V/C Ratio	-	-	0.354	0.11	-
HCM Control Delay (s)	-	-	18.9	8.2	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	1.6	0.4	-

Intersection	
Int Delay, s/veh	3.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	130	130	50	70	70	70
Future Vol, veh/h	130	130	50	70	70	70
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	141	141	54	76	76	76

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	282	0	396	212
Stage 1	-	-	-	-	212	-
Stage 2	-	-	-	-	184	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1280	-	609	828
Stage 1	-	-	-	-	823	-
Stage 2	-	-	-	-	848	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1280	-	582	828
Mov Cap-2 Maneuver	-	-	-	-	582	-
Stage 1	-	-	-	-	823	-
Stage 2	-	-	-	-	811	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.3	11.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	684	-	-	1280	-
HCM Lane V/C Ratio	0.222	-	-	0.042	-
HCM Control Delay (s)	11.8	-	-	7.9	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.8	-	-	0.1	-

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	80	260	290	60	30	70
Future Vol, veh/h	80	260	290	60	30	70
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	87	283	315	65	33	76

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	380	0	-	0	805	348
Stage 1	-	-	-	-	348	-
Stage 2	-	-	-	-	457	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1178	-	-	-	352	695
Stage 1	-	-	-	-	715	-
Stage 2	-	-	-	-	638	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1178	-	-	-	321	695
Mov Cap-2 Maneuver	-	-	-	-	321	-
Stage 1	-	-	-	-	652	-
Stage 2	-	-	-	-	638	-

Approach	EB	WB	SB
HCM Control Delay, s	2	0	13.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1178	-	-	-	515
HCM Lane V/C Ratio	0.074	-	-	-	0.211
HCM Control Delay (s)	8.3	0	-	-	13.9
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.8

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	11	326	22	326	164	109
v/c Ratio	0.06	0.48	0.10	0.47	0.42	0.33
Control Delay	30.3	18.9	29.9	18.7	22.9	25.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.3	18.9	29.9	18.7	22.9	25.2
Queue Length 50th (ft)	3	67	5	68	37	25
Queue Length 95th (ft)	22	229	34	226	124	100
Internal Link Dist (ft)		403		299	115	124
Turn Bay Length (ft)	290		285			
Base Capacity (vph)	225	1617	263	1643	1113	741
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.20	0.08	0.20	0.15	0.15

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	240	60	20	260	40	100	30	20	60	30	10
Future Volume (veh/h)	10	240	60	20	260	40	100	30	20	60	30	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	11	261	65	22	283	43	109	33	22	65	33	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	21	387	96	39	441	67	150	46	30	102	52	17
Arrive On Green	0.01	0.27	0.27	0.02	0.28	0.28	0.13	0.13	0.13	0.10	0.10	0.10
Sat Flow, veh/h	1781	1446	360	1781	1586	241	1176	356	237	1064	540	180
Grp Volume(v), veh/h	11	0	326	22	0	326	164	0	0	109	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1806	1781	0	1827	1769	0	0	1785	0	0
Q Serve(g_s), s	0.2	0.0	5.3	0.4	0.0	5.2	2.9	0.0	0.0	1.9	0.0	0.0
Cycle Q Clear(g_c), s	0.2	0.0	5.3	0.4	0.0	5.2	2.9	0.0	0.0	1.9	0.0	0.0
Prop In Lane	1.00		0.20	1.00		0.13	0.66		0.13	0.60		0.10
Lane Grp Cap(c), veh/h	21	0	483	39	0	508	226	0	0	171	0	0
V/C Ratio(X)	0.53	0.00	0.67	0.56	0.00	0.64	0.72	0.00	0.00	0.64	0.00	0.00
Avail Cap(c_a), veh/h	325	0	2689	379	0	2777	1586	0	0	1058	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	16.2	0.0	10.8	15.9	0.0	10.4	13.8	0.0	0.0	14.3	0.0	0.0
Incr Delay (d2), s/veh	14.7	0.0	1.2	8.8	0.0	1.0	1.7	0.0	0.0	3.9	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	1.4	0.2	0.0	1.3	0.9	0.0	0.0	0.7	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.9	0.0	12.0	24.8	0.0	11.4	15.4	0.0	0.0	18.2	0.0	0.0
LnGrp LOS	C	A	B	C	A	B	B	A	A	B	A	A
Approach Vol, veh/h		337			348			164			109	
Approach Delay, s/veh		12.6			12.3			15.4			18.2	
Approach LOS		B			B			B			B	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	4.4	14.2		7.7	4.7	13.8		6.7
Change Period (Y+Rc), s	4.0	5.0		3.5	4.0	5.0		3.5
Max Green Setting (Gmax), s	6.0	50.0		29.5	7.0	49.0		19.5
Max Q Clear Time (g_c+I1), s	2.2	7.2		4.9	2.4	7.3		3.9
Green Ext Time (p_c), s	0.0	1.5		0.5	0.0	1.5		0.4

Intersection Summary	
HCM 6th Ctrl Delay	13.6
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	174	43	33	120	293	217
v/c Ratio	0.37	0.10	0.18	0.13	0.38	0.28
Control Delay	17.6	7.2	24.6	6.9	13.3	3.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.6	7.2	24.6	6.9	13.3	3.5
Queue Length 50th (ft)	26	0	6	14	39	0
Queue Length 95th (ft)	101	21	35	39	140	37
Internal Link Dist (ft)	437			333	416	
Turn Bay Length (ft)		60	230			225
Base Capacity (vph)	1373	1237	480	1856	1705	1467
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.03	0.07	0.06	0.17	0.15

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	160	40	30	110	270	200
Future Volume (veh/h)	160	40	30	110	270	200
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	174	43	33	120	293	217
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	326	290	42	926	581	493
Arrive On Green	0.18	0.18	0.02	0.50	0.31	0.31
Sat Flow, veh/h	1781	1585	1781	1870	1870	1585
Grp Volume(v), veh/h	174	43	33	120	293	217
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1870	1870	1585
Q Serve(g_s), s	2.9	0.8	0.6	1.1	4.2	3.6
Cycle Q Clear(g_c), s	2.9	0.8	0.6	1.1	4.2	3.6
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	326	290	42	926	581	493
V/C Ratio(X)	0.53	0.15	0.78	0.13	0.50	0.44
Avail Cap(c_a), veh/h	1821	1620	632	3495	2530	2144
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	12.2	11.3	16.0	4.5	9.3	9.1
Incr Delay (d2), s/veh	2.1	0.4	10.9	0.1	1.1	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.7	0.3	0.2	1.0	0.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	14.3	11.7	26.9	4.6	10.4	10.1
LnGrp LOS	B	B	C	A	B	B
Approach Vol, veh/h	217			153	510	
Approach Delay, s/veh	13.8			9.4	10.2	
Approach LOS	B			A	B	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		21.6		11.3	6.1	15.5
Change Period (Y+Rc), s		5.3		5.3	5.3	5.3
Max Green Setting (Gmax), s		61.6		33.7	11.7	44.6
Max Q Clear Time (g_c+I1), s		3.1		4.9	2.6	6.2
Green Ext Time (p_c), s		1.1		1.2	0.0	4.0

Intersection Summary	
HCM 6th Ctrl Delay	11.0
HCM 6th LOS	B

Intersection	
Int Delay, s/veh	3.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	150	150	60	170	70	40
Future Vol, veh/h	150	150	60	170	70	40
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	163	163	65	185	76	43

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	326	0	560	245
Stage 1	-	-	-	-	245	-
Stage 2	-	-	-	-	315	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1234	-	489	794
Stage 1	-	-	-	-	796	-
Stage 2	-	-	-	-	740	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1234	-	460	794
Mov Cap-2 Maneuver	-	-	-	-	460	-
Stage 1	-	-	-	-	796	-
Stage 2	-	-	-	-	696	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.1	13.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	543	-	-	1234	-
HCM Lane V/C Ratio	0.22	-	-	0.053	-
HCM Control Delay (s)	13.5	-	-	8.1	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.8	-	-	0.2	-

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	30	250	290	20	30	40
Future Vol, veh/h	30	250	290	20	30	40
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	33	272	315	22	33	43

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	337	0	-	0	664	326
Stage 1	-	-	-	-	326	-
Stage 2	-	-	-	-	338	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1222	-	-	-	426	715
Stage 1	-	-	-	-	731	-
Stage 2	-	-	-	-	722	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1222	-	-	-	412	715
Mov Cap-2 Maneuver	-	-	-	-	412	-
Stage 1	-	-	-	-	708	-
Stage 2	-	-	-	-	722	-

Approach	EB	WB	SB
HCM Control Delay, s	0.9	0	12.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1222	-	-	-	544
HCM Lane V/C Ratio	0.027	-	-	-	0.14
HCM Control Delay (s)	8	0	-	-	12.7
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.5

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	22	533	141	315	217	195	43	98
v/c Ratio	0.20	0.85	0.63	0.35	0.70	0.33	0.34	0.42
Control Delay	50.1	37.8	52.5	16.8	48.9	10.0	51.2	36.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.1	37.8	52.5	16.8	48.9	10.0	51.2	36.5
Queue Length 50th (ft)	11	228	70	83	106	18	22	39
Queue Length 95th (ft)	43	#499	#190	228	#262	77	69	96
Internal Link Dist (ft)		484		464		352		157
Turn Bay Length (ft)	265		150		90		50	
Base Capacity (vph)	129	941	292	1152	426	846	163	544
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.57	0.48	0.27	0.51	0.23	0.26	0.18

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	260	230	130	270	20	200	40	140	40	60	30
Future Volume (veh/h)	20	260	230	130	270	20	200	40	140	40	60	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	22	283	250	141	293	22	217	43	152	43	65	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	27	326	288	180	758	57	267	77	271	52	107	54
Arrive On Green	0.02	0.36	0.36	0.10	0.44	0.44	0.15	0.21	0.21	0.03	0.09	0.09
Sat Flow, veh/h	1781	916	809	1781	1718	129	1781	362	1279	1781	1170	594
Grp Volume(v), veh/h	22	0	533	141	0	315	217	0	195	43	0	98
Grp Sat Flow(s),veh/h/ln	1781	0	1725	1781	0	1847	1781	0	1640	1781	0	1763
Q Serve(g_s), s	0.7	0.0	16.8	4.5	0.0	6.7	6.9	0.0	6.2	1.4	0.0	3.1
Cycle Q Clear(g_c), s	0.7	0.0	16.8	4.5	0.0	6.7	6.9	0.0	6.2	1.4	0.0	3.1
Prop In Lane	1.00		0.47	1.00		0.07	1.00		0.78	1.00		0.34
Lane Grp Cap(c), veh/h	27	0	613	180	0	815	267	0	348	52	0	162
V/C Ratio(X)	0.80	0.00	0.87	0.78	0.00	0.39	0.81	0.00	0.56	0.82	0.00	0.61
Avail Cap(c_a), veh/h	171	0	1207	388	0	1518	565	0	1004	217	0	696
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	28.6	0.0	17.5	25.6	0.0	11.0	24.0	0.0	20.5	28.1	0.0	25.5
Incr Delay (d2), s/veh	17.6	0.0	1.5	2.8	0.0	0.1	2.3	0.0	0.5	11.3	0.0	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	5.4	1.8	0.0	2.0	2.8	0.0	2.2	0.7	0.0	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	46.2	0.0	19.0	28.4	0.0	11.1	26.3	0.0	21.1	39.5	0.0	26.8
LnGrp LOS	D	A	B	C	A	B	C	A	C	D	A	C
Approach Vol, veh/h		555			456			412			141	
Approach Delay, s/veh		20.1			16.4			23.8			30.7	
Approach LOS		C			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.4	26.0	12.2	10.6	4.4	31.0	5.2	17.7
Change Period (Y+Rc), s	3.5	5.3	3.5	5.3	3.5	5.3	3.5	* 5.3
Max Green Setting (Gmax), s	12.7	40.8	18.5	23.0	5.6	47.9	7.1	* 36
Max Q Clear Time (g_c+I1), s	6.5	18.8	8.9	5.1	2.7	8.7	3.4	8.2
Green Ext Time (p_c), s	0.0	1.9	0.1	0.2	0.0	1.0	0.0	0.8

Intersection Summary	
HCM 6th Ctrl Delay	21.0
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	11	315	304	141
v/c Ratio	0.03	0.23	0.25	0.18
Control Delay	12.8	6.1	7.7	9.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	12.8	6.1	7.7	9.1
Queue Length 50th (ft)	1	12	10	10
Queue Length 95th (ft)	12	32	48	56
Internal Link Dist (ft)		628	1141	286
Turn Bay Length (ft)	300			
Base Capacity (vph)	410	3305	2597	1344
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.03	0.10	0.12	0.10

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	290	240	40	120	10
Future Volume (veh/h)	10	290	240	40	120	10
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	11	315	261	43	130	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	26	1480	656	107	337	28
Arrive On Green	0.01	0.42	0.21	0.21	0.21	0.21
Sat Flow, veh/h	1781	3647	3154	498	1616	137
Grp Volume(v), veh/h	11	315	150	154	142	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1777	1781	1765	0
Q Serve(g_s), s	0.1	1.4	1.7	1.8	1.7	0.0
Cycle Q Clear(g_c), s	0.1	1.4	1.7	1.8	1.7	0.0
Prop In Lane	1.00			0.28	0.92	0.08
Lane Grp Cap(c), veh/h	26	1480	381	382	368	0
V/C Ratio(X)	0.42	0.21	0.39	0.40	0.39	0.00
Avail Cap(c_a), veh/h	371	4073	1333	1336	1361	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	11.7	4.5	8.1	8.1	8.2	0.0
Incr Delay (d2), s/veh	10.3	0.1	0.7	0.7	0.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.2	0.5	0.5	0.5	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	22.0	4.6	8.8	8.8	8.8	0.0
LnGrp LOS	C	A	A	A	A	A
Approach Vol, veh/h		326	304		142	
Approach Delay, s/veh		5.1	8.8		8.8	
Approach LOS		A	A		A	

Timer - Assigned Phs		4		6	7	8
Phs Duration (G+Y+Rc), s		14.5		9.5	4.9	9.6
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		27.5		18.5	5.0	18.0
Max Q Clear Time (g_c+I1), s		3.4		3.7	2.1	3.8
Green Ext Time (p_c), s		2.0		0.3	0.0	1.4

Intersection Summary	
HCM 6th Ctrl Delay	7.3
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	180	10	10	190	5	10
Future Vol, veh/h	180	10	10	190	5	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	196	11	11	207	5	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	207	0	431	202
Stage 1	-	-	-	-	202	-
Stage 2	-	-	-	-	229	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1364	-	581	839
Stage 1	-	-	-	-	832	-
Stage 2	-	-	-	-	809	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1364	-	576	839
Mov Cap-2 Maneuver	-	-	-	-	576	-
Stage 1	-	-	-	-	832	-
Stage 2	-	-	-	-	802	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	10.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	728	-	-	1364	-
HCM Lane V/C Ratio	0.022	-	-	0.008	-
HCM Control Delay (s)	10.1	-	-	7.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	5.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	80	120	390	80	100	220
Future Vol, veh/h	80	120	390	80	100	220
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	245	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	87	130	424	87	109	239

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	925	468	0	0	511	0
Stage 1	468	-	-	-	-	-
Stage 2	457	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	299	595	-	-	1054	-
Stage 1	630	-	-	-	-	-
Stage 2	638	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	268	595	-	-	1054	-
Mov Cap-2 Maneuver	268	-	-	-	-	-
Stage 1	630	-	-	-	-	-
Stage 2	572	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	24.2	0	2.8
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	400	1054	-
HCM Lane V/C Ratio	-	-	0.543	0.103	-
HCM Control Delay (s)	-	-	24.2	8.8	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	3.1	0.3	-

Intersection	
Int Delay, s/veh	4.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	110	90	50	150	100	70
Future Vol, veh/h	110	90	50	150	100	70
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	120	98	54	163	109	76

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	218	0	440	169
Stage 1	-	-	-	-	169	-
Stage 2	-	-	-	-	271	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1352	-	574	875
Stage 1	-	-	-	-	861	-
Stage 2	-	-	-	-	775	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1352	-	549	875
Mov Cap-2 Maneuver	-	-	-	-	549	-
Stage 1	-	-	-	-	861	-
Stage 2	-	-	-	-	741	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.9	12.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	648	-	-	1352	-
HCM Lane V/C Ratio	0.285	-	-	0.04	-
HCM Control Delay (s)	12.8	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	1.2	-	-	0.1	-

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	50	160	260	10	30	70
Future Vol, veh/h	50	160	260	10	30	70
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	54	174	283	11	33	76

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	294	0	-	0	571	289
Stage 1	-	-	-	-	289	-
Stage 2	-	-	-	-	282	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1268	-	-	-	482	750
Stage 1	-	-	-	-	760	-
Stage 2	-	-	-	-	766	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1268	-	-	-	459	750
Mov Cap-2 Maneuver	-	-	-	-	459	-
Stage 1	-	-	-	-	724	-
Stage 2	-	-	-	-	766	-

Approach	EB	WB	SB
HCM Control Delay, s	1.9	0	11.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1268	-	-	-	630
HCM Lane V/C Ratio	0.043	-	-	-	0.173
HCM Control Delay (s)	8	0	-	-	11.9
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.6

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	11	229	43	402	184	131
v/c Ratio	0.06	0.38	0.20	0.55	0.49	0.39
Control Delay	34.3	20.9	33.8	18.7	26.5	28.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.3	20.9	33.8	18.7	26.5	28.5
Queue Length 50th (ft)	3	64	13	86	50	36
Queue Length 95th (ft)	24	162	59	288	148	123
Internal Link Dist (ft)		403		299	115	124
Turn Bay Length (ft)	290		285			
Base Capacity (vph)	213	1535	249	1511	1052	698
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.15	0.17	0.27	0.17	0.19

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	180	30	40	250	120	50	70	50	70	30	20
Future Volume (veh/h)	10	180	30	40	250	120	50	70	50	70	30	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	11	196	33	43	272	130	54	76	54	76	33	22
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	21	441	74	69	371	177	74	104	74	105	46	30
Arrive On Green	0.01	0.28	0.28	0.04	0.31	0.31	0.14	0.14	0.14	0.10	0.10	0.10
Sat Flow, veh/h	1781	1560	263	1781	1196	572	514	724	514	1024	445	297
Grp Volume(v), veh/h	11	0	229	43	0	402	184	0	0	131	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1823	1781	0	1767	1752	0	0	1766	0	0
Q Serve(g_s), s	0.2	0.0	3.8	0.9	0.0	7.5	3.7	0.0	0.0	2.7	0.0	0.0
Cycle Q Clear(g_c), s	0.2	0.0	3.8	0.9	0.0	7.5	3.7	0.0	0.0	2.7	0.0	0.0
Prop In Lane	1.00		0.14	1.00		0.32	0.29		0.29	0.58		0.17
Lane Grp Cap(c), veh/h	21	0	516	69	0	548	252	0	0	181	0	0
V/C Ratio(X)	0.53	0.00	0.44	0.63	0.00	0.73	0.73	0.00	0.00	0.72	0.00	0.00
Avail Cap(c_a), veh/h	288	0	2411	336	0	2385	1395	0	0	929	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	18.2	0.0	10.9	17.5	0.0	11.4	15.2	0.0	0.0	16.1	0.0	0.0
Incr Delay (d2), s/veh	15.0	0.0	0.4	6.7	0.0	1.4	1.5	0.0	0.0	5.4	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	1.1	0.4	0.0	2.0	1.2	0.0	0.0	1.1	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	33.2	0.0	11.3	24.3	0.0	12.9	16.7	0.0	0.0	21.5	0.0	0.0
LnGrp LOS	C	A	B	C	A	B	B	A	A	C	A	A
Approach Vol, veh/h		240			445			184			131	
Approach Delay, s/veh		12.3			14.0			16.7			21.5	
Approach LOS		B			B			B			C	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	4.4	16.5		8.8	5.4	15.5		7.3
Change Period (Y+Rc), s	4.0	5.0		3.5	4.0	5.0		3.5
Max Green Setting (Gmax), s	6.0	50.0		29.5	7.0	49.0		19.5
Max Q Clear Time (g_c+I1), s	2.2	9.5		5.7	2.9	5.8		4.7
Green Ext Time (p_c), s	0.0	2.0		0.6	0.0	1.0		0.5

Intersection Summary	
HCM 6th Ctrl Delay	15.1
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	228	33	43	337	185	163
v/c Ratio	0.44	0.07	0.21	0.40	0.27	0.24
Control Delay	17.3	8.8	24.4	9.7	13.6	4.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.3	8.8	24.4	9.7	13.6	4.1
Queue Length 50th (ft)	33	1	8	49	24	0
Queue Length 95th (ft)	131	20	42	113	95	34
Internal Link Dist (ft)	437			333	416	
Turn Bay Length (ft)		60	230			225
Base Capacity (vph)	1418	1273	497	1845	1715	1470
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.03	0.09	0.18	0.11	0.11

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	210	30	40	310	170	150
Future Volume (veh/h)	210	30	40	310	170	150
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	228	33	43	337	185	163
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	366	326	54	830	446	378
Arrive On Green	0.21	0.21	0.03	0.44	0.24	0.24
Sat Flow, veh/h	1781	1585	1781	1870	1870	1585
Grp Volume(v), veh/h	228	33	43	337	185	163
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1870	1870	1585
Q Serve(g_s), s	3.5	0.5	0.7	3.7	2.5	2.6
Cycle Q Clear(g_c), s	3.5	0.5	0.7	3.7	2.5	2.6
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	366	326	54	830	446	378
V/C Ratio(X)	0.62	0.10	0.80	0.41	0.41	0.43
Avail Cap(c_a), veh/h	1985	1767	689	3811	2759	2338
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	10.9	9.7	14.6	5.7	9.7	9.8
Incr Delay (d2), s/veh	2.7	0.2	9.8	0.5	1.0	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	0.0	0.4	0.7	0.6	0.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	13.7	10.0	24.4	6.2	10.7	11.0
LnGrp LOS	B	A	C	A	B	B
Approach Vol, veh/h	261			380	348	
Approach Delay, s/veh	13.2			8.3	10.8	
Approach LOS	B			A	B	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		18.7		11.5	6.2	12.5
Change Period (Y+Rc), s		5.3		5.3	5.3	5.3
Max Green Setting (Gmax), s		61.6		33.7	11.7	44.6
Max Q Clear Time (g_c+I1), s		5.7		5.5	2.7	4.6
Green Ext Time (p_c), s		3.5		1.4	0.0	2.6

Intersection Summary	
HCM 6th Ctrl Delay	10.5
HCM 6th LOS	B

Intersection	
Int Delay, s/veh	1.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	220	30	20	180	30	30
Future Vol, veh/h	220	30	20	180	30	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	239	33	22	196	33	33

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	272	0	496	256
Stage 1	-	-	-	-	256	-
Stage 2	-	-	-	-	240	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1291	-	533	783
Stage 1	-	-	-	-	787	-
Stage 2	-	-	-	-	800	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1291	-	523	783
Mov Cap-2 Maneuver	-	-	-	-	523	-
Stage 1	-	-	-	-	787	-
Stage 2	-	-	-	-	785	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.8	11.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	627	-	-	1291	-
HCM Lane V/C Ratio	0.104	-	-	0.017	-
HCM Control Delay (s)	11.4	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	30	240	180	40	30	30
Future Vol, veh/h	30	240	180	40	30	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	33	261	196	43	33	33

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	239	0	-	0	545	218
Stage 1	-	-	-	-	218	-
Stage 2	-	-	-	-	327	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1328	-	-	-	499	822
Stage 1	-	-	-	-	818	-
Stage 2	-	-	-	-	731	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1328	-	-	-	485	822
Mov Cap-2 Maneuver	-	-	-	-	485	-
Stage 1	-	-	-	-	794	-
Stage 2	-	-	-	-	731	-

Approach	EB	WB	SB
HCM Control Delay, s	0.9	0	11.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1328	-	-	-	610
HCM Lane V/C Ratio	0.025	-	-	-	0.107
HCM Control Delay (s)	7.8	0	-	-	11.6
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.4

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	33	620	152	250	359	185	11	76
v/c Ratio	0.35	0.89	0.82	0.29	0.87	0.28	0.18	0.40
Control Delay	57.4	44.4	77.9	19.3	60.5	14.1	56.9	39.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.4	44.4	77.9	19.3	60.5	14.1	56.9	39.4
Queue Length 50th (ft)	20	328	93	95	213	45	7	36
Queue Length 95th (ft)	56	#673	#238	194	#453	104	28	78
Internal Link Dist (ft)		484		464		352		157
Turn Bay Length (ft)	265		150		90		50	
Base Capacity (vph)	112	696	187	868	412	795	60	425
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.89	0.81	0.29	0.87	0.23	0.18	0.18

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	310	260	140	210	20	330	70	100	10	50	20
Future Volume (veh/h)	30	310	260	140	210	20	330	70	100	10	50	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	33	337	283	152	228	22	359	76	109	11	54	22
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	40	364	306	187	789	76	397	197	282	14	86	35
Arrive On Green	0.02	0.39	0.39	0.10	0.47	0.47	0.22	0.28	0.28	0.01	0.07	0.07
Sat Flow, veh/h	1781	939	789	1781	1679	162	1781	695	996	1781	1263	515
Grp Volume(v), veh/h	33	0	620	152	0	250	359	0	185	11	0	76
Grp Sat Flow(s),veh/h/ln	1781	0	1728	1781	0	1841	1781	0	1691	1781	0	1778
Q Serve(g_s), s	1.5	0.0	27.9	6.8	0.0	6.8	15.9	0.0	7.2	0.5	0.0	3.4
Cycle Q Clear(g_c), s	1.5	0.0	27.9	6.8	0.0	6.8	15.9	0.0	7.2	0.5	0.0	3.4
Prop In Lane	1.00		0.46	1.00		0.09	1.00		0.59	1.00		0.29
Lane Grp Cap(c), veh/h	40	0	670	187	0	865	397	0	478	14	0	121
V/C Ratio(X)	0.82	0.00	0.93	0.81	0.00	0.29	0.90	0.00	0.39	0.76	0.00	0.63
Avail Cap(c_a), veh/h	138	0	816	230	0	965	506	0	915	74	0	503
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	39.6	0.0	23.8	35.6	0.0	13.2	30.7	0.0	23.5	40.2	0.0	36.9
Incr Delay (d2), s/veh	13.8	0.0	13.3	13.6	0.0	0.1	14.8	0.0	0.2	25.6	0.0	2.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	0.0	12.2	3.4	0.0	2.4	8.1	0.0	2.7	0.3	0.0	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.4	0.0	37.1	49.2	0.0	13.3	45.6	0.0	23.7	65.8	0.0	38.9
LnGrp LOS	D	A	D	D	A	B	D	A	C	E	A	D
Approach Vol, veh/h		653			402			544			87	
Approach Delay, s/veh		37.9			26.9			38.1			42.3	
Approach LOS		D			C			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.0	36.8	21.6	10.8	5.3	43.5	4.2	28.3
Change Period (Y+Rc), s	3.5	5.3	3.5	5.3	3.5	5.3	3.5	* 5.3
Max Green Setting (Gmax), s	10.5	38.4	23.1	23.0	6.3	42.6	3.4	* 44
Max Q Clear Time (g_c+I1), s	8.8	29.9	17.9	5.4	3.5	8.8	2.5	9.2
Green Ext Time (p_c), s	0.0	1.7	0.2	0.2	0.0	0.8	0.0	0.7

Intersection Summary	
HCM 6th Ctrl Delay	35.6
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	11	348	435	131
v/c Ratio	0.03	0.26	0.37	0.26
Control Delay	13.9	6.2	8.0	10.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	13.9	6.2	8.0	10.1
Queue Length 50th (ft)	1	14	15	9
Queue Length 95th (ft)	13	34	65	55
Internal Link Dist (ft)		628	1141	286
Turn Bay Length (ft)	300			
Base Capacity (vph)	343	3273	2424	1261
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.03	0.11	0.18	0.10

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	320	330	70	100	20
Future Volume (veh/h)	10	320	330	70	100	20
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	11	348	359	76	109	22
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	26	1615	774	162	281	57
Arrive On Green	0.01	0.45	0.26	0.26	0.19	0.19
Sat Flow, veh/h	1781	3647	3018	612	1442	291
Grp Volume(v), veh/h	11	348	217	218	132	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1777	1760	1746	0
Q Serve(g_s), s	0.2	1.5	2.6	2.7	1.7	0.0
Cycle Q Clear(g_c), s	0.2	1.5	2.6	2.7	1.7	0.0
Prop In Lane	1.00			0.35	0.83	0.17
Lane Grp Cap(c), veh/h	26	1615	470	466	340	0
V/C Ratio(X)	0.42	0.22	0.46	0.47	0.39	0.00
Avail Cap(c_a), veh/h	347	3808	1246	1234	1258	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	12.5	4.2	7.9	7.9	9.0	0.0
Incr Delay (d2), s/veh	10.4	0.1	0.7	0.7	0.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.2	0.7	0.7	0.5	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	22.9	4.3	8.6	8.7	9.7	0.0
LnGrp LOS	C	A	A	A	A	A
Approach Vol, veh/h		359	435		132	
Approach Delay, s/veh		4.9	8.6		9.7	
Approach LOS		A	A		A	

Timer - Assigned Phs		4		6	7	8
Phs Duration (G+Y+Rc), s		16.2		9.5	4.9	11.3
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		27.5		18.5	5.0	18.0
Max Q Clear Time (g_c+I1), s		3.5		3.7	2.2	4.7
Green Ext Time (p_c), s		2.3		0.3	0.0	2.1

Intersection Summary	
HCM 6th Ctrl Delay	7.3
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	22	359	478	33
v/c Ratio	0.06	0.25	0.38	0.08
Control Delay	12.8	5.2	7.5	9.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	12.8	5.2	7.5	9.4
Queue Length 50th (ft)	2	13	16	2
Queue Length 95th (ft)	18	26	64	20
Internal Link Dist (ft)		628	1141	286
Turn Bay Length (ft)	300			
Base Capacity (vph)	353	3314	2510	1276
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.06	0.11	0.19	0.03

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	20	330	390	50	20	10
Future Volume (veh/h)	20	330	390	50	20	10
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	22	359	424	54	22	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	50	1681	874	111	209	104
Arrive On Green	0.03	0.47	0.28	0.28	0.19	0.19
Sat Flow, veh/h	1781	3647	3267	402	1110	555
Grp Volume(v), veh/h	22	359	236	242	34	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1777	1798	1715	0
Q Serve(g_s), s	0.3	1.6	3.0	3.0	0.4	0.0
Cycle Q Clear(g_c), s	0.3	1.6	3.0	3.0	0.4	0.0
Prop In Lane	1.00			0.22	0.65	0.32
Lane Grp Cap(c), veh/h	50	1681	489	495	323	0
V/C Ratio(X)	0.44	0.21	0.48	0.49	0.11	0.00
Avail Cap(c_a), veh/h	335	3679	1204	1218	1194	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	12.7	4.1	8.0	8.1	8.9	0.0
Incr Delay (d2), s/veh	5.9	0.1	0.7	0.7	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.2	0.8	0.8	0.1	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	18.6	4.2	8.8	8.8	9.1	0.0
LnGrp LOS	B	A	A	A	A	A
Approach Vol, veh/h		381	478		34	
Approach Delay, s/veh		5.0	8.8		9.1	
Approach LOS		A	A		A	

Timer - Assigned Phs			4		6	7	8
Phs Duration (G+Y+Rc), s			17.1		9.5	5.2	11.8
Change Period (Y+Rc), s			4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s			27.5		18.5	5.0	18.0
Max Q Clear Time (g_c+I1), s			3.6		2.4	2.3	5.0
Green Ext Time (p_c), s			2.4		0.0	0.0	2.3

Intersection Summary	
HCM 6th Ctrl Delay	7.2
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

HCS7 Two-Lane Highway Report

Project Information

Analyst	Kimley-Horn	Date	12/18/2023
Agency		Analysis Year	Cumulative (2043)
Jurisdiction	El Dorado County	Time Period Analyzed	AM Peak-Hour
Project Description	Red Hawk Casino - Seg 1. Green Valley Rd E/O Shingle Springs Dr NB	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	0
Speed Limit, mi/h	55	Access Point Density, pts/mi	14.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	141	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.92	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.08

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	53.7
Speed Slope Coefficient	3.47252	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34499	PF Power Coefficient	0.74378
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	0.7
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	52.8

Vehicle Results

Average Speed, mi/h	52.8	Percent Followers, %	26.9
Segment Travel Time, minutes	1.14	Followers Density, followers/mi/ln	0.7
Vehicle LOS	A		

Copyright © 2023 University of Florida. All Rights Reserved.

HCS7 Two-Lane Highway Report

Project Information

Analyst	Kimley-Horn	Date	12/18/2023
Agency		Analysis Year	Cumulative (2043)
Jurisdiction	El Dorado County	Time Period Analyzed	PM Peak-Hour
Project Description	Red Hawk Casino - Seg 1. Green Valley Rd E/O Shingle Springs Dr NB	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	0
Speed Limit, mi/h	55	Access Point Density, pts/mi	14.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	217	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.92	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.13

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	53.7
Speed Slope Coefficient	3.47252	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34499	PF Power Coefficient	0.74378
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	1.5
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	52.3

Vehicle Results

Average Speed, mi/h	52.3	Percent Followers, %	35.1
Segment Travel Time, minutes	1.15	Followers Density, followers/mi/ln	1.5
Vehicle LOS	A		

Copyright © 2023 University of Florida. All Rights Reserved.

HCS7 Two-Lane Highway Report

Project Information

Analyst	Kimley-Horn	Date	12/18/2023
Agency		Analysis Year	Cumulative (2043)
Jurisdiction	El Dorado County	Time Period Analyzed	AM Peak-Hour
Project Description	Red Hawk Casino - Seg 1. Green Valley Rd E/O Shingle Springs Dr SB	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	0
Speed Limit, mi/h	55	Access Point Density, pts/mi	14.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	250	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.92	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.15

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	53.7
Speed Slope Coefficient	3.47252	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34499	PF Power Coefficient	0.74378
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	1.8
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	52.2

Vehicle Results

Average Speed, mi/h	52.2	Percent Followers, %	38.1
Segment Travel Time, minutes	1.15	Followers Density, followers/mi/ln	1.8
Vehicle LOS	A		

Copyright © 2023 University of Florida. All Rights Reserved.

HCS7 Two-Lane Highway Report

Project Information

Analyst	Kimley-Horn	Date	12/18/2023
Agency		Analysis Year	Cumulative (2043)
Jurisdiction	El Dorado County	Time Period Analyzed	PM Peak-Hour
Project Description	Red Hawk Casino - Seg 1. Green Valley Rd E/O Shingle Springs Dr SB	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	0
Speed Limit, mi/h	55	Access Point Density, pts/mi	14.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	228	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.92	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.13

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	53.7
Speed Slope Coefficient	3.47252	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34499	PF Power Coefficient	0.74378
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	1.6
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	52.3

Vehicle Results

Average Speed, mi/h	52.3	Percent Followers, %	36.1
Segment Travel Time, minutes	1.15	Followers Density, followers/mi/ln	1.6
Vehicle LOS	A		

Copyright © 2023 University of Florida. All Rights Reserved.

HCS7 Two-Lane Highway Report

Project Information

Analyst	Kimley-Horn	Date	12/18/2023
Agency		Analysis Year	Cumulative (2043)
Jurisdiction	El Dorado County	Time Period Analyzed	AM Peak-Hour
Project Description	Red Hawk Casino - Seg 2. Green Valley Rd W/O Shingle Springs Dr EB	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	0
Speed Limit, mi/h	55	Access Point Density, pts/mi	6.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	239	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.92	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.14

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	55.7
Speed Slope Coefficient	3.58092	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.33105	PF Power Coefficient	0.74935
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	1.6
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	54.2

Vehicle Results

Average Speed, mi/h	54.2	Percent Followers, %	36.6
Segment Travel Time, minutes	1.11	Followers Density, followers/mi/ln	1.6
Vehicle LOS	A		

Copyright © 2023 University of Florida. All Rights Reserved.

HCS7 Two-Lane Highway Report

Project Information

Analyst	Kimley-Horn	Date	12/18/2023
Agency		Analysis Year	Cumulative (2043)
Jurisdiction	El Dorado County	Time Period Analyzed	PM Peak-Hour
Project Description	Red Hawk Casino - Seg 2. Green Valley Rd W/O Shingle Springs Dr EB	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	0
Speed Limit, mi/h	55	Access Point Density, pts/mi	6.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	228	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.92	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.13

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	55.7
Speed Slope Coefficient	3.58092	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.33105	PF Power Coefficient	0.74935
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	1.5
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	54.2

Vehicle Results

Average Speed, mi/h	54.2	Percent Followers, %	35.6
Segment Travel Time, minutes	1.11	Followers Density, followers/mi/ln	1.5
Vehicle LOS	A		

Copyright © 2023 University of Florida. All Rights Reserved.

HCS7 Two-Lane Highway Report

Project Information

Analyst	Kimley-Horn	Date	12/18/2023
Agency		Analysis Year	Cumulative (2043)
Jurisdiction	El Dorado County	Time Period Analyzed	AM Peak-Hour
Project Description	Red Hawk Casino - Seg 2. Green Valley Rd W/O Shingle Springs Dr WB	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	0
Speed Limit, mi/h	55	Access Point Density, pts/mi	6.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	130	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.92	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.08

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	55.7
Speed Slope Coefficient	3.58092	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.33105	PF Power Coefficient	0.74935
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	0.6
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	54.9

Vehicle Results

Average Speed, mi/h	54.9	Percent Followers, %	25.1
Segment Travel Time, minutes	1.09	Followers Density, followers/mi/ln	0.6
Vehicle LOS	A		

Copyright © 2023 University of Florida. All Rights Reserved.

HCS7 Two-Lane Highway Report

Project Information

Analyst	Kimley-Horn	Date	12/18/2023
Agency		Analysis Year	Cumulative (2043)
Jurisdiction	El Dorado County	Time Period Analyzed	PM Peak-Hour
Project Description	Red Hawk Casino - Seg 2. Green Valley Rd W/O Shingle Springs Dr WB	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	0
Speed Limit, mi/h	55	Access Point Density, pts/mi	6.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	217	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.92	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.13

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	55.7
Speed Slope Coefficient	3.58092	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.33105	PF Power Coefficient	0.74935
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	1.4
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	54.3

Vehicle Results

Average Speed, mi/h	54.3	Percent Followers, %	34.6
Segment Travel Time, minutes	1.11	Followers Density, followers/mi/ln	1.4
Vehicle LOS	A		

Copyright © 2023 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	5	Segment Name	WB West of Casino Ramps
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	2400	Percent Grade, %	-3.40
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	0.50
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2464	Heavy Vehicle Adjustment Factor (f_{HV})	0.931
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1438
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	30	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	70	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.24	Volume-to-Capacity Ratio (v/c)	0.62

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	67.2
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	21.3
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	3	Segment Name	EB between Ramps
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	3100	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	3301	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1902
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.82

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	61.7
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	30.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	3	Segment Name	WB between Ramps
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	2000	Percent Grade, %	5.50
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	0.20
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2421	Heavy Vehicle Adjustment Factor (f_{HV})	0.907
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1450
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	30	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	70	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.70	Volume-to-Capacity Ratio (v/c)	0.62

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	66.1
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	21.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	5	Segment Name	EB post-Casino
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	3780	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	3378	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1947
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.84

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	60.8
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	32.0
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	1	Segment Name	WB East of Casino Ramps
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	2150	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2514	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1449
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.62

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	67.3
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	21.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Weaving Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	2	Segment Name	EB Weave Shingle Springs Dr
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

Number of Lanes (N), ln	3	Segment Type	Freeway
Segment Length (L_S), ft	300	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Specific Grade	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	3.40	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.50	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000
Proportion of CAVs in Traffic Stream	0	Final Capacity Adjustment Factor (CAF)	0.968

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	3196	105	8	99
Peak Hour Factor (PHF)	0.92	0.92	0.92	0.92
Total Trucks, %	6.00	6.00	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.855	0.943	0.943	0.943
Flow Rate (v_i), pc/h	4063	121	9	114
Weaving Flow Rate (v_W), pc/h	235	Ideal Conditions Capacity (c_{IFL}), pc/h/ln		2382
Non-Weaving Flow Rate (v_{NW}), pc/h	4072	Density-Based Capacity (c_{IWL} × N × f_{HV}), veh/h		5591
Total Flow Rate (v), pc/h	4307	Demand Flow-Based Capacity (c_{IW} × f_{HV}), veh/h		37527
Volume Ratio (VR)	0.055	Weaving Area Capacity (c_W), veh/h		5591
Minimum Lane Change Rate (LC_{MIN}), lc/h	235	Adjusted Weaving Area Capacity (c_{WA}), veh/h		5412
Maximum Weaving Length (L_{MAX}), ft	3108	Volume-to-Capacity Ratio (v/c)		0.68

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	61	Average Weaving Speed (S_W), mi/h	52.5
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	424	Average Non-Weaving Speed (S_{NW}), mi/h	59.6
Weaving Lane Change Rate (LC_W), lc/h	235	Average Speed (S), mi/h	59.2

Weaving Lane Change Rate (LC_{All}), lc/h	659	Density (D), pc/mi/ln	24.3
Weaving Intensity Factor (W)	0.420	Level of Service (LOS)	C

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Merge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	4	Segment Name	EB Casino On-ramp_EB post-Casino
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	350	900
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	-5.50	-5.50
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	3301	77
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.931	0.931
Flow Rate (v_i), pc/h	3854	90
Capacity (c_{md}), pc/h	4700	2000
Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.87	0.05

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	56.1
Flow in Lanes 1 and 2 (v_{12}), pc/h	3854	Outer Lanes Freeway Speed (S_O), mi/h	68.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3944	Ramp Junction Speed (S), mi/h	56.1
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	35.2

Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	30.6

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Merge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	4	Segment Name	WB Casino On-ramp
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	340	400
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2421	43
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.943	0.943
Flow Rate (v_i), pc/h	2791	50
Capacity (c_{md}), pc/h	4700	2000
Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.62	0.03

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	58.7
Flow in Lanes 1 and 2 (v_{12}), pc/h	2791	Outer Lanes Freeway Speed (S_O), mi/h	68.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	2841	Ramp Junction Speed (S), mi/h	58.7
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	24.2
Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	25.2

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Diverge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	2	Segment Name	WB Casino Off-ramp
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	160	1000
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	5.50	5.50
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2514	93
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.931	0.931
Flow Rate (v_i), pc/h	2935	109
Capacity (c_{md}), pc/h	4700	2000
Initial Adjusted Capacity (c_{mda}), pc/h	4550	-
Final Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.65	0.06

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	56.4
Flow in Lanes 1 and 2 (v_{12}), pc/h	2935	Outer Lanes Freeway Speed (S_O), mi/h	74.8
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Ramp Junction Speed (S), mi/h	56.4
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	26.0

Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	20.5

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	5	Segment Name	WB West of Casino Ramps
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	2400	Percent Grade, %	-3.40
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	0.50
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2885	Heavy Vehicle Adjustment Factor (f_{HV})	0.931
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1684
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	30	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	70	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.24	Volume-to-Capacity Ratio (v/c)	0.73

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	65.1
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	25.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	3	Segment Name	EB between Ramps
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	3100	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.50
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	68.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2915	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1680
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2382
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2306
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2306
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.73

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	64.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	26.2
Total Ramp Density Adjustment	1.8	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	66.5		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	3	Segment Name	WB between Ramps
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	2000	Percent Grade, %	5.50
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	0.20
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2763	Heavy Vehicle Adjustment Factor (f_{HV})	0.907
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1656
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	30	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	70	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.70	Volume-to-Capacity Ratio (v/c)	0.71

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	65.4
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	25.3
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	5	Segment Name	EB post-Casino
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	3780	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	3191	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1839
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.79

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	62.8
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	29.3
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	1	Segment Name	WB East of Casino Ramps
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	2150	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2852	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1644
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.71

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	65.5
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	25.1
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Weaving Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	2	Segment Name	EB Weave Shingle Springs Dr
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	3	Segment Type	Freeway
Segment Length (L_S), ft	300	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Specific Grade	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	3.40	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.50	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000
Proportion of CAVs in Traffic Stream	0	Final Capacity Adjustment Factor (CAF)	0.968

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	2807	108	8	87
Peak Hour Factor (PHF)	0.92	0.92	0.92	0.92
Total Trucks, %	6.00	6.00	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.870	0.943	0.943	0.893
Flow Rate (v_i), pc/h	3507	124	9	106
Weaving Flow Rate (v_W), pc/h	230	Ideal Conditions Capacity (c_{IFL}), pc/h/ln		2382
Non-Weaving Flow Rate (v_{NW}), pc/h	3516	Density-Based Capacity (c_{IWL} × N × f_{HV}), veh/h		5667
Total Flow Rate (v), pc/h	3746	Demand Flow-Based Capacity (c_{IW} × f_{HV}), veh/h		34358
Volume Ratio (VR)	0.061	Weaving Area Capacity (c_W), veh/h		5667
Minimum Lane Change Rate (LC_{MIN}), lc/h	230	Adjusted Weaving Area Capacity (c_{WA}), veh/h		5486
Maximum Weaving Length (L_{MAX}), ft	3165	Volume-to-Capacity Ratio (v/c)		0.60

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	53	Average Weaving Speed (S_W), mi/h	54.1
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	309	Average Non-Weaving Speed (S_{NW}), mi/h	60.6
Weaving Lane Change Rate (LC_W), lc/h	230	Average Speed (S), mi/h	60.2

Weaving Lane Change Rate (LC_{All}), lc/h	539	Density (D), pc/mi/ln	20.7
Weaving Intensity Factor (W)	0.359	Level of Service (LOS)	C

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Merge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	4	Segment Name	EB Casino On-ramp_EB post-Casino
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	350	900
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	-5.50	-5.50
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2915	276
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.931	0.931
Flow Rate (v_i), pc/h	3403	322
Capacity (c_{md}), pc/h	4700	2000
Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.82	0.17

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	57.2
Flow in Lanes 1 and 2 (v_{12}), pc/h	3403	Outer Lanes Freeway Speed (S_O), mi/h	68.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3725	Ramp Junction Speed (S), mi/h	57.2
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	32.6

Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	28.8

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Merge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	4	Segment Name	WB Casino On-ramp
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	340	400
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2763	122
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.943	0.943
Flow Rate (v_i), pc/h	3185	141
Capacity (c_{md}), pc/h	4700	2000
Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.73	0.07

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	57.7
Flow in Lanes 1 and 2 (v_{12}), pc/h	3185	Outer Lanes Freeway Speed (S_O), mi/h	68.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3326	Ramp Junction Speed (S), mi/h	57.7
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	28.8
Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	28.9

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Diverge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	2	Segment Name	WB Casino Off-ramp
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	160	1000
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	5.50	5.50
Segment Type / Ramp Type	Highway/CD Roadway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2852	89
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.931	0.931
Flow Rate (v_i), pc/h	3330	104
Capacity (c_{md}), pc/h	4400	2000
Initial Adjusted Capacity (c_{mda}), pc/h	4259	-
Final Adjusted Capacity (c_{mda}), pc/h	4259	1936
Volume-to-Capacity Ratio (v/c)	0.78	0.05

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	56.4
Flow in Lanes 1 and 2 (v_{12}), pc/h	3330	Outer Lanes Freeway Speed (S_O), mi/h	74.8
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Ramp Junction Speed (S), mi/h	56.4
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	29.5

Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	23.9

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	5	Segment Name	WB West of Casino Ramps
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	2400	Percent Grade, %	-3.40
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	0.50
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2879	Heavy Vehicle Adjustment Factor (f_{HV})	0.931
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1680
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	30	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	70	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.24	Volume-to-Capacity Ratio (v/c)	0.72

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	65.1
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	25.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	3	Segment Name	EB between Ramps
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	3100	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2915	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1680
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.72

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	65.1
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	25.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	3	Segment Name	WB between Ramps
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	2000	Percent Grade, %	5.50
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	0.20
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2755	Heavy Vehicle Adjustment Factor (f_{HV})	0.907
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1651
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	30	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	70	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.70	Volume-to-Capacity Ratio (v/c)	0.71

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	65.5
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	25.2
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	5	Segment Name	EB post-Casino
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	3780	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	3204	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1846
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.80

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	62.7
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	29.4
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	1	Segment Name	WB East of Casino Ramps
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	2150	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2852	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1644
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.71

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	65.5
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	25.1
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Weaving Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	2	Segment Name	EB Weave Shingle Springs Dr
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	3	Segment Type	Freeway
Segment Length (L_S), ft	300	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Specific Grade	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	3.40	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.50	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000
Proportion of CAVs in Traffic Stream	0	Final Capacity Adjustment Factor (CAF)	0.968

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	2807	108	8	87
Peak Hour Factor (PHF)	0.92	0.92	0.92	0.92
Total Trucks, %	6.00	6.00	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.855	0.943	0.943	0.943
Flow Rate (v_i), pc/h	3569	124	9	100
Weaving Flow Rate (v_W), pc/h	224	Ideal Conditions Capacity (c_{IFL}), pc/h/ln		2382
Non-Weaving Flow Rate (v_{NW}), pc/h	3578	Density-Based Capacity ($c_{IWL} \times N \times f_{HV}$), veh/h		5586
Total Flow Rate (v), pc/h	3802	Demand Flow-Based Capacity ($c_{IW} \times f_{HV}$), veh/h		35000
Volume Ratio (VR)	0.059	Weaving Area Capacity (c_W), veh/h		5586
Minimum Lane Change Rate (LC_{MIN}), lc/h	224	Adjusted Weaving Area Capacity (c_{WA}), veh/h		5407
Maximum Weaving Length (L_{MAX}), ft	3146	Volume-to-Capacity Ratio (v/c)		0.61

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	54	Average Weaving Speed (S_W), mi/h	54.1
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	322	Average Non-Weaving Speed (S_{NW}), mi/h	60.5
Weaving Lane Change Rate (LC_W), lc/h	224	Average Speed (S), mi/h	60.1
Weaving Lane Change Rate (LC_{All}), lc/h	546	Density (D), pc/mi/ln	21.1

Weaving Intensity Factor (W)	0.362	Level of Service (LOS)	C

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Merge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	4	Segment Name	EB Casino On-ramp_EB post-Casino
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	350	900
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	-5.50	-5.50
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2915	289
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.931	0.931
Flow Rate (v_i), pc/h	3403	337
Capacity (c_{md}), pc/h	4700	2000
Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.82	0.17

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	57.1
Flow in Lanes 1 and 2 (v_{12}), pc/h	3403	Outer Lanes Freeway Speed (S_O), mi/h	68.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3740	Ramp Junction Speed (S), mi/h	57.1
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	32.7

Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	28.9

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Merge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	4	Segment Name	WB Casino On-ramp
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	340	400
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2755	124
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.943	0.943
Flow Rate (v_i), pc/h	3176	143
Capacity (c_{md}), pc/h	4700	2000
Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.73	0.07

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	57.7
Flow in Lanes 1 and 2 (v_{12}), pc/h	3176	Outer Lanes Freeway Speed (S_O), mi/h	68.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3319	Ramp Junction Speed (S), mi/h	57.7
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	28.8
Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	28.9

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Diverge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	2	Segment Name	WB Casino Off-ramp
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	160	1000
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	5.50	5.50
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2852	97
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.931	0.931
Flow Rate (v_i), pc/h	3330	113
Capacity (c_{md}), pc/h	4700	2000
Initial Adjusted Capacity (c_{mda}), pc/h	4550	-
Final Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.73	0.06

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	56.4
Flow in Lanes 1 and 2 (v_{12}), pc/h	3330	Outer Lanes Freeway Speed (S_O), mi/h	74.8
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Ramp Junction Speed (S), mi/h	56.4
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	29.5

Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	23.9

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	5	Segment Name	WB West of Casino Ramps
Analysis Period Number	1	Segment Analysis Period	12:00-12:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	2400	Percent Grade, %	-3.40
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	0.50
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2849	Heavy Vehicle Adjustment Factor (f_{HV})	0.931
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1663
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	30	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	70	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.24	Volume-to-Capacity Ratio (v/c)	0.72

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	65.3
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	25.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	3	Segment Name	EB between Ramps
Analysis Period Number	1	Segment Analysis Period	12:00-12:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	3100	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.50
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	68.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2915	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1680
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2382
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2306
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2306
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.73

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	64.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	26.2
Total Ramp Density Adjustment	1.8	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	66.5		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	3	Segment Name	WB between Ramps
Analysis Period Number	1	Segment Analysis Period	12:00-12:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	2000	Percent Grade, %	5.50
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	0.20
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2751	Heavy Vehicle Adjustment Factor (f_{HV})	0.907
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1648
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	30	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	70	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.70	Volume-to-Capacity Ratio (v/c)	0.71

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	65.5
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	25.2
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	5	Segment Name	EB post-Casino
Analysis Period Number	1	Segment Analysis Period	12:00-12:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	3780	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	3303	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1904
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.82

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	61.6
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	30.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	1	Segment Name	WB East of Casino Ramps
Analysis Period Number	1	Segment Analysis Period	12:00-12:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	2150	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2852	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1644
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.71

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	65.5
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	25.1
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Weaving Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	2	Segment Name	EB Weave Shingle Springs Dr
Analysis Period Number	1	Segment Analysis Period	12:00-12:15

Geometric Data

Number of Lanes (N), ln	3	Segment Type	Freeway
Segment Length (L_S), ft	300	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Specific Grade	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	3.40	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.50	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000
Proportion of CAVs in Traffic Stream	0	Final Capacity Adjustment Factor (CAF)	0.968

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	2807	108	8	87
Peak Hour Factor (PHF)	0.92	0.92	0.92	0.92
Total Trucks, %	6.00	6.00	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.870	0.943	0.943	0.893
Flow Rate (v_i), pc/h	3507	124	9	106
Weaving Flow Rate (v_W), pc/h	230	Ideal Conditions Capacity (c_{IFL}), pc/h/ln		2382
Non-Weaving Flow Rate (v_{NW}), pc/h	3516	Density-Based Capacity (c_{IWL} × N × f_{HV}), veh/h		5667
Total Flow Rate (v), pc/h	3746	Demand Flow-Based Capacity (c_{IW} × f_{HV}), veh/h		34358
Volume Ratio (VR)	0.061	Weaving Area Capacity (c_W), veh/h		5667
Minimum Lane Change Rate (LC_{MIN}), lc/h	230	Adjusted Weaving Area Capacity (c_{WA}), veh/h		5486
Maximum Weaving Length (L_{MAX}), ft	3165	Volume-to-Capacity Ratio (v/c)		0.60

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	53	Average Weaving Speed (S_W), mi/h	54.1
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	309	Average Non-Weaving Speed (S_{NW}), mi/h	60.6
Weaving Lane Change Rate (LC_W), lc/h	230	Average Speed (S), mi/h	60.2

Weaving Lane Change Rate (LC_{All}), lc/h	539	Density (D), pc/mi/ln	20.7
Weaving Intensity Factor (W)	0.359	Level of Service (LOS)	C

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Merge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	4	Segment Name	EB Casino On-ramp_EB post-Casino
Analysis Period Number	1	Segment Analysis Period	12:00-12:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	350	900
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	-5.50	-5.50
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2915	388
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.931	0.931
Flow Rate (v_i), pc/h	3403	453
Capacity (c_{md}), pc/h	4700	2000
Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.85	0.23

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	56.6
Flow in Lanes 1 and 2 (v_{12}), pc/h	3403	Outer Lanes Freeway Speed (S_O), mi/h	68.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3856	Ramp Junction Speed (S), mi/h	56.6
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	34.1

Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	29.8

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Merge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	4	Segment Name	WB Casino On-ramp
Analysis Period Number	1	Segment Analysis Period	12:00-12:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	340	400
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2751	98
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.943	0.943
Flow Rate (v_i), pc/h	3171	113
Capacity (c_{md}), pc/h	4700	2000
Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.72	0.06

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	57.8
Flow in Lanes 1 and 2 (v_{12}), pc/h	3171	Outer Lanes Freeway Speed (S_O), mi/h	68.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3284	Ramp Junction Speed (S), mi/h	57.8
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	28.4
Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	28.6

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Diverge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	2	Segment Name	WB Casino Off-ramp
Analysis Period Number	1	Segment Analysis Period	12:00-12:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	160	1000
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	5.50	5.50
Segment Type / Ramp Type	Highway/CD Roadway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2852	101
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.931	0.931
Flow Rate (v_i), pc/h	3330	118
Capacity (c_{md}), pc/h	4400	2000
Initial Adjusted Capacity (c_{mda}), pc/h	4259	-
Final Adjusted Capacity (c_{mda}), pc/h	4259	1936
Volume-to-Capacity Ratio (v/c)	0.78	0.06

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	56.4
Flow in Lanes 1 and 2 (v_{12}), pc/h	3330	Outer Lanes Freeway Speed (S_O), mi/h	74.8
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Ramp Junction Speed (S), mi/h	56.4
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	29.5

Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	23.9

Copyright © 2024 University of Florida. All Rights Reserved.

Appendix E

Analysis Worksheets for
Cumulative (2043) plus Proposed Project Conditions

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	11	125	372	76
v/c Ratio	0.03	0.11	0.35	0.15
Control Delay	11.2	5.3	4.1	8.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	11.2	5.3	4.1	8.5
Queue Length 50th (ft)	1	4	4	4
Queue Length 95th (ft)	11	12	30	32
Internal Link Dist (ft)		628	1141	286
Turn Bay Length (ft)	300			
Base Capacity (vph)	375	3353	2487	1377
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.03	0.04	0.15	0.06

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	115	110	232	60	10
Future Volume (veh/h)	10	115	110	232	60	10
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	11	125	120	252	65	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	26	1647	491	438	283	48
Arrive On Green	0.01	0.46	0.28	0.28	0.19	0.19
Sat Flow, veh/h	1781	3647	1870	1585	1478	250
Grp Volume(v), veh/h	11	125	120	252	77	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1777	1585	1751	0
Q Serve(g_s), s	0.2	0.5	1.4	3.6	1.0	0.0
Cycle Q Clear(g_c), s	0.2	0.5	1.4	3.6	1.0	0.0
Prop In Lane	1.00			1.00	0.84	0.14
Lane Grp Cap(c), veh/h	26	1647	491	438	336	0
V/C Ratio(X)	0.42	0.08	0.24	0.58	0.23	0.00
Avail Cap(c_a), veh/h	341	3746	1226	1094	1242	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	12.7	3.9	7.3	8.1	8.9	0.0
Incr Delay (d2), s/veh	10.4	0.0	0.3	1.2	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.1	0.3	0.9	0.3	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	23.1	3.9	7.6	9.3	9.3	0.0
LnGrp LOS	C	A	A	A	A	A
Approach Vol, veh/h		136	372		77	
Approach Delay, s/veh		5.5	8.8		9.3	
Approach LOS		A	A		A	

Timer - Assigned Phs	4	6	7	8
Phs Duration (G+Y+Rc), s	16.6	9.5	4.9	11.7
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	27.5	18.5	5.0	18.0
Max Q Clear Time (g_c+I1), s	2.5	3.0	2.2	5.6
Green Ext Time (p_c), s	0.7	0.1	0.0	1.8

Intersection Summary	
HCM 6th Ctrl Delay	8.1
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

Intersection	
Int Delay, s/veh	1.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	220	21	8	120	33	25
Future Vol, veh/h	220	21	8	120	33	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	239	23	9	130	36	27

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	262	0	399	251
Stage 1	-	-	-	-	251	-
Stage 2	-	-	-	-	148	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1302	-	607	788
Stage 1	-	-	-	-	791	-
Stage 2	-	-	-	-	880	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1302	-	603	788
Mov Cap-2 Maneuver	-	-	-	-	603	-
Stage 1	-	-	-	-	791	-
Stage 2	-	-	-	-	874	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	10.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	671	-	-	1302	-
HCM Lane V/C Ratio	0.094	-	-	0.007	-
HCM Control Delay (s)	10.9	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-

Intersection	
Int Delay, s/veh	5.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	99	64	150	120	131	360
Future Vol, veh/h	99	64	150	120	131	360
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	245	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	108	70	163	130	142	391

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	903	228	0	0	293	0
Stage 1	228	-	-	-	-	-
Stage 2	675	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	308	811	-	-	1269	-
Stage 1	810	-	-	-	-	-
Stage 2	506	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	274	811	-	-	1269	-
Mov Cap-2 Maneuver	274	-	-	-	-	-
Stage 1	810	-	-	-	-	-
Stage 2	449	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	23.4	0	2.2
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	370	1269	-
HCM Lane V/C Ratio	-	-	0.479	0.112	-
HCM Control Delay (s)	-	-	23.4	8.2	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	2.5	0.4	-

Intersection	
Int Delay, s/veh	3.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	151	134	50	77	71	70
Future Vol, veh/h	151	134	50	77	71	70
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	164	146	54	84	77	76

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	310	0	429	237
Stage 1	-	-	-	-	237	-
Stage 2	-	-	-	-	192	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1250	-	583	802
Stage 1	-	-	-	-	802	-
Stage 2	-	-	-	-	841	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1250	-	557	802
Mov Cap-2 Maneuver	-	-	-	-	557	-
Stage 1	-	-	-	-	802	-
Stage 2	-	-	-	-	803	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.2	12.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	657	-	-	1250	-
HCM Lane V/C Ratio	0.233	-	-	0.043	-
HCM Control Delay (s)	12.1	-	-	8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.9	-	-	0.1	-

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	88	272	294	60	30	73
Future Vol, veh/h	88	272	294	60	30	73
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	96	296	320	65	33	79

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	385	0	-	0	841	353
Stage 1	-	-	-	-	353	-
Stage 2	-	-	-	-	488	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1173	-	-	-	335	691
Stage 1	-	-	-	-	711	-
Stage 2	-	-	-	-	617	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1173	-	-	-	302	691
Mov Cap-2 Maneuver	-	-	-	-	302	-
Stage 1	-	-	-	-	641	-
Stage 2	-	-	-	-	617	-

Approach	EB	WB	SB
HCM Control Delay, s	2	0	14.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1173	-	-	-	502
HCM Lane V/C Ratio	0.082	-	-	-	0.223
HCM Control Delay (s)	8.3	0	-	-	14.2
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.3	-	-	-	0.8

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	11	340	22	329	165	109
v/c Ratio	0.06	0.51	0.11	0.45	0.44	0.34
Control Delay	32.7	20.6	32.3	17.6	25.3	27.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.7	20.6	32.3	17.6	25.3	27.5
Queue Length 50th (ft)	3	71	6	69	38	25
Queue Length 95th (ft)	22	240	34	228	127	101
Internal Link Dist (ft)		403		299	115	124
Turn Bay Length (ft)	290		285			
Base Capacity (vph)	217	1556	253	1582	1073	715
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.22	0.09	0.21	0.15	0.15

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	248	64	20	263	40	101	30	20	60	30	10
Future Volume (veh/h)	10	248	64	20	263	40	101	30	20	60	30	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	11	270	70	22	286	43	110	33	22	65	33	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	21	394	102	39	454	68	152	46	30	101	51	17
Arrive On Green	0.01	0.28	0.28	0.02	0.29	0.29	0.13	0.13	0.13	0.10	0.10	0.10
Sat Flow, veh/h	1781	1432	371	1781	1589	239	1179	354	236	1064	540	180
Grp Volume(v), veh/h	11	0	340	22	0	329	165	0	0	109	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1804	1781	0	1827	1769	0	0	1785	0	0
Q Serve(g_s), s	0.2	0.0	5.6	0.4	0.0	5.2	3.0	0.0	0.0	2.0	0.0	0.0
Cycle Q Clear(g_c), s	0.2	0.0	5.6	0.4	0.0	5.2	3.0	0.0	0.0	2.0	0.0	0.0
Prop In Lane	1.00		0.21	1.00		0.13	0.67		0.13	0.60		0.10
Lane Grp Cap(c), veh/h	21	0	496	39	0	522	228	0	0	170	0	0
V/C Ratio(X)	0.53	0.00	0.68	0.56	0.00	0.63	0.72	0.00	0.00	0.64	0.00	0.00
Avail Cap(c_a), veh/h	320	0	2644	373	0	2733	1561	0	0	1041	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	16.4	0.0	10.8	16.2	0.0	10.4	14.0	0.0	0.0	14.6	0.0	0.0
Incr Delay (d2), s/veh	14.8	0.0	1.3	8.9	0.0	0.9	1.6	0.0	0.0	4.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	1.5	0.2	0.0	1.4	0.9	0.0	0.0	0.7	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	31.2	0.0	12.1	25.1	0.0	11.3	15.6	0.0	0.0	18.6	0.0	0.0
LnGrp LOS	C	A	B	C	A	B	B	A	A	B	A	A
Approach Vol, veh/h		351			351			165			109	
Approach Delay, s/veh		12.7			12.2			15.6			18.6	
Approach LOS		B			B			B			B	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	4.4	14.6		7.8	4.7	14.2		6.7
Change Period (Y+Rc), s	4.0	5.0		3.5	4.0	5.0		3.5
Max Green Setting (Gmax), s	6.0	50.0		29.5	7.0	49.0		19.5
Max Q Clear Time (g_c+I1), s	2.2	7.2		5.0	2.4	7.6		4.0
Green Ext Time (p_c), s	0.0	1.5		0.5	0.0	1.6		0.4

Intersection Summary	
HCM 6th Ctrl Delay	13.7
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	183	43	33	121	298	245
v/c Ratio	0.39	0.10	0.18	0.13	0.39	0.31
Control Delay	18.0	7.6	25.1	7.0	13.4	3.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.0	7.6	25.1	7.0	13.4	3.5
Queue Length 50th (ft)	28	1	6	15	40	0
Queue Length 95th (ft)	107	21	35	40	143	39
Internal Link Dist (ft)	437			333	416	
Turn Bay Length (ft)		60	230			225
Base Capacity (vph)	1357	1223	476	1852	1691	1459
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.04	0.07	0.07	0.18	0.17

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	168	40	30	111	274	225
Future Volume (veh/h)	168	40	30	111	274	225
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	183	43	33	121	298	245
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	327	291	42	934	594	503
Arrive On Green	0.18	0.18	0.02	0.50	0.32	0.32
Sat Flow, veh/h	1781	1585	1781	1870	1870	1585
Grp Volume(v), veh/h	183	43	33	121	298	245
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1870	1870	1585
Q Serve(g_s), s	3.1	0.8	0.6	1.2	4.3	4.2
Cycle Q Clear(g_c), s	3.1	0.8	0.6	1.2	4.3	4.2
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	327	291	42	934	594	503
V/C Ratio(X)	0.56	0.15	0.78	0.13	0.50	0.49
Avail Cap(c_a), veh/h	1794	1597	623	3444	2494	2113
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	12.4	11.5	16.2	4.5	9.3	9.2
Incr Delay (d2), s/veh	2.4	0.4	11.0	0.1	1.0	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	0.8	0.3	0.2	1.0	0.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	14.8	11.8	27.3	4.6	10.3	10.4
LnGrp LOS	B	B	C	A	B	B
Approach Vol, veh/h	226			154	543	
Approach Delay, s/veh	14.2			9.4	10.3	
Approach LOS	B			A	B	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		22.0		11.4	6.1	15.9
Change Period (Y+Rc), s		5.3		5.3	5.3	5.3
Max Green Setting (Gmax), s		61.6		33.7	11.7	44.6
Max Q Clear Time (g_c+I1), s		3.2		5.1	2.6	6.3
Green Ext Time (p_c), s		1.1		1.2	0.0	4.3

Intersection Summary	
HCM 6th Ctrl Delay	11.1
HCM 6th LOS	B

Intersection	
Int Delay, s/veh	3.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	157	150	64	191	70	41
Future Vol, veh/h	157	150	64	191	70	41
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	171	163	70	208	76	45

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	334	0	601	253
Stage 1	-	-	-	-	253	-
Stage 2	-	-	-	-	348	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1225	-	463	786
Stage 1	-	-	-	-	789	-
Stage 2	-	-	-	-	715	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1225	-	433	786
Mov Cap-2 Maneuver	-	-	-	-	433	-
Stage 1	-	-	-	-	789	-
Stage 2	-	-	-	-	669	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2	14
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	519	-	-	1225	-
HCM Lane V/C Ratio	0.232	-	-	0.057	-
HCM Control Delay (s)	14	-	-	8.1	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.9	-	-	0.2	-

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	30	257	311	20	30	40
Future Vol, veh/h	30	257	311	20	30	40
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	33	279	338	22	33	43

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	360	0	-	0	694	349
Stage 1	-	-	-	-	349	-
Stage 2	-	-	-	-	345	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1199	-	-	-	409	694
Stage 1	-	-	-	-	714	-
Stage 2	-	-	-	-	717	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1199	-	-	-	396	694
Mov Cap-2 Maneuver	-	-	-	-	396	-
Stage 1	-	-	-	-	690	-
Stage 2	-	-	-	-	717	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	13
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1199	-	-	-	525
HCM Lane V/C Ratio	0.027	-	-	-	0.145
HCM Control Delay (s)	8.1	0	-	-	13
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.5

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	22	536	154	324	217	200	43	98
v/c Ratio	0.21	0.85	0.65	0.36	0.71	0.34	0.34	0.43
Control Delay	50.4	38.4	53.4	16.8	49.7	10.0	51.7	36.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.4	38.4	53.4	16.8	49.7	10.0	51.7	36.9
Queue Length 50th (ft)	11	236	77	86	108	18	22	40
Queue Length 95th (ft)	43	#504	#215	235	#262	78	69	96
Internal Link Dist (ft)		484		464		352		157
Turn Bay Length (ft)	265		150		90		50	
Base Capacity (vph)	127	927	288	1134	419	837	161	535
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.58	0.53	0.29	0.52	0.24	0.27	0.18

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	263	230	142	278	20	200	40	144	40	60	30
Future Volume (veh/h)	20	263	230	142	278	20	200	40	144	40	60	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	22	286	250	154	302	22	217	43	157	43	65	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	27	328	287	195	775	56	266	74	271	52	106	54
Arrive On Green	0.02	0.36	0.36	0.11	0.45	0.45	0.15	0.21	0.21	0.03	0.09	0.09
Sat Flow, veh/h	1781	921	805	1781	1722	125	1781	352	1286	1781	1170	594
Grp Volume(v), veh/h	22	0	536	154	0	324	217	0	200	43	0	98
Grp Sat Flow(s),veh/h/ln	1781	0	1725	1781	0	1848	1781	0	1639	1781	0	1763
Q Serve(g_s), s	0.7	0.0	17.3	5.0	0.0	7.0	7.1	0.0	6.6	1.4	0.0	3.2
Cycle Q Clear(g_c), s	0.7	0.0	17.3	5.0	0.0	7.0	7.1	0.0	6.6	1.4	0.0	3.2
Prop In Lane	1.00		0.47	1.00		0.07	1.00		0.79	1.00		0.34
Lane Grp Cap(c), veh/h	27	0	614	195	0	832	266	0	345	52	0	160
V/C Ratio(X)	0.80	0.00	0.87	0.79	0.00	0.39	0.82	0.00	0.58	0.82	0.00	0.61
Avail Cap(c_a), veh/h	167	0	1178	378	0	1480	551	0	979	212	0	678
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	29.3	0.0	18.0	26.0	0.0	11.0	24.6	0.0	21.2	28.9	0.0	26.2
Incr Delay (d2), s/veh	18.0	0.0	1.6	2.7	0.0	0.1	2.3	0.0	0.6	11.2	0.0	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	5.6	2.0	0.0	2.1	2.9	0.0	2.3	0.7	0.0	1.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	47.3	0.0	19.5	28.7	0.0	11.1	27.0	0.0	21.8	40.0	0.0	27.6
LnGrp LOS	D	A	B	C	A	B	C	A	C	D	A	C
Approach Vol, veh/h		558			478			417			141	
Approach Delay, s/veh		20.6			16.7			24.5			31.4	
Approach LOS		C			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.0	26.6	12.4	10.7	4.4	32.2	5.3	17.9
Change Period (Y+Rc), s	3.5	5.3	3.5	5.3	3.5	5.3	3.5	* 5.3
Max Green Setting (Gmax), s	12.7	40.8	18.5	23.0	5.6	47.9	7.1	* 36
Max Q Clear Time (g_c+I1), s	7.0	19.3	9.1	5.2	2.7	9.0	3.4	8.6
Green Ext Time (p_c), s	0.1	1.9	0.1	0.2	0.0	1.0	0.0	0.8

Intersection Summary	
HCM 6th Ctrl Delay	21.4
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	11	438	1505	256
v/c Ratio	0.05	0.25	0.93	0.53
Control Delay	19.6	6.7	26.2	16.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	19.6	6.7	26.2	16.9
Queue Length 50th (ft)	2	24	126	43
Queue Length 95th (ft)	15	59	#458	117
Internal Link Dist (ft)		628	1141	286
Turn Bay Length (ft)	300			
Base Capacity (vph)	226	2493	1618	839
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.05	0.18	0.93	0.31

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	403	1215	169	225	10
Future Volume (veh/h)	10	403	1215	169	225	10
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	11	438	1321	184	245	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	26	2045	1408	195	338	15
Arrive On Green	0.01	0.58	0.45	0.45	0.20	0.20
Sat Flow, veh/h	1781	3647	3229	434	1689	76
Grp Volume(v), veh/h	11	438	745	760	257	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1777	1792	1772	0
Q Serve(g_s), s	0.2	2.4	15.9	16.3	5.4	0.0
Cycle Q Clear(g_c), s	0.2	2.4	15.9	16.3	5.4	0.0
Prop In Lane	1.00			0.24	0.95	0.04
Lane Grp Cap(c), veh/h	26	2045	798	805	354	0
V/C Ratio(X)	0.43	0.21	0.93	0.95	0.73	0.00
Avail Cap(c_a), veh/h	222	2437	798	805	818	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	19.6	4.1	10.5	10.6	15.0	0.0
Incr Delay (d2), s/veh	11.0	0.1	17.8	19.6	2.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.5	8.1	8.7	2.2	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	30.6	4.2	28.2	30.2	17.8	0.0
LnGrp LOS	C	A	C	C	B	A
Approach Vol, veh/h		449	1505		257	
Approach Delay, s/veh		4.8	29.2		17.8	
Approach LOS		A	C		B	

Timer - Assigned Phs			4		6	7	8
Phs Duration (G+Y+Rc), s			27.6		12.5	5.1	22.5
Change Period (Y+Rc), s			4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s			27.5		18.5	5.0	18.0
Max Q Clear Time (g_c+I1), s			4.4		7.4	2.2	18.3
Green Ext Time (p_c), s			2.9		0.6	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	22.9
HCM 6th LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

Intersection	
Int Delay, s/veh	1.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	180	44	35	190	20	25
Future Vol, veh/h	180	44	35	190	20	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	196	48	38	207	22	27

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	244	0	503	220
Stage 1	-	-	-	-	220	-
Stage 2	-	-	-	-	283	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1322	-	528	820
Stage 1	-	-	-	-	817	-
Stage 2	-	-	-	-	765	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1322	-	511	820
Mov Cap-2 Maneuver	-	-	-	-	511	-
Stage 1	-	-	-	-	817	-
Stage 2	-	-	-	-	741	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.2	11
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	646	-	-	1322	-
HCM Lane V/C Ratio	0.076	-	-	0.029	-
HCM Control Delay (s)	11	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-

Intersection	
Int Delay, s/veh	7.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	98	123	390	109	104	220
Future Vol, veh/h	98	123	390	109	104	220
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	245	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	107	134	424	118	113	239

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	948	483	0	0	542	0
Stage 1	483	-	-	-	-	-
Stage 2	465	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	289	584	-	-	1027	-
Stage 1	620	-	-	-	-	-
Stage 2	632	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	257	584	-	-	1027	-
Mov Cap-2 Maneuver	257	-	-	-	-	-
Stage 1	620	-	-	-	-	-
Stage 2	562	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	30.5	0	2.9
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	373	1027	-
HCM Lane V/C Ratio	-	-	0.644	0.11	-
HCM Control Delay (s)	-	-	30.5	8.9	-
HCM Lane LOS	-	-	D	A	-
HCM 95th %tile Q(veh)	-	-	4.3	0.4	-

Intersection	
Int Delay, s/veh	4.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	123	93	50	171	104	70
Future Vol, veh/h	123	93	50	171	104	70
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	134	101	54	186	113	76

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	235	0	479	185
Stage 1	-	-	-	-	185	-
Stage 2	-	-	-	-	294	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1332	-	545	857
Stage 1	-	-	-	-	847	-
Stage 2	-	-	-	-	756	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1332	-	520	857
Mov Cap-2 Maneuver	-	-	-	-	520	-
Stage 1	-	-	-	-	847	-
Stage 2	-	-	-	-	722	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.8	13.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	618	-	-	1332	-
HCM Lane V/C Ratio	0.306	-	-	0.041	-
HCM Control Delay (s)	13.4	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	1.3	-	-	0.1	-

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	55	168	273	10	30	78
Future Vol, veh/h	55	168	273	10	30	78
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	60	183	297	11	33	85

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	308	0	-	0	606	303
Stage 1	-	-	-	-	303	-
Stage 2	-	-	-	-	303	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1253	-	-	-	460	737
Stage 1	-	-	-	-	749	-
Stage 2	-	-	-	-	749	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1253	-	-	-	436	737
Mov Cap-2 Maneuver	-	-	-	-	436	-
Stage 1	-	-	-	-	709	-
Stage 2	-	-	-	-	749	-

Approach	EB	WB	SB
HCM Control Delay, s	2	0	12.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1253	-	-	-	618
HCM Lane V/C Ratio	0.048	-	-	-	0.19
HCM Control Delay (s)	8	0	-	-	12.2
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.7

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	11	237	43	410	189	131
v/c Ratio	0.06	0.39	0.20	0.56	0.50	0.39
Control Delay	34.7	20.9	34.3	18.9	26.9	28.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.7	20.9	34.3	18.9	26.9	28.8
Queue Length 50th (ft)	3	66	13	90	52	37
Queue Length 95th (ft)	24	168	59	296	154	124
Internal Link Dist (ft)		403		299	115	124
Turn Bay Length (ft)	290		285			
Base Capacity (vph)	212	1524	248	1502	1047	695
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.16	0.17	0.27	0.18	0.19

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	185	33	40	258	120	54	70	50	70	30	20
Future Volume (veh/h)	10	185	33	40	258	120	54	70	50	70	30	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	11	201	36	43	280	130	59	76	54	76	33	22
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	21	442	79	69	379	176	81	104	74	105	46	30
Arrive On Green	0.01	0.29	0.29	0.04	0.31	0.31	0.15	0.15	0.15	0.10	0.10	0.10
Sat Flow, veh/h	1781	1544	277	1781	1208	561	547	705	501	1024	445	297
Grp Volume(v), veh/h	11	0	237	43	0	410	189	0	0	131	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1821	1781	0	1769	1753	0	0	1766	0	0
Q Serve(g_s), s	0.2	0.0	4.0	0.9	0.0	7.8	3.9	0.0	0.0	2.7	0.0	0.0
Cycle Q Clear(g_c), s	0.2	0.0	4.0	0.9	0.0	7.8	3.9	0.0	0.0	2.7	0.0	0.0
Prop In Lane	1.00		0.15	1.00		0.32	0.31		0.29	0.58		0.17
Lane Grp Cap(c), veh/h	21	0	521	69	0	554	259	0	0	181	0	0
V/C Ratio(X)	0.53	0.00	0.45	0.63	0.00	0.74	0.73	0.00	0.00	0.72	0.00	0.00
Avail Cap(c_a), veh/h	284	0	2368	331	0	2349	1373	0	0	914	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	18.5	0.0	11.0	17.8	0.0	11.6	15.3	0.0	0.0	16.4	0.0	0.0
Incr Delay (d2), s/veh	15.1	0.0	0.5	6.8	0.0	1.5	1.5	0.0	0.0	5.4	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	1.1	0.4	0.0	2.2	1.2	0.0	0.0	1.1	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	33.6	0.0	11.5	24.7	0.0	13.0	16.8	0.0	0.0	21.8	0.0	0.0
LnGrp LOS	C	A	B	C	A	B	B	A	A	C	A	A
Approach Vol, veh/h		248			453			189			131	
Approach Delay, s/veh		12.5			14.1			16.8			21.8	
Approach LOS		B			B			B			C	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	4.4	16.8		9.1	5.4	15.8		7.4
Change Period (Y+Rc), s	4.0	5.0		3.5	4.0	5.0		3.5
Max Green Setting (Gmax), s	6.0	50.0		29.5	7.0	49.0		19.5
Max Q Clear Time (g_c+I1), s	2.2	9.8		5.9	2.9	6.0		4.7
Green Ext Time (p_c), s	0.0	2.0		0.6	0.0	1.0		0.5

Intersection Summary		
HCM 6th Ctrl Delay		15.2
HCM 6th LOS		B

Notes

User approved pedestrian interval to be less than phase max green.

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	255	33	43	341	188	179
v/c Ratio	0.47	0.07	0.22	0.42	0.28	0.26
Control Delay	17.4	9.2	25.1	10.4	14.2	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.4	9.2	25.1	10.4	14.2	4.2
Queue Length 50th (ft)	39	1	8	52	26	0
Queue Length 95th (ft)	146	21	43	121	100	36
Internal Link Dist (ft)	437			333	416	
Turn Bay Length (ft)		60	230			225
Base Capacity (vph)	1424	1278	496	1836	1699	1460
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.18	0.03	0.09	0.19	0.11	0.12

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	235	30	40	314	173	165
Future Volume (veh/h)	235	30	40	314	173	165
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	255	33	43	341	188	179
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	399	355	53	826	457	388
Arrive On Green	0.22	0.22	0.03	0.44	0.24	0.24
Sat Flow, veh/h	1781	1585	1781	1870	1870	1585
Grp Volume(v), veh/h	255	33	43	341	188	179
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1870	1870	1585
Q Serve(g_s), s	4.1	0.5	0.8	3.9	2.7	3.0
Cycle Q Clear(g_c), s	4.1	0.5	0.8	3.9	2.7	3.0
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	399	355	53	826	457	388
V/C Ratio(X)	0.64	0.09	0.81	0.41	0.41	0.46
Avail Cap(c_a), veh/h	1894	1685	658	3635	2632	2231
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.1	9.7	15.3	6.0	10.1	10.2
Incr Delay (d2), s/veh	2.7	0.2	10.3	0.5	0.9	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	0.5	0.4	0.8	0.7	0.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	13.8	9.9	25.6	6.6	11.0	11.6
LnGrp LOS	B	A	C	A	B	B
Approach Vol, veh/h	288			384	367	
Approach Delay, s/veh	13.4			8.7	11.3	
Approach LOS	B			A	B	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		19.3		12.4	6.2	13.1
Change Period (Y+Rc), s		5.3		5.3	5.3	5.3
Max Green Setting (Gmax), s		61.6		33.7	11.7	44.6
Max Q Clear Time (g_c+I1), s		5.9		6.1	2.8	5.0
Green Ext Time (p_c), s		3.5		1.6	0.0	2.7

Intersection Summary	
HCM 6th Ctrl Delay	10.9
HCM 6th LOS	B

Intersection	
Int Delay, s/veh	1.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	241	30	23	193	30	34
Future Vol, veh/h	241	30	23	193	30	34
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	262	33	25	210	33	37

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	295	0	539	279
Stage 1	-	-	-	-	279	-
Stage 2	-	-	-	-	260	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1266	-	503	760
Stage 1	-	-	-	-	768	-
Stage 2	-	-	-	-	783	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1266	-	492	760
Mov Cap-2 Maneuver	-	-	-	-	492	-
Stage 1	-	-	-	-	768	-
Stage 2	-	-	-	-	766	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.8	11.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	605	-	-	1266	-
HCM Lane V/C Ratio	0.115	-	-	0.02	-
HCM Control Delay (s)	11.7	-	-	7.9	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.4	-	-	0.1	-

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	30	261	193	40	30	30
Future Vol, veh/h	30	261	193	40	30	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	33	284	210	43	33	33

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	253	0	-	0	582	232
Stage 1	-	-	-	-	232	-
Stage 2	-	-	-	-	350	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1312	-	-	-	475	807
Stage 1	-	-	-	-	807	-
Stage 2	-	-	-	-	713	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1312	-	-	-	461	807
Mov Cap-2 Maneuver	-	-	-	-	461	-
Stage 1	-	-	-	-	783	-
Stage 2	-	-	-	-	713	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	11.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1312	-	-	-	587
HCM Lane V/C Ratio	0.025	-	-	-	0.111
HCM Control Delay (s)	7.8	0	-	-	11.9
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.4

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	33	629	161	256	359	199	11	76
v/c Ratio	0.35	0.90	0.86	0.29	0.87	0.30	0.18	0.40
Control Delay	57.4	46.3	83.8	19.4	60.6	13.8	56.9	39.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.4	46.3	83.8	19.4	60.6	13.8	56.9	39.4
Queue Length 50th (ft)	20	336	99	97	213	47	7	36
Queue Length 95th (ft)	56	#688	#254	199	#453	108	28	78
Internal Link Dist (ft)		484		464		352		157
Turn Bay Length (ft)	265		150		90		50	
Base Capacity (vph)	112	696	187	869	411	795	60	424
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.90	0.86	0.29	0.87	0.25	0.18	0.18

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	318	260	148	215	20	330	70	113	10	50	20
Future Volume (veh/h)	30	318	260	148	215	20	330	70	113	10	50	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	33	346	283	161	234	22	359	76	123	11	54	22
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	40	372	304	196	804	76	396	181	293	14	85	35
Arrive On Green	0.02	0.39	0.39	0.11	0.48	0.48	0.22	0.28	0.28	0.01	0.07	0.07
Sat Flow, veh/h	1781	952	778	1781	1684	158	1781	643	1040	1781	1263	515
Grp Volume(v), veh/h	33	0	629	161	0	256	359	0	199	11	0	76
Grp Sat Flow(s),veh/h/ln	1781	0	1730	1781	0	1842	1781	0	1683	1781	0	1778
Q Serve(g_s), s	1.5	0.0	29.2	7.4	0.0	7.1	16.4	0.0	8.1	0.5	0.0	3.5
Cycle Q Clear(g_c), s	1.5	0.0	29.2	7.4	0.0	7.1	16.4	0.0	8.1	0.5	0.0	3.5
Prop In Lane	1.00		0.45	1.00		0.09	1.00		0.62	1.00		0.29
Lane Grp Cap(c), veh/h	40	0	676	196	0	880	396	0	474	14	0	120
V/C Ratio(X)	0.82	0.00	0.93	0.82	0.00	0.29	0.91	0.00	0.42	0.76	0.00	0.63
Avail Cap(c_a), veh/h	134	0	793	223	0	937	491	0	884	72	0	488
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	40.8	0.0	24.4	36.5	0.0	13.3	31.7	0.0	24.5	41.5	0.0	38.1
Incr Delay (d2), s/veh	13.6	0.0	15.0	17.1	0.0	0.1	16.2	0.0	0.2	25.9	0.0	2.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	0.0	13.1	3.9	0.0	2.5	8.5	0.0	3.1	0.3	0.0	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.3	0.0	39.5	53.6	0.0	13.3	47.9	0.0	24.7	67.4	0.0	40.1
LnGrp LOS	D	A	D	D	A	B	D	A	C	E	A	D
Approach Vol, veh/h		662			417			558			87	
Approach Delay, s/veh		40.2			28.9			39.6			43.6	
Approach LOS		D			C			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.7	38.0	22.1	10.9	5.4	45.3	4.2	28.9
Change Period (Y+Rc), s	3.5	5.3	3.5	5.3	3.5	5.3	3.5	* 5.3
Max Green Setting (Gmax), s	10.5	38.4	23.1	23.0	6.3	42.6	3.4	* 44
Max Q Clear Time (g_c+I1), s	9.4	31.2	18.4	5.5	3.5	9.1	2.5	10.1
Green Ext Time (p_c), s	0.0	1.5	0.2	0.2	0.0	0.8	0.0	0.8

Intersection Summary	
HCM 6th Ctrl Delay	37.5
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	11	471	1634	245
v/c Ratio	0.05	0.27	1.00	0.52
Control Delay	19.3	6.6	38.7	16.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	19.3	6.6	38.7	16.5
Queue Length 50th (ft)	2	25	143	40
Queue Length 95th (ft)	15	62	#501	110
Internal Link Dist (ft)		628	1141	286
Turn Bay Length (ft)	300			
Base Capacity (vph)	229	2519	1633	847
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.05	0.19	1.00	0.29

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	433	1305	199	205	20
Future Volume (veh/h)	10	433	1305	199	205	20
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	11	471	1418	216	223	22
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	26	2059	1400	211	311	31
Arrive On Green	0.01	0.58	0.45	0.45	0.19	0.19
Sat Flow, veh/h	1781	3647	3191	466	1597	158
Grp Volume(v), veh/h	11	471	806	828	246	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1777	1786	1762	0
Q Serve(g_s), s	0.2	2.6	18.0	18.0	5.2	0.0
Cycle Q Clear(g_c), s	0.2	2.6	18.0	18.0	5.2	0.0
Prop In Lane	1.00			0.26	0.91	0.09
Lane Grp Cap(c), veh/h	26	2059	803	807	343	0
V/C Ratio(X)	0.43	0.23	1.00	1.03	0.72	0.00
Avail Cap(c_a), veh/h	224	2453	803	807	818	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	19.5	4.1	10.9	10.9	15.0	0.0
Incr Delay (d2), s/veh	11.0	0.1	32.8	38.3	2.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.5	12.0	13.3	2.1	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	30.4	4.1	43.7	49.2	17.8	0.0
LnGrp LOS	C	A	F	F	B	A
Approach Vol, veh/h		482	1634		246	
Approach Delay, s/veh		4.7	46.5		17.8	
Approach LOS		A	D		B	

Timer - Assigned Phs		4		6	7	8
Phs Duration (G+Y+Rc), s		27.6		12.3	5.1	22.5
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		27.5		18.5	5.0	18.0
Max Q Clear Time (g_c+I1), s		4.6		7.2	2.2	20.0
Green Ext Time (p_c), s		3.2		0.6	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	35.0
HCM 6th LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	22	484	1672	138
v/c Ratio	0.09	0.26	0.96	0.35
Control Delay	17.8	5.3	28.7	15.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	17.8	5.3	28.7	15.0
Queue Length 50th (ft)	4	22	124	20
Queue Length 95th (ft)	22	49	#454	66
Internal Link Dist (ft)		628	1141	286
Turn Bay Length (ft)	300			
Base Capacity (vph)	243	2677	1735	900
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.09	0.18	0.96	0.15

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	20	445	1365	173	117	10
Future Volume (veh/h)	20	445	1365	173	117	10
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	22	484	1484	188	127	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	49	2224	1521	191	217	19
Arrive On Green	0.03	0.63	0.48	0.48	0.13	0.13
Sat Flow, veh/h	1781	3647	3271	398	1612	140
Grp Volume(v), veh/h	22	484	823	849	139	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1777	1799	1765	0
Q Serve(g_s), s	0.5	2.2	16.9	17.5	2.8	0.0
Cycle Q Clear(g_c), s	0.5	2.2	16.9	17.5	2.8	0.0
Prop In Lane	1.00			0.22	0.91	0.08
Lane Grp Cap(c), veh/h	49	2224	851	861	238	0
V/C Ratio(X)	0.45	0.22	0.97	0.99	0.58	0.00
Avail Cap(c_a), veh/h	237	2599	851	861	868	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	18.0	3.0	9.5	9.7	15.3	0.0
Incr Delay (d2), s/veh	6.4	0.0	23.0	27.2	2.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.3	9.3	10.6	1.1	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	24.4	3.1	32.5	36.9	17.5	0.0
LnGrp LOS	C	A	C	D	B	A
Approach Vol, veh/h		506	1672		139	
Approach Delay, s/veh		4.0	34.8		17.5	
Approach LOS		A	C		B	

Timer - Assigned Phs		4		6	7	8
Phs Duration (G+Y+Rc), s		28.0		9.6	5.5	22.5
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		27.5		18.5	5.0	18.0
Max Q Clear Time (g_c+I1), s		4.2		4.8	2.5	19.5
Green Ext Time (p_c), s		3.3		0.3	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	27.0
HCM 6th LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

HCS7 Two-Lane Highway Report

Project Information

Analyst	Kimley-Horn	Date	12/18/2023
Agency		Analysis Year	Cumulative (2043) plus Project
Jurisdiction	El Dorado County	Time Period Analyzed	AM Peak-Hour
Project Description	Red Hawk Casino - Seg 1. Green Valley Rd E/O Shingle Springs Dr NB	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	0
Speed Limit, mi/h	55	Access Point Density, pts/mi	14.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	150	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.92	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.09

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	53.7
Speed Slope Coefficient	3.47252	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34499	PF Power Coefficient	0.74378
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	0.8
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	52.7

Vehicle Results

Average Speed, mi/h	52.7	Percent Followers, %	28.0
Segment Travel Time, minutes	1.14	Followers Density, followers/mi/ln	0.8
Vehicle LOS	A		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS7 Two-Lane Highway Report

Project Information

Analyst	Kimley-Horn	Date	12/18/2023
Agency		Analysis Year	Cumulative (2043) plus Project
Jurisdiction	El Dorado County	Time Period Analyzed	PM Peak-Hour
Project Description	Red Hawk Casino - Seg 1. Green Valley Rd E/O Shingle Springs Dr NB	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	0
Speed Limit, mi/h	55	Access Point Density, pts/mi	14.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	245	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.92	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.14

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	53.7
Speed Slope Coefficient	3.47252	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34499	PF Power Coefficient	0.74378
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	1.8
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	52.2

Vehicle Results

Average Speed, mi/h	52.2	Percent Followers, %	37.6
Segment Travel Time, minutes	1.15	Followers Density, followers/mi/ln	1.8
Vehicle LOS	A		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS7 Two-Lane Highway Report

Project Information

Analyst	Kimley-Horn	Date	12/18/2023
Agency		Analysis Year	Cumulative (2043) plus Project
Jurisdiction	El Dorado County	Time Period Analyzed	AM Peak-Hour
Project Description	Red Hawk Casino - Seg 1. Green Valley Rd E/O Shingle Springs Dr SB	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	0
Speed Limit, mi/h	55	Access Point Density, pts/mi	14.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	277	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.92	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.16

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	53.7
Speed Slope Coefficient	3.47252	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34499	PF Power Coefficient	0.74378
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	2.2
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	52.0

Vehicle Results

Average Speed, mi/h	52.0	Percent Followers, %	40.4
Segment Travel Time, minutes	1.15	Followers Density, followers/mi/ln	2.2
Vehicle LOS	B		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS7 Two-Lane Highway Report

Project Information

Analyst	Kimley-Horn	Date	12/18/2023
Agency		Analysis Year	Cumulative (2043) plus Project
Jurisdiction	El Dorado County	Time Period Analyzed	PM Peak-Hour
Project Description	Red Hawk Casino - Seg 1. Green Valley Rd E/O Shingle Springs Dr SB	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	0
Speed Limit, mi/h	55	Access Point Density, pts/mi	14.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	245	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.92	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.14

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	53.7
Speed Slope Coefficient	3.47252	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34499	PF Power Coefficient	0.74378
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	1.8
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	52.2

Vehicle Results

Average Speed, mi/h	52.2	Percent Followers, %	37.6
Segment Travel Time, minutes	1.15	Followers Density, followers/mi/ln	1.8
Vehicle LOS	A		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS7 Two-Lane Highway Report

Project Information

Analyst	Kimley-Horn	Date	12/18/2023
Agency		Analysis Year	Cumulative (2043) plus Project
Jurisdiction	El Dorado County	Time Period Analyzed	AM Peak-Hour
Project Description	Red Hawk Casino - Seg 2. Green Valley Rd W/O Shingle Springs Dr EB	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	0
Speed Limit, mi/h	55	Access Point Density, pts/mi	6.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	251	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.92	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.15

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	55.7
Speed Slope Coefficient	3.58092	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.33105	PF Power Coefficient	0.74935
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	1.7
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	54.1

Vehicle Results

Average Speed, mi/h	54.1	Percent Followers, %	37.7
Segment Travel Time, minutes	1.11	Followers Density, followers/mi/ln	1.7
Vehicle LOS	A		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS7 Two-Lane Highway Report

Project Information

Analyst	Kimley-Horn	Date	12/18/2023
Agency		Analysis Year	Cumulative (2043) plus Project
Jurisdiction	El Dorado County	Time Period Analyzed	PM Peak-Hour
Project Description	Red Hawk Casino - Seg 2. Green Valley Rd W/O Shingle Springs Dr EB	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	0
Speed Limit, mi/h	55	Access Point Density, pts/mi	6.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	265	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.92	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.16

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	55.7
Speed Slope Coefficient	3.58092	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.33105	PF Power Coefficient	0.74935
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	1.9
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	54.0

Vehicle Results

Average Speed, mi/h	54.0	Percent Followers, %	38.9
Segment Travel Time, minutes	1.11	Followers Density, followers/mi/ln	1.9
Vehicle LOS	A		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS7 Two-Lane Highway Report

Project Information

Analyst	Kimley-Horn	Date	12/18/2023
Agency		Analysis Year	Cumulative (2043) plus Project
Jurisdiction	El Dorado County	Time Period Analyzed	AM Peak-Hour
Project Description	Red Hawk Casino - Seg 2. Green Valley Rd W/O Shingle Springs Dr WB	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	0
Speed Limit, mi/h	55	Access Point Density, pts/mi	6.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	166	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.92	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.10

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	55.7
Speed Slope Coefficient	3.58092	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.33105	PF Power Coefficient	0.74935
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	0.9
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	54.6

Vehicle Results

Average Speed, mi/h	54.6	Percent Followers, %	29.3
Segment Travel Time, minutes	1.10	Followers Density, followers/mi/ln	0.9
Vehicle LOS	A		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS7 Two-Lane Highway Report

Project Information

Analyst	Kimley-Horn	Date	12/18/2023
Agency		Analysis Year	Cumulative (2043) plus Project
Jurisdiction	El Dorado County	Time Period Analyzed	PM Peak-Hour
Project Description	Red Hawk Casino - Seg 2. Green Valley Rd W/O Shingle Springs Dr WB	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	0
Speed Limit, mi/h	55	Access Point Density, pts/mi	6.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	239	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.92	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.14

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	55.7
Speed Slope Coefficient	3.58092	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.33105	PF Power Coefficient	0.74935
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	1.6
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	54.2

Vehicle Results

Average Speed, mi/h	54.2	Percent Followers, %	36.6
Segment Travel Time, minutes	1.11	Followers Density, followers/mi/ln	1.6
Vehicle LOS	A		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	5	Segment Name	WB West of Casino Ramps
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	2400	Percent Grade, %	-3.40
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	0.50
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	3281	Heavy Vehicle Adjustment Factor (f_{HV})	0.931
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1916
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	30	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	70	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.24	Volume-to-Capacity Ratio (v/c)	0.82

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	61.4
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	31.2
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	3	Segment Name	EB between Ramps
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	3100	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	3301	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1902
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.82

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	61.7
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	30.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	3	Segment Name	WB between Ramps
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	2000	Percent Grade, %	5.50
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	0.20
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	3215	Heavy Vehicle Adjustment Factor (f_{HV})	0.907
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1926
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	30	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	70	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.70	Volume-to-Capacity Ratio (v/c)	0.83

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	61.2
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	31.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	5	Segment Name	EB post-Casino
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	3780	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	3410	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1966
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.85

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	60.4
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	32.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	1	Segment Name	WB East of Casino Ramps
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	2150	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	3328	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1918
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.83

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	61.4
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	31.2
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Weaving Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	2	Segment Name	EB Weave Shingle Springs Dr
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

Number of Lanes (N), ln	3	Segment Type	Freeway
Segment Length (L_S), ft	300	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Specific Grade	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	3.40	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.50	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000
Proportion of CAVs in Traffic Stream	0	Final Capacity Adjustment Factor (CAF)	0.968

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	3196	105	8	132
Peak Hour Factor (PHF)	0.92	0.92	0.92	0.92
Total Trucks, %	6.00	6.00	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.855	0.943	0.943	0.943
Flow Rate (v_i), pc/h	4063	121	9	152
Weaving Flow Rate (v_W), pc/h	273	Ideal Conditions Capacity (c_{IFL}), pc/h/ln		2382
Non-Weaving Flow Rate (v_{NW}), pc/h	4072	Density-Based Capacity ($c_{IWL} \times N \times f_{HV}$), veh/h		5580
Total Flow Rate (v), pc/h	4345	Demand Flow-Based Capacity ($c_{IW} \times f_{HV}$), veh/h		32789
Volume Ratio (VR)	0.063	Weaving Area Capacity (c_W), veh/h		5580
Minimum Lane Change Rate (LC_{MIN}), lc/h	273	Adjusted Weaving Area Capacity (c_{WA}), veh/h		5401
Maximum Weaving Length (L_{MAX}), ft	3184	Volume-to-Capacity Ratio (v/c)		0.69

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	61	Average Weaving Speed (S_W), mi/h	51.9
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	424	Average Non-Weaving Speed (S_{NW}), mi/h	59.3
Weaving Lane Change Rate (LC_W), lc/h	273	Average Speed (S), mi/h	58.8

Weaving Lane Change Rate (LC_{All}), lc/h	697	Density (D), pc/mi/ln	24.6
Weaving Intensity Factor (W)	0.440	Level of Service (LOS)	C

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Merge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	4	Segment Name	EB Casino On-ramp_EB post-Casino
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	350	900
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	-5.50	-5.50
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	3301	109
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.931	0.931
Flow Rate (v_i), pc/h	3854	127
Capacity (c_{md}), pc/h	4700	2000
Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.88	0.07

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	55.9
Flow in Lanes 1 and 2 (v_{12}), pc/h	3854	Outer Lanes Freeway Speed (S_O), mi/h	68.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3981	Ramp Junction Speed (S), mi/h	55.8
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	35.6

Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	30.9

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Merge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	4	Segment Name	WB Casino On-ramp
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	340	400
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	3215	66
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.943	0.943
Flow Rate (v_i), pc/h	3706	76
Capacity (c_{md}), pc/h	4700	2000
Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.83	0.04

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	56.0
Flow in Lanes 1 and 2 (v_{12}), pc/h	3706	Outer Lanes Freeway Speed (S_O), mi/h	68.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3782	Ramp Junction Speed (S), mi/h	56.0
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	33.8

Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	32.5

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Diverge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Weekday AM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	2	Segment Name	WB Casino Off-ramp
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Deceleration Length (LD), ft	160	1000
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	5.50	5.50
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	3328	113
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.931	0.931
Flow Rate (v_i), pc/h	3885	132
Capacity (c_{md}), pc/h	4700	2000
Initial Adjusted Capacity (c_{mda}), pc/h	4550	-
Final Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.85	0.07

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	56.4
Flow in Lanes 1 and 2 (v_{12}), pc/h	3885	Outer Lanes Freeway Speed (S_O), mi/h	74.8
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Ramp Junction Speed (S), mi/h	56.4

Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	34.4
Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	28.7

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	5	Segment Name	WB West of Casino Ramps
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	2400	Percent Grade, %	-3.40
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	0.50
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2964	Heavy Vehicle Adjustment Factor (f_{HV})	0.931
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1730
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	30	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	70	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.24	Volume-to-Capacity Ratio (v/c)	0.75

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	64.4
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	26.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Weaving Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	2	Segment Name	EB Weave Shingle Springs Dr
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	3	Segment Type	Freeway
Segment Length (L_S), ft	300	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Specific Grade	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	3.40	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.50	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000
Proportion of CAVs in Traffic Stream	0	Final Capacity Adjustment Factor (CAF)	0.968

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	2807	108	8	800
Peak Hour Factor (PHF)	0.92	0.92	0.92	0.92
Total Trucks, %	6.00	6.00	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.870	0.943	0.943	0.893
Flow Rate (v_i), pc/h	3507	124	9	974
Weaving Flow Rate (v_W), pc/h	1098	Ideal Conditions Capacity (c_{IFL}), pc/h/ln		2382
Non-Weaving Flow Rate (v_{NW}), pc/h	3516	Density-Based Capacity ($c_{IWL} \times N \times f_{HV}$), veh/h		5335
Total Flow Rate (v), pc/h	4614	Demand Flow-Based Capacity ($c_{IW} \times f_{HV}$), veh/h		8843
Volume Ratio (VR)	0.238	Weaving Area Capacity (c_W), veh/h		5335
Minimum Lane Change Rate (LC_{MIN}), lc/h	1098	Adjusted Weaving Area Capacity (c_{WA}), veh/h		5164
Maximum Weaving Length (L_{MAX}), ft	4928	Volume-to-Capacity Ratio (v/c)		0.78

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	53	Average Weaving Speed (S_W), mi/h	45.1
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	309	Average Non-Weaving Speed (S_{NW}), mi/h	52.9
Weaving Lane Change Rate (LC_W), lc/h	1098	Average Speed (S), mi/h	50.8

Weaving Lane Change Rate (LC_{All}), lc/h	1407	Density (D), pc/mi/ln	30.3
Weaving Intensity Factor (W)	0.765	Level of Service (LOS)	D

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	3	Segment Name	WB between Ramps
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	2000	Percent Grade, %	5.50
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	0.20
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2763	Heavy Vehicle Adjustment Factor (f_{HV})	0.907
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1656
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	30	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	70	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.70	Volume-to-Capacity Ratio (v/c)	0.71

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	65.4
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	25.3
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	5	Segment Name	EB post-Casino
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	3780	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	3329	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1918
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.83

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	61.4
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	31.2
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	1	Segment Name	WB East of Casino Ramps
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	2150	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	3243	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1869
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.80

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	62.3
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	30.0
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Weaving Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	2	Segment Name	EB Weave Shingle Springs Dr
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	3	Segment Type	Freeway
Segment Length (L_S), ft	300	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Specific Grade	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	3.40	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.50	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000
Proportion of CAVs in Traffic Stream	0	Final Capacity Adjustment Factor (CAF)	0.968

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	2807	108	8	800
Peak Hour Factor (PHF)	0.92	0.92	0.92	0.92
Total Trucks, %	6.00	6.00	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.870	0.943	0.943	0.893
Flow Rate (v_i), pc/h	3507	124	9	974
Weaving Flow Rate (v_W), pc/h	1098	Ideal Conditions Capacity (c_{IFL}), pc/h/ln		2382
Non-Weaving Flow Rate (v_{NW}), pc/h	3516	Density-Based Capacity ($c_{IWL} \times N \times f_{HV}$), veh/h		5335
Total Flow Rate (v), pc/h	4614	Demand Flow-Based Capacity ($c_{IW} \times f_{HV}$), veh/h		8843
Volume Ratio (VR)	0.238	Weaving Area Capacity (c_W), veh/h		5335
Minimum Lane Change Rate (LC_{MIN}), lc/h	1098	Adjusted Weaving Area Capacity (c_{WA}), veh/h		5164
Maximum Weaving Length (L_{MAX}), ft	4928	Volume-to-Capacity Ratio (v/c)		0.78

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	53	Average Weaving Speed (S_W), mi/h	45.1
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	309	Average Non-Weaving Speed (S_{NW}), mi/h	52.9
Weaving Lane Change Rate (LC_W), lc/h	1098	Average Speed (S), mi/h	50.8

Weaving Lane Change Rate (LC_{All}), lc/h	1407	Density (D), pc/mi/ln	30.3
Weaving Intensity Factor (W)	0.765	Level of Service (LOS)	D

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Merge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	4	Segment Name	EB Casino On-ramp_EB post-Casino
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	350	900
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	-5.50	-5.50
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2915	414
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.931	0.931
Flow Rate (v_i), pc/h	3403	483
Capacity (c_{md}), pc/h	4700	2000
Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.85	0.25

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	56.4
Flow in Lanes 1 and 2 (v_{12}), pc/h	3403	Outer Lanes Freeway Speed (S_O), mi/h	68.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3886	Ramp Junction Speed (S), mi/h	56.4
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	34.5

Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	30.0

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Merge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	4	Segment Name	WB Casino On-ramp
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	340	400
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2763	201
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.943	0.943
Flow Rate (v_i), pc/h	3185	232
Capacity (c_{md}), pc/h	4700	2000
Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.75	0.12

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	57.4
Flow in Lanes 1 and 2 (v_{12}), pc/h	3185	Outer Lanes Freeway Speed (S_O), mi/h	68.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3417	Ramp Junction Speed (S), mi/h	57.4
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	29.8

Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	29.6

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Diverge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Weekday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	2	Segment Name	WB Casino Off-ramp
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Deceleration Length (LD), ft	160	1000
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	5.50	5.50
Segment Type / Ramp Type	Highway/CD Roadway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	3243	480
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.931	0.931
Flow Rate (v_i), pc/h	3786	560
Capacity (c_{md}), pc/h	4400	2000
Initial Adjusted Capacity (c_{mda}), pc/h	4259	-
Final Adjusted Capacity (c_{mda}), pc/h	4259	1936
Volume-to-Capacity Ratio (v/c)	0.89	0.29

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	55.4
Flow in Lanes 1 and 2 (v_{12}), pc/h	3786	Outer Lanes Freeway Speed (S_O), mi/h	74.8
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Ramp Junction Speed (S), mi/h	55.4

Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	34.2
Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	27.8

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	5	Segment Name	WB West of Casino Ramps
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	2400	Percent Grade, %	-3.40
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	0.50
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2958	Heavy Vehicle Adjustment Factor (f_{HV})	0.931
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1727
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	30	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	70	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.24	Volume-to-Capacity Ratio (v/c)	0.74

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	64.5
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	26.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	3	Segment Name	EB between Ramps
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	3100	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2915	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1680
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.72

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	65.1
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	25.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	3	Segment Name	WB between Ramps
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	2000	Percent Grade, %	5.50
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	0.20
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2755	Heavy Vehicle Adjustment Factor (f_{HV})	0.907
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1651
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	30	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	70	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.70	Volume-to-Capacity Ratio (v/c)	0.71

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	65.5
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	25.2
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	5	Segment Name	EB post-Casino
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	3780	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	3342	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1926
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.83

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	61.2
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	31.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	1	Segment Name	WB East of Casino Ramps
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	2150	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	3243	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1869
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.80

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	62.3
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	30.0
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Weaving Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	2	Segment Name	EB Weave Shingle Springs Dr
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	3	Segment Type	Freeway
Segment Length (L_S), ft	300	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Specific Grade	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	3.40	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.50	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000
Proportion of CAVs in Traffic Stream	0	Final Capacity Adjustment Factor (CAF)	0.968

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	2807	108	8	800
Peak Hour Factor (PHF)	0.92	0.92	0.92	0.92
Total Trucks, %	6.00	6.00	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.855	0.943	0.943	0.943
Flow Rate (v_i), pc/h	3569	124	9	922
Weaving Flow Rate (v_W), pc/h	1046	Ideal Conditions Capacity (c_{IFL}), pc/h/ln		2382
Non-Weaving Flow Rate (v_{NW}), pc/h	3578	Density-Based Capacity ($c_{IWL} \times N \times f_{HV}$), veh/h		5348
Total Flow Rate (v), pc/h	4624	Demand Flow-Based Capacity ($c_{IW} \times f_{HV}$), veh/h		9293
Volume Ratio (VR)	0.226	Weaving Area Capacity (c_W), veh/h		5348
Minimum Lane Change Rate (LC_{MIN}), lc/h	1046	Adjusted Weaving Area Capacity (c_{WA}), veh/h		5177
Maximum Weaving Length (L_{MAX}), ft	4804	Volume-to-Capacity Ratio (v/c)		0.78

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	54	Average Weaving Speed (S_W), mi/h	45.4
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	322	Average Non-Weaving Speed (S_{NW}), mi/h	53.3
Weaving Lane Change Rate (LC_W), lc/h	1046	Average Speed (S), mi/h	51.3

Weaving Lane Change Rate (LC_{All}), lc/h	1368	Density (D), pc/mi/ln	30.0
Weaving Intensity Factor (W)	0.748	Level of Service (LOS)	D

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Merge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	4	Segment Name	EB Casino On-ramp_EB post-Casino
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	350	900
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	-5.50	-5.50
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2915	427
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.931	0.931
Flow Rate (v_i), pc/h	3403	499
Capacity (c_{md}), pc/h	4700	2000
Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.86	0.26

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	56.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	3403	Outer Lanes Freeway Speed (S_O), mi/h	68.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3902	Ramp Junction Speed (S), mi/h	56.3
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	34.7

Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	30.1

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Merge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	4	Segment Name	WB Casino On-ramp
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	340	400
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2755	203
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.943	0.943
Flow Rate (v_i), pc/h	3176	234
Capacity (c_{md}), pc/h	4700	2000
Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.75	0.12

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	57.4
Flow in Lanes 1 and 2 (v_{12}), pc/h	3176	Outer Lanes Freeway Speed (S_O), mi/h	68.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3410	Ramp Junction Speed (S), mi/h	57.4
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	29.7

Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	29.5

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Diverge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Friday PM
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	2	Segment Name	WB Casino Off-ramp
Analysis Period Number	1	Segment Analysis Period	07:30-07:45

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Deceleration Length (LD), ft	160	1000
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	5.50	5.50
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	3243	488
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.931	0.931
Flow Rate (v_i), pc/h	3786	570
Capacity (c_{md}), pc/h	4700	2000
Initial Adjusted Capacity (c_{mda}), pc/h	4550	-
Final Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.83	0.29

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	55.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	3786	Outer Lanes Freeway Speed (S_O), mi/h	74.8
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Ramp Junction Speed (S), mi/h	55.3

Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	34.2
Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	27.8

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	5	Segment Name	WB West of Casino Ramps
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	2400	Percent Grade, %	-3.40
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	0.50
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2926	Heavy Vehicle Adjustment Factor (f_{HV})	0.931
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1708
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	30	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	70	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.24	Volume-to-Capacity Ratio (v/c)	0.74

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	64.7
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	26.4
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	3	Segment Name	EB between Ramps
Analysis Period Number	1	Segment Analysis Period	12:00-12:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	3100	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.50
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	68.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2915	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1680
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2382
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2306
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2306
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.73

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	64.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	26.2
Total Ramp Density Adjustment	1.8	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	66.5		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	3	Segment Name	WB between Ramps
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	2000	Percent Grade, %	5.50
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	0.20
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	2751	Heavy Vehicle Adjustment Factor (f_{HV})	0.907
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1648
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	30	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	70	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.70	Volume-to-Capacity Ratio (v/c)	0.71

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	65.5
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	25.2
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	5	Segment Name	EB post-Casino
Analysis Period Number	1	Segment Analysis Period	12:00-12:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	3780	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	3438	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1982
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.85

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	60.1
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	33.0
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Basic Freeway Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	1	Segment Name	WB East of Casino Ramps
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	2150	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	0.968
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAF_{CAV}	1.000

Demand and Capacity

Demand Volume (V), veh/h	3239	Heavy Vehicle Adjustment Factor (f_{HV})	0.943
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1866
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2399
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (c_{adj}), pc/h/ln	2323
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (c_{adj}), pc/h/ln	2323
Passenger Car Equivalent (E_T)	2.00	Volume-to-Capacity Ratio (v/c)	0.80

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	62.3
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	30.0
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.2		

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Weaving Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	2	Segment Name	EB Weave Shingle Springs Dr
Analysis Period Number	1	Segment Analysis Period	12:00-12:15

Geometric Data

Number of Lanes (N), ln	3	Segment Type	Freeway
Segment Length (L_S), ft	300	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Specific Grade	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	3.40	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.50	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000
Proportion of CAVs in Traffic Stream	0	Final Capacity Adjustment Factor (CAF)	0.968

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	2807	108	8	797
Peak Hour Factor (PHF)	0.92	0.92	0.92	0.92
Total Trucks, %	6.00	6.00	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.870	0.943	0.943	0.893
Flow Rate (v_i), pc/h	3507	124	9	970
Weaving Flow Rate (v_W), pc/h	1094	Ideal Conditions Capacity (c_{IFL}), pc/h/ln		2382
Non-Weaving Flow Rate (v_{NW}), pc/h	3516	Density-Based Capacity ($c_{IWL} \times N \times f_{HV}$), veh/h		5338
Total Flow Rate (v), pc/h	4610	Demand Flow-Based Capacity ($c_{IW} \times f_{HV}$), veh/h		8881
Volume Ratio (VR)	0.237	Weaving Area Capacity (c_W), veh/h		5338
Minimum Lane Change Rate (LC_{MIN}), lc/h	1094	Adjusted Weaving Area Capacity (c_{WA}), veh/h		5167
Maximum Weaving Length (L_{MAX}), ft	4918	Volume-to-Capacity Ratio (v/c)		0.78

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	53	Average Weaving Speed (S_W), mi/h	45.2
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	309	Average Non-Weaving Speed (S_{NW}), mi/h	52.5
Weaving Lane Change Rate (LC_W), lc/h	1094	Average Speed (S), mi/h	50.8

Weaving Lane Change Rate (LC_{All}), lc/h	1403	Density (D), pc/mi/ln	30.2
Weaving Intensity Factor (W)	0.763	Level of Service (LOS)	D

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Merge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	4	Segment Name	EB Casino On-ramp_EB post-Casino
Analysis Period Number	1	Segment Analysis Period	12:00-12:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	350	900
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	-5.50	-5.50
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2915	523
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.931	0.931
Flow Rate (v_i), pc/h	3403	611
Capacity (c_{md}), pc/h	4700	2000
Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.88	0.32

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	55.7
Flow in Lanes 1 and 2 (v_{12}), pc/h	3403	Outer Lanes Freeway Speed (S_O), mi/h	68.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	4014	Ramp Junction Speed (S), mi/h	55.7
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	36.0

Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	30.9

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Merge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	4	Segment Name	WB Casino On-ramp
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	340	400
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	2751	175
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.943	0.943
Flow Rate (v_i), pc/h	3171	202
Capacity (c_{md}), pc/h	4700	2000
Adjusted Capacity (c_{mda}), pc/h	4550	1936
Volume-to-Capacity Ratio (v/c)	0.74	0.10

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	57.5
Flow in Lanes 1 and 2 (v_{12}), pc/h	3171	Outer Lanes Freeway Speed (S_O), mi/h	68.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3373	Ramp Junction Speed (S), mi/h	57.5
Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	29.3

Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	29.3

Copyright © 2024 University of Florida. All Rights Reserved.

HCS Freeway Diverge Report

Project Information

Analyst	Kimley-Horn	Date	12/27/2023
Agency		Analysis Year	2023
Jurisdiction	El Dorado County	Time Analyzed	Cumulative plus Project Saturday Midday
Project Description	Red Hawk Resort and Casino	Units	U.S. Customary
Segment Number	2	Segment Name	WB Casino Off-ramp
Analysis Period Number	1	Segment Analysis Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Deceleration Length (L_D), ft	160	1000
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	5.50	5.50
Segment Type / Ramp Type	Highway/CD Roadway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Proportion of CAVs in Traffic Stream	0	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Demand Adjustment Factor (DAF)	1.000	1.000
Capacity Adjustment Factor for CAVs, CAF_{CAV}	1.000	-
Final Capacity Adjustment Factor (CAF)	0.968	0.968

Demand and Capacity

Demand Volume (V_i), veh/h	3239	488
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.931	0.931
Flow Rate (v_i), pc/h	3782	570
Capacity (c_{md}), pc/h	4400	2000
Initial Adjusted Capacity (c_{mda}), pc/h	4259	-
Final Adjusted Capacity (c_{mda}), pc/h	4259	1936
Volume-to-Capacity Ratio (v/c)	0.89	0.29

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	55.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	3782	Outer Lanes Freeway Speed (S_O), mi/h	74.8
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Ramp Junction Speed (S), mi/h	55.3

Number of Outer Lanes on Freeway (N_O), ln	0	Average Density (D), pc/mi/ln	34.2
Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	27.8

Copyright © 2024 University of Florida. All Rights Reserved.

Appendix F

Analysis Worksheets for
Improved plus Proposed Project Intersection Conditions

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	4	473	1919	330
v/c Ratio	0.04	0.20	0.87	0.80
Control Delay	39.0	6.0	19.0	44.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	39.0	6.0	19.0	44.9
Queue Length 50th (ft)	2	47	362	150
Queue Length 95th (ft)	10	49	383	199
Internal Link Dist (ft)		628	1141	286
Turn Bay Length (ft)	300			
Base Capacity (vph)	114	2688	2228	469
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.04	0.18	0.86	0.70

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	331	1183	160	224	7
Future Volume (veh/h)	3	331	1183	160	224	7
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	4	473	1690	229	320	10
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	9	2397	1931	256	363	11
Arrive On Green	0.01	0.67	0.61	0.61	0.21	0.21
Sat Flow, veh/h	1781	3647	3247	418	1716	54
Grp Volume(v), veh/h	4	473	936	983	331	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1777	1795	1775	0
Q Serve(g_s), s	0.2	4.0	34.1	37.1	14.3	0.0
Cycle Q Clear(g_c), s	0.2	4.0	34.1	37.1	14.3	0.0
Prop In Lane	1.00			0.23	0.97	0.03
Lane Grp Cap(c), veh/h	9	2397	1088	1099	376	0
V/C Ratio(X)	0.42	0.20	0.86	0.89	0.88	0.00
Avail Cap(c_a), veh/h	115	2700	1134	1146	469	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	39.2	4.8	12.6	13.1	30.2	0.0
Incr Delay (d2), s/veh	27.2	0.0	6.7	9.1	14.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	1.2	13.2	15.0	7.5	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	66.4	4.9	19.3	22.2	45.1	0.0
LnGrp LOS	E	A	B	C	D	A
Approach Vol, veh/h		477	1919		331	
Approach Delay, s/veh		5.4	20.8		45.1	
Approach LOS		A	C		D	

Timer - Assigned Phs	4	6	7	8
Phs Duration (G+Y+Rc), s	57.9	21.3	4.9	52.9
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	60.1	20.9	5.1	50.5
Max Q Clear Time (g_c+I1), s	6.0	16.3	2.2	39.1
Green Ext Time (p_c), s	3.6	0.5	0.0	9.3

Intersection Summary	
HCM 6th Ctrl Delay	21.0
HCM 6th LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	9	527	2087	299
v/c Ratio	0.08	0.22	0.92	0.79
Control Delay	39.8	5.4	21.2	47.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	39.8	5.4	21.2	47.1
Queue Length 50th (ft)	4	49	412	137
Queue Length 95th (ft)	16	50	419	185
Internal Link Dist (ft)		628	1141	286
Turn Bay Length (ft)	300			
Base Capacity (vph)	112	2738	2279	418
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.08	0.19	0.92	0.72

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	369	1268	193	198	11
Future Volume (veh/h)	6	369	1268	193	198	11
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	9	527	1811	276	283	16
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	20	2480	1961	291	322	18
Arrive On Green	0.01	0.70	0.63	0.63	0.19	0.19
Sat Flow, veh/h	1781	3647	3197	461	1670	94
Grp Volume(v), veh/h	9	527	1017	1070	300	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1777	1787	1770	0
Q Serve(g_s), s	0.4	4.3	40.5	45.2	13.6	0.0
Cycle Q Clear(g_c), s	0.4	4.3	40.5	45.2	13.6	0.0
Prop In Lane	1.00			0.26	0.94	0.05
Lane Grp Cap(c), veh/h	20	2480	1123	1130	341	0
V/C Ratio(X)	0.45	0.21	0.91	0.95	0.88	0.00
Avail Cap(c_a), veh/h	110	2680	1133	1139	406	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	40.5	4.4	13.0	13.9	32.3	0.0
Incr Delay (d2), s/veh	14.8	0.0	10.4	15.7	17.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	1.3	16.4	19.7	7.3	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	55.2	4.5	23.4	29.6	49.5	0.0
LnGrp LOS	E	A	C	C	D	A
Approach Vol, veh/h		536	2087		300	
Approach Delay, s/veh		5.3	26.6		49.5	
Approach LOS		A	C		D	

Timer - Assigned Phs		4		6	7	8
Phs Duration (G+Y+Rc), s		62.0		20.4	5.4	56.5
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		62.1		18.9	5.1	52.5
Max Q Clear Time (g_c+I1), s		6.3		15.6	2.4	47.2
Green Ext Time (p_c), s		4.1		0.3	0.0	4.8

Intersection Summary	
HCM 6th Ctrl Delay	25.0
HCM 6th LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	21	533	2138	166
v/c Ratio	0.18	0.21	0.90	0.59
Control Delay	42.2	4.1	19.6	39.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	42.2	4.1	19.6	39.7
Queue Length 50th (ft)	9	34	299	70
Queue Length 95th (ft)	27	50	433	107
Internal Link Dist (ft)		628	1141	286
Turn Bay Length (ft)	300			
Base Capacity (vph)	116	2848	2378	423
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.18	0.19	0.90	0.39

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	15	373	1328	169	112	4
Future Volume (veh/h)	15	373	1328	169	112	4
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	21	533	1897	241	160	6
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	42	2699	2152	268	207	8
Arrive On Green	0.02	0.76	0.68	0.68	0.12	0.12
Sat Flow, veh/h	1781	3647	3274	395	1700	64
Grp Volume(v), veh/h	21	533	1042	1096	167	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1777	1799	1774	0
Q Serve(g_s), s	0.9	3.2	34.7	38.2	6.9	0.0
Cycle Q Clear(g_c), s	0.9	3.2	34.7	38.2	6.9	0.0
Prop In Lane	1.00			0.22	0.96	0.04
Lane Grp Cap(c), veh/h	42	2699	1202	1217	216	0
V/C Ratio(X)	0.50	0.20	0.87	0.90	0.77	0.00
Avail Cap(c_a), veh/h	120	2932	1241	1256	433	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	36.5	2.6	9.6	10.1	32.3	0.0
Incr Delay (d2), s/veh	8.9	0.0	6.6	8.9	5.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.7	12.0	14.0	3.3	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	45.5	2.6	16.1	19.1	38.1	0.0
LnGrp LOS	D	A	B	B	D	A
Approach Vol, veh/h		554	2138		167	
Approach Delay, s/veh		4.2	17.6		38.1	
Approach LOS		A	B		D	

Timer - Assigned Phs		4		6	7	8
Phs Duration (G+Y+Rc), s		62.0		13.7	6.3	55.8
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		62.5		18.5	5.1	52.9
Max Q Clear Time (g_c+I1), s		5.2		8.9	2.9	40.2
Green Ext Time (p_c), s		4.2		0.3	0.0	11.0

Intersection Summary	
HCM 6th Ctrl Delay	16.2
HCM 6th LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Appendix G

Peak-Hour Signal Warrant Reports

Kimley»Horn

PEAK HOUR SIGNAL WARRANT ANALYSIS (Warrant #3, California MUTCD 2014 Edition)

INT #2

PROJECT NAME: *Red Hawk Casino*

SCENARIO: *Existing (2023)*

COMMENTS:

MAJOR STREET: *Green Valley Rd* ☐ NB/SB ☑ EB/WB # OF APPROACH LANES: 1

MINOR STREET: *Shingle Springs Dr* ☑ NB/SB ☐ EB/WB # OF APPROACH LANES: 1

THE STUDY INTERSECTION HAS MORE THAN THREE APPROACHES (Y OR N): Y

ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000 (Y OR N): N

85TH PERCENTILE SPEED GREATER THAN 40 MPH ON MAJOR STREET (Y OR N): Y

	AM		PM	
WORST CASE DELAY FOR MINOR STREET APPROACH:	0.0	sec/veh	9.3	sec/veh
	0.00	veh-hr	0.00	veh-hr

			MAJOR STREET			MINOR STREET				
			EB Approach	WB Approach	Total	NB Approach	SB Approach	Heavy Leg	Total	Intersection Total
06:00 AM	TO	07:00 AM			0			0	0	0
07:00 AM	TO	08:00 AM	214	116	330	0	0	0	0	330
08:00 AM	TO	09:00 AM			0			0	0	0
09:00 AM	TO	10:00 AM			0			0	0	0
10:00 AM	TO	11:00 AM			0			0	0	0
11:00 AM	TO	12:00 PM			0			0	0	0
12:00 PM	TO	01:00 PM			0			0	0	0
01:00 PM	TO	02:00 PM			0			0	0	0
02:00 PM	TO	03:00 PM			0			0	0	0
03:00 PM	TO	04:00 PM			0			0	0	0
04:00 PM	TO	05:00 PM			0			0	0	0
05:00 PM	TO	06:00 PM	173	176	349	1	0	1	1	350
06:00 PM	TO	07:00 PM			0			0	0	0
07:00 PM	TO	08:00 PM			0			0	0	0
08:00 PM	TO	09:00 PM			0			0	0	0
09:00 PM	TO	10:00 PM			0			0	0	0

	MAJOR STREET		MINOR STREET			INTERSECTION
	Total		Heavy Leg	Total		Total
AM MAX	330	AM MAX	0	0	AM MAX	330
PM MAX	349	PM MAX	1	1	PM MAX	350

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Existing (2023) AM

Intersection: Green Valley Rd AND Shingle Springs Dr

Comments:

PART A or PART B	SATISFIED	**NO**

PART A

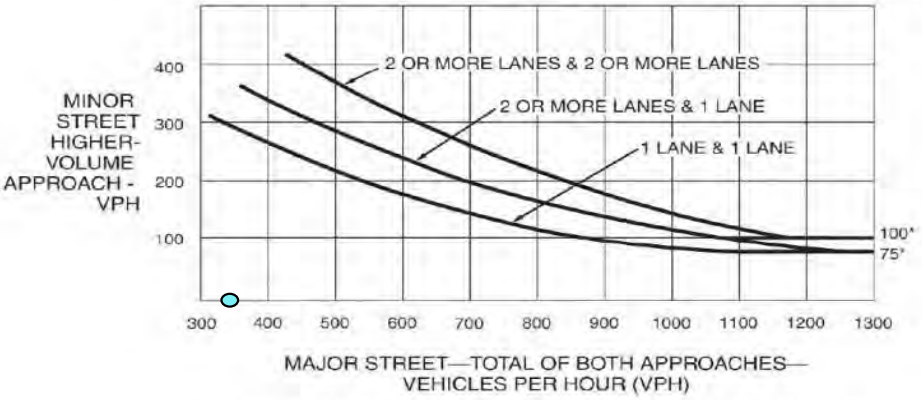
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		No
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B	SATISFIED	**No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	330	
Highest Approach - Minor Street	0	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Existing (2023) PM

Intersection: Green Valley Rd AND Shingle Springs Dr

Comments:

PART A or PART B	SATISFIED	**NO**

PART A

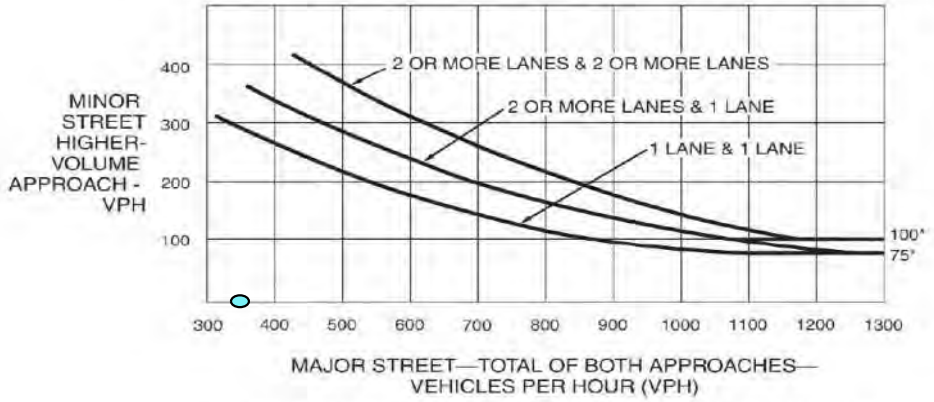
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		No
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B — SATISFIED **No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	349	
Highest Approach - Minor Street	1	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Kimley»Horn

PEAK HOUR SIGNAL WARRANT ANALYSIS (Warrant #3, California MUTCD 2014 Edition)

INT #3

PROJECT NAME: ***Red Hawk Casino***

SCENARIO: ***Existing (2023)***

COMMENTS:

MAJOR STREET: ***Green Valley Rd/Lotus Rd*** ☑ NB/SB ☐ EB/WB # OF APPROACH LANES: 1

MINOR STREET: ***Green Valley Rd*** ☐ NB/SB ☑ EB/WB # OF APPROACH LANES: 1

THE STUDY INTERSECTION HAS MORE THAN THREE APPROACHES (Y OR N): Y

ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000 (Y OR N): N

85TH PERCENTILE SPEED GREATER THAN 40 MPH ON MAJOR STREET (Y OR N): Y

	AM		PM	
WORST CASE DELAY FOR MINOR STREET APPROACH:	18.9	sec/veh	23.3	sec/veh
	0.62	veh-hr	1.16	veh-hr

			MAJOR STREET			MINOR STREET				
			NB Approach	SB Approach	Total	EB Approach	WB Approach	Heavy Leg	Total	Intersection Total
06:00 AM	TO	07:00 AM			0			0	0	0
07:00 AM	TO	08:00 AM	239	469	708	0	119	119	119	827
08:00 AM	TO	09:00 AM			0			0	0	0
09:00 AM	TO	10:00 AM			0			0	0	0
10:00 AM	TO	11:00 AM			0			0	0	0
11:00 AM	TO	12:00 PM			0			0	0	0
12:00 PM	TO	01:00 PM			0			0	0	0
01:00 PM	TO	02:00 PM			0			0	0	0
02:00 PM	TO	03:00 PM			0			0	0	0
03:00 PM	TO	04:00 PM			0			0	0	0
04:00 PM	TO	05:00 PM			0			0	0	0
05:00 PM	TO	06:00 PM	462	302	764	0	179	179	179	943
06:00 PM	TO	07:00 PM			0			0	0	0
07:00 PM	TO	08:00 PM			0			0	0	0
08:00 PM	TO	09:00 PM			0			0	0	0
09:00 PM	TO	10:00 PM			0			0	0	0

	MAJOR STREET		MINOR STREET		INTERSECTION
	Total		Heavy Leg	Total	Total
AM MAX	708	**AM MAX**	119	119	**AM MAX** 827
PM MAX	764	**PM MAX**	179	179	**PM MAX** 943

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Existing (2023) AM

Intersection: Green Valley Rd/Lotus Rd AND Green Valley Rd

Comments:

PART A or PART B	SATISFIED	**NO**

PART A

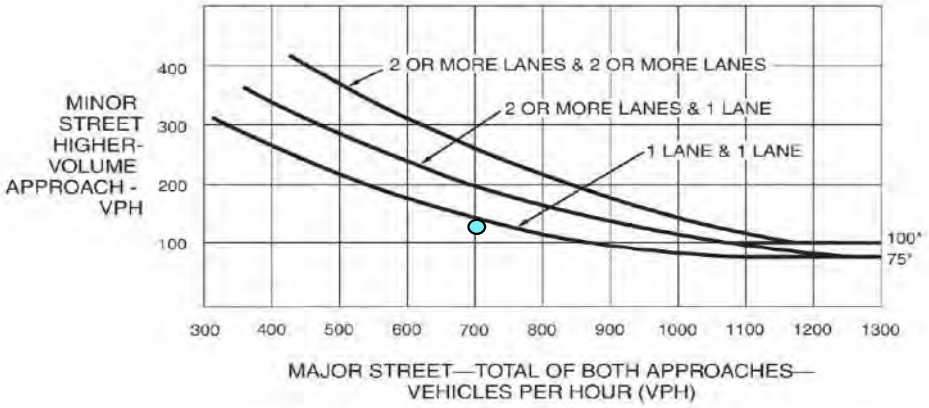
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		Yes
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		Yes

PART B	SATISFIED	**No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	708	
Highest Approach - Minor Street	119	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Red Hawk Casino

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Existing (2023) PM

Intersection: Green Valley Rd/Lotus Rd AND Green Valley Rd

Comments:

PART A or PART B	SATISFIED	**YES**

PART A

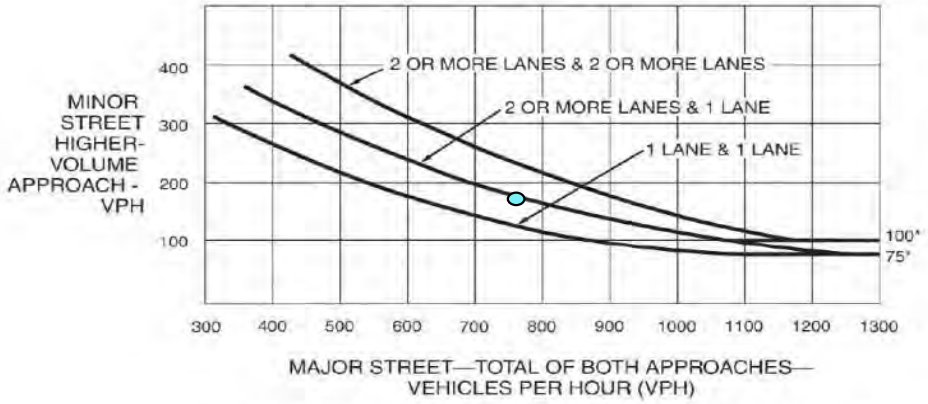
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		Yes
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		Yes

PART B	SATISFIED	**Yes**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	764	
Highest Approach - Minor Street	179	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Kimley»Horn

PEAK HOUR SIGNAL WARRANT ANALYSIS (Warrant #3, California MUTCD 2014 Edition)

INT #4

PROJECT NAME: ***Red Hawk Casino***

SCENARIO: ***Existing (2023)***

COMMENTS:

MAJOR STREET: ***Green Valley Rd*** ☐ NB/SB ☑ EB/WB # OF APPROACH LANES: 1

MINOR STREET: ***Greenstone Rd*** ☑ NB/SB ☐ EB/WB # OF APPROACH LANES: 1

THE STUDY INTERSECTION HAS MORE THAN THREE APPROACHES (Y OR N): Y

ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000 (Y OR N): N

85TH PERCENTILE SPEED GREATER THAN 40 MPH ON MAJOR STREET (Y OR N): Y

	AM		PM	
WORST CASE DELAY FOR MINOR STREET APPROACH:	11.6	sec/veh	12.2	sec/veh
	0.36	veh-hr	0.49	veh-hr

			MAJOR STREET			MINOR STREET				
			EB Approach	WB Approach	Total	NB Approach	SB Approach	Heavy Leg	Total	Intersection Total
06:00 AM	TO	07:00 AM			0			0	0	0
07:00 AM	TO	08:00 AM	253	109	362	111	0	111	111	473
08:00 AM	TO	09:00 AM			0			0	0	0
09:00 AM	TO	10:00 AM			0			0	0	0
10:00 AM	TO	11:00 AM			0			0	0	0
11:00 AM	TO	12:00 PM			0			0	0	0
12:00 PM	TO	01:00 PM			0			0	0	0
01:00 PM	TO	02:00 PM			0			0	0	0
02:00 PM	TO	03:00 PM			0			0	0	0
03:00 PM	TO	04:00 PM			0			0	0	0
04:00 PM	TO	05:00 PM			0			0	0	0
05:00 PM	TO	06:00 PM	192	174	366	145	0	145	145	511
06:00 PM	TO	07:00 PM			0			0	0	0
07:00 PM	TO	08:00 PM			0			0	0	0
08:00 PM	TO	09:00 PM			0			0	0	0
09:00 PM	TO	10:00 PM			0			0	0	0

	MAJOR STREET		MINOR STREET			INTERSECTION
	Total		Heavy Leg	Total		Total
AM MAX	362	**AM MAX**	111	111	**AM MAX**	473
PM MAX	366	**PM MAX**	145	145	**PM MAX**	511

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Existing (2023) AM

Intersection: Green Valley Rd AND Greenstone Rd

Comments:

PART A or PART B	SATISFIED	**NO**

PART A

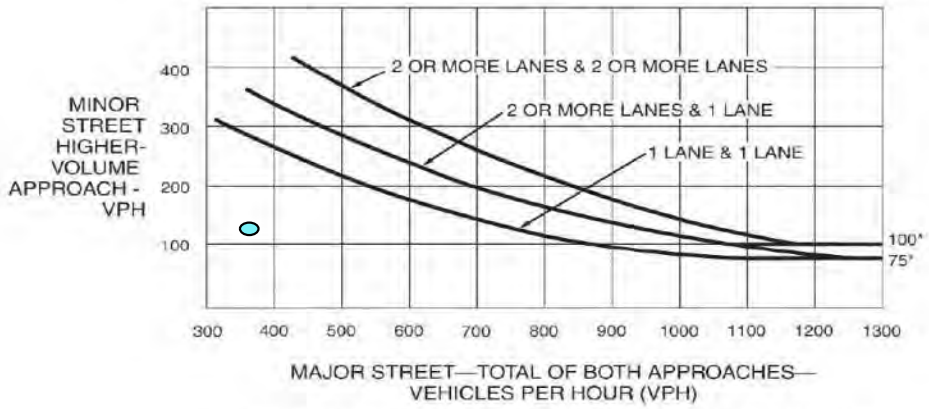
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		Yes
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B	SATISFIED	**No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	362	
Highest Approach - Minor Street	111	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Red Hawk Casino

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Existing (2023) PM

Intersection: Green Valley Rd AND Greenstone Rd

Comments:

PART A or PART B	SATISFIED	**NO**

PART A

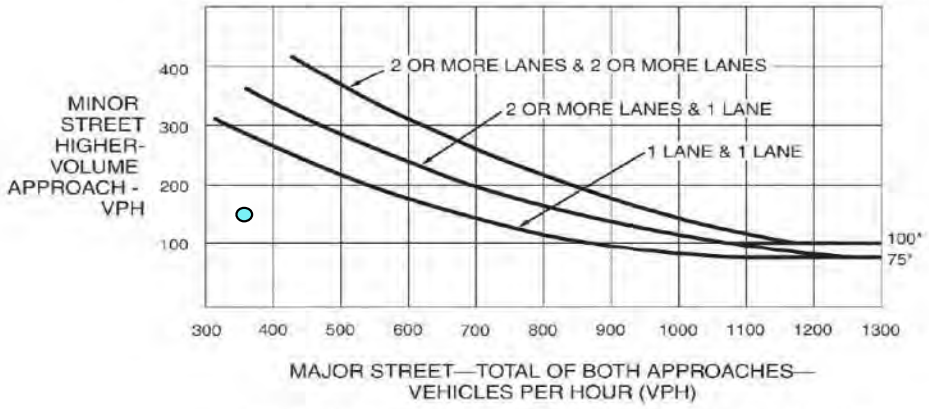
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		Yes
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B	SATISFIED	**No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	366	
Highest Approach - Minor Street	145	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Red Hawk Casino

Kimley»Horn

PEAK HOUR SIGNAL WARRANT ANALYSIS (Warrant #3, California MUTCD 2014 Edition)

INT #5

PROJECT NAME: *Red Hawk Casino*

SCENARIO: *Existing (2023)*

COMMENTS:

MAJOR STREET: *Green Valley Rd/ Missouri Flat Rd* ☐ NB/SB ☑ EB/WB # OF APPROACH LANES: 1

MINOR STREET: *Green Valley Rd* ☑ NB/SB ☐ EB/WB # OF APPROACH LANES: 1

THE STUDY INTERSECTION HAS MORE THAN THREE APPROACHES (Y OR N): Y

ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000 (Y OR N): N

85TH PERCENTILE SPEED GREATER THAN 40 MPH ON MAJOR STREET (Y OR N): Y

	AM		PM	
WORST CASE DELAY FOR MINOR STREET APPROACH:	15.3	sec/veh	12.3	sec/veh
	0.36	veh-hr	0.29	veh-hr

			MAJOR STREET			MINOR STREET				
			EB Approach	WB Approach	Total	NB Approach	SB Approach	Heavy Leg	Total	Intersection Total
06:00 AM	TO	07:00 AM			0			0	0	0
07:00 AM	TO	08:00 AM	310	341	651	0	84	84	84	735
08:00 AM	TO	09:00 AM			0			0	0	0
09:00 AM	TO	10:00 AM			0			0	0	0
10:00 AM	TO	11:00 AM			0			0	0	0
11:00 AM	TO	12:00 PM			0			0	0	0
12:00 PM	TO	01:00 PM			0			0	0	0
01:00 PM	TO	02:00 PM			0			0	0	0
02:00 PM	TO	03:00 PM			0			0	0	0
03:00 PM	TO	04:00 PM			0			0	0	0
04:00 PM	TO	05:00 PM			0			0	0	0
05:00 PM	TO	06:00 PM	194	245	439	85	0	85	85	524
06:00 PM	TO	07:00 PM			0			0	0	0
07:00 PM	TO	08:00 PM			0			0	0	0
08:00 PM	TO	09:00 PM			0			0	0	0
09:00 PM	TO	10:00 PM			0			0	0	0

	MAJOR STREET		MINOR STREET			INTERSECTION
	Total		Heavy Leg	Total		Total
AM MAX	651	**AM MAX**	84	84	**AM MAX**	735
PM MAX	439	**PM MAX**	85	85	**PM MAX**	524

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Existing (2023) AM

Intersection: Green Valley Rd/ Missouri Flat Rd AND Green Valley Rd

Comments:

PART A or PART B	SATISFIED	**NO**

PART A

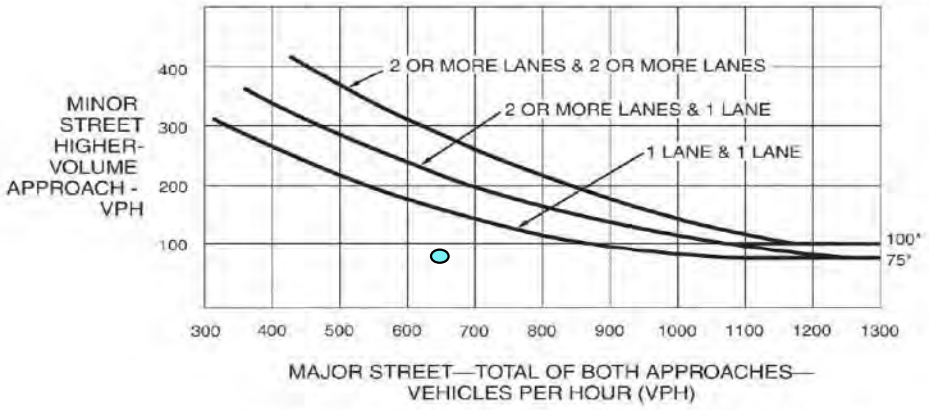
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		No
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B — SATISFIED **NO**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	651	
Highest Approach - Minor Street	84	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Red Hawk Casino

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Existing (2023) PM

Intersection: Green Valley Rd/ Missouri Flat Rd AND Green Valley Rd

Comments:

PART A or PART B	SATISFIED	**NO**

PART A

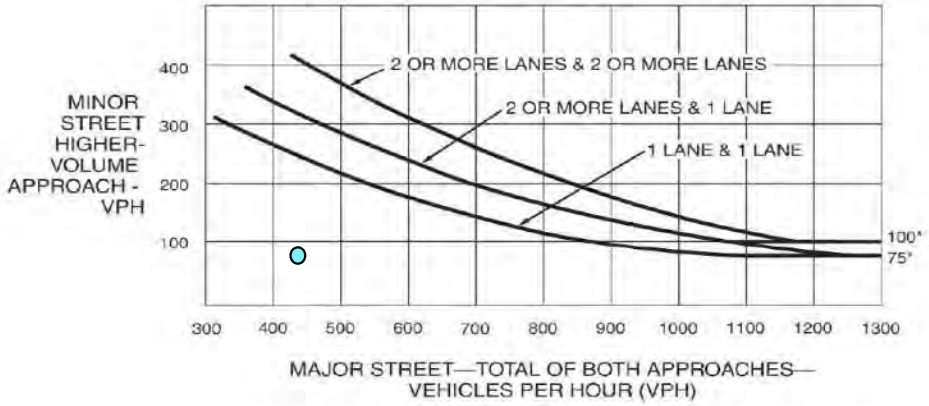
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		No
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B SATISFIED **No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	439	
Highest Approach - Minor Street	85	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Red Hawk Casino

Kimley»Horn

PEAK HOUR SIGNAL WARRANT ANALYSIS (Warrant #3, California MUTCD 2014 Edition)

INT #8

PROJECT NAME: ***Red Hawk Casino***

SCENARIO: ***Existing (2023)***

COMMENTS:

MAJOR STREET: ***Green Valley Rd*** ☐ NB/SB ☑ EB/WB # OF APPROACH LANES: 1

MINOR STREET: ***Ponderosa Rd*** ☑ NB/SB ☐ EB/WB # OF APPROACH LANES: 1

THE STUDY INTERSECTION HAS MORE THAN THREE APPROACHES (Y OR N): Y

ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000 (Y OR N): N

85TH PERCENTILE SPEED GREATER THAN 40 MPH ON MAJOR STREET (Y OR N): Y

	AM		PM	
WORST CASE DELAY FOR MINOR STREET APPROACH:	15.1	sec/veh	11.4	sec/veh
	0.42	veh-hr	0.15	veh-hr

			MAJOR STREET			MINOR STREET				
			EB Approach	WB Approach	Total	NB Approach	SB Approach	Heavy Leg	Total	Intersection Total
06:00 AM	TO	07:00 AM			0			0	0	0
07:00 AM	TO	08:00 AM	288	225	513	101	0	101	101	614
08:00 AM	TO	09:00 AM			0			0	0	0
09:00 AM	TO	10:00 AM			0			0	0	0
10:00 AM	TO	11:00 AM			0			0	0	0
11:00 AM	TO	12:00 PM			0			0	0	0
12:00 PM	TO	01:00 PM			0			0	0	0
01:00 PM	TO	02:00 PM			0			0	0	0
02:00 PM	TO	03:00 PM			0			0	0	0
03:00 PM	TO	04:00 PM			0			0	0	0
04:00 PM	TO	05:00 PM			0			0	0	0
05:00 PM	TO	06:00 PM	238	184	422	46	0	46	46	468
06:00 PM	TO	07:00 PM			0			0	0	0
07:00 PM	TO	08:00 PM			0			0	0	0
08:00 PM	TO	09:00 PM			0			0	0	0
09:00 PM	TO	10:00 PM			0			0	0	0

	MAJOR STREET		MINOR STREET			INTERSECTION
	Total		Heavy Leg	Total		Total
AM MAX	513	**AM MAX**	101	101	**AM MAX**	614
PM MAX	422	**PM MAX**	46	46	**PM MAX**	468

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Existing (2023) AM

Intersection: Green Valley Rd AND Ponderosa Rd

Comments:

PART A or PART B	SATISFIED	**NO**

PART A

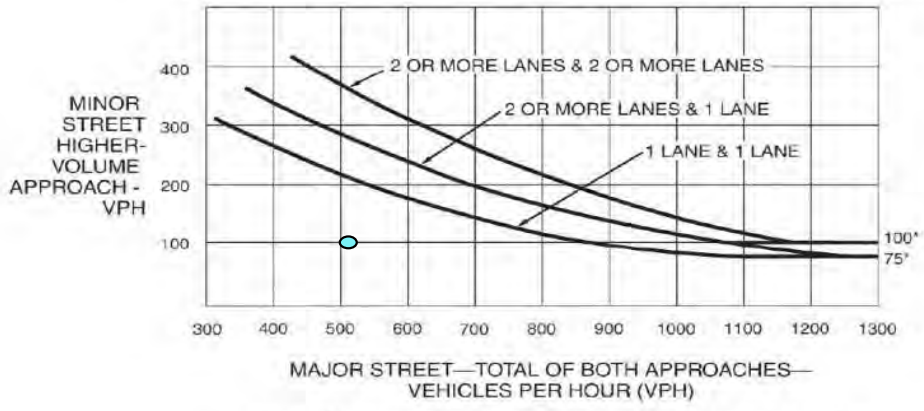
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		Yes
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B	SATISFIED	**No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	513	
Highest Approach - Minor Street	101	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Red Hawk Casino

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Existing (2023) PM

Intersection: Green Valley Rd AND Ponderosa Rd

Comments:

PART A or PART B	SATISFIED	**NO**

PART A

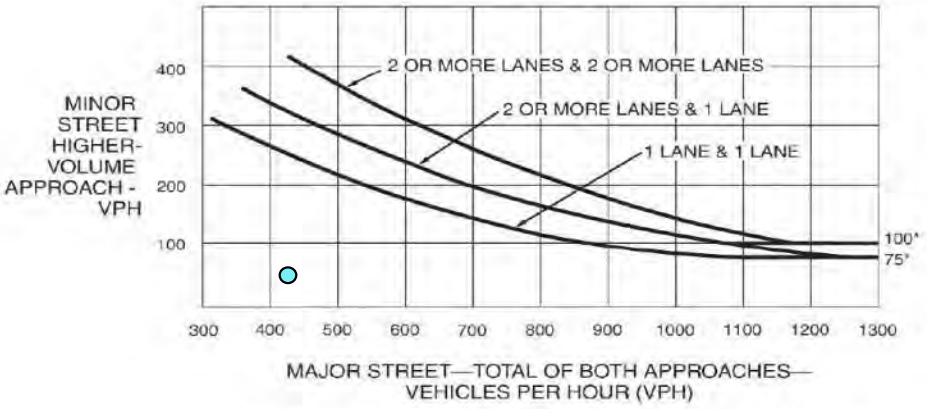
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		No
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B — SATISFIED **No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	422	
Highest Approach - Minor Street	46	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Red Hawk Casino

Kimley»Horn

PEAK HOUR SIGNAL WARRANT ANALYSIS (Warrant #3, California MUTCD 2014 Edition)

INT #8

PROJECT NAME: *Red Hawk Casino*

SCENARIO: *Existing (2023)*

COMMENTS:

MAJOR STREET: *Green Valley Rd* ☐ NB/SB ☑ EB/WB # OF APPROACH LANES: 1

MINOR STREET: *Deer Valley Rd* ☑ NB/SB ☐ EB/WB # OF APPROACH LANES: 1

THE STUDY INTERSECTION HAS MORE THAN THREE APPROACHES (Y OR N): Y

ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000 (Y OR N): N

85TH PERCENTILE SPEED GREATER THAN 40 MPH ON MAJOR STREET (Y OR N): Y

	AM		PM	
WORST CASE DELAY FOR MINOR STREET APPROACH:	15.1	sec/veh	11.4	sec/veh
	0.42	veh-hr	0.15	veh-hr

			MAJOR STREET			MINOR STREET				
			EB Approach	WB Approach	Total	NB Approach	SB Approach	Heavy Leg	Total	Intersection Total
06:00 AM	TO	07:00 AM			0			0	0	0
07:00 AM	TO	08:00 AM	288	225	513	101	0	101	101	614
08:00 AM	TO	09:00 AM			0			0	0	0
09:00 AM	TO	10:00 AM			0			0	0	0
10:00 AM	TO	11:00 AM			0			0	0	0
11:00 AM	TO	12:00 PM			0			0	0	0
12:00 PM	TO	01:00 PM			0			0	0	0
01:00 PM	TO	02:00 PM			0			0	0	0
02:00 PM	TO	03:00 PM			0			0	0	0
03:00 PM	TO	04:00 PM			0			0	0	0
04:00 PM	TO	05:00 PM			0			0	0	0
05:00 PM	TO	06:00 PM	238	184	422	46	0	46	46	468
06:00 PM	TO	07:00 PM			0			0	0	0
07:00 PM	TO	08:00 PM			0			0	0	0
08:00 PM	TO	09:00 PM			0			0	0	0
09:00 PM	TO	10:00 PM			0			0	0	0

	MAJOR STREET		MINOR STREET			INTERSECTION
	Total		Heavy Leg	Total		Total
AM MAX	513	**AM MAX**	101	101	**AM MAX**	614
PM MAX	422	**PM MAX**	46	46	**PM MAX**	468

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Existing (2023) AM

Intersection: Green Valley Rd AND Deer Valley Rd

Comments:

PART A or PART B	SATISFIED	**NO**

PART A

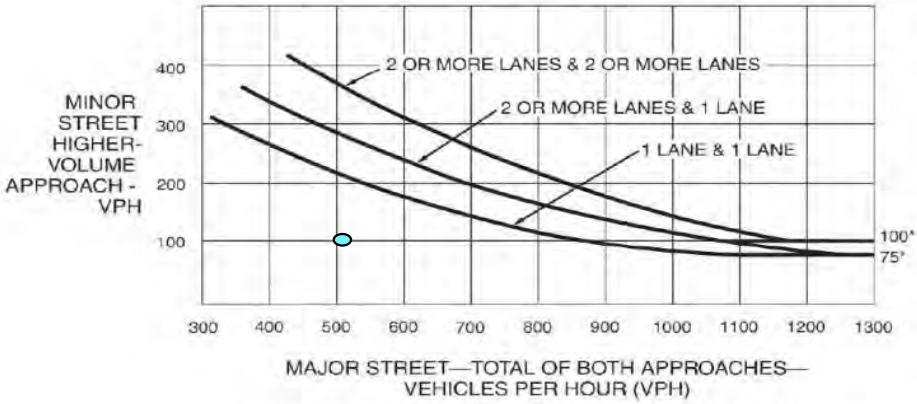
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		Yes
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B	SATISFIED	**No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	513	
Highest Approach - Minor Street	101	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Red Hawk Casino

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Existing (2023) PM

Intersection: Green Valley Rd AND Deer Valley Rd

Comments:

	PART A or PART B	SATISFIED	**NO**

PART A

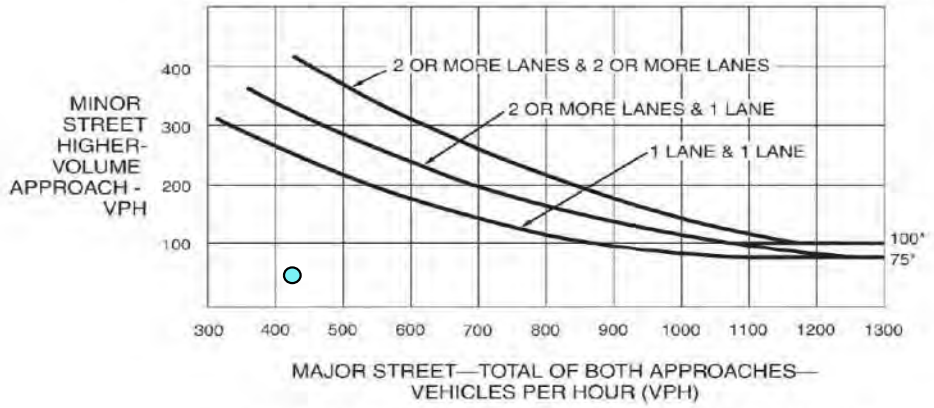
		SATISFIED	**NO**
(All parts 1, 2, and 3 below must be satisfied)			
1.	The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2.	The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		No
3.	The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B — SATISFIED **No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	422	
Highest Approach - Minor Street	46	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Red Hawk Casino

Kimley»Horn

PEAK HOUR SIGNAL WARRANT ANALYSIS (Warrant #3, California MUTCD 2014 Edition)

INT #2

PROJECT NAME: ***Red Hawk Casino***

SCENARIO: ***Existing (2023) plus Project***

COMMENTS:

MAJOR STREET: ***Green Valley Rd*** ☐ NB/SB ☑ EB/WB # OF APPROACH LANES: 1

MINOR STREET: ***Shingle Springs Dr*** ☑ NB/SB ☐ EB/WB # OF APPROACH LANES: 1

THE STUDY INTERSECTION HAS MORE THAN THREE APPROACHES (Y OR N): Y

ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000 (Y OR N): N

85TH PERCENTILE SPEED GREATER THAN 40 MPH ON MAJOR STREET (Y OR N): Y

	AM		PM	
WORST CASE DELAY FOR MINOR STREET APPROACH:	11.0	sec/veh	11.4	sec/veh
	0.18	veh-hr	0.11	veh-hr

			MAJOR STREET			MINOR STREET				
			EB Approach	WB Approach	Total	NB Approach	SB Approach	Heavy Leg	Total	Intersection Total
06:00 AM	TO	07:00 AM			0			0	0	0
07:00 AM	TO	08:00 AM	225	124	349	58	0	58	58	407
08:00 AM	TO	09:00 AM			0			0	0	0
09:00 AM	TO	10:00 AM			0			0	0	0
10:00 AM	TO	11:00 AM			0			0	0	0
11:00 AM	TO	12:00 PM			0			0	0	0
12:00 PM	TO	01:00 PM			0			0	0	0
01:00 PM	TO	02:00 PM			0			0	0	0
02:00 PM	TO	03:00 PM			0			0	0	0
03:00 PM	TO	04:00 PM			0			0	0	0
04:00 PM	TO	05:00 PM			0			0	0	0
05:00 PM	TO	06:00 PM	207	201	408	36	0	36	36	444
06:00 PM	TO	07:00 PM			0			0	0	0
07:00 PM	TO	08:00 PM			0			0	0	0
08:00 PM	TO	09:00 PM			0			0	0	0
09:00 PM	TO	10:00 PM			0			0	0	0

	MAJOR STREET		MINOR STREET			INTERSECTION
	Total		Heavy Leg	Total		Total
AM MAX	349	**AM MAX**	58	58	**AM MAX**	407
PM MAX	408	**PM MAX**	36	36	**PM MAX**	444

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Existing (2023) plus Project AM

Intersection: Green Valley Rd AND Shingle Springs Dr

Comments:

	PART A or PART B	SATISFIED	**NO**

PART A

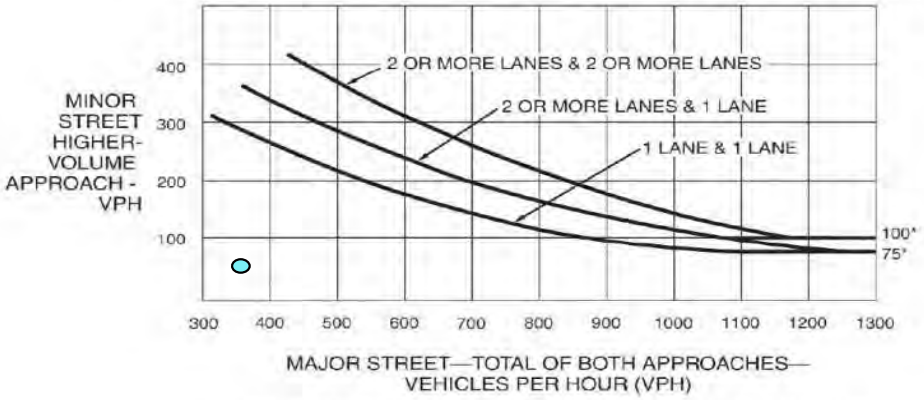
		SATISFIED	**NO**
(All parts 1, 2, and 3 below must be satisfied)			
1.	The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2.	The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		No
3.	The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B — SATISFIED **No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	349	
Highest Approach - Minor Street	58	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Existing (2023) plus Project PM

Intersection: Green Valley Rd AND Shingle Springs Dr

Comments:

	PART A or PART B	SATISFIED	**NO**

PART A

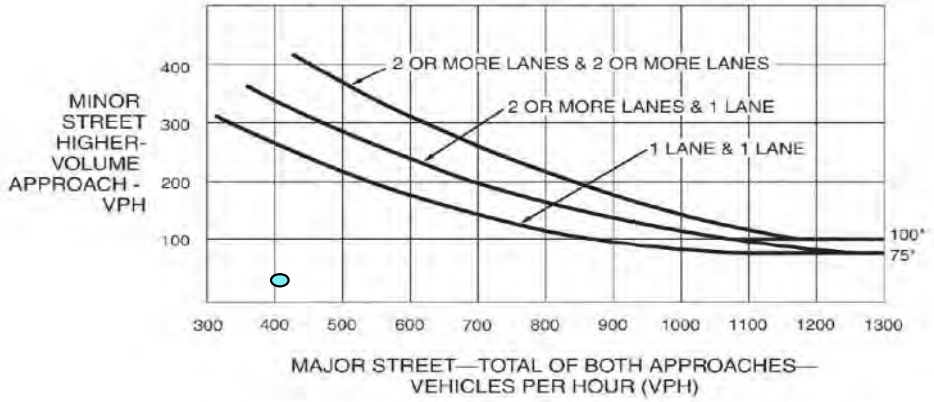
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		No
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B — SATISFIED **No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	408	
Highest Approach - Minor Street	36	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Kimley»Horn

PEAK HOUR SIGNAL WARRANT ANALYSIS (Warrant #3, California MUTCD 2014 Edition)

INT #3

PROJECT NAME: ***Red Hawk Casino***

SCENARIO: ***Existing (2023) plus Project***

COMMENTS:

MAJOR STREET: ***Green Valley Rd/Lotus Rd*** ☑ NB/SB ☐ EB/WB # OF APPROACH LANES: 1

MINOR STREET: ***Green Valley Rd*** ☐ NB/SB ☑ EB/WB # OF APPROACH LANES: 1

THE STUDY INTERSECTION HAS MORE THAN THREE APPROACHES (Y OR N): Y

ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000 (Y OR N): N

85TH PERCENTILE SPEED GREATER THAN 40 MPH ON MAJOR STREET (Y OR N): Y

	AM		PM	
WORST CASE DELAY FOR MINOR STREET APPROACH:	23.3	sec/veh	30.0	sec/veh
	0.98	veh-hr	1.67	veh-hr

			MAJOR STREET			MINOR STREET				
			NB Approach	SB Approach	Total	EB Approach	WB Approach	Heavy Leg	Total	Intersection Total
06:00 AM	TO	07:00 AM			0			0	0	0
07:00 AM	TO	08:00 AM	249	470	719	0	152	152	152	871
08:00 AM	TO	09:00 AM			0			0	0	0
09:00 AM	TO	10:00 AM			0			0	0	0
10:00 AM	TO	11:00 AM			0			0	0	0
11:00 AM	TO	12:00 PM			0			0	0	0
12:00 PM	TO	01:00 PM			0			0	0	0
01:00 PM	TO	02:00 PM			0			0	0	0
02:00 PM	TO	03:00 PM			0			0	0	0
03:00 PM	TO	04:00 PM			0			0	0	0
04:00 PM	TO	05:00 PM			0			0	0	0
05:00 PM	TO	06:00 PM	491	306	797	0	200	200	200	997
06:00 PM	TO	07:00 PM			0			0	0	0
07:00 PM	TO	08:00 PM			0			0	0	0
08:00 PM	TO	09:00 PM			0			0	0	0
09:00 PM	TO	10:00 PM			0			0	0	0

	MAJOR STREET		MINOR STREET			INTERSECTION
	Total		Heavy Leg	Total		Total
AM MAX	719	**AM MAX**	152	152	**AM MAX**	871
PM MAX	797	**PM MAX**	200	200	**PM MAX**	997

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Existing (2023) plus Project AM

Intersection: Green Valley Rd/Lotus Rd AND Green Valley Rd

Comments:

PART A or PART B	SATISFIED	**YES**

PART A

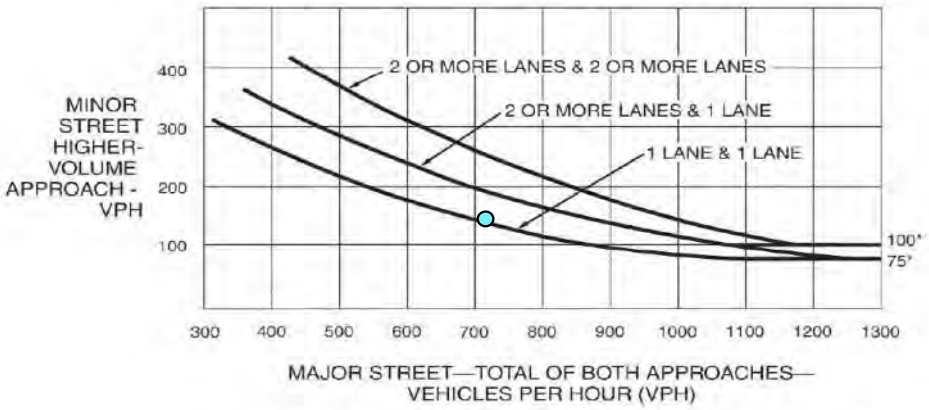
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		Yes
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		Yes

PART B — SATISFIED **Yes**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	719	
Highest Approach - Minor Street	152	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Red Hawk Casino

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Existing (2023) plus Project PM

Intersection: Green Valley Rd/Lotus Rd AND Green Valley Rd

Comments:

PART A or PART B	SATISFIED	**YES**

PART A

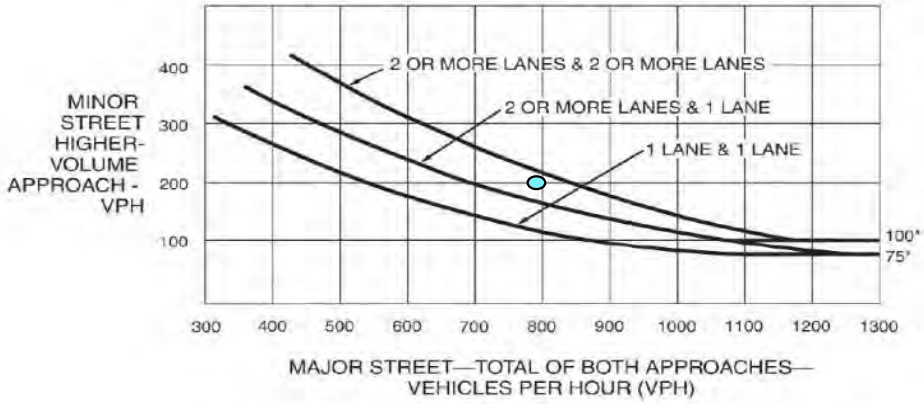
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		Yes
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		Yes

PART B	SATISFIED	**Yes**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	797	
Highest Approach - Minor Street	200	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Kimley»Horn

PEAK HOUR SIGNAL WARRANT ANALYSIS (Warrant #3, California MUTCD 2014 Edition)

INT #4

PROJECT NAME: ***Red Hawk Casino***

SCENARIO: ***Existing (2023) plus Project***

COMMENTS:

MAJOR STREET: ***Green Valley Rd*** ☐ NB/SB ☑ EB/WB # OF APPROACH LANES: 1

MINOR STREET: ***Greenstone Rd*** ☑ NB/SB ☐ EB/WB # OF APPROACH LANES: 1

THE STUDY INTERSECTION HAS MORE THAN THREE APPROACHES (Y OR N): Y

ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000 (Y OR N): N

85TH PERCENTILE SPEED GREATER THAN 40 MPH ON MAJOR STREET (Y OR N): Y

	AM		PM	
WORST CASE DELAY FOR MINOR STREET APPROACH:	11.9	sec/veh	12.9	sec/veh
	0.37	veh-hr	0.53	veh-hr

			MAJOR STREET			MINOR STREET				
			EB Approach	WB Approach	Total	NB Approach	SB Approach	Heavy Leg	Total	Intersection Total
06:00 AM	TO	07:00 AM			0			0	0	0
07:00 AM	TO	08:00 AM	278	116	394	112	0	112	112	506
08:00 AM	TO	09:00 AM			0			0	0	0
09:00 AM	TO	10:00 AM			0			0	0	0
10:00 AM	TO	11:00 AM			0			0	0	0
11:00 AM	TO	12:00 PM			0			0	0	0
12:00 PM	TO	01:00 PM			0			0	0	0
01:00 PM	TO	02:00 PM			0			0	0	0
02:00 PM	TO	03:00 PM			0			0	0	0
03:00 PM	TO	04:00 PM			0			0	0	0
04:00 PM	TO	05:00 PM			0			0	0	0
05:00 PM	TO	06:00 PM	208	195	403	149	0	149	149	552
06:00 PM	TO	07:00 PM			0			0	0	0
07:00 PM	TO	08:00 PM			0			0	0	0
08:00 PM	TO	09:00 PM			0			0	0	0
09:00 PM	TO	10:00 PM			0			0	0	0

	MAJOR STREET		MINOR STREET			INTERSECTION
	Total		Heavy Leg	Total		Total
AM MAX	394	**AM MAX**	112	112	**AM MAX**	506
PM MAX	403	**PM MAX**	149	149	**PM MAX**	552

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Existing (2023) plus Project AM

Intersection: Green Valley Rd AND Greenstone Rd

Comments:

PART A or PART B	SATISFIED	**NO**

PART A

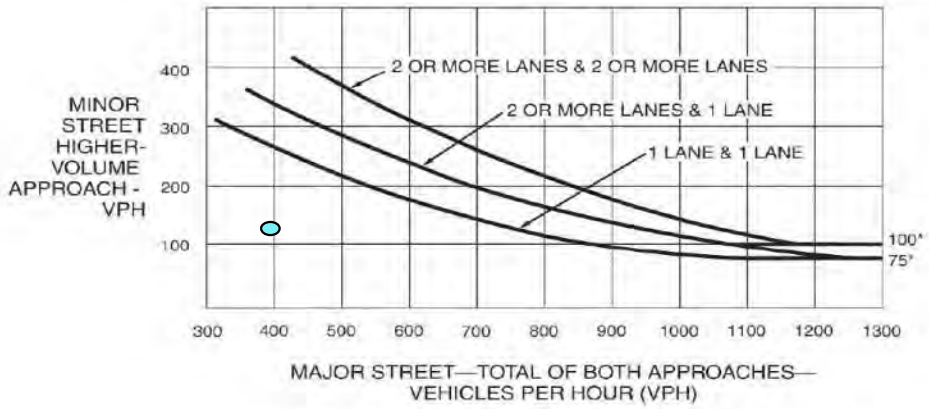
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		Yes
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B	SATISFIED	**No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	394	
Highest Approach - Minor Street	112	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Red Hawk Casino

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Existing (2023) plus Project PM

Intersection: Green Valley Rd AND Greenstone Rd

Comments:

PART A or PART B	SATISFIED	**NO**

PART A

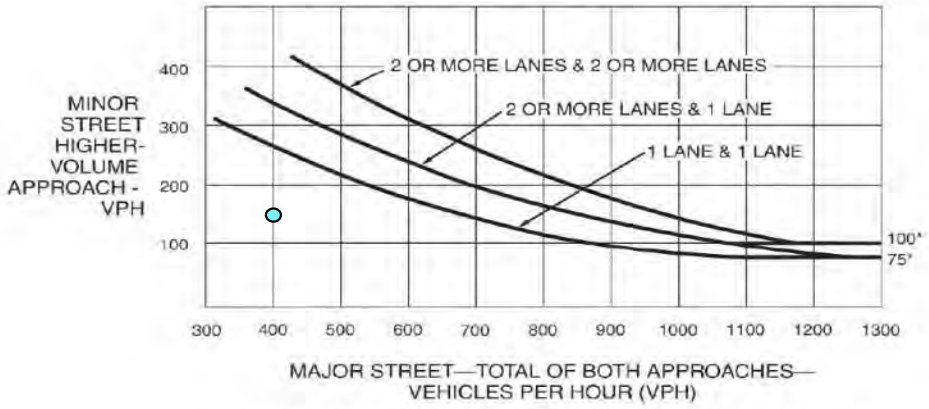
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		Yes
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B	SATISFIED	**No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	403	
Highest Approach - Minor Street	149	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Red Hawk Casino

Kimley»Horn

PEAK HOUR SIGNAL WARRANT ANALYSIS (Warrant #3, California MUTCD 2014 Edition)

INT #5

PROJECT NAME: ***Red Hawk Casino***

SCENARIO: ***Existing (2023) plus Project***

COMMENTS:

MAJOR STREET: ***Green Valley Rd/ Missouri Flat Rd*** ☐ NB/SB ☑ EB/WB # OF APPROACH LANES: 1

MINOR STREET: ***Green Valley Rd*** ☑ NB/SB ☐ EB/WB # OF APPROACH LANES: 1

THE STUDY INTERSECTION HAS MORE THAN THREE APPROACHES (Y OR N): Y

ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000 (Y OR N): N

85TH PERCENTILE SPEED GREATER THAN 40 MPH ON MAJOR STREET (Y OR N): Y

	AM		PM	
WORST CASE DELAY FOR MINOR STREET APPROACH:	15.8	sec/veh	13.3	sec/veh
	0.38	veh-hr	0.34	veh-hr

			MAJOR STREET			MINOR STREET				
			EB Approach	WB Approach	Total	NB Approach	SB Approach	Heavy Leg	Total	Intersection Total
06:00 AM	TO	07:00 AM			0			0	0	0
07:00 AM	TO	08:00 AM	330	345	675	0	87	87	87	762
08:00 AM	TO	09:00 AM			0			0	0	0
09:00 AM	TO	10:00 AM			0			0	0	0
10:00 AM	TO	11:00 AM			0			0	0	0
11:00 AM	TO	12:00 PM			0			0	0	0
12:00 PM	TO	01:00 PM			0			0	0	0
01:00 PM	TO	02:00 PM			0			0	0	0
02:00 PM	TO	03:00 PM			0			0	0	0
03:00 PM	TO	04:00 PM			0			0	0	0
04:00 PM	TO	05:00 PM			0			0	0	0
05:00 PM	TO	06:00 PM	207	258	465	0	93	93	93	558
06:00 PM	TO	07:00 PM			0			0	0	0
07:00 PM	TO	08:00 PM			0			0	0	0
08:00 PM	TO	09:00 PM			0			0	0	0
09:00 PM	TO	10:00 PM			0			0	0	0

	MAJOR STREET		MINOR STREET		INTERSECTION
	Total		Heavy Leg	Total	Total
AM MAX	675	**AM MAX**	87	87	**AM MAX** 762
PM MAX	465	**PM MAX**	93	93	**PM MAX** 558

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Existing (2023) plus Project AM

Intersection: Green Valley Rd/ Missouri Flat Rd AND Green Valley Rd

Comments:

PART A or PART B	SATISFIED	**NO**

PART A

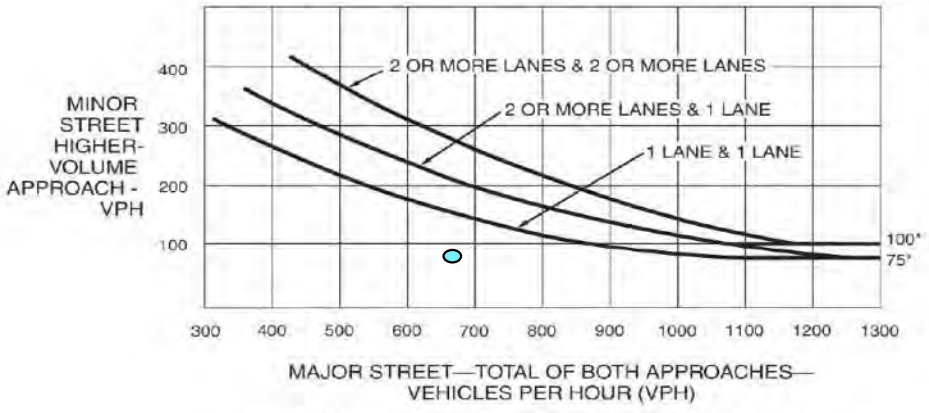
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		No
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B — SATISFIED **NO**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	675	
Highest Approach - Minor Street	87	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Red Hawk Casino

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Existing (2023) plus Project PM

Intersection: Green Valley Rd/ Missouri Flat Rd AND Green Valley Rd

Comments:

PART A or PART B	SATISFIED	**NO**

PART A

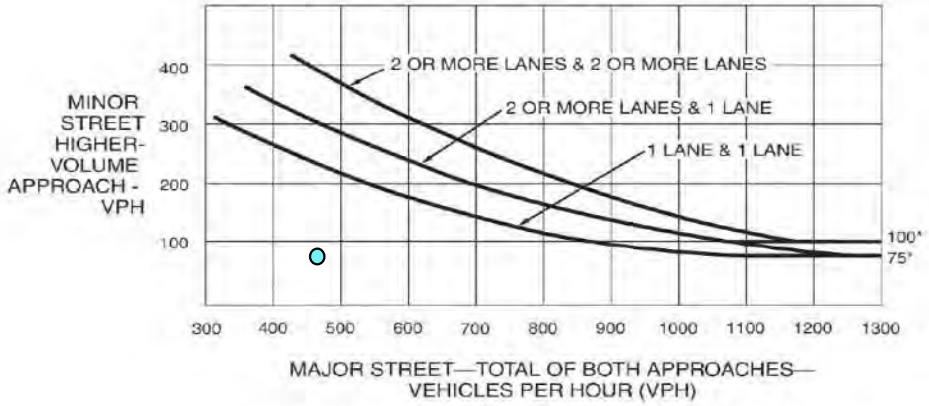
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		No
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B — SATISFIED **No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	465	
Highest Approach - Minor Street	93	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Kimley»Horn

PEAK HOUR SIGNAL WARRANT ANALYSIS (Warrant #3, California MUTCD 2014 Edition)

INT #8

PROJECT NAME: ***Red Hawk Casino***

SCENARIO: ***Existing (2023) plus Project***

COMMENTS:

MAJOR STREET: ***Green Valley Rd*** ☐ NB/SB ☑ EB/WB # OF APPROACH LANES: 1

MINOR STREET: ***Ponderosa Rd*** ☑ NB/SB ☐ EB/WB # OF APPROACH LANES: 1

THE STUDY INTERSECTION HAS MORE THAN THREE APPROACHES (Y OR N): Y

ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000 (Y OR N): N

85TH PERCENTILE SPEED GREATER THAN 40 MPH ON MAJOR STREET (Y OR N): Y

	AM		PM	
WORST CASE DELAY FOR MINOR STREET APPROACH:	15.9	sec/veh	12.0	sec/veh
	0.45	veh-hr	0.17	veh-hr

			MAJOR STREET			MINOR STREET				
			EB Approach	WB Approach	Total	NB Approach	SB Approach	Heavy Leg	Total	Intersection Total
06:00 AM	TO	07:00 AM			0			0	0	0
07:00 AM	TO	08:00 AM	295	250	545	102	0	102	102	647
08:00 AM	TO	09:00 AM			0			0	0	0
09:00 AM	TO	10:00 AM			0			0	0	0
10:00 AM	TO	11:00 AM			0			0	0	0
11:00 AM	TO	12:00 PM			0			0	0	0
12:00 PM	TO	01:00 PM			0			0	0	0
01:00 PM	TO	02:00 PM			0			0	0	0
02:00 PM	TO	03:00 PM			0			0	0	0
03:00 PM	TO	04:00 PM			0			0	0	0
04:00 PM	TO	05:00 PM			0			0	0	0
05:00 PM	TO	06:00 PM	259	200	459	50	0	50	50	509
06:00 PM	TO	07:00 PM			0			0	0	0
07:00 PM	TO	08:00 PM			0			0	0	0
08:00 PM	TO	09:00 PM			0			0	0	0
09:00 PM	TO	10:00 PM			0			0	0	0

	MAJOR STREET		MINOR STREET			INTERSECTION
	Total		Heavy Leg	Total		Total
AM MAX	545	**AM MAX**	102	102	**AM MAX**	647
PM MAX	459	**PM MAX**	50	50	**PM MAX**	509

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Existing (2023) plus Project AM

Intersection: Green Valley Rd AND Ponderosa Rd

Comments:

PART A or PART B	SATISFIED	**NO**

PART A

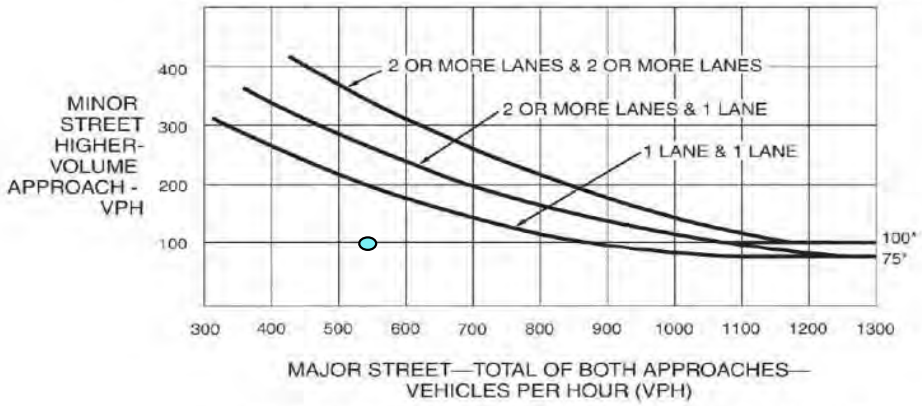
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		Yes
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B — SATISFIED **No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	545	
Highest Approach - Minor Street	102	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Existing (2023) plus Project PM

Intersection: Green Valley Rd AND Ponderosa Rd

Comments:

	PART A or PART B	SATISFIED	**NO**

PART A

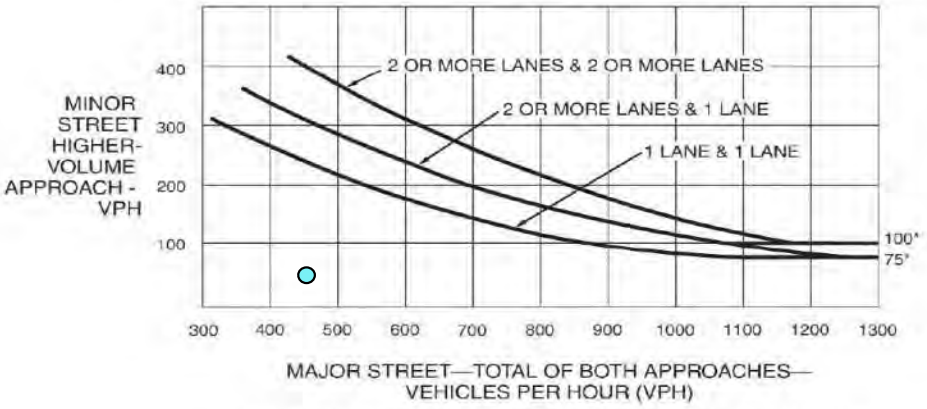
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		No
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B — SATISFIED **No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	459	
Highest Approach - Minor Street	50	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Red Hawk Casino

Kimley»Horn

PEAK HOUR SIGNAL WARRANT ANALYSIS (Warrant #3, California MUTCD 2014 Edition)

INT #8

PROJECT NAME: ***Red Hawk Casino***

SCENARIO: ***Existing (2023) plus Project***

COMMENTS:

MAJOR STREET: ***Green Valley Rd*** ☐ NB/SB ☑ EB/WB # OF APPROACH LANES: 1

MINOR STREET: ***Deer Valley Rd*** ☑ NB/SB ☐ EB/WB # OF APPROACH LANES: 1

THE STUDY INTERSECTION HAS MORE THAN THREE APPROACHES (Y OR N): Y

ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000 (Y OR N): N

85TH PERCENTILE SPEED GREATER THAN 40 MPH ON MAJOR STREET (Y OR N): Y

	AM		PM	
WORST CASE DELAY FOR MINOR STREET APPROACH:	15.9	sec/veh	12.0	sec/veh
	0.45	veh-hr	0.17	veh-hr

			MAJOR STREET			MINOR STREET				
			EB Approach	WB Approach	Total	NB Approach	SB Approach	Heavy Leg	Total	Intersection Total
06:00 AM	TO	07:00 AM			0			0	0	0
07:00 AM	TO	08:00 AM	295	250	545	102	0	102	102	647
08:00 AM	TO	09:00 AM			0			0	0	0
09:00 AM	TO	10:00 AM			0			0	0	0
10:00 AM	TO	11:00 AM			0			0	0	0
11:00 AM	TO	12:00 PM			0			0	0	0
12:00 PM	TO	01:00 PM			0			0	0	0
01:00 PM	TO	02:00 PM			0			0	0	0
02:00 PM	TO	03:00 PM			0			0	0	0
03:00 PM	TO	04:00 PM			0			0	0	0
04:00 PM	TO	05:00 PM			0			0	0	0
05:00 PM	TO	06:00 PM	259	200	459	50	0	50	50	509
06:00 PM	TO	07:00 PM			0			0	0	0
07:00 PM	TO	08:00 PM			0			0	0	0
08:00 PM	TO	09:00 PM			0			0	0	0
09:00 PM	TO	10:00 PM			0			0	0	0

	MAJOR STREET		MINOR STREET			INTERSECTION
	Total		Heavy Leg	Total		Total
AM MAX	545	**AM MAX**	102	102	**AM MAX**	647
PM MAX	459	**PM MAX**	50	50	**PM MAX**	509

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Existing (2023) plus Project AM

Intersection: Green Valley Rd AND Deer Valley Rd

Comments:

PART A or PART B	SATISFIED	**NO**

PART A

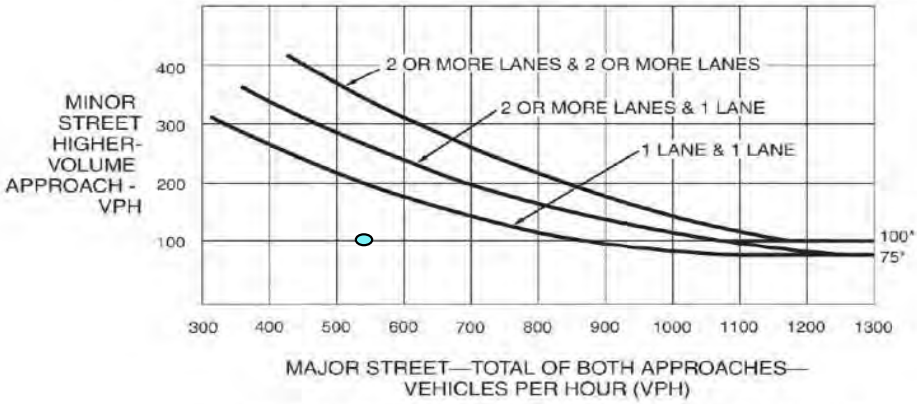
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		Yes
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B	SATISFIED	**No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	545	
Highest Approach - Minor Street	102	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Red Hawk Casino

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Existing (2023) plus Project PM

Intersection: Green Valley Rd AND Deer Valley Rd

Comments:

PART A or PART B	SATISFIED	**NO**

PART A

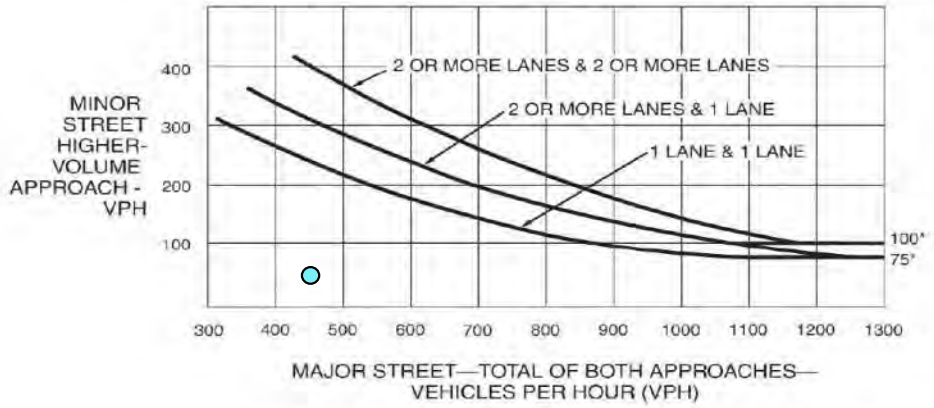
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		No
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B — SATISFIED **No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	459	
Highest Approach - Minor Street	50	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Red Hawk Casino

Kimley»Horn

PEAK HOUR SIGNAL WARRANT ANALYSIS (Warrant #3, California MUTCD 2014 Edition)

INT #2

PROJECT NAME: *Red Hawk Casino*

SCENARIO: *Cumulative (2043)*

COMMENTS:

MAJOR STREET: *Green Valley Rd* ☐ NB/SB ☑ EB/WB # OF APPROACH LANES: 1

MINOR STREET: *Shingle Springs Dr* ☑ NB/SB ☐ EB/WB # OF APPROACH LANES: 1

THE STUDY INTERSECTION HAS MORE THAN THREE APPROACHES (Y OR N): Y

ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000 (Y OR N): N

85TH PERCENTILE SPEED GREATER THAN 40 MPH ON MAJOR STREET (Y OR N): Y

	AM		PM	
WORST CASE DELAY FOR MINOR STREET APPROACH:	0.0	sec/veh	9.3	sec/veh
	0.00	veh-hr	0.03	veh-hr

			MAJOR STREET			MINOR STREET				
			EB Approach	WB Approach	Total	NB Approach	SB Approach	Heavy Leg	Total	Intersection Total
06:00 AM	TO	07:00 AM			0			0	0	0
07:00 AM	TO	08:00 AM	230	120	350	0	0	0	0	350
08:00 AM	TO	09:00 AM			0			0	0	0
09:00 AM	TO	10:00 AM			0			0	0	0
10:00 AM	TO	11:00 AM			0			0	0	0
11:00 AM	TO	12:00 PM			0			0	0	0
12:00 PM	TO	01:00 PM			0			0	0	0
01:00 PM	TO	02:00 PM			0			0	0	0
02:00 PM	TO	03:00 PM			0			0	0	0
03:00 PM	TO	04:00 PM			0			0	0	0
04:00 PM	TO	05:00 PM			0			0	0	0
05:00 PM	TO	06:00 PM	190	200	390	10	0	10	10	400
06:00 PM	TO	07:00 PM			0			0	0	0
07:00 PM	TO	08:00 PM			0			0	0	0
08:00 PM	TO	09:00 PM			0			0	0	0
09:00 PM	TO	10:00 PM			0			0	0	0

	MAJOR STREET		MINOR STREET			INTERSECTION
	Total		Heavy Leg	Total		Total
AM MAX	350	**AM MAX**	0	0	**AM MAX**	350
PM MAX	390	**PM MAX**	10	10	**PM MAX**	400

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Cumulative (2043) AM

Intersection: Green Valley Rd AND Shingle Springs Dr

Comments:

PART A or PART B	SATISFIED	**NO**

PART A

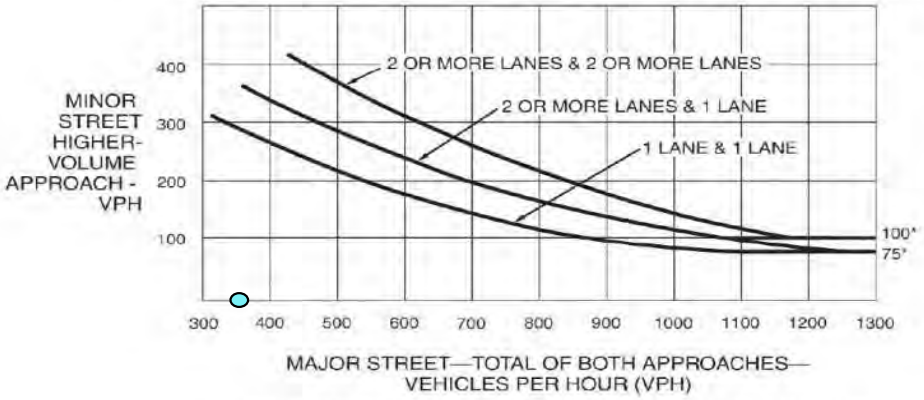
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		No
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B	SATISFIED	**No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	350	
Highest Approach - Minor Street	0	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Cumulative (2043) PM

Intersection: Green Valley Rd AND Shingle Springs Dr

Comments:

	PART A or PART B	SATISFIED	**NO**

PART A

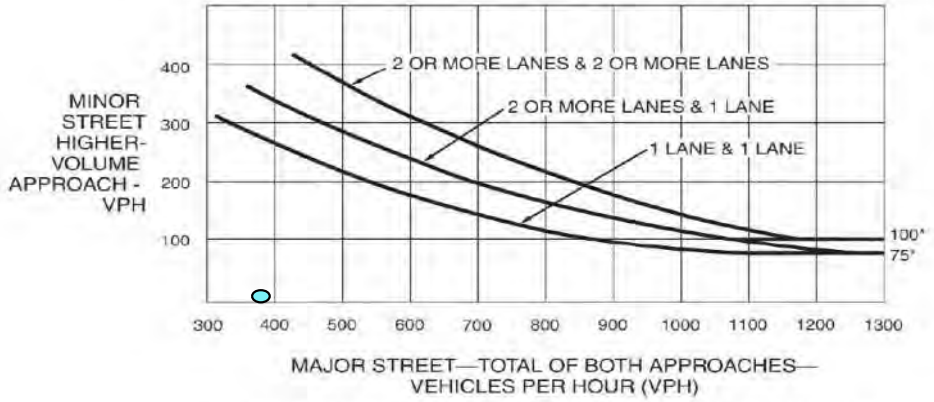
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		No
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B — SATISFIED **No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	390	
Highest Approach - Minor Street	10	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Kimley»Horn

PEAK HOUR SIGNAL WARRANT ANALYSIS (Warrant #3, California MUTCD 2014 Edition)

INT #3

PROJECT NAME: ***Red Hawk Casino***

SCENARIO: ***Cumulative (2043)***

COMMENTS:

MAJOR STREET: ***Green Valley Rd/Lotus Rd*** ☑ NB/SB ☐ EB/WB # OF APPROACH LANES: 1

MINOR STREET: ***Green Valley Rd*** ☐ NB/SB ☑ EB/WB # OF APPROACH LANES: 1

THE STUDY INTERSECTION HAS MORE THAN THREE APPROACHES (Y OR N): Y

ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000 (Y OR N): N

85TH PERCENTILE SPEED GREATER THAN 40 MPH ON MAJOR STREET (Y OR N): Y

	AM		PM	
WORST CASE DELAY FOR MINOR STREET APPROACH:	18.9	sec/veh	24.2	sec/veh
	0.68	veh-hr	1.34	veh-hr

			MAJOR STREET			MINOR STREET				
			NB Approach	SB Approach	Total	EB Approach	WB Approach	Heavy Leg	Total	Intersection Total
06:00 AM	TO	07:00 AM			0			0	0	0
07:00 AM	TO	08:00 AM	260	490	750	0	130	130	130	880
08:00 AM	TO	09:00 AM			0			0	0	0
09:00 AM	TO	10:00 AM			0			0	0	0
10:00 AM	TO	11:00 AM			0			0	0	0
11:00 AM	TO	12:00 PM			0			0	0	0
12:00 PM	TO	01:00 PM			0			0	0	0
01:00 PM	TO	02:00 PM			0			0	0	0
02:00 PM	TO	03:00 PM			0			0	0	0
03:00 PM	TO	04:00 PM			0			0	0	0
04:00 PM	TO	05:00 PM			0			0	0	0
05:00 PM	TO	06:00 PM	470	320	790	0	200	200	200	990
06:00 PM	TO	07:00 PM			0			0	0	0
07:00 PM	TO	08:00 PM			0			0	0	0
08:00 PM	TO	09:00 PM			0			0	0	0
09:00 PM	TO	10:00 PM			0			0	0	0

	MAJOR STREET		MINOR STREET		INTERSECTION
	Total		Heavy Leg	Total	Total
AM MAX	750	**AM MAX**	130	130	**AM MAX** 880
PM MAX	790	**PM MAX**	200	200	**PM MAX** 990

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Cumulative (2043) AM

Intersection: Green Valley Rd/Lotus Rd AND Green Valley Rd

Comments:

	PART A or PART B	SATISFIED	**YES**

PART A

(All parts 1, 2, and 3 below must be satisfied) SATISFIED **NO**

1.	The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND	No
2.	The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND	Yes
3.	The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.	Yes

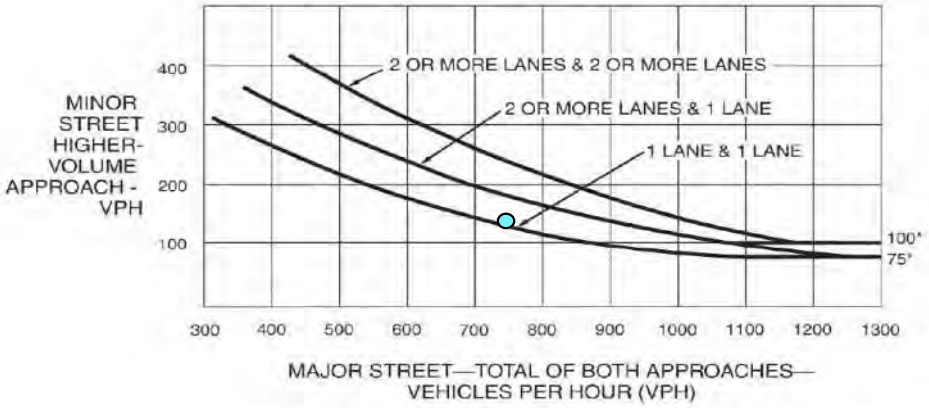
PART B SATISFIED **Yes**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	750	
Highest Approach - Minor Street	130	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Red Hawk Casino

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Cumulative (2043) PM

Intersection: Green Valley Rd/Lotus Rd AND Green Valley Rd

Comments:

PART A or PART B	SATISFIED	**YES**

PART A

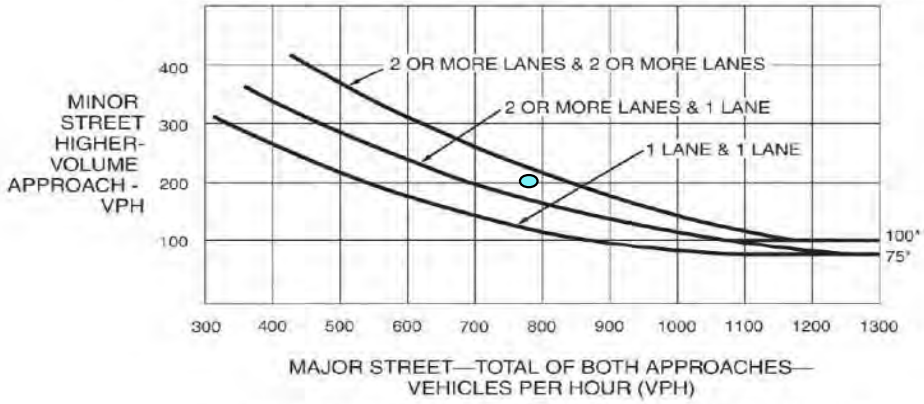
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		Yes
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		Yes

PART B — SATISFIED **Yes**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	790	
Highest Approach - Minor Street	200	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Kimley»Horn

PEAK HOUR SIGNAL WARRANT ANALYSIS (Warrant #3, California MUTCD 2014 Edition)

INT #4

PROJECT NAME: ***Red Hawk Casino***

SCENARIO: ***Cumulative (2043)***

COMMENTS:

MAJOR STREET: ***Green Valley Rd*** ☐ NB/SB ☑ EB/WB # OF APPROACH LANES: 1

MINOR STREET: ***Greenstone Rd*** ☑ NB/SB ☐ EB/WB # OF APPROACH LANES: 1

THE STUDY INTERSECTION HAS MORE THAN THREE APPROACHES (Y OR N): Y

ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000 (Y OR N): N

85TH PERCENTILE SPEED GREATER THAN 40 MPH ON MAJOR STREET (Y OR N): Y

	AM		PM	
WORST CASE DELAY FOR MINOR STREET APPROACH:	11.8	sec/veh	12.8	sec/veh
	0.46	veh-hr	0.60	veh-hr

			MAJOR STREET			MINOR STREET				
			EB Approach	WB Approach	Total	NB Approach	SB Approach	Heavy Leg	Total	Intersection Total
06:00 AM	TO	07:00 AM			0			0	0	0
07:00 AM	TO	08:00 AM	260	120	380	140	0	140	140	520
08:00 AM	TO	09:00 AM			0			0	0	0
09:00 AM	TO	10:00 AM			0			0	0	0
10:00 AM	TO	11:00 AM			0			0	0	0
11:00 AM	TO	12:00 PM			0			0	0	0
12:00 PM	TO	01:00 PM			0			0	0	0
01:00 PM	TO	02:00 PM			0			0	0	0
02:00 PM	TO	03:00 PM			0			0	0	0
03:00 PM	TO	04:00 PM			0			0	0	0
04:00 PM	TO	05:00 PM			0			0	0	0
05:00 PM	TO	06:00 PM	200	200	400	170	0	170	170	570
06:00 PM	TO	07:00 PM			0			0	0	0
07:00 PM	TO	08:00 PM			0			0	0	0
08:00 PM	TO	09:00 PM			0			0	0	0
09:00 PM	TO	10:00 PM			0			0	0	0

	MAJOR STREET		MINOR STREET			INTERSECTION
	Total		Heavy Leg	Total		Total
AM MAX	380	**AM MAX**	140	140	**AM MAX**	520
PM MAX	400	**PM MAX**	170	170	**PM MAX**	570

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Cumulative (2043) AM

Intersection: Green Valley Rd AND Greenstone Rd

Comments:

	PART A or PART B	SATISFIED	**NO**

PART A

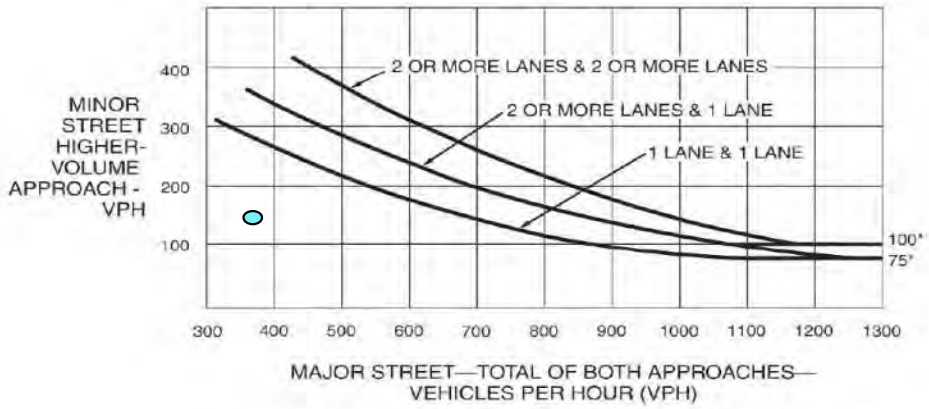
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		Yes
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B SATISFIED **No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	380	
Highest Approach - Minor Street	140	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Red Hawk Casino

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Cumulative (2043) PM

Intersection: Green Valley Rd AND Greenstone Rd

Comments:

PART A or PART B	SATISFIED	**NO**

PART A

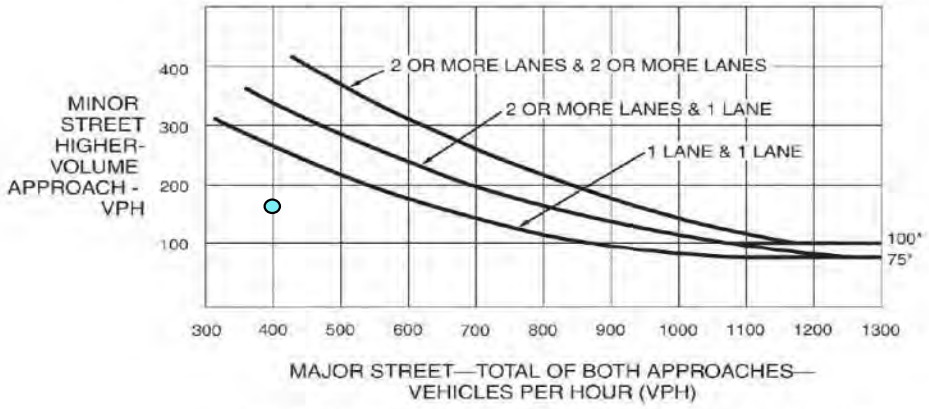
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		Yes
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B	SATISFIED	**No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	400	
Highest Approach - Minor Street	170	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Kimley»Horn

PEAK HOUR SIGNAL WARRANT ANALYSIS (Warrant #3, California MUTCD 2014 Edition)

INT #5

PROJECT NAME: *Red Hawk Casino*

SCENARIO: *Cumulative (2043)*

COMMENTS:

MAJOR STREET: *Green Valley Rd/ Missouri Flat Rd* ☐ NB/SB ☑ EB/WB # OF APPROACH LANES: 1

MINOR STREET: *Green Valley Rd* ☑ NB/SB ☐ EB/WB # OF APPROACH LANES: 1

THE STUDY INTERSECTION HAS MORE THAN THREE APPROACHES (Y OR N): Y

ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000 (Y OR N): N

85TH PERCENTILE SPEED GREATER THAN 40 MPH ON MAJOR STREET (Y OR N): Y

	AM		PM	
WORST CASE DELAY FOR MINOR STREET APPROACH:	13.9	sec/veh	11.9	sec/veh
	0.39	veh-hr	0.33	veh-hr

			MAJOR STREET			MINOR STREET				
			EB Approach	WB Approach	Total	NB Approach	SB Approach	Heavy Leg	Total	Intersection Total
06:00 AM	TO	07:00 AM			0			0	0	0
07:00 AM	TO	08:00 AM	340	350	690	0	100	100	100	790
08:00 AM	TO	09:00 AM			0			0	0	0
09:00 AM	TO	10:00 AM			0			0	0	0
10:00 AM	TO	11:00 AM			0			0	0	0
11:00 AM	TO	12:00 PM			0			0	0	0
12:00 PM	TO	01:00 PM			0			0	0	0
01:00 PM	TO	02:00 PM			0			0	0	0
02:00 PM	TO	03:00 PM			0			0	0	0
03:00 PM	TO	04:00 PM			0			0	0	0
04:00 PM	TO	05:00 PM			0			0	0	0
05:00 PM	TO	06:00 PM	210	270	480	0	100	100	100	580
06:00 PM	TO	07:00 PM			0			0	0	0
07:00 PM	TO	08:00 PM			0			0	0	0
08:00 PM	TO	09:00 PM			0			0	0	0
09:00 PM	TO	10:00 PM			0			0	0	0

	MAJOR STREET		MINOR STREET			INTERSECTION
	Total		Heavy Leg	Total		Total
AM MAX	690	**AM MAX**	100	100	**AM MAX**	790
PM MAX	480	**PM MAX**	100	100	**PM MAX**	580

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Cumulative (2043) AM

Intersection: Green Valley Rd/ Missouri Flat Rd AND Green Valley Rd

Comments:

PART A or PART B	SATISFIED	**NO**

PART A

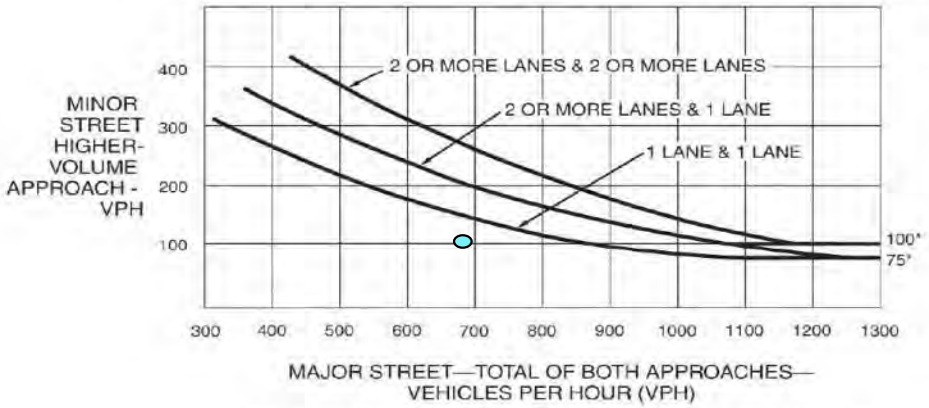
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		Yes
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B — SATISFIED **NO**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	690	
Highest Approach - Minor Street	100	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Red Hawk Casino

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Cumulative (2043) PM

Intersection: Green Valley Rd/ Missouri Flat Rd AND Green Valley Rd

Comments:

PART A or PART B	SATISFIED	**NO**

PART A

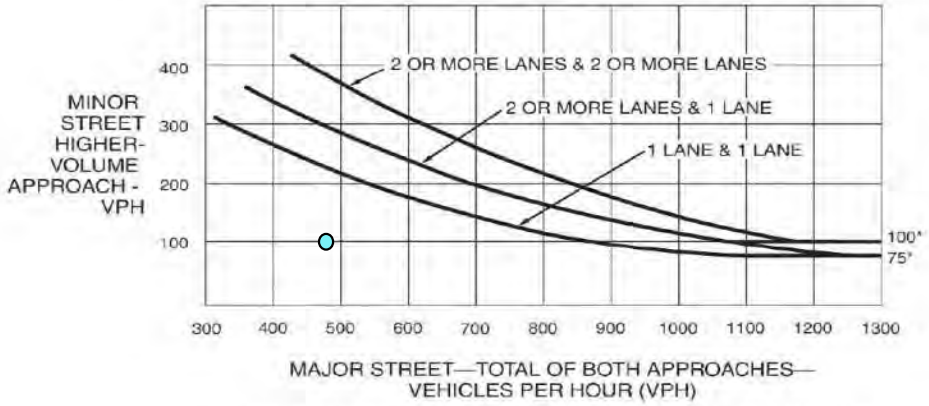
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		Yes
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B	SATISFIED	**No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	480	
Highest Approach - Minor Street	100	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Red Hawk Casino

Kimley»Horn

PEAK HOUR SIGNAL WARRANT ANALYSIS (Warrant #3, California MUTCD 2014 Edition)

INT #8

PROJECT NAME: *Red Hawk Casino*

SCENARIO: *Cumulative (2043)*

COMMENTS:

MAJOR STREET: *Green Valley Rd* ☐ NB/SB ☑ EB/WB # OF APPROACH LANES: 1

MINOR STREET: *Ponderosa Rd* ☑ NB/SB ☐ EB/WB # OF APPROACH LANES: 1

THE STUDY INTERSECTION HAS MORE THAN THREE APPROACHES (Y OR N): Y

ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000 (Y OR N): N

85TH PERCENTILE SPEED GREATER THAN 40 MPH ON MAJOR STREET (Y OR N): Y

	AM		PM	
WORST CASE DELAY FOR MINOR STREET APPROACH:	13.5	sec/veh	11.4	sec/veh
	0.41	veh-hr	0.19	veh-hr

			MAJOR STREET			MINOR STREET				
			EB Approach	WB Approach	Total	NB Approach	SB Approach	Heavy Leg	Total	Intersection Total
06:00 AM	TO	07:00 AM			0			0	0	0
07:00 AM	TO	08:00 AM	300	230	530	110	0	110	110	640
08:00 AM	TO	09:00 AM			0			0	0	0
09:00 AM	TO	10:00 AM			0			0	0	0
10:00 AM	TO	11:00 AM			0			0	0	0
11:00 AM	TO	12:00 PM			0			0	0	0
12:00 PM	TO	01:00 PM			0			0	0	0
01:00 PM	TO	02:00 PM			0			0	0	0
02:00 PM	TO	03:00 PM			0			0	0	0
03:00 PM	TO	04:00 PM			0			0	0	0
04:00 PM	TO	05:00 PM			0			0	0	0
05:00 PM	TO	06:00 PM	250	200	450	60	0	60	60	510
06:00 PM	TO	07:00 PM			0			0	0	0
07:00 PM	TO	08:00 PM			0			0	0	0
08:00 PM	TO	09:00 PM			0			0	0	0
09:00 PM	TO	10:00 PM			0			0	0	0

	MAJOR STREET		MINOR STREET			INTERSECTION
	Total		Heavy Leg	Total		Total
AM MAX	530	**AM MAX**	110	110	**AM MAX**	640
PM MAX	450	**PM MAX**	60	60	**PM MAX**	510

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Cumulative (2043) AM

Intersection: Green Valley Rd AND Ponderosa Rd

Comments:

PART A or PART B	SATISFIED	**NO**

PART A

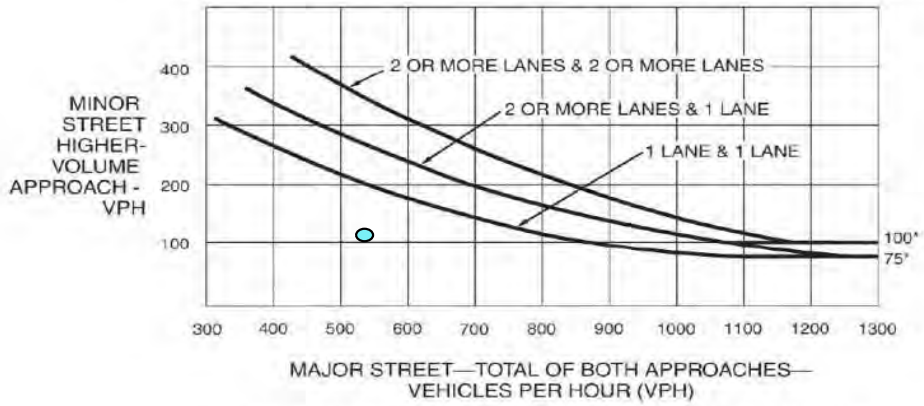
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		Yes
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B	SATISFIED	**No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	530	
Highest Approach - Minor Street	110	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Red Hawk Casino

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Cumulative (2043) PM

Intersection: Green Valley Rd AND Ponderosa Rd

Comments:

	PART A or PART B	SATISFIED	**NO**

PART A

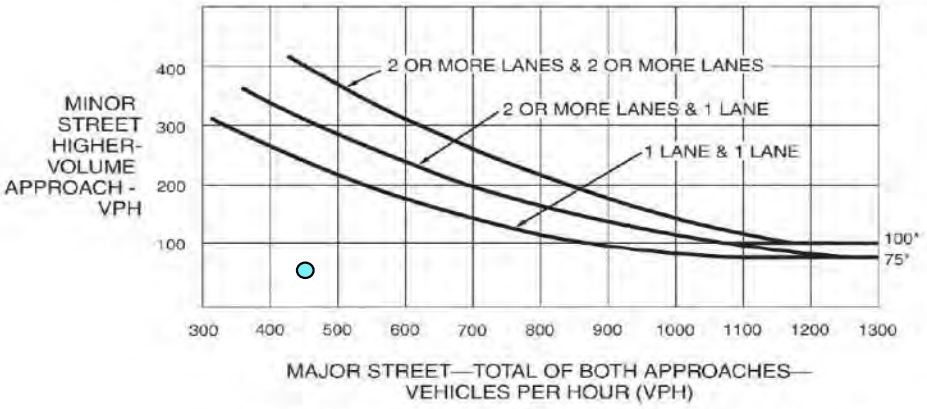
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		No
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B — SATISFIED **No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	450	
Highest Approach - Minor Street	60	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Red Hawk Casino

Kimley»Horn

PEAK HOUR SIGNAL WARRANT ANALYSIS (Warrant #3, California MUTCD 2014 Edition)

INT #8

PROJECT NAME: ***Red Hawk Casino***

SCENARIO: ***Cumulative (2043)***

COMMENTS:

MAJOR STREET: ***Green Valley Rd*** ☐ NB/SB ☑ EB/WB # OF APPROACH LANES: 1

MINOR STREET: ***Deer Valley Rd*** ☑ NB/SB ☐ EB/WB # OF APPROACH LANES: 1

THE STUDY INTERSECTION HAS MORE THAN THREE APPROACHES (Y OR N): Y

ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000 (Y OR N): N

85TH PERCENTILE SPEED GREATER THAN 40 MPH ON MAJOR STREET (Y OR N): Y

	AM		PM	
WORST CASE DELAY FOR MINOR STREET APPROACH:	13.5	sec/veh	11.4	sec/veh
	0.41	veh-hr	0.19	veh-hr

			MAJOR STREET			MINOR STREET				
			EB Approach	WB Approach	Total	NB Approach	SB Approach	Heavy Leg	Total	Intersection Total
06:00 AM	TO	07:00 AM			0			0	0	0
07:00 AM	TO	08:00 AM	300	230	530	110	0	110	110	640
08:00 AM	TO	09:00 AM			0			0	0	0
09:00 AM	TO	10:00 AM			0			0	0	0
10:00 AM	TO	11:00 AM			0			0	0	0
11:00 AM	TO	12:00 PM			0			0	0	0
12:00 PM	TO	01:00 PM			0			0	0	0
01:00 PM	TO	02:00 PM			0			0	0	0
02:00 PM	TO	03:00 PM			0			0	0	0
03:00 PM	TO	04:00 PM			0			0	0	0
04:00 PM	TO	05:00 PM			0			0	0	0
05:00 PM	TO	06:00 PM	250	200	450	60	0	60	60	510
06:00 PM	TO	07:00 PM			0			0	0	0
07:00 PM	TO	08:00 PM			0			0	0	0
08:00 PM	TO	09:00 PM			0			0	0	0
09:00 PM	TO	10:00 PM			0			0	0	0

	MAJOR STREET		MINOR STREET			INTERSECTION
	Total		Heavy Leg	Total		Total
AM MAX	530	**AM MAX**	110	110	**AM MAX**	640
PM MAX	450	**PM MAX**	60	60	**PM MAX**	510

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Cumulative (2043) AM

Intersection: Green Valley Rd AND Deer Valley Rd

Comments:

	PART A or PART B	SATISFIED	**NO**

PART A

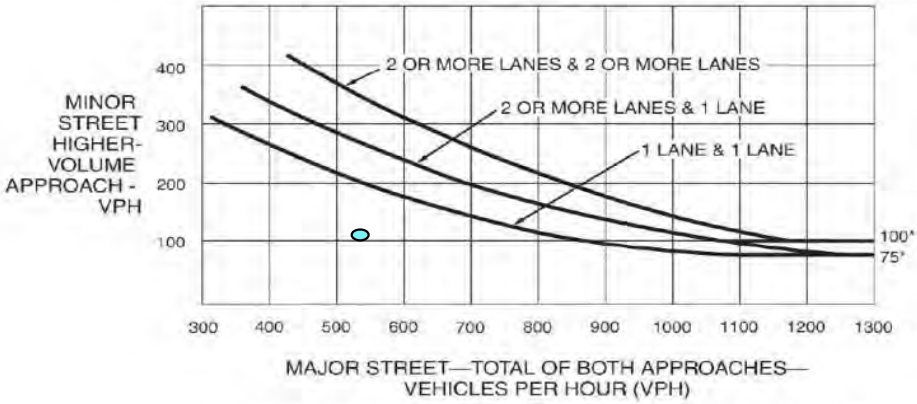
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		Yes
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B SATISFIED **No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	530	
Highest Approach - Minor Street	110	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Red Hawk Casino

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Cumulative (2043) PM

Intersection: Green Valley Rd AND Deer Valley Rd

Comments:

PART A or PART B	SATISFIED	**NO**

PART A

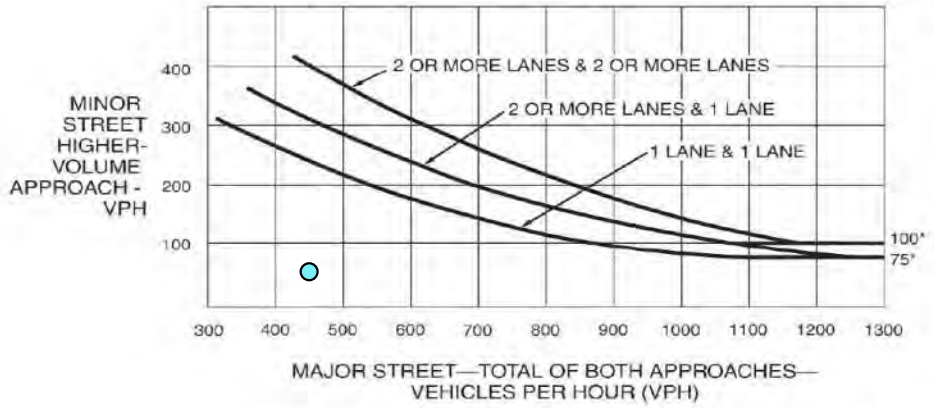
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		No
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B SATISFIED **No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	450	
Highest Approach - Minor Street	60	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Red Hawk Casino

Kimley»Horn

PEAK HOUR SIGNAL WARRANT ANALYSIS (Warrant #3, California MUTCD 2014 Edition)

INT #2

PROJECT NAME: *Red Hawk Casino*

SCENARIO: *Cumulative (2043) plus Project*

COMMENTS:

MAJOR STREET: *Green Valley Rd* ☐ NB/SB ☑ EB/WB # OF APPROACH LANES: 1

MINOR STREET: *Shingle Springs Dr* ☑ NB/SB ☐ EB/WB # OF APPROACH LANES: 1

THE STUDY INTERSECTION HAS MORE THAN THREE APPROACHES (Y OR N): Y

ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000 (Y OR N): N

85TH PERCENTILE SPEED GREATER THAN 40 MPH ON MAJOR STREET (Y OR N): Y

	AM		PM	
WORST CASE DELAY FOR MINOR STREET APPROACH:	10.9	sec/veh	11.1	sec/veh
	0.18	veh-hr	0.14	veh-hr

			MAJOR STREET			MINOR STREET				
			EB Approach	WB Approach	Total	NB Approach	SB Approach	Heavy Leg	Total	Intersection Total
06:00 AM	TO	07:00 AM			0			0	0	0
07:00 AM	TO	08:00 AM	241	128	369	58	0	58	58	427
08:00 AM	TO	09:00 AM			0			0	0	0
09:00 AM	TO	10:00 AM			0			0	0	0
10:00 AM	TO	11:00 AM			0			0	0	0
11:00 AM	TO	12:00 PM			0			0	0	0
12:00 PM	TO	01:00 PM			0			0	0	0
01:00 PM	TO	02:00 PM			0			0	0	0
02:00 PM	TO	03:00 PM			0			0	0	0
03:00 PM	TO	04:00 PM			0			0	0	0
04:00 PM	TO	05:00 PM			0			0	0	0
05:00 PM	TO	06:00 PM	224	225	449	45	0	45	45	494
06:00 PM	TO	07:00 PM			0			0	0	0
07:00 PM	TO	08:00 PM			0			0	0	0
08:00 PM	TO	09:00 PM			0			0	0	0
09:00 PM	TO	10:00 PM			0			0	0	0

	MAJOR STREET		MINOR STREET			INTERSECTION
	Total		Heavy Leg	Total		Total
AM MAX	369	AM MAX	58	58	AM MAX	427
PM MAX	449	PM MAX	45	45	PM MAX	494

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Cumulative (2043) plus Project AM

Intersection: Green Valley Rd AND Shingle Springs Dr

Comments:

	PART A or PART B	SATISFIED	**NO**

PART A

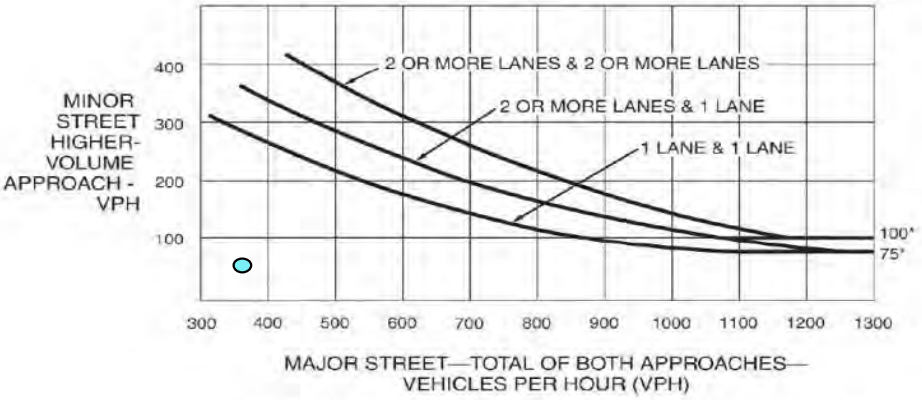
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		No
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B — SATISFIED **No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	369	
Highest Approach - Minor Street	58	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Cumulative (2043) plus Project PM

Intersection: Green Valley Rd AND Shingle Springs Dr

Comments:

	PART A or PART B	SATISFIED	**NO**

PART A

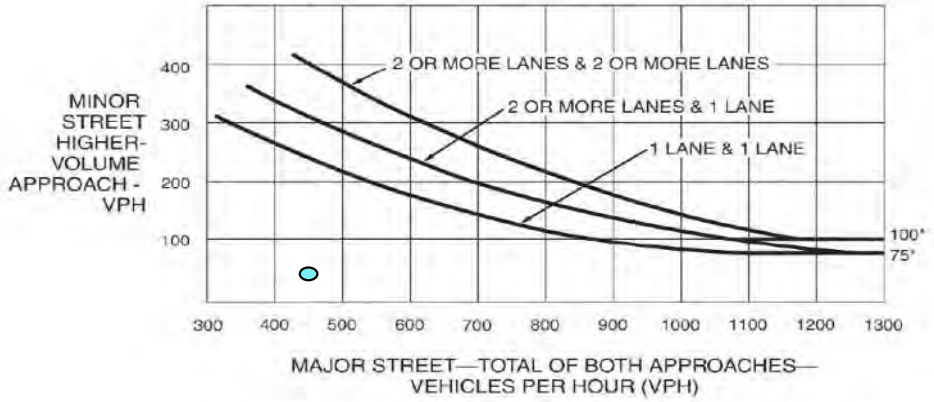
		SATISFIED	**NO**
(All parts 1, 2, and 3 below must be satisfied)			
1.	The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2.	The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		No
3.	The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B — SATISFIED **No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	449	
Highest Approach - Minor Street	45	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Kimley»Horn

PEAK HOUR SIGNAL WARRANT ANALYSIS (Warrant #3, California MUTCD 2014 Edition)

INT #3

PROJECT NAME: ***Red Hawk Casino***

SCENARIO: ***Cumulative (2043) plus Project***

COMMENTS:

MAJOR STREET: ***Green Valley Rd/Lotus Rd*** ☑ NB/SB ☐ EB/WB # OF APPROACH LANES: 1

MINOR STREET: ***Green Valley Rd*** ☐ NB/SB ☑ EB/WB # OF APPROACH LANES: 1

THE STUDY INTERSECTION HAS MORE THAN THREE APPROACHES (Y OR N): Y

ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000 (Y OR N): N

85TH PERCENTILE SPEED GREATER THAN 40 MPH ON MAJOR STREET (Y OR N): Y

	AM		PM	
WORST CASE DELAY FOR MINOR STREET APPROACH:	23.4	sec/veh	30.5	sec/veh
	1.06	veh-hr	1.87	veh-hr

			MAJOR STREET			MINOR STREET				
			NB Approach	SB Approach	Total	EB Approach	WB Approach	Heavy Leg	Total	Intersection Total
06:00 AM	TO	07:00 AM			0			0	0	0
07:00 AM	TO	08:00 AM	270	491	761	0	163	163	163	924
08:00 AM	TO	09:00 AM			0			0	0	0
09:00 AM	TO	10:00 AM			0			0	0	0
10:00 AM	TO	11:00 AM			0			0	0	0
11:00 AM	TO	12:00 PM			0			0	0	0
12:00 PM	TO	01:00 PM			0			0	0	0
01:00 PM	TO	02:00 PM			0			0	0	0
02:00 PM	TO	03:00 PM			0			0	0	0
03:00 PM	TO	04:00 PM			0			0	0	0
04:00 PM	TO	05:00 PM			0			0	0	0
05:00 PM	TO	06:00 PM	499	324	823	0	221	221	221	1044
06:00 PM	TO	07:00 PM			0			0	0	0
07:00 PM	TO	08:00 PM			0			0	0	0
08:00 PM	TO	09:00 PM			0			0	0	0
09:00 PM	TO	10:00 PM			0			0	0	0

	MAJOR STREET		MINOR STREET			INTERSECTION
	Total		Heavy Leg	Total		Total
AM MAX	761	**AM MAX**	163	163	**AM MAX**	924
PM MAX	823	**PM MAX**	221	221	**PM MAX**	1044

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Cumulative (2043) plus Project AM

Intersection: Green Valley Rd/Lotus Rd AND Green Valley Rd

Comments:

PART A or PART B	SATISFIED	**YES**

PART A

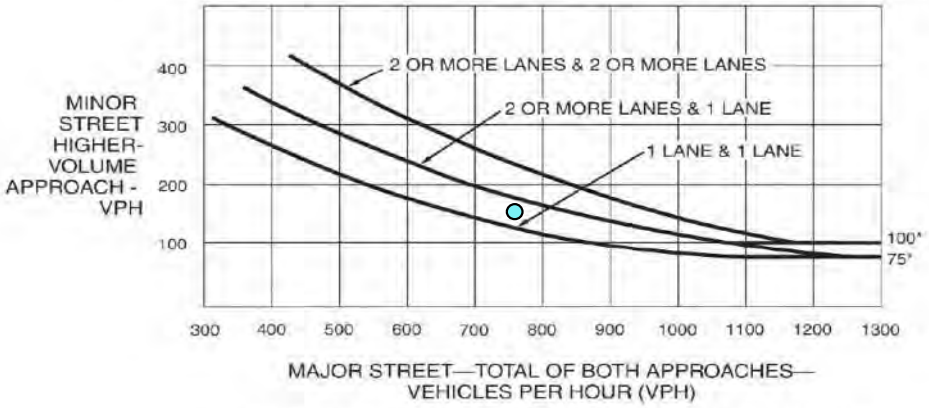
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		Yes
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		Yes

PART B — SATISFIED **Yes**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	761	
Highest Approach - Minor Street	163	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Red Hawk Casino

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Cumulative (2043) plus Project PM

Intersection: Green Valley Rd/Lotus Rd AND Green Valley Rd

Comments:

PART A or PART B	SATISFIED	**YES**

PART A

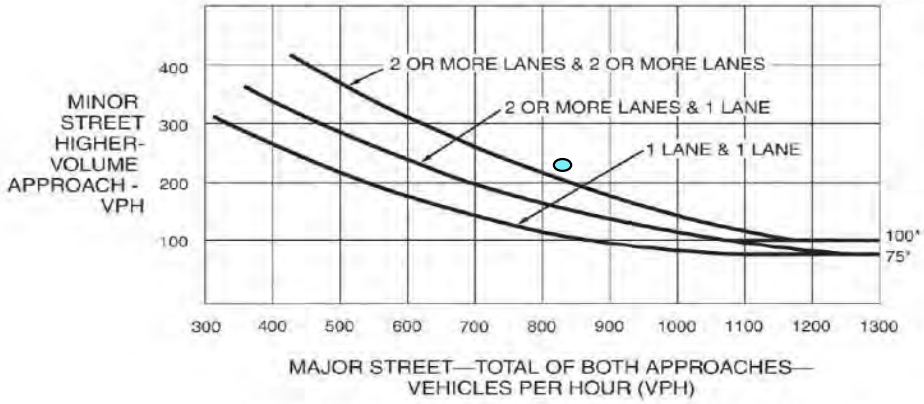
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		Yes
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		Yes

PART B	SATISFIED	**Yes**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	823	
Highest Approach - Minor Street	221	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Red Hawk Casino

Kimley»Horn

PEAK HOUR SIGNAL WARRANT ANALYSIS (Warrant #3, California MUTCD 2014 Edition)

INT #4

PROJECT NAME: ***Red Hawk Casino***

SCENARIO: ***Cumulative (2043) plus Project***

COMMENTS:

MAJOR STREET: ***Green Valley Rd*** ☐ NB/SB ☑ EB/WB # OF APPROACH LANES: 1

MINOR STREET: ***Greenstone Rd*** ☑ NB/SB ☐ EB/WB # OF APPROACH LANES: 1

THE STUDY INTERSECTION HAS MORE THAN THREE APPROACHES (Y OR N): Y

ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000 (Y OR N): N

85TH PERCENTILE SPEED GREATER THAN 40 MPH ON MAJOR STREET (Y OR N): Y

	AM		PM	
WORST CASE DELAY FOR MINOR STREET APPROACH:	12.1	sec/veh	13.4	sec/veh
	0.47	veh-hr	0.65	veh-hr

	MAJOR STREET			MINOR STREET				
	EB Approach	WB Approach	Total	NB Approach	SB Approach	Heavy Leg	Total	Intersection Total
06:00 AM TO 07:00 AM			0			0	0	0
07:00 AM TO 08:00 AM	285	127	412	141	0	141	141	553
08:00 AM TO 09:00 AM			0			0	0	0
09:00 AM TO 10:00 AM			0			0	0	0
10:00 AM TO 11:00 AM			0			0	0	0
11:00 AM TO 12:00 PM			0			0	0	0
12:00 PM TO 01:00 PM			0			0	0	0
01:00 PM TO 02:00 PM			0			0	0	0
02:00 PM TO 03:00 PM			0			0	0	0
03:00 PM TO 04:00 PM			0			0	0	0
04:00 PM TO 05:00 PM			0			0	0	0
05:00 PM TO 06:00 PM	216	221	437	174	0	174	174	611
06:00 PM TO 07:00 PM			0			0	0	0
07:00 PM TO 08:00 PM			0			0	0	0
08:00 PM TO 09:00 PM			0			0	0	0
09:00 PM TO 10:00 PM			0			0	0	0

	MAJOR STREET		MINOR STREET			INTERSECTION
	Total		Heavy Leg	Total		Total
AM MAX	412	**AM MAX**	141	141	**AM MAX**	553
PM MAX	437	**PM MAX**	174	174	**PM MAX**	611

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Cumulative (2043) plus Project AM

Intersection: Green Valley Rd AND Greenstone Rd

Comments:

PART A or PART B	SATISFIED	**NO**

PART A

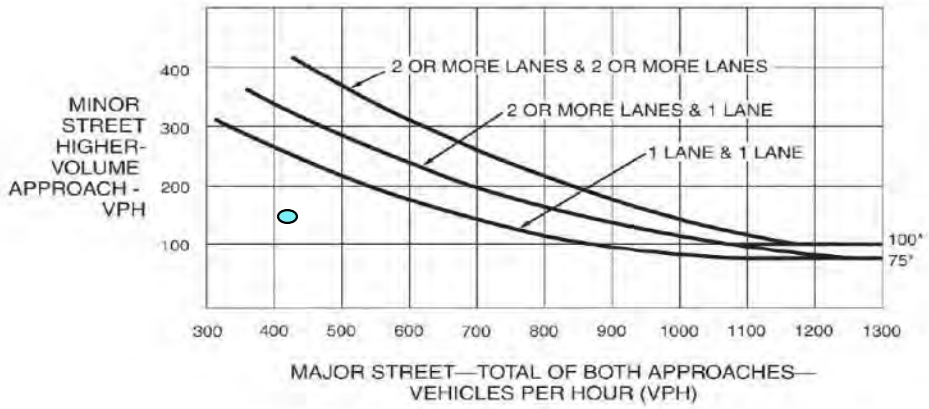
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		Yes
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B	SATISFIED	**No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	412	
Highest Approach - Minor Street	141	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Red Hawk Casino

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Cumulative (2043) plus Project PM

Intersection: Green Valley Rd AND Greenstone Rd

Comments:

PART A or PART B	SATISFIED	**NO**

PART A

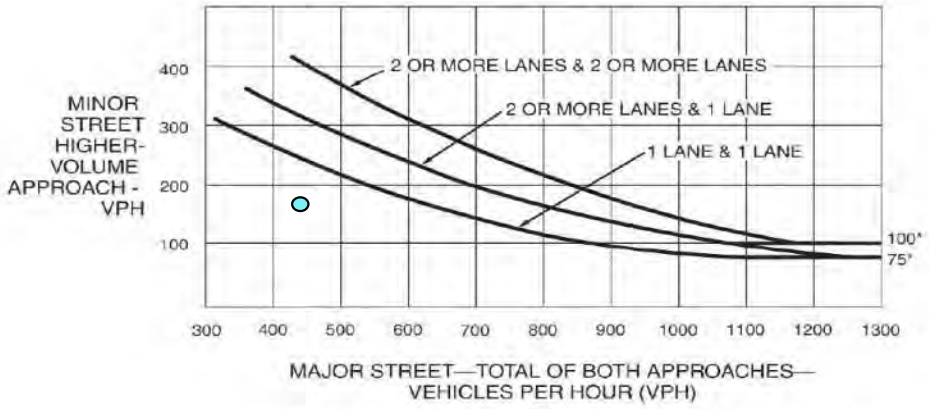
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		Yes
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B	SATISFIED	**No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	437	
Highest Approach - Minor Street	174	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Red Hawk Casino

Kimley»Horn

PEAK HOUR SIGNAL WARRANT ANALYSIS (Warrant #3, California MUTCD 2014 Edition)

INT #5

PROJECT NAME: ***Red Hawk Casino***

SCENARIO: ***Cumulative (2043) plus Project***

COMMENTS:

MAJOR STREET: ***Green Valley Rd/ Missouri Flat Rd*** ☐ NB/SB ☑ EB/WB # OF APPROACH LANES: 1

MINOR STREET: ***Green Valley Rd*** ☑ NB/SB ☐ EB/WB # OF APPROACH LANES: 1

THE STUDY INTERSECTION HAS MORE THAN THREE APPROACHES (Y OR N): Y

ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000 (Y OR N): N

85TH PERCENTILE SPEED GREATER THAN 40 MPH ON MAJOR STREET (Y OR N): Y

	AM		PM	
WORST CASE DELAY FOR MINOR STREET APPROACH:	14.2	sec/veh	12.2	sec/veh
	0.41	veh-hr	0.37	veh-hr

			MAJOR STREET			MINOR STREET				
			EB Approach	WB Approach	Total	NB Approach	SB Approach	Heavy Leg	Total	Intersection Total
06:00 AM	TO	07:00 AM			0			0	0	0
07:00 AM	TO	08:00 AM	360	354	714	0	103	103	103	817
08:00 AM	TO	09:00 AM			0			0	0	0
09:00 AM	TO	10:00 AM			0			0	0	0
10:00 AM	TO	11:00 AM			0			0	0	0
11:00 AM	TO	12:00 PM			0			0	0	0
12:00 PM	TO	01:00 PM			0			0	0	0
01:00 PM	TO	02:00 PM			0			0	0	0
02:00 PM	TO	03:00 PM			0			0	0	0
03:00 PM	TO	04:00 PM			0			0	0	0
04:00 PM	TO	05:00 PM			0			0	0	0
05:00 PM	TO	06:00 PM	223	283	506	0	108	108	108	614
06:00 PM	TO	07:00 PM			0			0	0	0
07:00 PM	TO	08:00 PM			0			0	0	0
08:00 PM	TO	09:00 PM			0			0	0	0
09:00 PM	TO	10:00 PM			0			0	0	0

	MAJOR STREET		MINOR STREET			INTERSECTION
	Total		Heavy Leg	Total		Total
AM MAX	714	**AM MAX**	103	103	**AM MAX**	817
PM MAX	506	**PM MAX**	108	108	**PM MAX**	614

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Cumulative (2043) plus Project AM

Intersection: Green Valley Rd/ Missouri Flat Rd AND Green Valley Rd

Comments:

PART A or PART B	SATISFIED	**NO**

PART A

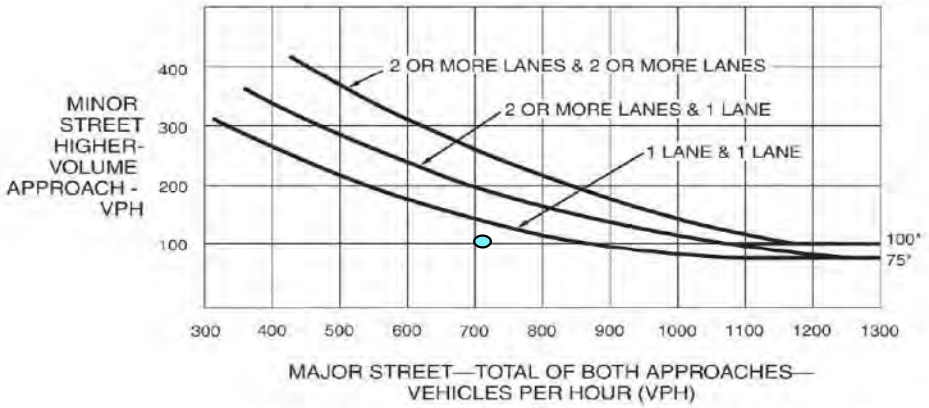
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		Yes
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		Yes

PART B	SATISFIED	**NO**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	714	
Highest Approach - Minor Street	103	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Cumulative (2043) plus Project PM

Intersection: Green Valley Rd/ Missouri Flat Rd AND Green Valley Rd

Comments:

PART A or PART B	SATISFIED	**NO**

PART A

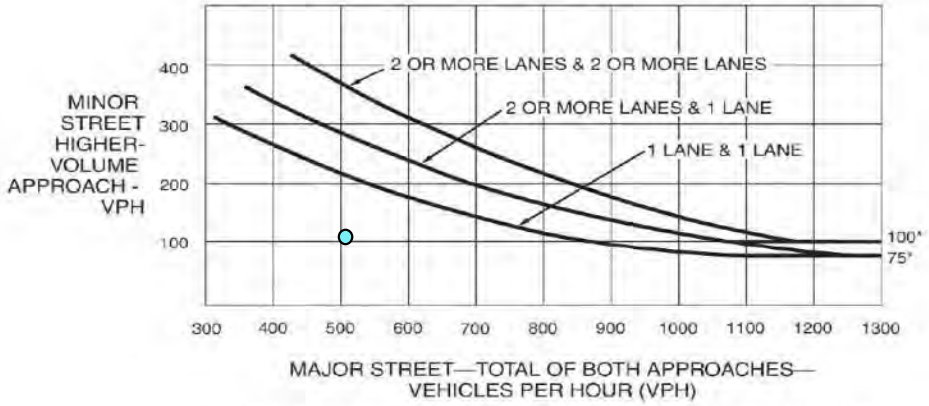
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		Yes
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B	SATISFIED	**No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	506	
Highest Approach - Minor Street	108	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Red Hawk Casino

Kimley»Horn

PEAK HOUR SIGNAL WARRANT ANALYSIS (Warrant #3, California MUTCD 2014 Edition)

INT #8

PROJECT NAME: ***Red Hawk Casino***

SCENARIO: ***Cumulative (2043) plus Project***

COMMENTS:

MAJOR STREET: ***Green Valley Rd*** ☐ NB/SB ☑ EB/WB # OF APPROACH LANES: 1

MINOR STREET: ***Ponderosa Rd*** ☑ NB/SB ☐ EB/WB # OF APPROACH LANES: 1

THE STUDY INTERSECTION HAS MORE THAN THREE APPROACHES (Y OR N): Y

ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000 (Y OR N): N

85TH PERCENTILE SPEED GREATER THAN 40 MPH ON MAJOR STREET (Y OR N): Y

	AM		PM	
WORST CASE DELAY FOR MINOR STREET APPROACH:	14.0	sec/veh	11.7	sec/veh
	0.43	veh-hr	0.21	veh-hr

			MAJOR STREET			MINOR STREET				
			EB Approach	WB Approach	Total	NB Approach	SB Approach	Heavy Leg	Total	Intersection Total
06:00 AM	TO	07:00 AM			0			0	0	0
07:00 AM	TO	08:00 AM	307	255	562	111	0	111	111	673
08:00 AM	TO	09:00 AM			0			0	0	0
09:00 AM	TO	10:00 AM			0			0	0	0
10:00 AM	TO	11:00 AM			0			0	0	0
11:00 AM	TO	12:00 PM			0			0	0	0
12:00 PM	TO	01:00 PM			0			0	0	0
01:00 PM	TO	02:00 PM			0			0	0	0
02:00 PM	TO	03:00 PM			0			0	0	0
03:00 PM	TO	04:00 PM			0			0	0	0
04:00 PM	TO	05:00 PM			0			0	0	0
05:00 PM	TO	06:00 PM	271	216	487	64	0	64	64	551
06:00 PM	TO	07:00 PM			0			0	0	0
07:00 PM	TO	08:00 PM			0			0	0	0
08:00 PM	TO	09:00 PM			0			0	0	0
09:00 PM	TO	10:00 PM			0			0	0	0

	MAJOR STREET		MINOR STREET			INTERSECTION
	Total		Heavy Leg	Total		Total
AM MAX	562	**AM MAX**	111	111	**AM MAX**	673
PM MAX	487	**PM MAX**	64	64	**PM MAX**	551

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Cumulative (2043) plus Project AM

Intersection: Green Valley Rd AND Ponderosa Rd

Comments:

	PART A or PART B	SATISFIED	**NO**

PART A

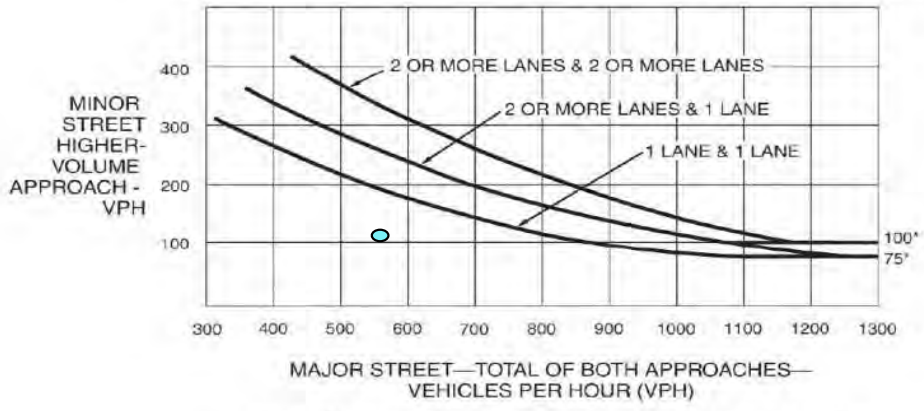
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		Yes
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B — SATISFIED **No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	562	
Highest Approach - Minor Street	111	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Red Hawk Casino

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Cumulative (2043) plus Project PM

Intersection: Green Valley Rd AND Ponderosa Rd

Comments:

	PART A or PART B	SATISFIED	**NO**

PART A

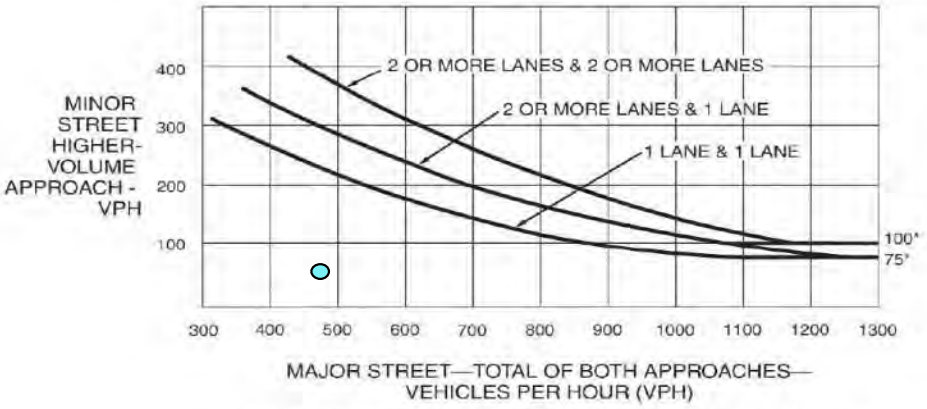
		SATISFIED	**NO**
(All parts 1, 2, and 3 below must be satisfied)			
1.	The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2.	The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		No
3.	The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B — SATISFIED **No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	487	
Highest Approach - Minor Street	64	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Kimley»Horn

PEAK HOUR SIGNAL WARRANT ANALYSIS (Warrant #3, California MUTCD 2014 Edition)

INT #8

PROJECT NAME: *Red Hawk Casino*

SCENARIO: *Cumulative (2043) plus Project*

COMMENTS:

MAJOR STREET: *Green Valley Rd* ☐ NB/SB ☑ EB/WB # OF APPROACH LANES: 1

MINOR STREET: *Deer Valley Rd* ☑ NB/SB ☐ EB/WB # OF APPROACH LANES: 1

THE STUDY INTERSECTION HAS MORE THAN THREE APPROACHES (Y OR N): Y

ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000 (Y OR N): N

85TH PERCENTILE SPEED GREATER THAN 40 MPH ON MAJOR STREET (Y OR N): Y

	AM		PM	
WORST CASE DELAY FOR MINOR STREET APPROACH:	14.0	sec/veh	11.7	sec/veh
	0.43	veh-hr	0.21	veh-hr

			MAJOR STREET			MINOR STREET				
			EB Approach	WB Approach	Total	NB Approach	SB Approach	Heavy Leg	Total	Intersection Total
06:00 AM	TO	07:00 AM			0			0	0	0
07:00 AM	TO	08:00 AM	307	255	562	111	0	111	111	673
08:00 AM	TO	09:00 AM			0			0	0	0
09:00 AM	TO	10:00 AM			0			0	0	0
10:00 AM	TO	11:00 AM			0			0	0	0
11:00 AM	TO	12:00 PM			0			0	0	0
12:00 PM	TO	01:00 PM			0			0	0	0
01:00 PM	TO	02:00 PM			0			0	0	0
02:00 PM	TO	03:00 PM			0			0	0	0
03:00 PM	TO	04:00 PM			0			0	0	0
04:00 PM	TO	05:00 PM			0			0	0	0
05:00 PM	TO	06:00 PM	271	216	487	64	0	64	64	551
06:00 PM	TO	07:00 PM			0			0	0	0
07:00 PM	TO	08:00 PM			0			0	0	0
08:00 PM	TO	09:00 PM			0			0	0	0
09:00 PM	TO	10:00 PM			0			0	0	0

	MAJOR STREET		MINOR STREET			INTERSECTION
	Total		Heavy Leg	Total		Total
AM MAX	562	AM MAX	111	111	AM MAX	673
PM MAX	487	PM MAX	64	64	PM MAX	551

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Cumulative (2043) plus Project AM

Intersection: Green Valley Rd AND Deer Valley Rd

Comments:

PART A or PART B	SATISFIED	**NO**

PART A

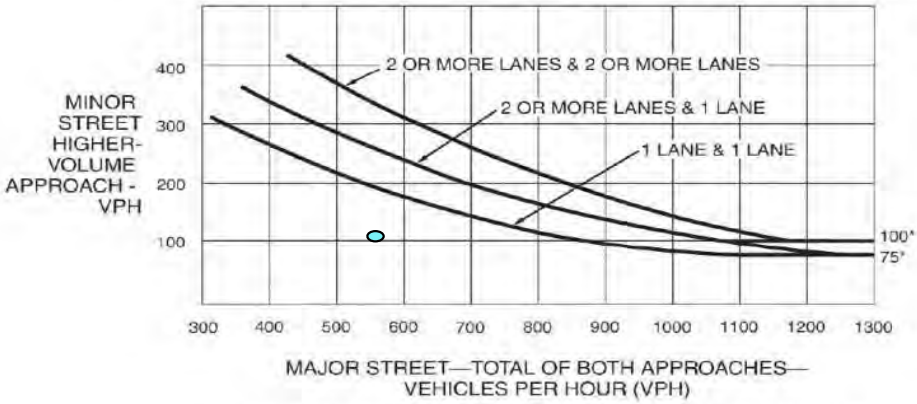
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		Yes
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B	SATISFIED	**No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	562	
Highest Approach - Minor Street	111	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Red Hawk Casino

Kimley»Horn

Traffic Signal Warrants Worksheet
Warrant 3: Peak Hour
Source: MUTCD 2014 California Supplement

Scenario: Cumulative (2043) plus Project PM

Intersection: Green Valley Rd AND Deer Valley Rd

Comments:

PART A or PART B	SATISFIED	**NO**

PART A

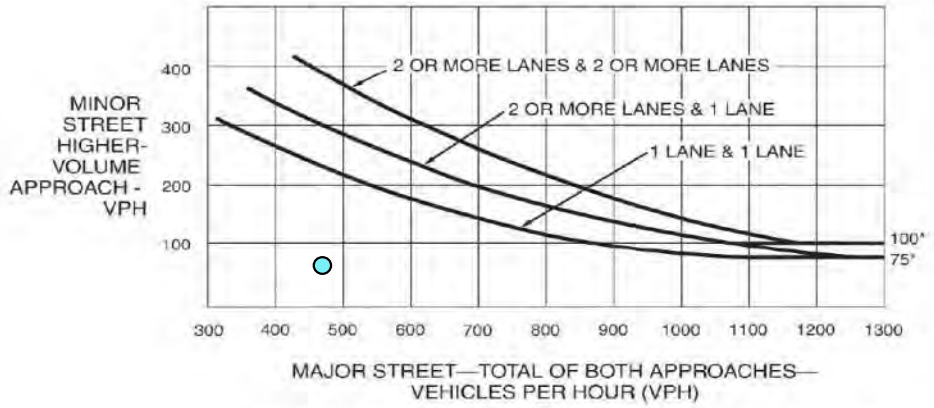
(All parts 1, 2, and 3 below must be satisfied)	SATISFIED	**NO**
1. The total delay experienced for traffic on one minor street approach controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach; AND		No
2. The volume on the same minor street approach equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes; AND		No
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersection with four or more approaches or 650 vph for intersection with less than four approaches.		No

PART B — SATISFIED **No**

APPROACH LANES	One	2 or More
Both Approaches - Major Street	487	
Highest Approach - Minor Street	64	

The plotted points for vehicles per hour on major streets (both approaches) and the corresponding per hour higher volume minor street approach (one direction only) for one hour (any consecutive 15 minute period) fall above applicable curves in MUTCD Figure 4C-3.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Red Hawk Casino

Appendix G

Farmland Conversion Impact Rating Form

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request 6/3/2024
Name of Project Shingle Springs FTT	Federal Agency Involved BIA
Proposed Land Use Residential and Commercial	County and State El Dorado County, CA
PART II *(To be completed by NRCS)*	Date Request Received By NRCS / Person Completing Form:

Does the site contain Prime, Unique, Statewide or Local Important Farmland? *(If no, the FPPA does not apply - do not complete additional parts of this form)*	YES ☑ NO ☐	Acres Irrigated	Average Farm Size
Major Crop(s)	Farmable Land In Govt. Jurisdiction Acres: %	Amount of Farmland As Defined in FPPA Acres: %	
Name of Land Evaluation System Used	Name of State or Local Site Assessment System	Date Land Evaluation Returned by NRCS	

PART III *(To be completed by Federal Agency)*	Alternative Site Rating			
	Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly				
B. Total Acres To Be Converted Indirectly				
C. Total Acres In Site	295.72			
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland				
B. Total Acres Statewide Important or Local Important Farmland				
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted				
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value				
PART V (To be completed by NRCS) Land Evaluation Criterion Relative Value of Farmland To Be Converted (Scale of 0 to 100 Points)				

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(Criteria are explained in 7 CFR 658.5 b. For Corridor project use form NRCS-CPA-106)*	**Maximum Points**	Site A	Site B	Site C	Site D
1. Area In Non-urban Use	(15)	8			
2. Perimeter In Non-urban Use	(10)	6			
3. Percent Of Site Being Farmed	(20)	2			
4. Protection Provided By State and Local Government	(20)	0			
5. Distance From Urban Built-up Area	(15)	0			
6. Distance To Urban Support Services	(15)	0			
7. Size Of Present Farm Unit Compared To Average	(10)	0			
8. Creation Of Non-farmable Farmland	(10)	7			
9. Availability Of Farm Support Services	(5)	0			
10. On-Farm Investments	(20)	0			
11. Effects Of Conversion On Farm Support Services	(10)	0			
12. Compatibility With Existing Agricultural Use	(10)	0			
TOTAL SITE ASSESSMENT POINTS	160	23			
PART VII ***(To be completed by Federal Agency)***					
Relative Value Of Farmland *(From Part V)*	100				
Total Site Assessment *(From Part VI above or local site assessment)*	160	23			
TOTAL POINTS ***(Total of above 2 lines)***	260				

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? YES ☐ NO ☐

Reason For Selection:

Name of Federal agency representative completing this form: Emma Miller | Date: 6/3/2024

(See Instructions on reverse side) **Form AD-1006 (03-02)**

STEPS IN THE PROCESSING THE FARMLAND AND CONVERSION IMPACT RATING FORM

Step 1 - Federal agencies (or Federally funded projects) involved in proposed projects that may convert farmland, as defined in the Farmland Protection Policy Act (FPPA) to nonagricultural uses, will initially complete Parts I and III of the form. For Corridor type projects, the Federal agency shall use form NRCS-CPA-106 in place of form AD-1006. The Land Evaluation and Site Assessment (LESA) process may also be accessed by visiting the FPPA website, http://fppa.nrcs.usda.gov/lesa/.

Step 2 - Originator (Federal Agency) will send one original copy of the form together with appropriate scaled maps indicating location(s)of project site(s), to the Natural Resources Conservation Service (NRCS) local Field Office or USDA Service Center and retain a copy for their files. (NRCS has offices in most counties in the U.S. The USDA Office Information Locator may be found at http://offices.usda.gov/scripts/ndISAPI.dll/oip_public/USA_map, or the offices can usually be found in the Phone Book under U.S. Government, Department of Agriculture. A list of field offices is available from the NRCS State Conservationist and State Office in each State.)

Step 3 - NRCS will, within 10 working days after receipt of the completed form, make a determination as to whether the site(s) of the proposed project contains prime, unique, statewide or local important farmland. (When a site visit or land evaluation system design is needed, NRCS will respond within 30 working days.

Step 4 - For sites where farmland covered by the FPPA will be converted by the proposed project, NRCS will complete Parts II, IV and V of the form.

Step 5 - NRCS will return the original copy of the form to the Federal agency involved in the project, and retain a file copy for NRCS records.

Step 6 - The Federal agency involved in the proposed project will complete Parts VI and VII of the form and return the form with the final selected site to the servicing NRCS office.

Step 7 - The Federal agency providing financial or technical assistance to the proposed project will make a determination as to whether the proposed conversion is consistent with the FPPA.

INSTRUCTIONS FOR COMPLETING THE FARMLAND CONVERSION IMPACT RATING FORM

(For Federal Agency)

Part I: When completing the "County and State" questions, list all the local governments that are responsible for local land use controls where site(s) are to be evaluated.

Part III: When completing item B (Total Acres To Be Converted Indirectly), include the following:

1. Acres not being directly converted but that would no longer be capable of being farmed after the conversion, because the conversion would restrict access to them or other major change in the ability to use the land for agriculture.
2. Acres planned to receive services from an infrastructure project as indicated in the project justification (e.g. highways, utilities planned build out capacity) that will cause a direct conversion.

Part VI: Do not complete Part VI using the standard format if a State or Local site assessment is used. With local and NRCS assistance, use the local Land Evaluation and Site Assessment (LESA).

1. Assign the maximum points for each site assessment criterion as shown in § 658.5(b) of CFR. In cases of corridor-type project such as transportation, power line and flood control, criteria #5 and #6 will not apply and will, be weighted zero, however, criterion #8 will be weighed a maximum of 25 points and criterion #11 a maximum of 25 points.

2. Federal agencies may assign relative weights among the 12 site assessment criteria other than those shown on the FPPA rule after submitting individual agency FPPA policy for review and comment to NRCS. In all cases where other weights are assigned, relative adjustments must be made to maintain the maximum total points at 160. For project sites where the total points equal or exceed 160, consider alternative actions, as appropriate, that could reduce adverse impacts (e.g. Alternative Sites, Modifications or Mitigation).

Part VII: In computing the "Total Site Assessment Points" where a State or local site assessment is used and the total maximum number of points is other than 160, convert the site assessment points to a base of 160.
Example: if the Site Assessment maximum is 200 points, and the alternative Site "A" is rated 180 points:

$$\frac{\text{Total points assigned Site A}}{\text{Maximum points possible}} = \frac{180}{200} \text{ X } 160 = 144 \text{ points for Site A}$$

For assistance in completing this form or FPPA process, contact the local NRCS Field Office or USDA Service Center.

NRCS employees, consult the FPPA Manual and/or policy for additional instructions to complete the AD-1006 form.

Appendix H

Water and Wastewater Feasibility Study

Red Hawk Casino

Water and Wastewater Feasibility Study – Arena and Housing Project

Prepared by HydroScience Engineers

DRAFT

June 2024

HydroScience Engineering Solutions

TABLE OF CONTENTS

SECTION 1 – Introduction 1-1
1.1 Background 1-1
1.2 Objectives 1-4
1.3 Description of Existing Facilities and Proposed Project 1-4
SECTION 2 – WASTEWATER FLOWS AND WATER DEMANDS 2-1
2.1 Recent Historical Flows 2-1
2.2 Wastewater Flows 2-2
2.2.1 Existing Facilities Wastewater Flow Model 2-2
2.2.2 Projected Incremental Wastewater Flows 2-5
2.2.3 Total Projected Wastewater Flows 2-5
2.3 Recycled Water Demands 2-6
2.3.1 Irrigation Water Demands 2-6
2.4 Potable Water Demands 2-7
2.4.1 Historical and Existing Net Water Demand 2-7
2.4.2 Projected Incremental Water Demands 2-8
2.4.3 Total Projected Water Demands 2-8
SECTION 3 – REGULATORY REQUIREMENTS 3-1
3.1 Regulatory Authority 3-1
3.2 Wastewater Treatment Plant 3-1
3.3 Effluent Disposal and Reuse 3-1
3.3.1 Land Discharge 3-1
3.3.2 Leach Field Disposal 3-1
3.3.3 Toilet/Urinal Flushing 3-2
3.3.4 Cooling Tower Blowdown Generation and Disposal 3-3
3.4 Recycled Water Storage and Distribution System 3-3
3.5 Water Supply Storage and Distribution System 3-4
3.6 Biosolids 3-4
SECTION 4 – WASTEWATER ASSESSMENT 4-1
4.1 Existing Wastewater Facilities 4-1
4.1.1 Existing Wastewater Facility Sizing Criteria 4-1
4.1.2 Existing Wastewater Collection System 4-1
4.1.3 Coarse Screening Facility 4-2
4.1.4 Existing Wastewater Treatment System 4-2
4.1.5 Existing WWTP Electrical Power Equipment 4-8
4.1.6 Existing WWTP Electrical Control Equipment 4-9
4.2 Wastewater Facilities Evaluation – Proposed Project 4-9
4.2.1 Wastewater Collection System 4-10
4.2.2 Wastewater Treatment System 4-11
4.2.3 Proposed Electrical and Control Equipment Upgrades 4-13
SECTION 5 – RECYCLED WATER ASSESSMENT 5-1
5.1 Existing Recycled Water Distribution and Storage 5-1
5.1.1 Existing Landscape Irrigation and Miscellaneous Demands 5-1

5.1.2 Existing Leach and Spray Disposal Fields 5-1
5.1.3 Existing Toilet/Urinal Flushing 5-4
5.1.4 Existing Recycled Water Seasonal Storage 5-4
5.1.5 Existing Recycled Water Distribution Electrical Equipment 5-4
5.2 Recycled Water Distribution and Storage Evaluation – Proposed Project 5-5
5.2.1 Landscape Irrigation 5-5
5.2.2 WWTP Demands 5-5
5.2.3 Leach/Spray Fields 5-6
5.2.4 Toilet and Urinal Flushing 5-6
5.2.5 Fire Suppression 5-6
5.2.6 Cooling Tower Demands 5-6
5.2.7 Recycled Water Seasonal Storage 5-7
5.2.8 Recycled Water Distribution Pump Station 5-7
5.2.9 Proposed Electrical and Control Equipment Upgrades 5-8
5.3 Project Water Balance – Proposed Project 5-9
SECTION 6 Water Supply Assessment 6-11
6.1 Existing Water Supply Distribution and Storage 6-11
6.1.1 Existing Water Demands 6-11
6.1.2 Existing Water Storage 6-11
6.1.3 Existing Water Distribution System 6-11
6.2 Water Supply Distribution and Storage Evaluation – Proposed Project 6-13
6.2.1 EID Contractual Limitations 6-13
6.2.2 Water Storage 6-13
6.2.3 Water Distribution Pump Station 6-14
SECTION 7 – CONCLUSIONS AND RECOMMENDATIONS 7-1
7.1 Wastewater Pumping and Treatment 7-1
7.2 Effluent Reuse and Disposal 7-2
7.3 Water Supply Distribution and Storage 7-4
SECTION 8 – ACRONYMS AND ABBREVIATIONS 8-1

LIST OF APPENDICES

Appendix A: Shingle Springs Rancheria Water, Wastewater and Reclamation Study, 2001

Appendix B: Water Balance

Appendix C: EID Agreement Letter

LIST OF TABLES

Table 1-1: Summary of Existing Resort Elements 1-5
Table 1-2: Summary of Proposed Project Elements 1-6
Table 2-1: Historical Flow Measurements 2-1
Table 2-2: Estimated Incremental Wastewater Flows for Previous Resort and Entertainment Project 2-2
Table 2-3: Revised Incremental Wastewater Flows for Previous Resort and Entertainment Project 2-3
Table 2-4: Wastewater Flows - Existing Wastewater Generating Facilities 2-4
Table 2-5: Estimated Incremental Wastewater Flows for Proposed Project 2-5
Table 2-6: Projected Wastewater Flows 2-6
Table 2-7: Landscape Irrigation Demand Projections 2-7
Table 2-8: Historical, Existing and Anticipated Water Demand 2-8
Table 2-9: Projected Water Demands 2-9
Table 4-1: Wastewater Characteristics for the Existing Facilities 4-2
Table 4-2: Projected Wastewater Flows and Membrane Flux Rates 4-10
Table 5-1: Summary of Seasonal Storage Requirements – Existing Facilities Plus Proposed Project 5-10
Table 6-1: Historical and Existing Water Storage Tank Inflow from EID 6-11
Table 6-2: Current and Projected Water Demands 6-13

LIST OF FIGURES

Figure 1-1: Site Vicinity and Project Location Map 1-2
Figure 1-2: Aerial Site View 1-3
Figure 1-3: Proposed Project Site Plan 1-7
Figure 4-1: Existing Wastewater Process Flow Diagram 4-4
Figure 4-2: Existing WWTP Layout 4-5
Figure 5-1: Existing Recycled Water Disposal and Storage Locations 5-3
Figure 6-1: Existing Water Supply Storage and Distribution System 6-12
Figure 7-1: Recommended Upgrades to Wastewater Treatment Facilities 7-5
Figure 7-2: Recommended Upgrades to Wastewater Collection and Recycled Water Facilities 7-6
Figure 7-3: Recommended Upgrades to Water Supply Facilities 7-7

SECTION 1 – INTRODUCTION

This Water and *Wastewater Feasibility Study* (Study) was prepared by HydroScience Engineers, Inc. (HydroScience) for Acorn Environmental as a supporting document to the Red Hawk Casino and Resort Arena and Housing Development Project Environmental Assessment (EA). This Study addresses the Arena and Housing Development Project, referred to as the Proposed Project. This Study addresses the treatment and disposal of wastewater, potable water supply, and reuse of recycled water for the project.

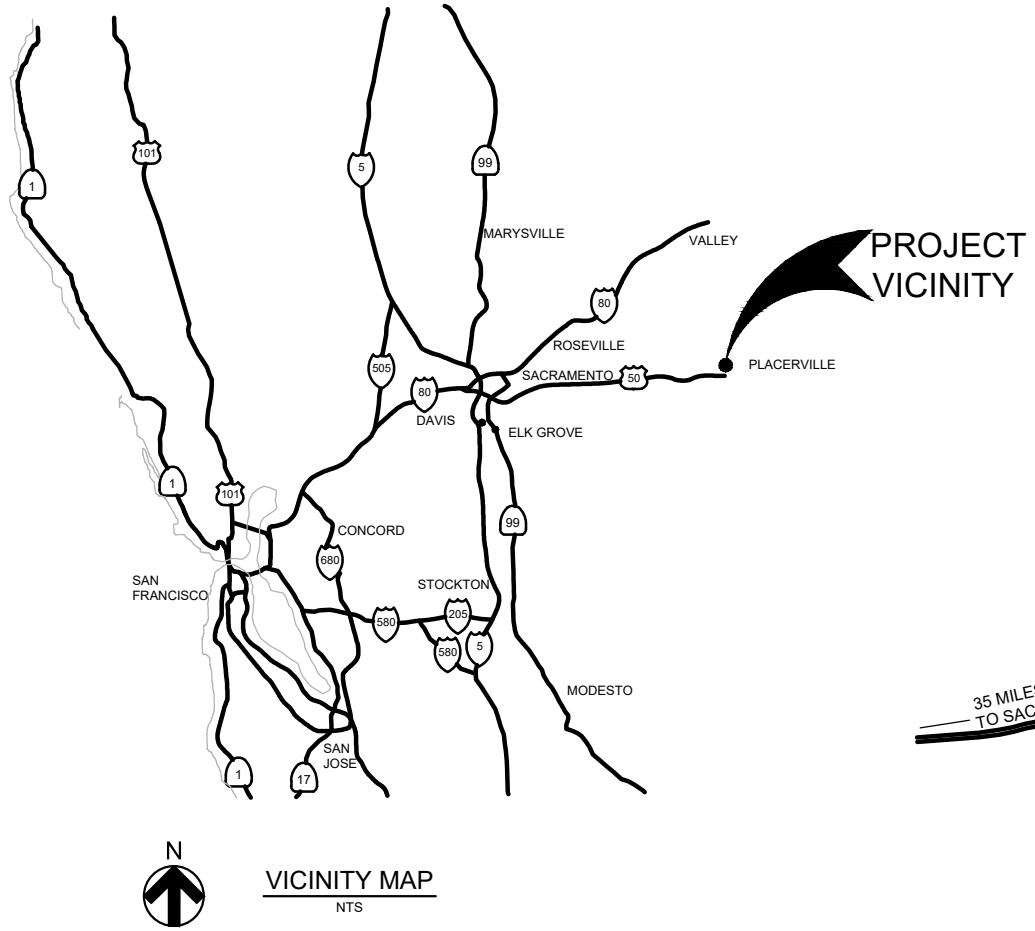
1.1 Background

The Red Hawk Casino and Resort (Resort) is located in El Dorado County, California, along Highway 50 and approximately two miles east of Shingle Springs (**Figure 1-1**). The Tribe owns and operates the Casino, which is located on land held in Trust by the Federal Government.

The existing Resort covers a total of approximately 239,000 square feet (sq. ft.) of space. Various other facilities (e.g., parking garage, generator plant) are also located on trust land near the Casino. In 2023, a new 150-room hotel and various entertainment facilities were opened. With the addition of the new Casino facilities, new wastewater and recycled water facilities were constructed and some existing facilities were upgraded to support the additional flows. These facilities included two additional 3 MG each recycled water storage tanks with booster pumps, booster pump station building, extension of the existing recycled water distribution system, effluent pump upgrade, installation of buried emergency storage tank at the existing influent pump station and supporting electrical/control/instrumentation components. The Resort and all of these facilities are collectively referred to as Existing Facilities in this Study. All of the Existing Facilities are located on Trust Land (see individual parcels on **Figure 1-2**). Components of the Existing Facilities include:

- Gaming areas (casino)
- Resort
- Apex (entertainment facility)
- Restaurants (dining)
- Back of house
- Parking garage
- Tribal offices (Administration Building)
- Health Clinic
- Generator plant
- Other facilities and infrastructure (including water and wastewater treatment)

The Tribe currently owns and operates a water, wastewater, and recycled water system to support the Existing Facilities. The water supply system (storage tank and booster pump station) receives potable water from El Dorado Irrigation District (EID) through an existing 3-inch water meter. The existing wastewater, potable water, and recycled water system will be evaluated in this Study to determine additional facility needs (additions or modifications) to support the Proposed Project.



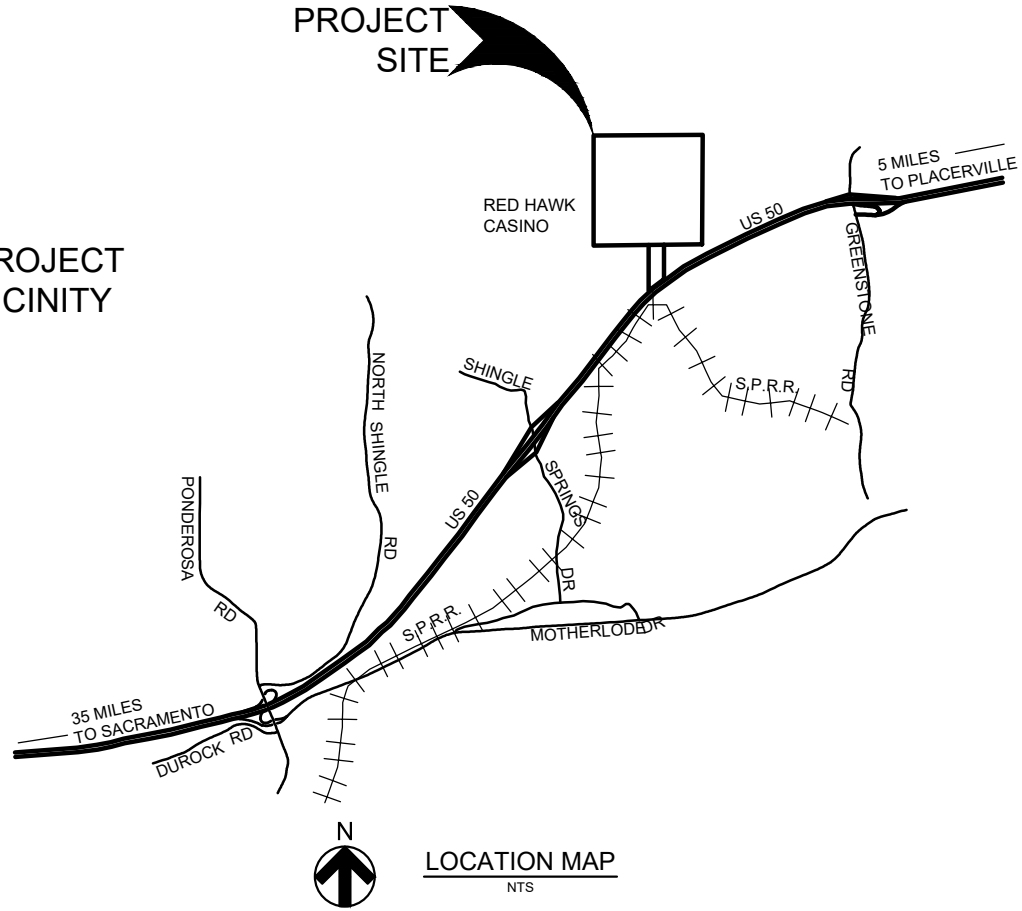
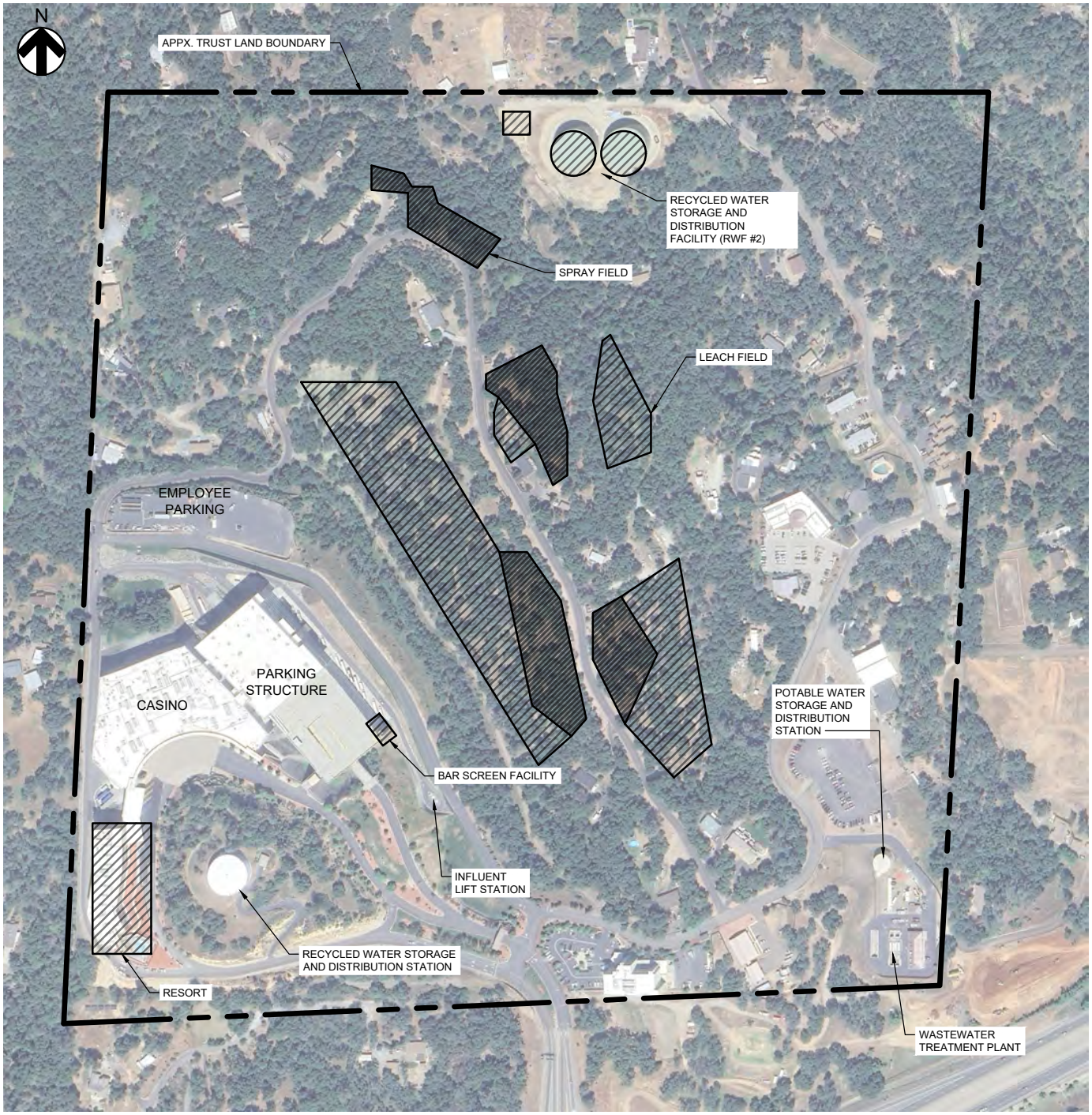


Figure 1-1
Red Hawk Casino
Water and Wastewater Feasibility Study
Site Vicinity and Project Location Map

HydroScience



NOTES

1. LANDSCAPE IRRIGATION TYPICAL AROUND CASINO. AREAS NOT HATCHED FOR CLARITY.
2. BOUNDARIES ARE APPROXIMATE.

Figure 1-2
Red Hawk Casino
Water and Wastewater Feasibility Study
Aerial Site View

HydroScience

All of the wastewater generated from the Existing Facilities is collected and pumped to the on-site wastewater treatment plant (WWTP), located southeast of the Resort as shown in **Figure 1-2**.

The WWTP employs a membrane bioreactor (MBR) process that produces highly treated tertiary effluent acceptable for irrigation purposes and other reuse applications. Additional facilities at the WWTP include an operations building with a laboratory, maintenance shop, blower room and motor control center (MCC) panels, a chlorine contact basin (CCB), emergency overflow basin, and solids handling facility. The highly treated effluent produced by the WWTP provides recycled water for toilet flushing and fire sprinklers in the casino and resort, casino and resort landscape irrigation, on-site use for WWTP treatment processes, and landscape irrigation of other areas (e.g., Clinic, tribal residences). Major effluent disposal areas are also shown on **Figure 1-2**. SECTION 4 and SECTION 5 of this Study provide more information with respect to the WWTP system and effluent disposal, respectively.

The Tribe receives potable water through an existing agreement with EID. The potable water is supplied through a 3-inch meter and stored in a 500,000-gal tank at the WWTP. Potable water is used throughout the casino and resort and the Rancheria. The additional facilities associated with the potable water system are a high and low flow booster pump station, pump building and distribution system. The terms of the agreement state that EID will provide water service at a maximum instantaneous rate of 95 gpm and a total average volume of 135,000 gpd. The agreement also states that the Tribe may apply for more water in the future. Section 6 of this Study provides more information on the potable water storage and distribution system.

1.2 Objectives

The goal of this Study is to support the wastewater and water evaluation in the EA by identifying a feasible approach for providing wastewater and water service to the Proposed Project. Specific objectives of this Study are to:

- Evaluate the existing wastewater collection, treatment, and disposal systems.
- Evaluate the existing potable water demands, storage and distribution.
- Estimate incremental domestic water demand and projected wastewater flow.
- Summarize the regulatory requirements associated with upgrades to the wastewater and recycled water facilities, effluent disposal, and storage facilities.
- Determine modifications required to existing wastewater and recycled water facilities to support the project and maintain compliance with regulatory requirements and public health objectives.
- Determine the required new connection capacity for EID supplied potable water, and modifications required to existing potable water facilities to support the project.
- Provide a summary of the recommended improvements necessary to support the project.

1.3 Description of Existing Facilities and Proposed Project

This section describes the components of the Existing Facilities and the Proposed Project. **Table 1-1** summarizes Existing Facilities elements.

Table 1-1: Summary of Existing Resort Elements

Element	Units	Program
Casino / Gaming Floor	sq-ft	82,800
Dining	sq-ft	43,300
Buffet	seats	480
Burger Spot	seats	60
Henry's	seats	139
Original Mels	seats	162
Pearl	seats	74
High Limit Bar / Kitchen	seats	13
Other Back of House		
Kitchen, etc.	sq-ft	112,400
Admin	sq-ft	32,000
Clinic	sq-ft	40,000
Entertainment		
Bowling Alley	sq-ft	8,000
Virtual Reality Golf Suites	sq-ft	2,000
Indoor Karting Track	sq-ft	24,000
Golf Simulator	sq-ft	2,000
Café	sq-ft	1,400
Lounge	sq-ft	400
Employees – Operating	employee	110
Admin./ Facilities	sq-ft	1,300
Sports Bar	sq-ft	4,000
Meeting Rooms	sq-ft	4,000
Resort	rooms	150

The previous feasibility study and Tribal Environmental Impact Report (TEIR) (2021), consisted of the Entertainment facilities, Sports Bar, meeting rooms, resort and supporting facilities, which were subsequently constructed and placed into operation. For the previous feasibility study (2021) see **Appendix A**.

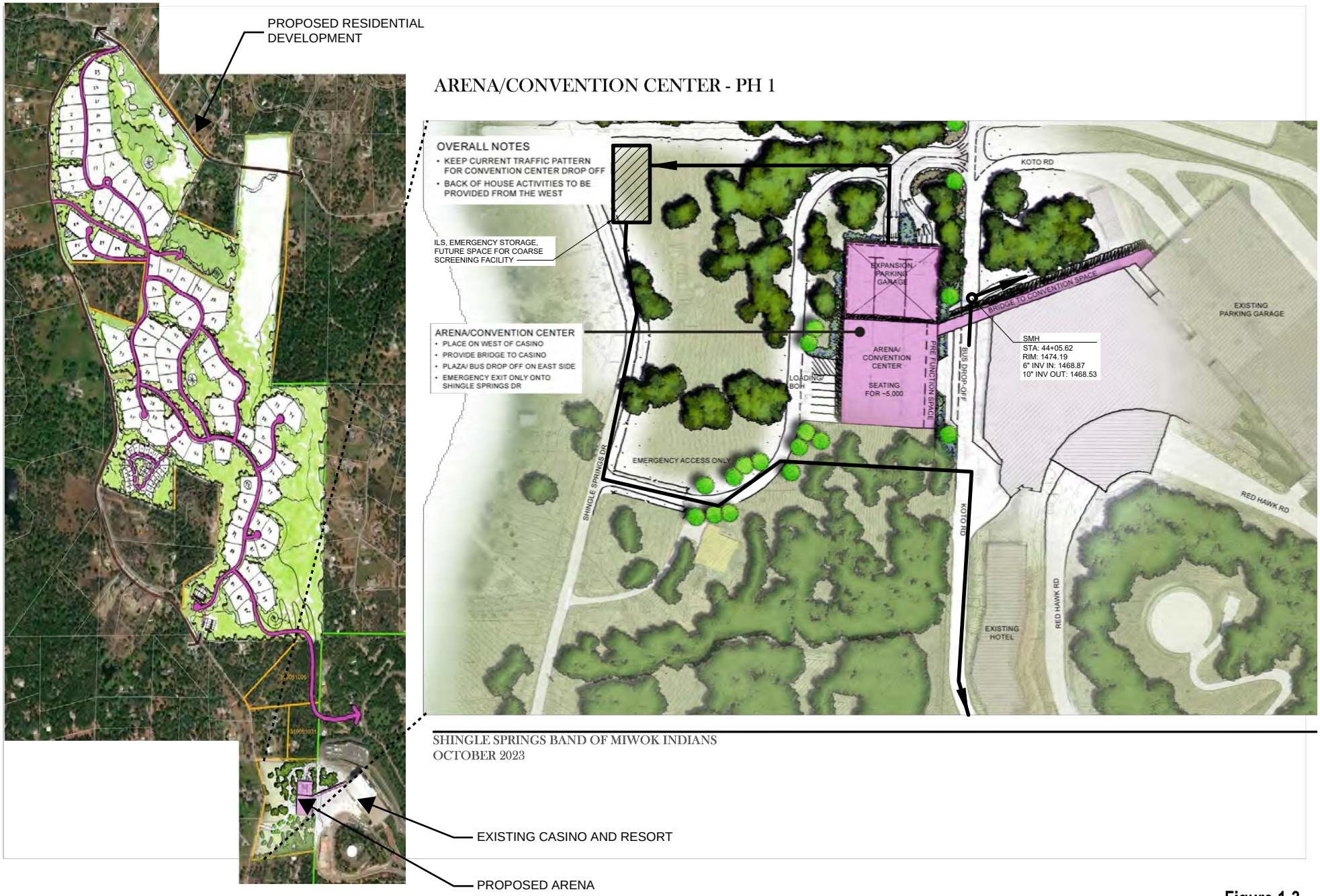
Table 1-2 provides a summary of the Proposed Project components. The site plan for the Proposed Project is shown in **Figure 1-3**.

.

Table 1-2: Summary of Proposed Project Elements

Element	Units	Program
Arena		
Sports/Concert/Center Stage	sq-ft	80,000
Team Store	sq-ft	400
Concourse Retail	sq-ft	500
Other Back of House		
Employees – Operating	employee	70
Commercial	sq-ft	30,000
Multi-Purpose Emergency Shelter	sq-ft	5,300
Maintenance Operations Building	sq-ft	3,000
Residential		
Townhomes (High-Density)	EDU	16
Cottages	EDU	24
Single-Family Homes	EDU	92

Note: EDU=Equivalent Dwelling Unit



HydroScience

Figure 1-3
Red Hawk Casino
Water and Wastewater Feasibility Study
Proposed Project Site Plan

SECTION 2 – WASTEWATER FLOWS AND WATER DEMANDS

This section presents estimated wastewater flows and recycled water demands for the Existing Facilities and the Proposed Project. At this and other gaming facilities, HydroScience Engineers has established a reliable method for estimating a casino and resort's wastewater flows and recycled water demands:

1. Compile recent historical flows based on existing flowmeter data.
2. Develop an Existing Facilities model based on measured data to validate unit flow factors by facility.
3. Apply these unit flow factors to future project quantities to project future flows.

For housing, we utilize typical planning level flow generation factors for residential housing, factoring in different categories of housing density.

2.1 Recent Historical Flows

Table 2-1 below presents recent historical flow measurements for wastewater generation and recycled water consumption at the Existing Facilities.

Table 2-1: Historical Flow Measurements

	Wastewater Flow [1,2]		Recycled Water Consumption[1]	
Year	Annual Total (gal/yr)	Average Daily Flow (gpd)	Annual Total (gal/yr)	Average Daily Flow (gpd)
2023	29,985,000	92,000	37,987,000	104,000
2022	24,321,000	67,000	32,933,000	90,000
2019	36,500,000	100,000	44,085,000	121,000
2018	38,275,000	106,000	45,932,000	127,000
2017	37,679,000	103,000	49,179,000	135,000
2016	36,341,000	99,000	43,914,000	120,000
2015	36,245,000	99,000	43,468,000	119,000

Notes:
1. Rounded to the nearest 1,000 unless otherwise noted.
2. Wastewater Flow is metered influent to the WWTP; this does not include water used on-site by plant processes that is returned for treatment downstream of the influent flow meter.
3. Data from 2020-2021 excluded. This data is not representative of normal operation due to COVID-19 restrictions and significantly reduced patronage.

The previous feasibility study projected an increase of 42,000 gpd for average daily wastewater flow and 16,000 gpd for averaged daily recycled water consumption. Based on the recent 2023 flow data, the plant is receiving 20% less wastewater flow and 15% less recycled water is consumed than the 2015-2019 historical average. The reason for this is not clear. This Study

does not take credit for the recent reduction in flows because of the potential for flows to increase back to previously projected levels in the future.

2.2 Wastewater Flows

The wastewater flow generation model for Existing Facilities is presented first and compared to the data provided in Table 2-1 to verify calibration to existing conditions. Then the additional flows due to the construction of the Proposed Project are calculated based on the size of the new facilities relative to the Existing Facilities and an adjusted percent occupancy level based on existing data. Total wastewater flows following construction of the Proposed Project are then presented.

2.2.1 Existing Facilities Wastewater Flow Model

As discussed in Section 2.1 above, the existing facility demands have been lower than historical averages even with the addition of the 150-room resort (previously termed hotel) and entertainment facility that were previously projected to increase wastewater influent flows by 42,000 gpd. **Table 2-2** presents the estimated breakdown of wastewater generated by the previously projected facilities and the revised projections (**Table 2-3**) based on recent data provided by Resort staff.

Table 2-2: Estimated Incremental Wastewater Flows for Previous Resort and Entertainment Project

Element	Units	Program	Average Daily Flow (gpd)
Entertainment			
Bowling Alley	sq-ft	13,500	4,160
Virtual Reality Golf Suites	sq-ft	7,000	1,536
Indoor Karting Track	sq-ft	24,000	3,840
Golf Simulator	sq-ft	1,500	240
Other Back of House			
Employees – Operating	employee	150	1,800
Admin./ Facilities	sq-ft	17,000	850
Sports Bar	sq-ft	7,000	6,400
Meeting Rooms	sq-ft	5,000	5,000
Subtotal for Proposed Project[1]			**24,000**
Resort	rooms	150	18,000
Projected Average Daily Wastewater Flows [1]			**42,000**
Projected Peak Daily Wastewater Flow (PF=1.4) [1]			**59,000**

Notes:
1. Rounded to the nearest 1,000 gpd.

Table 2-3: Revised Incremental Wastewater Flows for Previous Resort and Entertainment Project

Element	Units	Program	Average Daily Flow (gpd)
Entertainment			
Bowling Alley	sq-ft	8,000	700
Virtual Reality Golf Suites	sq-ft	2,000	800
Indoor Karting Track	sq-ft	24,000	3,900
Golf Simulator	sq-ft	2,000	250
Café	sq-ft	1,400	1,000
Lounge	sq-ft	400	700
Other Back of House			
Employees – Operating	employee	110	1,300
Admin./ Facilities	sq-ft	1,300	100
Sports Bar, Bar Lounge and Patio	sq-ft	4,000	6,400
Meeting Rooms	sq-ft	4,000	3,700
Subtotal for Proposed Project[1]			**19,000**
Resort	rooms	150	18,000
Projected Average Daily Wastewater Flows [1]			**37,000**
Projected Peak Daily Wastewater Flow (PF=1.4) [1]			**52,000**

Notes:
1. Rounded to the nearest 1,000 gpd.

The revised project facilities were adjusted based on the architectural plans for the constructed project. Even with the additional flows from the previously unaccounted for café and lounge spaces, the key facilities that contributed to a decrease in projected flow were the decrease in meeting room square footage, bowling alley lanes, and virtual reality golf suites.

Table 2-4 presents an estimated breakdown of anticipated wastewater generation by existing facility component. Existing facility quantities/sizes were provided by Resort staff in the previous feasibility study. The Total Average Daily Wastewater Flow expected for the Existing Facilities is 139,000 gpd. Similarly, a wastewater peaking factor of 1.4 was used based on a review of existing flowmeter data which was also consistent with recent prior experience with similar facilities. The peaking factor was applied to the measured Total Average Daily Wastewater Flow to determine a Total Peak Daily Wastewater Flow.

Inflow and infiltration (I&I) is typical in older gravity sewer collection systems, in areas of poor surface drainage and high groundwater, or with long gravity collection systems. In the previous feasibility study and based on recent 2022 and 2023 flow data it was concluded that existing influent flows do not exhibit I&I tendencies.

Table 2-4: Wastewater Flows - Existing Wastewater Generating Facilities

Element	Units	Program	Average Daily Flow (gpd) [1]
Casino / Gaming Floor	sq-ft	82,800	
Patrons	Per day	10,000	50,000
Employees – Operating & Administration	employees	1,000	12,000
Dining			
Buffet	seats	480	11,520
Burger Spot	seats	60	1,440
Henry's	seats	139	3,336
Original Mels	seats	162	3,888
Pearl	seats	74	1,776
High Limit Bar / Kitchen	seats	13	312
Other Back of House			
Kitchen, Admin., etc.	sq-ft	17,000	NA
Admin. Building	sq-ft	32,000	2,240
Clinic	sq-ft	40,000	15,600
Entertainment			
Bowling Alley	sq-ft	8,000	700
Virtual Reality Golf Suites	sq-ft	2,000	800
Indoor Karting Track	sq-ft	24,000	3,900
Golf Simulator	sq-ft	2,000	250
Cafe	sq-ft	1,400	1,000
Lounge	sq-ft	400	700
Other Back of House			
Employees – Operating	employee	110	1,300
Admin./ Facilities	sq-ft	1,300	100
Sports Bar, Bar Lounge and Patio	sq-ft	4,000	6,400
Meeting Rooms	sq-ft	4,000	3,700
Resort	rooms	150	18,000
Total Average Daily Wastewater Flows [2]			**139,000**
Peak Daily Wastewater Flow (PF=1.4) [2]			**195,000**

Notes:
NA = Not applicable or not calculated. Wastewater contribution included in other elements.
1. Rounded to the nearest 1,000 gpd, unless otherwise noted.
2. Although the existing wastewater treatment facility is not experiencing this flow currently, this is the anticipated total flow with the previous new facilities. It is assumed that current flows have not reached their pre-COVID-19 levels and will increase steadily over time. Measured peaking factor approximately 1.4.

2.2.2 Projected Incremental Wastewater Flows

The unit flow factors and percent occupancy levels derived from Table 2-3 were utilized to estimate incremental wastewater flow generation for the construction of the Proposed Project. Wastewater flow for the residential units was estimated based on a rate of 190, 200, and 290 gallons per day per equivalent dwelling unit (gpd/EDU) for townhomes, cottages and single-family homes, respectively. The residential wastewater rate was based on a recent similar study for a Tribal residential community and typical flow factors used for residential project planning in the region. Note that Tribal housing is expected to be constructed in a phased manner over time. The incremental flow estimate only looks at the buildout condition. The results are shown in **Table 2-5**.

Table 2-5: Estimated Incremental Wastewater Flows for Proposed Project

Element	Units	Program	Average Daily Flow (gpd)
Arena			
Sports/Concert/Center Stage	sq-ft	80,000	10,714
Team Store	sq-ft	400	18
Concourse Retail	sq-ft	500	23
Other Back of House			
Employees – Operating	employee	70	840
Commercial	sq-ft	30,000	1,050
Multi-Purpose Emergency Shelter	sq-ft	5,300	2,160
Maintenance Operations Building[2]	sq-ft	3,000	0
Residential			
Townhomes (High-Density)	EDU	16	3,040
Cottages	EDU	24	4,800
Single-Family Homes	EDU	92	26,680
Projected Average Daily Wastewater Flows, Excluding Residential [1]			**15,000**
Projected Average Daily Wastewater Flows, Residential Only [1]			**34,000**
Projected Average Daily Wastewater Flows, Total [1]			**49,000**
Projected Peak Daily Wastewater Flow (PF=1.4) [1]			**69,000**

Notes:
1. Rounded to the nearest 1,000 gpd.
2. Assumed flow demand is included in number of employees.

2.2.3 Total Projected Wastewater Flows

To determine the total projected wastewater flows, the estimated incremental flows from Table 2-5 are added to the existing flows in Table 2-4. Total wastewater flows for the Existing Facilities plus the project are summarized in **Table 2-6**.

Table 2-6: Projected Wastewater Flows

Parameter	Total Projected Wastewater Flow, no Residential (gpd)	Total Projected Wastewater Flow, with Residential (gpd)
Existing Facilities [1]	139,000	139,000
Project (Incremental) [2]	15,000	49,000
Total Average Daily Wastewater Flow [3]	**154,000**	**188,000**

Notes:
1. See Table 2-4.
2. See Table 2-5.
3. All flows in this table are average day flows. Apply a peaking factor (PF) of 1.4 to obtain estimated peak flows and a factor of 3.5 to obtain estimated peak hourly flows.

2.3 Recycled Water Demands

For the purposes of this Study, recycled water is defined as WWTP effluent which has been oxidized, filtered, and disinfected to a product water quality meeting the State of California's definition of disinfected tertiary recycled water, and is subsequently delivered to on-site non-potable demands suited for using recycled water, with the excess disposed in spray fields or subsurface disposal fields. Related regulations are further detailed in SECTION 3.

To conserve potable water and reduce disposal of treated wastewater, disinfected tertiary recycled water is currently produced on-site and reused for toilet and urinal flushing, fire suppression, casino and clinic landscape irrigation, WWTP treatment process water, and tribal residential landscape irrigation. The distribution, use, and disposal of recycled water is discussed in greater detail in SECTION 5. The proposed project is not anticipated to increase recycled water use for toilet and urinal flushing. The metered recycled water returned to the casino for toilet and urinal flushing for 2023 was an average of 22,000 gpd. It is anticipated that construction of a cooling tower is planned in the near future, refer to **Section 5.2** and **Section 5.3** for the Proposed Project water balance and cooling tower demands.

2.3.1 Irrigation Water Demands

Irrigation demands at the Resort include landscaping around the Casino and Resort facilities. Recycled water for irrigation is also used at the Clinic and tribal residential properties. All landscaped areas are located on Trust Land. Projected landscape irrigation demands are based on the original design criteria of the landscaped areas. Landscape demands are currently met with recycled water from the WWTP. The project will add landscaped areas for the proposed residential community, however that area has yet to be determined. For the purposes of this study, it is assumed that the residential landscaped area will be twice the existing landscaped area. **Table 2-7** provides the total annual average landscape irrigation demand for the Existing Facilities compared to the previous feasibility study projection.

Table 2-7: Landscape Irrigation Demand Projections

Parameter	Units	Landscape Irrigation
Existing Landscape Area, Total	acres	4.8
Previously Anticipated Landscape Irrigation Demand, Total[1]	MG/year	1.16
Anticipated Irrigation Demand, Total[2]	MG/year	2.32
Total Projected Irrigation Demand Difference[3]	**MG/year**	**1.16**

Notes:
1. Previous study anticipated irrigation annual demand of 1.03 MG/YR. This was updated based on actual acreage reduction as part of previous improvement project.
2. Previous study anticipated irrigation demand is assumed to double to account for additional residential housing landscape demands.
3. Staff Ops have confirmed that there is typically insufficient stored recycled water to meet landscape demands during summer months in addition to metering errors. Existing demands may be higher than shown in the data. Higher than projected demands would benefit the water balance.

2.4 Potable Water Demands

This section presents the potable water demands for the Existing Facilities and estimated incremental demands of the Proposed Project. Net potable water demand is calculated as the difference between base water demand and the demand served by recycled water. Base water demands are estimated from a water loss factor applied to the projected wastewater flows (Table 2-6). Recycled water demands are then estimated for toilet and urinal flushing. Since using recycled water reduces the total water demand, these recycled water demands are subtracted from the base water demand to determine the net potable water demand. The proposed project is not anticipated to increase recycled water use for toilet and urinal flushing.

2.4.1 Historical and Existing Net Water Demand

In the previous feasibility study, it was anticipated that the net potable water demand would increase by 31,000 gpd for the Resort facilities. However, recent data trends suggest that potable water demands to the Resort facilities have decreased by 30%. As discussed in Section 2.2, the previous wastewater flow projections were revised and reduced by 5,000 gpd. The previous flow projections also assumed the entertainment facility would utilize recycled water for toilet and urinal flushing. Resort staff confirmed recycled water for toilet and urinal flushing only applies to the newly constructed resort. For the purposes of this study, it is assumed that potable water demands will include the revised projections for recycled water and net potable water demand.

Table 2-8 presents the historical (pre-COVID-19) water demands and 2023 average demands. The table also includes the revised projections for the previous feasibility study. The potable water system currently serves the casino, resort, and residential tribal housing.

Table 2-8: Historical, Existing and Anticipated Water Demand

Parameter	Average Potable Demand to Resort (gpd)	Average Potable Demand to Tribal Housing (gpd)	Total Average Potable Demand (gpd)
Historical Average (2015-2019)	62,000	31,000	93,000
Existing Average (2023)[1]	45,000	37,000	82,000
Previous Project (Incremental)[2]	31,000	-	-
Revised Previous Project (Incremental)[3]	30,000	-	-

Notes:
1. The year 2023 was used to determine existing demand conditions since newly constructed facilities were in full operation during this year (i.e., entertainment facility and resort).
2. See previous study flow projections. Tribal housing was not evaluated in the previous project study.
3. The difference between previous and revised project incremental demands is insignificant due to lower overall wastewater flow estimate and reduced recycled water demand.

2.4.2 Projected Incremental Water Demands

Base water demand estimates were calculated by applying a typical water loss percentage to the projected wastewater flows. Prior studies estimated annual average facility water loss of about 19%. Water losses can be attributed to human consumption, cooking activities, evaporation, leaks, and cooling tower losses. Since the Resort does not currently utilize cooling towers, a water loss of 10% will be used for planning purposes. Cooling tower demands will be addressed in the seasonal water balance projected for this Project and will utilize recycled water. Recycled water demands are subtracted from base demands to determine net potable demands. Since recycled water is not anticipated to be used for toilet and urinal flushing the net potable demand is estimated at 54,900 gpd. Apply a peaking factor (PF) of 1.5 to obtain estimated peak flows.

2.4.3 Total Projected Water Demands

To determine the total projected water demands, the estimated incremental demands are added to the existing demands in Table 2-8. Total water demands for the Existing Facilities plus the project are summarized in **Table 2-9**.

.

Table 2-9: Projected Water Demands

Parameter	Total Average Potable Demand (gpd)
Existing Facilities [1]	123,000
Project (Arena and Support Facilities, Incremental) [2]	16,600
Project (Residential, Incremental) [2]	38,300
Total Average Daily Water Demands [3]	**178,000**

Notes:
1. See Table 2-8. This is derived from the sum of the historical average total demand and revised project incremental from the previous project.
2. All flows in this table are average day flows. Water demand projections are based on wastewater flow projections multiplied by a factor of 1.1 to account for water losses.
3. All flows rounded to the nearest 1,000 gpd. Apply a peaking factor (PF) of 1.5 to obtain estimated peak flows and a factor of 3.5 to obtain estimated peak hourly flows.

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 3 – REGULATORY REQUIREMENTS

This section details the regulatory issues associated with wastewater service for the existing facilities and the Project. Regulations for water reuse and wastewater effluent disposal are also discussed.

3.1 Regulatory Authority

Because the Resort is located on the Tribe's Trust Land, the United States Environmental Protection Agency (EPA) has jurisdiction over on-site water and wastewater service. Although the State of California has no jurisdictional authority over facilities located on tribal Trust Land, the recycled water quality and application will conform to California Code of Regulations (CCR) Title 22 recycled water standards.

3.2 Wastewater Treatment Plant

The operation of the WWTP is regulated by EPA because it is located on Trust Land. State of California agencies do not have jurisdiction over the operation of the plant or the use of recycled water and disposal of wastewater on Trust Lands. The WWTP is currently operated in accordance with EPA requirements and will continue as such after implementation of the project. The quality of the effluent (recycled water) produced by the WWTP must meet all requirements that apply to each method of reuse or disposal, as described in the following sections.

3.3 Effluent Disposal and Reuse

EPA regulates recycled water use on Trust Land. Recycled water is used for toilet/urinal flushing in the casino area of the facilities, landscape irrigation in the Resort area, tribal residential landscape use and additional recycled water is disposed of in leach / spray fields, all of which are on Trust Land.

3.3.1 Land Discharge

Currently, recycled water is discharged for land application to landscape irrigation and subsurface disposal fields within Trust Land, which is under EPA jurisdiction. When applying recycled water to Trust Land, the Tribe meets the Title 22 reclamation requirements, although no site-specific permit is required for Trust Land application of recycled water.

Reporting of recycled water distributed on Trust Land is conducted by Operations Staff. All recycled water disposal options are metered and read and recorded daily. Monthly reports submitted to EPA account for all recycled water applied on-site.

3.3.2 Leach Field Disposal

Leach fields are used on Trust Land to dispose of effluent (recycled water) from the WWTP. Leach field disposal is regulated under the Federal Underground Injection Control (UIC) Program, which works to prevent contamination of drinking water resources from underground

injection of waste. The UIC Program is administered by EPA, not only because the leach fields are located on Trust Land, but because California is a Direct Implementation State (40 CFR Part 144.83). The UIC program is a crucial component of the source water assessment and protection program, because it identifies, permits, and regulates the design, siting, operation, and maintenance of leach field disposal systems that are designed to dispose of waste underground. Subsurface disposal of recycled water from the WWTP through leach fields is classified as a Class V injection well under the UIC Program. All Class V injection well owners in California and on Trust Land are required to submit inventory information to the EPA.

The leach fields are located on Trust Land (**Figure 1-2**)**.** EPA regulates the use and application of the leach fields and requires that the flow volumes going to the leach fields be reported. Monthly reports (applicable to leach field operations) are submitted to EPA and to El Dorado County that include:

- Wastewater influent and recycled water (effluent) flows and quality
- Recycled water (effluent) distribution (volumes sent to each of the leach fields)
- Daily readings and summary reports from the site observation wells

3.3.3 Toilet/Urinal Flushing

To conserve potable water, recycled water for toilet and urinal flushing is currently supplied to restrooms located in the casino and resort. Since these facilities are located on Trust Land, this use of recycled water falls under the jurisdiction of the EPA. However, the quality of recycled water delivered to these uses, and the overall operation of the distribution system, is conducted in accordance with CCR Title 22 guidelines and requirements.

While the use of recycled water for toilet flushing conserves potable water and is a green initiative, it can have the detrimental effect of increasing the recycled water's salinity. As potable water is consumed through domestic uses and waste streams are produced, salinity increases. Recycled water therefore has higher salinity than the potable water source it was derived from. The use of recycled water in toilets and urinals is a "closed loop" activity, in that this recycled water returns again to the WWTP as a waste stream. This "loop effect" can increase, or "cycle up," salinity and other dissolved constituent concentrations in the wastewater and subsequent recycled water if it represents a significant portion of the total flow. However, the amount of "cycling up" is limited by the diluting effects of the larger system, which includes the continuous introduction of potable water and the disposal of a portion of the recycled water on landscape or disposal fields, which does not involve a return stream. Excessive cycling up of dissolved constituent concentrations is not expected to change after construction of the Proposed Project.

Currently, the chlorine residual and total coliform concentrations are collected daily and reported to EPA on a monthly basis. It is anticipated that this monitoring and reporting process will remain unchanged after completion of the project as dual-plumbed restrooms will continue to be used.

3.3.4 Cooling Tower Blowdown Generation and Disposal

The Resort is considering constructing cooling towers in the near future to serve the existing casino and gaming areas. A cooling tower operates by evaporating a small portion of the recirculating water to remove heat from an HVAC system. As the warm water from the system is sprayed or distributed over fill material inside the tower, air is drawn or forced through, causing a portion of the water to evaporate. This evaporation cools the remaining water, which is then recirculated back into the system. To control the concentration of dissolved minerals and impurities, a portion of the water is periodically discharged as blowdown, which is replaced by fresh makeup water. This process helps maintain water quality and prevents scaling, corrosion, and biological fouling in the cooling system.

Cooling towers incorporated into the Resort would utilize recycled water as the water source for cooling and would discharge blowdown to the sewer system to be treated at the WWTP. The site-specific seasonal water demands and water quality of cooling tower blowdown are not yet defined and will depend on the water chemistry of the recycled water, cooling system configuration, operating parameters, and use of chemicals. This study uses typical planning-level cooling tower operating parameters to generally account for the addition of this facility as part of the Proposed Project.

3.4 Recycled Water Storage and Distribution System

Recycled water storage and pumping is addressed by two recycled water facilities (RWFs) referred to herein as RWF #1 and RWF #2.

RWF #1 is the primary facility that receives treated recycled water from the WWTP and pumps it into the distribution system. This facility is located near the Resort facility and includes a single 3 MG welded storage tank, four 1,500 gpm pumps, and two 300 gpm pumps. Two large pumps are needed for fire flow demands, while the smaller pumps are typically used to satisfy daily recycled water demands. The storage tank was designed to provide sufficient storage of recycled water to accommodate actual wastewater flow, all infiltration and inflow, agronomic use of recycled water, and design seasonal precipitation.

RWF #2 consists of two (2) new 3 MG welded steel storage tanks at the Lot 40 site. The storage tanks were shown on Figure 1-2. The storage tanks are located within Trust Land boundaries. This facility was constructed to serve as a seasonal storage and distribution pump station as part of the recent construction of the entertainment facility and resort. The RWF #2 was designed to fill from RWF #1 via the distribution system and a modulating control valve to regulate the flow into the tanks. RWF #2 is designed to operate as a backup facility to RWF #1 and is not designed to run at the same time. The RWF #2 pump station is expected to fill during wet weather months and drain during the summer months. RWF #2 is equipped with two 400 gpm vertical turbine pumps in duty – standby configuration and is not equipped to provide fire flow suppression. The discharge pressure is designed to meet the existing station delivery pressure of the primary facility.

All storage tanks have a diameter of 120 feet (ft). The finished floor elevation is at 1,595 ft above mean sea level for the primary tank and 1,326 ft above mean sea level for the RWF #2 storage tanks. The overflow is at an internal height of 35.5 ft. The operational storage capacity is roughly 2.4 MG for the RWF #1 tank, since fire flow reserves require the minimum depth in the tank to

remain at approximately 6.5-7 ft. The total operational capacity of the new tanks at RWF #2 is 3 MG each.

3.5 Water Supply Storage and Distribution System

The water supply system (storage tank and booster pump station) receives potable water from El Dorado Irrigation District (EID) through an existing 3-inch water meter. Per the EID agreement (Appendix C), EID agreed to provide the Rancheria a maximum rate of 95 gpm with an average total volume of 135,000 gpd. The water meter is physically restricted to provide any more than the service agreement flow limitations. The potable water storage and distribution system includes a 0.5 MG welded storage tank located at the WWTP. The storage tank was shown on Figure 1-2. The storage tank has a diameter of 54 feet (ft). The finished floor elevation is 1,432 ft above mean sea level. The overflow is at an internal height of 30 ft.

The water distribution system includes four 485 gpm pumps (60 HP) and two 300 gpm pumps (25 HP). The water supply pumps are used to satisfy daily water demands. The storage tank was designed to provide sufficient storage of water to accommodate Resort facilities and tribal community demands.

3.6 Biosolids

The dewatered biosolids (typically greater than 14% solids) produced by the existing belt press at the WWTP are considered a special waste product which is acceptable at a Class 2 sanitary landfill as long as it meets specific waste acceptance criteria. Currently, the biosolids meet the El Dorado Landfill Waste Acceptance Criteria and are off-hauled to the landfill for disposal. The biosolids are tested annually for the required constituents, and disposal permits are issued by El Dorado County.

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 4 – WASTEWATER ASSESSMENT

This section describes the wastewater collection and treatment for the Existing Facilities, and identifies those facilities that must be upgraded, modified, or expanded to meet the projected flows for the project alternatives.

4.1 Existing Wastewater Facilities

All wastewater generated by Existing Facilities (casino/resort/entertainment, admin, clinic, etc.) is collected and pumped to the on-site WWTP, located southeast of the Resort on Trust Land. The WWTP employs a membrane bioreactor (MBR) process that produces highly treated tertiary quality effluent acceptable for irrigation purposes and other reuse applications. The Resort recently performed in-kind replacement of the existing WWTP membranes, which were at the end of their useful life, with new membranes of the same type. The existing configuration is rated for 225,000 gpd maximum month flow and 350,000 gpd design flow. The system is designed for a maximum membrane flux of 14.5 gallons per square foot per day (gfd) at maximum month flow with one membrane unit offline, and 29 gfd for a sustained peak of up to 24 hours. The membrane units were installed with every slot filled with a membrane cartridge. If required, additional filtration capacity can be installed by stacked membrane units in the empty spaces above the existing units.

4.1.1 Existing Wastewater Facility Sizing Criteria

Existing wastewater flows were provided in Table 2-4. The anticipated average day flow of 139,000 gpd is below the average day flow design capacity of the MBR system (175,000 gpd). The average day flow affects the sizing of biological treatment components and determines overall effluent storage and disposal requirements. The existing peak day flow of 195,000 gpd determines the hydraulic capacity requirements including membrane surface area, pumping, and disinfection. Pumping equipment is typically sized based on peak hourly flows, for this study a peaking factor of 3.5 was applied to determine the anticipated pumping equipment upgrades for the Project. The peaking factor is based on previous studies and models.

4.1.2 Existing Wastewater Collection System

The Influent Lift Station (ILS) is the primary lift station to the WWTP and is located near the entrance ramp to the Resort South of the Parking garage (Figure 1-2). Only one lift station is used to pump sewage from the Casino, Resort and most other Existing Facilities to the WWTP. The ILS is currently tied to the Resort backup generators.

The ILS facility includes one wet well with three submersible pumps (two duty and one standby) and one valve vault. The control panel for the ILS facility is also located near the ILS. Improvements as part of the previous project included the construction of a new coarse screening facility approximately 300 ft upstream of the ILS. The ILS collects all of the wastewater generated by the casino and nearby facilities via gravity. Additional sewage from the Administration Building and Clinic are collected downstream from the ILS but upstream from the influent flow meter. A large passive grease interceptor behind the casino building separates the fats, oil, and grease (FOG) from the sewage prior to entering the ILS.

The wastewater from the Casino and Resort flows into the wet well of the ILS, where two non-clog submersible pumps pump the sewage to the WWTP headworks station. Each pump has a firm pumping capacity of approximately 442 gpm (636,000 gpd) and are equipped with constant speed motors. The wastewater collection system also includes a buried emergency overflow tank with a total nominal volume of 6,183 gal. The tank was designed to provide approximately 1 hour of average day flow storage capacity.

The projected wastewater flows for the Proposed Project are expected to bypass the existing ILS. Since the Project flows are likely to be added downstream of the ILS, the Proposed Project flows are not expected to affect the ILS or the emergency overflow tank.

4.1.3 Coarse Screening Facility

A course screening facility was constructed as part of the previous project to remove large debris that may be found in hotel/resort wastewater. The coarse screening facility includes a mechanically cleaned coarse bar screen rated for an average flow of 0.72 mgd and maximum flow of 1 mgd. It also includes an integrated washer compactor and continuous bagging system for dewatered screenings. The bar screen system is housed in a pre-manufactured fiberglass reinforced plastic structure for odor control. The coarse screening facility was constructed upstream of the existing ILS and tied in to an existing upstream manhole with a 10” sanitary sewer pipeline.

The projected wastewater flows for the Proposed Project are expected to bypass the existing ILS. Since the Project flows are likely to be added downstream of the ILS, the Proposed Project flows are not expected to affect the coarse screening facility.

4.1.4 Existing Wastewater Treatment System

The WWTP influent has a strength exceeding that typically found in municipal wastewater. **Table 4-1** summarizes the typical range of influent wastewater quality for the existing WWTP.

Table 4-1: Wastewater Characteristics for the Existing Facilities

Year	Parameter	Units	Influent Wastewater Quality [1]		
			Average	Minimum	Maximum
2015-2018	BOD	mg/L	487	215	1,040
	TSS	mg/L	322	89	848
2023	BOD	mg/L	415	301	537
	TSS	mg/L	367	202	544

Notes
1. Minimum and maximum are an average of the lowest and highest measured values.

The Existing Facilities for wastewater collection and treatment are described below. A process flow diagram for the existing wastewater treatment and disposal system is shown in **Figure 4-1** with the existing WWTP layout presented in **Figure 4-2**. Major components of the existing WWTP include:

- Headworks – two rotary perforated plate screen units, 2-mm screens

- Overflow/emergency storage – one 120,000-gallon basin
- MBR process and membrane trains – two trains with a combined tertiary treatment capacity of 350,000 gpd
- Plant drain pump station – one duplex submersible pump station with two 5 HP submersible pumps
- Operations/MCC/blower building – approximately 2,800 sq-ft
- Chlorine Contact Basin (CCB) – 661,000 gpd disinfection capacity
- Belt Filter Press Building – approximately 1,400 sq-ft with a 1.5-meter belt filter press to dewater waste activated solids (WAS)

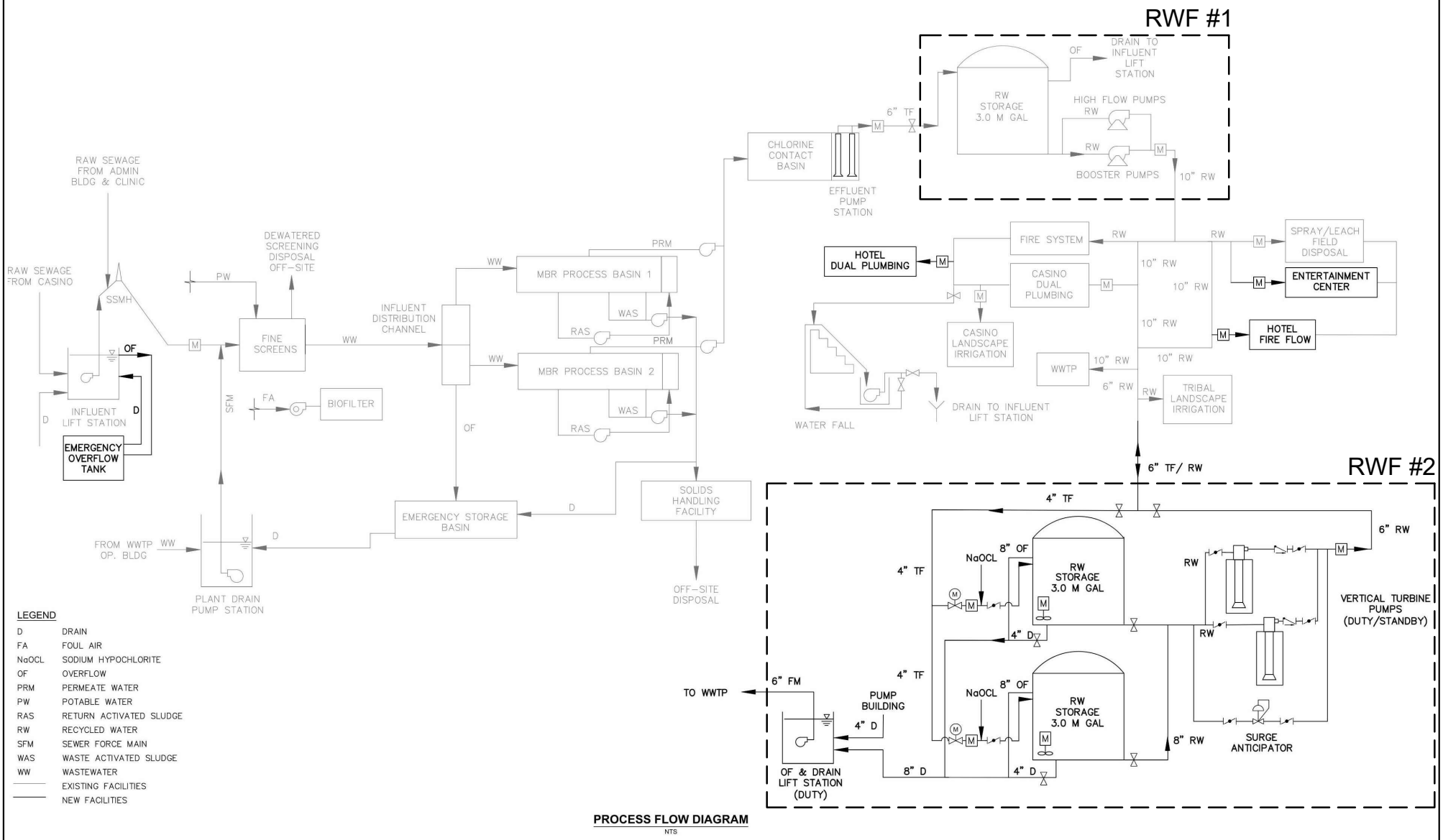


Figure 4-1
Red Hawk Casino
Water and Wastewater Feasibility Study
Existing Wastewater Process Flow Diagram

HydroScience

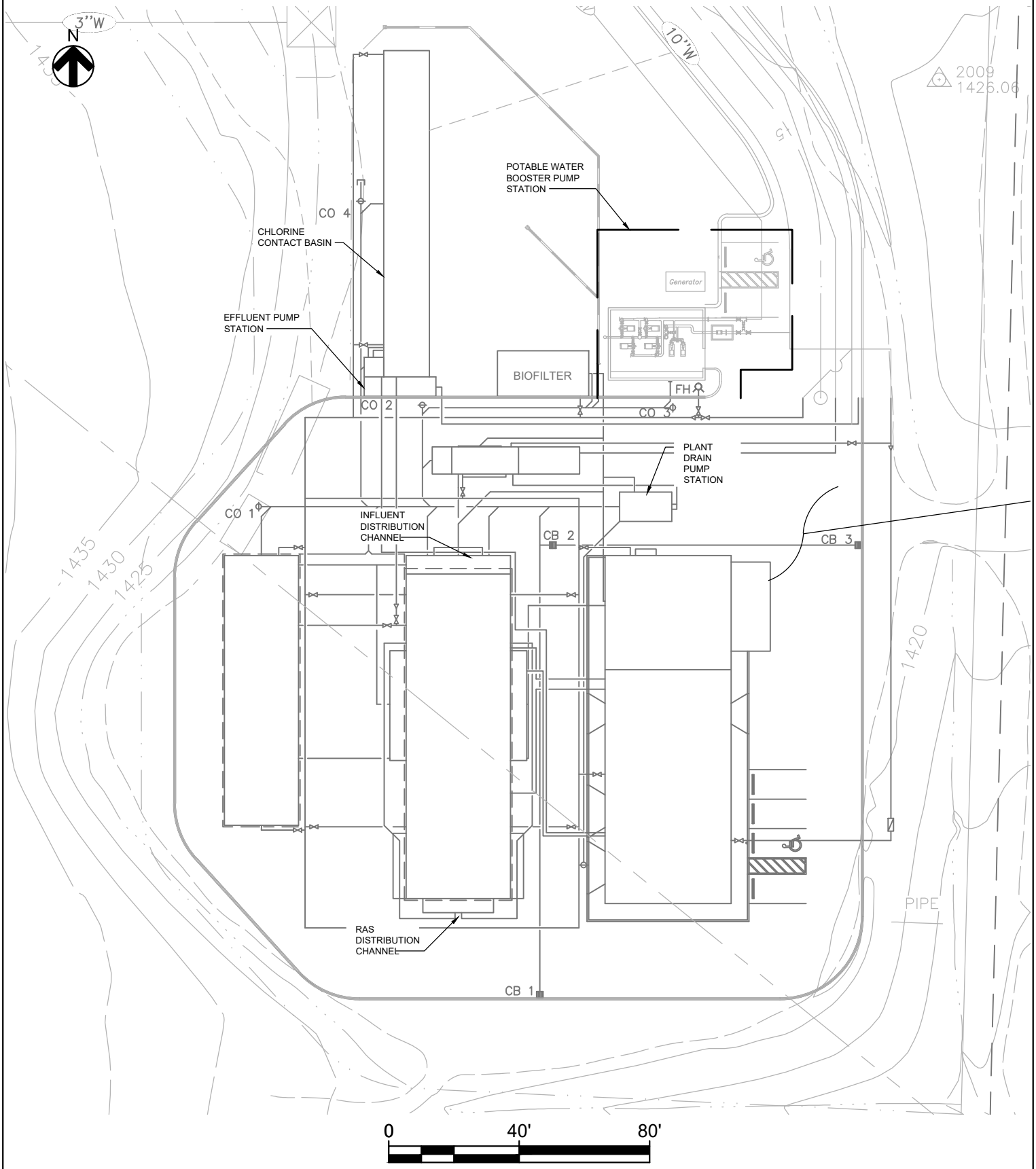


Figure 4-2
Red Hawk Casino
Water and Wastewater Feasibility Study
Existing WWTP Layout

HydroScience

4.1.4.1 Headworks

The Resort flows pumped from the ILS combine with wastewater generated from the Administration Building and Clinic upstream of the influent flow meter. The combined wastewater flows to the headworks located at the WWTP site, north of the MBR trains. Each fine screen has a built-in washer/compactor and 2-mm openings that remove hair, inorganics, and wastes. The 2-mm opening is necessary to protect the integrity of the membrane filters downstream. Each screen can handle 0.6 mgd. During normal operation, wastewater flows by gravity to the wet well, and three submersible non-clog pumps are used to convey the wastewater to the WWTP headworks. The washed and compacted screenings collected at the headworks are stored in bins on-site to be periodically disposed of at the El Dorado County Landfill.

4.1.4.2 Existing WWTP

The WWTP treats wastewater in an MBR process. The MBR is a modified activated sludge process designed for biological oxidation, nitrification (ammonia removal), denitrification (nitrate removal), and solids separation. The existing MBR plant, which has been in operation since 2008, meets all water quality permitting requirements and standards. The MBR has consistently produced a high-quality effluent meeting all applicable recycled water limitations and water quality objectives (SECTION 3).

The MBR has two parallel process trains. Each process train consists of an anoxic zone, pre - aeration zone, and membrane filters, rated at a treatment capacity of 225,000 gpd. Screened influent flows by gravity from the headworks to the influent distribution structure and from there flows into the MBR. The existing MBR is designed for a continuous peak day design flow of 225,000 gpd and a sustained peak weekend flow of 350,000 gpd.

The design membrane flux is rated for 14.5 gfd during maximum monthly flow conditions (350,000 gpd) and 29.0 gfd during peak daily loading conditions (to not exceed 24 hours). The calculated membrane flux for existing facilities flow using the modeled flow from the wastewater generation model (Table 2-4) of 139,000 gpd average day flow with a 1.4 peaking factor is 6.2 and 8.7 gfd during average day flows and peak day flows, respectively. The existing membrane flux is calculated assuming both trains online, which is consistent with current operations, and with one membrane unit offline for maintenance. The results show the existing flow conditions and membrane flux of the filtration system is well under design capacity.

Treatment Basins: The anoxic zone is a basin where the influent sewage is combined with overflow from the membrane tank and mechanically mixed. The basin is mixed without aeration to promote denitrification, which converts nitrates to nitrogen gas. Return Activated Sludge (RAS) is pumped from the anoxic zone to the pre-aeration basin.

The aeration basin converts dissolved BOD to a filterable solid material in a suspended growth process referred to as activated sludge. This basin also converts ammonia into nitrates. The basin is aerated and mixed by a fine bubble diffuser system.

Membranes: The membrane filters consist of flat plates with a pore size of approximately 0.4 microns. Membranes in this facility are arranged in 14 membrane units, 7 per process train for each of the two trains. Each membrane unit contains 200 flat plate cartridges with 8.61 sq. ft. of membrane area per cartridge. There is 24,108 sq. ft. of total membrane filtration surface area and this reduces to 22,386 sq. ft. when one membrane unit is out of service. Suction is applied to the membranes by a low pressure permeate pump to draw liquid through the membranes and

the suspended solids are filtered out by the membrane. The membrane filters replace a clarifier that is typically used in an activated sludge process to separate solids. Since the membranes have such a small pore size, they also replace the filtration process used after clarifiers to provide the advanced tertiary treatment necessary to meet Title 22 requirements.

The outside of the membranes are cleaned by providing coarse bubble scour air at the bottom of the module and periodically backwashed in place with a sodium hypochlorite solution.

Blowers: Two aeration blowers (duty-standby) supply process air to the fine bubble diffuser system in the pre-aeration basin to support the biological treatment process. There are two blowers (duty-standby) to provide scour air to the membranes. All of the blowers are positive displacement type to provide a constant airflow under varying water level (head) conditions in the tanks. The blowers are located in the Operations Building (Figure 4-2).

4.1.4.3 Existing Disinfection

The recycled water from the MBR is pumped to a CCB for disinfection to meet Title 22. The existing CCB provides a 90-minute modal contact time at 661,000 gpd, based on an assumed baffling factor of 0.9. This provides greater disinfection capacity than the existing WWTP can currently utilize.

At the exit point of the CCB, the recycled water meets all Title 22 criteria for recycled water, unrestricted use. Thus, the water can be used for landscape irrigation and/or toilet and urinal flushing. Typically, a residual of 1-2 mg/L effectively prevents any regrowth in the recycled water distribution system.

Chlorinated effluent flows by gravity into the effluent pump station. Effluent is then pumped to a 3 MG storage tank located northwest of the WWTP, near the Resort, via two vertical turbine pumps. Each pump has a capacity of 576,000 gpd and is equipped with a VFD.

4.1.4.4 Existing Emergency Storage

Currently, the WWTP has an emergency overflow storage capacity of approximately 120,000 gallons in an emergency storage basin west of the MBR system. Currently the emergency overflow basin takes overflow from the MBR influent distribution channel, drainage from the WAS pump station, storm drainage, as well as precipitation during rainfall events (Figure 4-2). Stored wastewater is sent to the plant drain pump station. If the WWTP were to shut down the emergency storage basin would be able to provide approximately 20 and 13 hours of emergency response time at anticipated average and peak day flows, respectively.

4.1.4.5 Plant Drain Pump Station

The existing plant drain pump station is located northeast of the MBR system (Figure 4-2). The pump station wet well currently houses two 316,800 gpd submersible pumps to convey accumulated wastewater flow from the emergency storage basin drain, wastewater generated by the operations building, and drainage from the MBR influent distribution channel. Discharge from the station returns to the headworks facility to be treated in the WWTP.

4.1.4.6 Existing Operations Building

The existing operations building is located east of the MBR trains (Figure 4-2). This building currently is approximately 4,800 sf, housing a laboratory, operations room, chemical feed room, maintenance area, blower room and MCC room.

4.1.4.7 Existing Biosolids Facilities

Biosolids generated in the MBR are pumped to the belt filter press dewatering facility adjacent to the operations building (Figure 4-2). A 1.5-meter belt filter press capable of handling up to 9,600 pounds of dry solids per day is currently used on-site to reduce the volume of biosolids to greater than 14 percent solids before it is hauled to the El Dorado County Landfill by a licensed hauling contractor. The belt filter press and disposal waste bin are located within the belt press building to contain odors. Recent sludge generation rates from the existing WWTP require operators to run the belt press approximately 2.5 hours per day, 2.5 days per week.

4.1.5 Existing WWTP Electrical Power Equipment

The existing WWTP plant consists of an electrical equipment room with a main 480V switchboard, three 480V, 600A motor control centers, two control panels, and a 3-phase, 208V/120V standalone lighting panel and transformer. In addition to this equipment there is a SCADA rack, wood telco board and numerous alarms panels which take up most of the remaining wall space in this room. The main switch board 'MSB-WWTP', has a 1200 amp main breaker and feeds all the WWTP loads via the three MCCs. Apart from the recently replaced effluent pump VFDs, all electrical equipment is approximately 16 years old and in good condition.

Motor control centers MCC-A, MCC-MBR1 and MBR2 are each supplied by a 600 amp feeder from the main switchboard and have only a main lug connection to each MCC. MCC-A provides power to all the WWTP loads other than those included the MBR process. Conversely, MCC-MBR 1 and MCC-MBR 2 were supplied by the MBR provider and are dedicated to this process only.

The 30 HP VFDs for the effluent pumps have recently been replaced with 40HP VFDs in MCC-A to support effluent pump upgrades to accommodate increased peak flows as a result of the prior project. This upgrade has used all available empty space in this MCC. Immediately to the right of MCC-A is the stand-alone Lighting Panel A and transformer which interferes with the addition of any MCC sections at this end. There is space between the left side of this MCC and the main switchboard, but it cannot be determined yet if this has the 20 inches of width required for a new MCC section. With the recent upgrade of the effluent pumps on this MCC the current load is 386 amps. This leaves a margin of 94 amps available capacity with an 80% rated feeder breaker.

MCC-MBR 1 has one completely empty spare section along with 48" of vertical space (8X) and 24" of vertical space (4X) in adjacent sections. There is also 18" of vertical space (3X) and 6" of vertical space (1X) in other sections of this MCC. There is no available space on either end for additional MCC sections unless existing equipment is relocated. The existing load on this MCC is 274 amps which leaves a margin of 206 amps available capacity with an 80% rated feeder breaker.

MCC-MBR 2 has two adjacent sections with 48” of vertical space (8X) along with 18” of vertical space (3X) and 6” of vertical space (1X) in other sections of this MCC. There is no available space on either end for additional MCC sections unless existing equipment is moved. The existing load on this MCC is 205 amps which leaves a margin of 275 amps available capacity with an 80% rated feeder breaker.

Lighting Panel A appears to have no available spare breakers. An additional panel will need to be added if additional 208V or 120V loads are required.

4.1.6 Existing WWTP Electrical Control Equipment

The Plant Control Panel ‘PCP’ uses an Allen-Bradley Logix 5561 PLC and has an available 21 spare discrete input (DI) channels and 11 spare discrete output (DO) channels for pump status and control per the Tesco record drawings. There is also one spare analog input (AI) channel and two spare analog output (AO) channels for pump speed control and feedback per the Tesco record drawings. There are no more slots on the PLC backplane to accommodate any additional input/output (I/O) modules. There is potentially room for one more module if the existing backplane is re-placed with a wider model and back panel components are relocated. There is also room for additional AO field terminal blocks and DIN rail further down.

The Filter Control Panel ‘FCP’ is dedicated to the MBR system and uses an Allen-Bradley CompactLogix 1769-L35E PLC. The number of spare I/O channels cannot be determined at this time however there is additional DIN rail space to accommodate a wider PLC backplane with more I/O modules. There is also additional DIN rail space for more field terminal blocks.

The SCADA rack in the electrical room contains the switches and patch panel needed to communicate with the rest of the Resort facilities and will have capacity for all the planned future upgrades.

4.2 Wastewater Facilities Evaluation – Proposed Project

The facilities required to adequately treat wastewater generated by the Existing Facilities plus the construction of the Proposed Project are evaluated in this section.

The Existing Facilities plus of the Proposed Project influent flows are projected at an average day flow of 188,000 gpd (Table 2-6). New residences may be constructed in phases over time. The construction of the other portions of the Proposed Project prior to new residences results in a projected average day flow of 154,000 gpd. A peaking factor of 1.4 was established for the Existing Facilities and is also applied to projected future flows after construction. Although peak hourly data was not accessible for the Study, real time data for other Resort wastewater flows were accessed to establish a peak hourly factor of 3.5. The peak hourly wastewater flow projection was used to determine the capacity of all pumps and headworks facility. **Table 4-2** presents the projected peak day wastewater influent flow necessary for sizing facilities for the Existing Facilities plus construction of the Proposed Project. It also presents calculated membrane flux rates at these flows.

Table 4-2: Projected Wastewater Flows and Membrane Flux Rates

Parameter	Influent Flow (gpd), no Residential	Influent Flow (gpd), with Residential	Membrane Flux (gfd), no Residential[4]	Membrane Flux (gfd), with Residential[4]
Average Daily Wastewater Flow [1]	154,000	188,000	6.9	8.4
Peak Daily Wastewater Flow[2]	216,000	264,000	9.6	12
Peak Hourly Wastewater Flow[3]	539,000	659,000	24	29

Notes:
1. See Table 2-6.
2. Daily peaking factor of 1.4 multiplied by the sum of average day wastewater flow, rounded to the nearest 1,000 gpd.
3. Hourly peaking factor of 3.5 multiplied by the sum of average day wastewater flow, rounded to the nearest 1,000 gpd.
4. Flux is calculated with one membrane unit offline.

4.2.1 Wastewater Collection System

The existing wastewater collection system was described in Section 4.1.2. Improvements needed for construction of the Proposed Project are assessed in this section.

4.2.1.1 Grease Interceptor

The Resort utilizes a passive grease interceptor for trapping the majority of FOG generated primarily by the restaurants. The grease interceptor system is currently near capacity, and additional grease interceptors are being incorporated with the expansion to protect the WWTP from excessive FOG load from the expansion project. The architect should reevaluate existing and future restaurant/concession flows and size traps accordingly, augmenting as needed. Management of FOG is critical to maintain proper operation of the MBR WWTP.

4.2.1.2 Influent Lift Station

As discussed previously, the proposed Project flows are not anticipated to enter the existing coarse screening facility, ILS, or emergency storage tank. It is anticipated that non residential portions of the Project will consist of a new wastewater collection system to include a local ILS and emergency overflow tank near the Arena that will tie-in downstream in the collection system prior to entering the headworks facility. It is anticipated that a new ILS will be constructed at an appropriate location for the Proposed Project. Based on this assumption and with the addition of the proposed peak hour flows downstream of the existing ILS pumps, the hydraulic capacity of the existing pumps will not be affected significantly.

The planned residential community is located well to the north of the Resort at elevations as much as approximately 250 ft below the existing ILS rim elevation. It is expected a separate residential lift station will be needed to serve that area.

During design of the collection system and pump station improvements, the capacity of the sewer force main from the existing ILS to the WWTP should be evaluated to determine if spare capacity exists to receive additional pumped flows from new lift stations serving the Proposed Project, in consideration of the pumping hydraulics of the existing ILS and the new stations

discharging into the same force main. The existing force main is 8” diameter, resulting in a liquid velocity of approximately 3 feet per second (fps) at the projected peak hourly wastewater flow. This is within acceptable range for a force main design. However, the operational coordination of three lift stations discharging into a single force main can become challenging and a higher head will be placed on the existing ILS pumps. Therefore, during preliminary design hydraulic modeling should be used to evaluate a common force main versus parallel force mains and associated pumping requirements and determine the best approach to implement.

4.2.1.3 Headworks

The existing headworks station as mentioned previously can handle a flow of 1.2 mgd (with both units in service), or 600,000 gpd each. As shown in Table 4-2, the existing headworks screens are sufficient to serve the non-residential portion of the Proposed Project, leaving 61,000 gpd of spare peak capacity to construction a portion of the proposed residences. Once residential buildout is achieved, the total peak hourly flows are projected to exceed the capacity of the existing screens while reserving one screen on standby. Either screen replacement with larger screens and associated piping and structure improvements will be required, or a third screen will need to be added.

4.2.1.4 Existing Emergency Storage

As discussed previously, the WWTP has an emergency overflow storage capacity of approximately 120,000 gallons in an emergency storage basin west of the MBR system. This provides 21 hours of emergency storage at average day flow. Once the non-residential portion of the Proposed Project is online, this will decrease to 19 hours (10% reduction). Once residential buildout is achieved, this will reduce to 15 hours (29% reduction).

A 10% reduction in emergency response time afforded by the existing emergency storage tank is not a concern, particularly given the Resort’s ability to control wastewater generating activities at the site. A 29% reduction would be significant. Prior to buildout of the residential community, an evaluation should be performed that considers availability of the Operations staff and equipment required during an emergency and identified the minimum response time that should be allowed for significant system failures. Additional emergency storage volume should be considered. This can be located next to the existing WWTP tank or added at one or both of the new lift stations. The advantage of the latter approach is that storage located at the lift stations can provide response time for emergencies at either the WWTP or the lift station itself.

4.2.2 Wastewater Treatment System

This section discusses the modifications required to the WWTP and disinfection system necessary to accommodate additional influent flow from the Proposed Project.

Based on the flows presented in Table 4-2, the existing MBR system is sufficient to treat the increased flows to the WWTP for the Proposed Project. Given the wastewater quality presented in Table 4-1, the existing average BOD concentration is slightly below the estimated design parameter and existing TSS concentration has been slightly higher than originally anticipated (5%). It is anticipated that the wastewater characteristics will remain similar to existing (Table 4-1) because the elements of the Proposed Project (arena and support facilities) are similar types of facilities currently served by the WWTP.

The residential community is anticipated to provide modest dilution to the overall wastewater stream, offsetting the higher loads seen from food production facilities (restaurants and concession stands).

Immersed MBR: The MBR consists of many elements evaluated individually to determine whether additional capacity is necessary. With the recent replacement of the membranes, the design capacity is maintained as well as the opportunity to add future capacity if needed. To accommodate the additional flows of the Proposed Project, the current membrane flux rates would increase to 8.4 and 12 gfd, for average day and peak day flows respectively, with one membrane unit out of service and both trains online. Peak hour flux rates are 24 gfd prior to residential development, and 29 gfd at residential buildout. At buildout, the maximum flux will be at the design limit, unless some peak buffering is performed at the equalization tank, which is feasible. The analysis shows that additional membranes would not be needed for the MBR trains. Each MBR train is currently equipped with seven total cassettes, fully populated. However, the MBR can accommodate additional cassettes by double stacking membranes, if needed.

Pumping: The waste activated sludge (WAS) pumps have adequate capacity for the Proposed Project. The return activated sludge (RAS) pumps would require upsizing to accommodate the additional flows for the Proposed Project assuming a recirculation ratio of 5.0. The RAS pump upgrade is not triggered until housing construction begins.

Aeration System: The system is currently operating with one blower at less than 10% of capacity on an average day. No changes to the blower drives and controls will be necessary to accommodate additional flows from the Proposed Project.

Scour Air Blowers: Scour air requirements are based on membrane area. Since no additional membranes are needed for the addition of the Proposed Project, no changes are needed for the scour air blowers.

Sludge dewatering: Currently, the belt press is operated 2.5 days per week for less than 3 hours per day. To accommodate increased flows for the Proposed Project, the belt press will need to be operated more frequently. Based on maximum operation of the belt press at five days a week for eight hours a day (typical workday), the maximum flow rate capacity of the belt filter press is still not exceeded by construction of the Proposed Project. The belt press will not require improvements or upsizing. The dewatered biosolids, or cake, produced by the belt press will continue to be disposed of in accordance with the current disposal strategy.

Chlorine Contact Basin: The existing CCB has a tested and certified disinfection capacity of 661,000 gpd based on providing a minimum of 90 minutes of modal contact time at a CT value (chlorine concentration multiplied by contact time) of 450 mg*min/L, based on an assumed baffling factor of 0.9 and chlorine concentration of 5 mg/l at the sampling point.

The peak hourly wastewater flow projected for the Proposed Project is 659,000, which is 99% of the rated contact time capacity based on the assumed baffling factor. As the residential portion of the Proposed Project is constructed, projected flows and peaking factors should be calibrated to actual measured flows. A dye tracer study should be performed if CCB flows are expected to consume more than 90% of rated capacity to confirm the baffle factor of the process. If disinfection capacity is found to be insufficient, the options to resolve this are to construct additional contact volume, improve baffling efficiency if feasible, and/or utilize upstream equalization to reduce peak hour flows.

Each effluent pump has a capacity of 576,000 gpd. Based on existing and historical data, a 30% safety factor is applied to projected influent flows to account for flow inputs internal to the plant (water usage, etc.) and pumping control strategies. The projected flow rates without this safety factor are 539,000 gpd without housing and 658,000 gpd with housing. With the safety factor applied, these increase to 701,000 gpd without housing and 855,700 gpd with housing. The actual peak effluent pumping rate required will depend on whether the addition of the proposed facilities tempers the peak hour peaking factor and/or the safety factor required to account for flow variations internal to the WWTP.

An upgrade to the effluent pumps will be necessary at a minimum when significant housing comes online. It may be required for construction of the other elements of the Proposed Project as well, depending on effects to peaking factors. Interim measures available to manage effluent flows are to either buffer peak hour flows in the equalization basin or utilize the standby pump in a limited fashion during very high peaks.

4.2.3 Proposed Electrical and Control Equipment Upgrades

Upgrades to the Fine Screening, RAS Pumps and CC Basin are anticipated for the Proposed Project.

Assuming a worst case of adding a similar sized fine screen and control panel to the headworks process, this addition can be accommodated by adding a 30-amp feeder breaker to one of the spare 6” (1X) buckets in either one of the MBR MCCs. The additional load on either MCC would be minimal compared the upgrades under consideration. The additional fine screen control panel would either require a network connection or four channels of DI which can be accommodated by the Plant Control Panel PLC.

Assuming a worst case of adding one additional 8 HP RAS pump of similar size to the existing two pumps, this will require a spare 42” of vertical space (7X) in MCC-MBR2. This is assuming both new effluent pump VFDs are added to MCC-MBR1. This is also assuming that the additional RAS pump VFD and controls will not be integrated into the existing or new Belt Filter Press control panel. The additional FLA of the 8 HP pump will be approximately 11 amps so either one of the MBR MCCs can accommodate this load. The new effluent pumps will likely use up the available analog I/O in the Plant Control Panel PLC, so this pump will need to be controlled by the Filter Control Panel PLC.

Upgrades to the effluent pump station are anticipated for the Proposed Project. Assuming a new CCB and effluent pump station is constructed in parallel to the existing with the same capacity, the anticipated two additional 40 HP pump VFDs will require two full additional sections of MCC. One of these VFDs can be accommodated in the completely empty section of MCC-MBR1. The second pump VFD would have to be added to an extra MCC section installed onto an existing MCC lineup. Depending upon the MCC chosen, existing equipment would have to be relocated to accommodate this extra section. An alternative would be to relocate an existing MBR pump VFD to other MCC bucket so as to create an additional completely empty MCC section.

The combined FLA of two 40 HP pumps will be 104 amps, so either one of the MBR MCCs can accommodate the load of both pumps. MCC-A would only be able to handle the load of one pump.

The two additional pumps will require eight channels of DI, two channels of DO, two channels of AI. and two channels of AO This I/O can be accommodated on the plant Control Panel PLC if one additional AI channel is added. Otherwise, the PLC backplane in the Filter Control Panel may have to be expanded to accommodate the additional I/O.

An additional CCB will likely require additional sampling pumps and chemical induction mixer. The sampling pumps will operate from 120VAC and will require an addition 208V/120V lighting panel since the existing panel space is full. The mixer will require a 15 amp feeder breaker installed one of the spare 6” (1X) buckets in either one of the MBR MCCs. The additional load on either MCC would be minimal compared to the other upgrades under consideration. The control panel for this mixer will be installed in the field with discrete I/O connected to the Plant Control Panel PLC.

SECTION 5 – RECYCLED WATER ASSESSMENT

This section discusses the recycled water storage, distribution, and reuse strategies currently being used by the Tribe and modifications required to accommodate the increased flows from construction of the Proposed Project.

5.1 Existing Recycled Water Distribution and Storage

Recycled water is reused and discharged as described below for the Existing Facilities. **Figure 5-1** shows the various locations where recycled water is stored and distributed for disposal and reuse.

5.1.1 Existing Landscape Irrigation and Miscellaneous Demands

5.1.1.1 Casino and Resort Landscape Irrigation

Recycled water is currently used to irrigate three areas/stations of landscape turf at the Casino and Resort. Irrigation demand is currently not satisfied during the summer/dry months since a minimum storage volume is maintained for fire flow demand. The existing landscape irrigation system for the Casino and Resort is metered at each station/area and data is readily available. Currently the demand for landscape irrigation at the Casino and Resort is 3,000 gpd (2023). Historically the annual average demand for landscape irrigation was 21,000 gpd (2015-2019) which included demands for a dry year (2015).

5.1.1.2 Other Landscape Irrigation and WWTP Demands

Recycled water is also used for Tribal residence landscape irrigation, landscape irrigation at the Clinic, and on-site process water for the WWTP. However, these demands are not metered individually. Therefore, usage is estimated for each site. Irrigation demand is currently not satisfied during the summer/dry months since a minimum storage volume is needed for fire flow demand at all times. In the previous study, the recycled water demands for WWTP processes was estimated as the difference between the influent metered flows and effluent flows after the CCB disinfection system. The historical average difference during summer months (winter months are affected by rainfall events) was used to estimate demands for the WWTP. This average was removed from the total monthly metered usage total to estimate landscape irrigation demands for residential and Clinic use. The existing 2022-2023 average demand for onsite WWTP processes and other (Clinic, Admin, residential) landscape irrigation areas has not changed significantly and will not be evaluated further.

5.1.2 Existing Leach and Spray Disposal Fields

Eleven existing leach and drip fields and four spray fields (**Figure 5-1**) are employed for disposal of wastewater effluent. The leach fields may be used year-round and the spray fields may only be used during the absence of rainfall based on agronomic demands. Observation wells located throughout the leach fields are inspected during operation to verify the leach fields are not overly saturated. The leach fields originally had a total rated capacity of 94,195 gpd. The highest monthly average flow recorded was used to evaluate the capacity of each leach field. Historically (2015-2019), approximately 77,000 gpd was applied on average. The existing maximum

average was 21,000 and 122,000 gpd for 2022 and 2023 (22% and 129% of design capacity), respectively.

Currently, the leach fields are used year-round. During normal summertime operating conditions, there is sufficient recycled water demand for toilet and urinal flushing and landscape irrigation to use all tertiary recycled water produced. However, during wet weather periods when landscape demand is non-existent and the spray fields are unavailable for use, the available seasonal storage volume in the existing storage tank must be utilized to buffer the difference between recycled water production and leach field capacity. Leach field capacity during rainfall events is also limited to the condition of the soil and observation wells are currently shown to fill quickly for some leach fields.

Existing data shows all fields performing as originally designed or better. Although the data for Drip Field J shows minimal usage, operations staff have confirmed that the field is being used and the erroneous data is a result of a faulty flow meter.

The spray fields overall were designed to provide the highest disposal capacity, but they are historically the most underutilized. The recent data (2022, 2023) shows usage was increased to approximately 46% of design capacity in 2022 and 18% in 2023. In the summer/dry months, preference is given to recycled water distribution for landscape irrigation to the Casino/Resort, Clinic, and tribal residential homes in addition to dual plumbing use for the Casino and Resort. Approximately 600,000 gallons of storage volume are required for fire flow demand at all times, which limits use of the existing spray fields to winter months and only in the absence of rainfall.

In addition to evaluating the monthly disposal capacity data of each leach field over a period of five years, and based on the existing data, it was determined that the total capacity of the subsurface disposal fields remains consistent with the design capacity of 94,000 gpd.

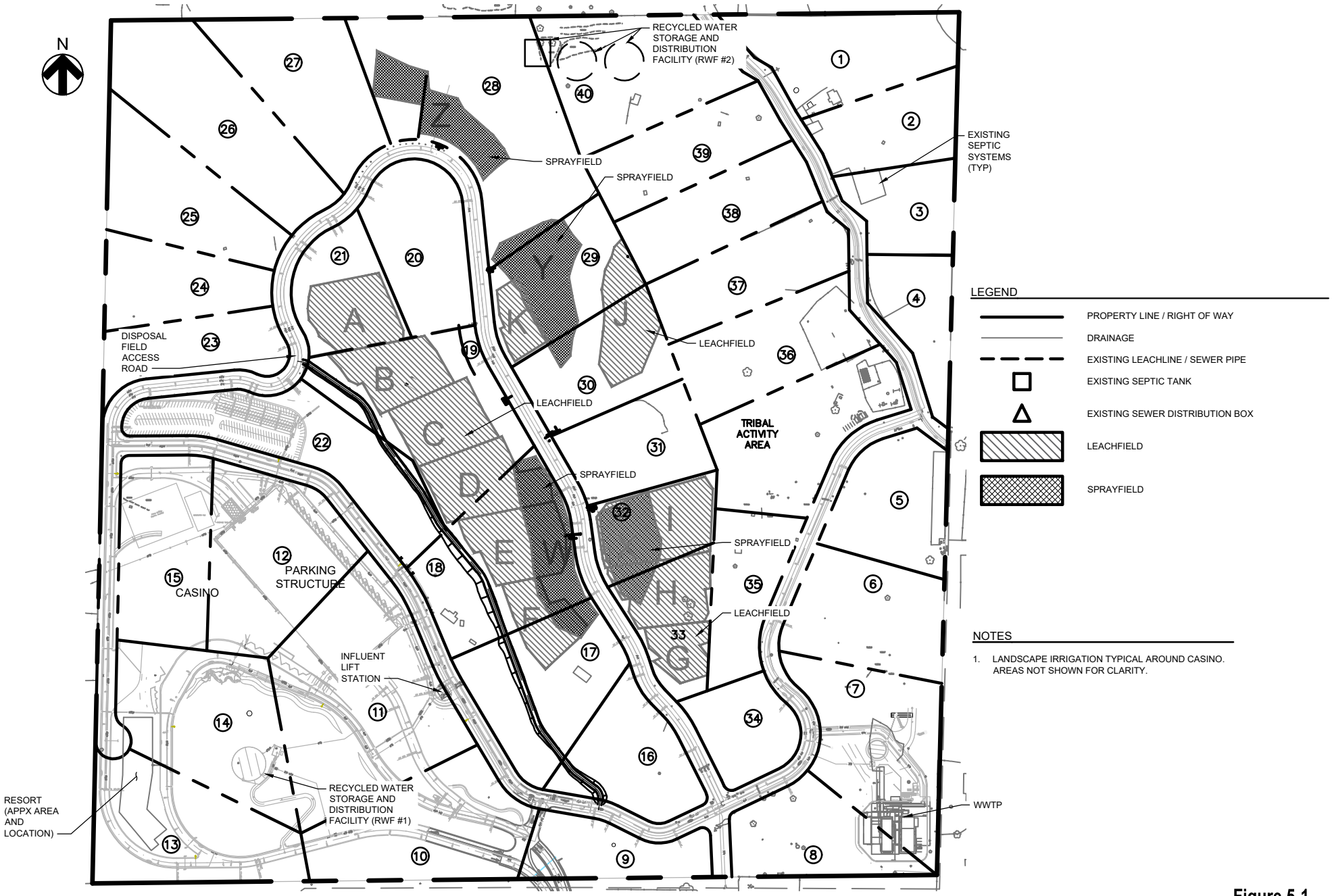


Figure 5-1
Red Hawk Casino
Water and Wastewater Feasibility Study
Existing Wastewater Recycled Water Disposal and Storage Locations

HydroScience

5.1.3 Existing Toilet/Urinal Flushing

Recycled water that meets Title 22 criteria is currently used in the Casino and Resort restrooms for toilet and urinal flushing. Currently, the demand for toilet and urinal flushing in the restrooms is approximately 22,000 gpd (2023). Although the use of recycled water in the restrooms of the Casino and Resort is on Trust Land, recycled water quality meets Title 22 disinfected tertiary recycled water standards, and the distribution system is operated in accordance with CDPH Title 22 guidelines (Section 3.3.3).

5.1.4 Existing Recycled Water Seasonal Storage

Currently, recycled water is stored seasonally in three 3 MG storage tanks as previously described. The primary tank at RWF #1, while maintaining the design tank freeboard (Section 3.3.4) and 6.5-7 feet of minimum level to address fire flow demand, has an operational storage capacity of approximately 7.4 acre-feet (ac-ft). Overflow discharge is conveyed to a common outlet structure, which conveys flows to the influent lift station. The RWF #2 tanks maintain a design tank freeboard but are not used to store fire flow demand. These tanks have an operational storage capacity of 8.6 ac-ft each. Overflow discharge is conveyed to the site plant Drain Lift Station which pumps flow back into the wastewater collection system.

The primary storage tank operational strategy typically involves building the water level to 32 ft near the end of the wet weather months, in anticipation of summer demands, and draining the water level to 7 ft in advance of the wet season (typically is done in November). Data from the last two years (2022-2023), shows that the storage tank level never exceeded the overflow, which may have been due to the lower than historical average influent flows to the WWTP as discussed previously. Therefore, there is insufficient operating data to evaluate the capacity of the existing seasonal storage tanks to accommodate anticipated flows on the basis of past operation. Instead, a conservative estimate was applied in the Proposed Project water balance.

5.1.4.1 Existing Recycled Water Distribution System

As previously mentioned, the RWF #1 recycled water distribution pumps station consists of four 1,500 gpm pumps and two 300 gpm pumps. Two of the four large pumps are needed for fire flow demands, while the smaller pumps are typically used to satisfy daily recycled water demands. RWF #2 utilizes two 400 gpm pumps. On an average day one pump from either facility is sufficient to meet daily and peak demands.

5.1.5 Existing Recycled Water Distribution Electrical Equipment

5.1.5.1 Primary Facility RWF #1

RWF #1 includes a combined electrical equipment and pump room with a 480V, 600A motor control center, an integrated control panel, and a 3-phase, 208V/120V integrated lighting panel and transformer. All electrical equipment is approximately 16 years old and in good condition.

Motor control center MCC-RWF is supplied by a 600 amp feeder from the main switchboard outside and as a 600A main breaker. This MCC provides power to all the RW pumps in the building. MCC-RWF has 18” of vertical space (3X) above both Booster Pump 1 and Booster Pump 2 15HP VFDs. There is also 12” of vertical space (2X) above each Booster Pumps 3

through 6 40 HP RVSS drives and in the main breaker section. There is no available space to the left or right side of this MCC. The existing demand load on this MCC is 248 amps which leaves a margin of 232 amps available capacity with an 80% rated feeder breaker.

Lighting Panel LP appears to have available spare breakers per the Frisch Engineering record drawings.

The Recycled Water Pump Station Control Panel 'RWPSCP' uses an Allen-Bradley PLC. It cannot be determined from the record drawings how much spare I/O is available for additional new pumps.

5.1.5.2 Secondary Facility RWF #2

RWF #2 includes a 480V, 600A motor control center and a 3-phase, 208V/120V integrated lighting panel and transformer. There is a separate PLC control panel.

The MCC houses the two VFDs powering the 75 HP recycled water delivery pumps, drain lift station pump RVSS, chemical metering pump feeders, water heater feeder, and tank inlet valve feeders. There are two separate 24" (2X) spare vertical spaces in the MCC cabinet containing spare breakers. The 18 pulse, 75 HP VFDs occupy two full height 90" MCC sections which are each 40" wide. The existing demand load is 314 amps. This equipment was installed as part of the Hotel project and is new.

The Control Panel uses an Allen-Bradley 5069 Series PLC. There are 35 spare channels of available D.I., 7 spare channels of D.O., 1 spare channel of A.I. and 4 spare channels of A.O. There is an 8-port Ethernet switch in the control panel with no available spare ports.

5.2 Recycled Water Distribution and Storage Evaluation – Proposed Project

This section assesses the disposal of the additional recycled water generated by the Proposed Project.

5.2.1 Landscape Irrigation

Resort and other irrigation demands will continue to be served with recycled water, consistent with current practices. It is anticipated that the Proposed Project will include newly landscaped areas around the residential community. Based on the previous study and the 51% reduction of Station 139 landscaped area, the previously anticipated average demand was 17,000 gpd. Consequently, the volume of recycled water delivered to this point of use will increase by an average of 17,000 gpd for the Proposed Project, while all other landscape irrigation demands will remain unchanged.

5.2.2 WWTP Demands

Recycled water used for on-site WWTP processes will continue as usual with no change in demand projected by the Proposed Project.

5.2.3 Leach/Spray Fields

The Proposed Project will require increased use of the leach, drip, and spray fields to dispose of recycled water (WWTP effluent). Section 5.1.2 discussed the evaluation and confirmation of disposal field capacities based on operational data. After adjusting the maximum capacities of each subsurface disposal field to account for this operating experience, the total capacity of the subsurface disposal fields remains consistent with the design capacity of approximately 94,000 gpd. Some individual field capacities are less than original design targets, others are higher, and the remaining ones have performed as originally designed.

The spray fields will require an increase in existing utilization to better conform to the original design intent, based on current evapotranspiration rates, soil percolation capacity, and appropriate weather conditions. Since the spray fields were installed on high percolation soil areas, it is expected that the spray fields will perform at their original design capacity. Using the spray fields in the winter months opposed to the leach fields when weather and soil conditions allow will give the leach fields more time to dry/rest in anticipation of rainfall events.

5.2.4 Toilet and Urinal Flushing

The Proposed Project includes construction of a new Arena and support facilities, commercial space, multi-purpose shelter and maintenance operations building and residential community. These facilities are not expected to use recycled water for toilet and urinal flushing. The storage and pumping infrastructure is not anticipated to require improvements to serve the demand added by the Proposed Project.

5.2.5 Fire Suppression

The Arena and support facilities are not anticipated to change the design fire flow or duration currently addressed by the Existing Facilities. Typical residential fire flow requirements for new communities in the EID service area is 1,000 gpm for 2 hours, which is less than the fire flow criteria for the Existing Facilities. This volume equates to 120,000 gals of storage.

As discussed below, the residential development is expected to include a new local recycled water storage tank and booster pump station for serving residential irrigation demands and fire flows. This system would be supplied by a pressure main extended from the existing distribution system. Hydraulic modeling of the recycled water distribution system should be performed during preliminary design to finalize distribution system modifications and pumping requirements.

5.2.6 Cooling Tower Demands

Recycled water is anticipated to be used for cooling tower makeup at the existing Resort and Proposed Project (Arena only). Currently, cooling towers do not exist at the site, but are planned to be part of an HVAC upgrade to the existing Resort and will also serve the Arena. Using treated effluent for cooling tower makeup will help reduce storage requirements through cooling tower drift, evaporation system leakage losses, and blowdown. The blowdown generated by the towers will be conveyed to the WWTP.

The cooling tower project is in an early scoping phase. Total annual and seasonal estimates of recycled water demand and blowdown generation are not yet available. The current water balance (Section 5.3) utilizes the following estimates based on typical unit generation rates:

- Square footage to be served: 350,000 sf
- Recycled water demand, unit rate: 0.04 gpd/sf
- Calculated peak demand: 15,000 gpd

The water balance assumes 100% of the calculated rate for June-September, and a derated value ranging from 5-50% for the remaining months. The implementation of cooling towers reduces recycled water sent to disposal fields, particularly in the summer months and shoulder seasons.

Once site specific seasonal demand projections are available, these volumes should be updated in the water balance and the recommendations herein should be revised accordingly.

5.2.7 Recycled Water Seasonal Storage

The volume of recycled water delivered to seasonal storage (currently provided by three 3 MG tanks), evaluated based on a 100-year return period rainfall followed by an average year rainfall in consideration of the increased wastewater flows and increased recycled water demands, is not anticipated to increase beyond the combined capacity of those tanks. This is demonstrated by the water balance presented in **Section 5.3**.

5.2.8 Recycled Water Distribution Pump Station

The Proposed Project will increase the recycled water demands of the existing distribution system. With the addition of the Proposed Project, the existing pump station is still sufficient to meet average and peak daily demands. However, projected peak hourly demands would initiate the standby pump to operate eliminating the ability to reserve this equipment redundancy.

Although new larger capacity pumps were recently installed at the Lot 40 location, the new pumps would require upsizing to meet the peak hourly demands anticipated for the Proposed Project, which is projected to be approximately 500 gpm once non-residential portions of the Proposed Project are constructed, and 660 gpm once the residences are constructed. This is based on an assumed peak hour peaking factor of 3.5.

As the system grows and the number and types of recycled water demands increase, the peaking factor may moderate and may reduce requirements for pump upgrades. The peaking factor estimate should be refined as these facilities and their landscaping and irrigation systems are designed. If increased pumping requirements are confirmed, the RWF #1 and #2 pumps should be upgraded or augmented with additional pumps.

The residential component of the recycled water demand should include a local storage tank and booster pump station to serve local demands and fire flows. Given that the residential site is 100 ft lower than RWF #2 and 370 ft lower than RWF #1, a pressure reducing valve (PRV) and/or altitude valve will be needed to reduce tank fill pressure upstream of the inlet. The sizing of this tank should be finalized once assumed usage rates, fire flows, and landscape acreage

are determined during preliminary design, and the water balance re-run with these values. The approximate size of this tank would be 0.5 MG.

RWF #2 is currently located at a dead-end in the distribution piping network which limits peak flows. It is recommended that a looped system be created by extending the distribution main from the pump discharge manifold to the west along the northern property boundary. This would tie into the existing recycled water distribution piping near the Resort or directly to a new main extended from the existing system to the new residential site. Looping the system would reduce the friction losses associated with pumping peak flows from either recycled water pump station and would reduce or delay the need to upgrade the pumps until later stages of development. A detailed distribution system hydraulic model should be developed to optimize the sizing of pipeline improvements and pump upgrades. This should be performed in conjunction with preliminary design of the Proposed Project.

5.2.9 Proposed Electrical and Control Equipment Upgrades

5.2.9.1 Primary Facility RWF #1

Although there is no confirmed space to add additional pumps to this station, there is available space in the MCC to increase the pump VFD and soft starters sizes.

Both 15 HP booster pumps have enough space in their respective MCC sections to be upgraded to higher VFD HP ratings. These ratings can be as high as 60 HP each. This would add approximately 56 amps of demand load to the existing MCC load.

All four 40 HP booster pumps also have enough space in their respective MCC sections to be upgraded to higher soft starter HP ratings. These ratings can also go as high as 60 HP. This would add approximately 75 amps of demand load to the existing MCC load. This would be a total of 187 amps of additional demand load which is well within the margin of 232 amps of spare capacity.

As mentioned previously, the amount of spare I/O in the Recycled Water Pump Station Control Panel PLC cannot be determined yet. However, if there is no increase in the number of pumps, the I/O count and type would likely remain the about same even if the HP rating of the VFDs and soft starters are increased.

5.2.9.2 Secondary Facility RWF #2

There is available space in the MCC to increase the RW delivery pump VFD sizes and add two additional small pumps.

Both 75 HP RW delivery pumps have enough space in their respective MCC enclosures to be upgraded to higher VFD HP ratings. These ratings can go as high as 125 HP each and possibly to 150 HP. 150 HP pumps would add approximately 168 amps of demand load to the MCC/MSB load, which would be the absolute maximum possible. The trip rating of the meter main breaker and MCC breaker would need to be increased from 400 amp to 600 amp. It is recommended that any new pump upgrades be smaller than 150 HP. If 125 HP pumps are chosen, there is available space and capacity left in the MCC for two small pumps of up to 10 HP on constant speed full voltage starters.

If both RW delivery pump VFDs are simply replaced with larger units, they can reuse the same existing Ethernet ports with no additional control panel upgrade. If additional VFDs or RVSSs are added, the Ethernet switch will have to be replaced with a unit providing more ports. If more constant speed full voltage starters are required, there are sufficient discrete I/O spares to accommodate up to seven more pumps.

If higher horsepower pumps are required or additional pumps are needed, free standing VFD enclosures or additional enclosed starters can be added along the interior of the south wall of the electrical room. These loads can be fed from the available spare breakers in the MCC. Again, there would be a limit of about 168 additional amps from this MCC and MSB. A higher load will require a replacement of the MCC and MSB or an additional service with MSB and additional MCC.

As discussed previously, several solutions exist to provide the additional pumping capacity required to meet recycled water demands for the Proposed Project. These include looping the distribution system, upgrading existing pumps at RWF #1 and RWF #2, and/or constructing a new RWF #3 (local tank and pump station) at the residential community. The final approach should be selected during preliminary design based on an evaluation of construction cost, operational complexity, and optimum system performance.

5.3 Project Water Balance – Proposed Project

A water balance was prepared to assess the impact of the Proposed Project on the storage and reuse facilities. The water balance was developed to assess recycled water use and storage conditions under average and 100-year return period rainfall conditions. The results are summarized in **Table 5-1**. The water balance is based on the average daily influent flow established in SECTION 2. The water balance spreadsheet is provided in **Appendix B**. The following assumptions were incorporated in the basis of the water balance:

- Recycled water to be stored in the three 3 MG storage tanks.
- The primary (RWF #1) 3 MG storage tank has a usable capacity of 7.4 ac-ft while maintaining design freeboard given the following conditions:
  - Minimum depth for fire flow set at 6.5-7 feet
  - Overflow occurs at water level of 35.5 feet
  - Active storage depth of 29 feet
- The secondary (RWF #2) includes two 3 MG storage tanks with a usable capacity of 8.6 ac-ft, with similar design conditions as the primary tank minus the minimum fire flow depth requirement.
- 11,000 gpd of recycled water is returned for casino facilities and resort toilet and urinal flushing
- Recycled water is being applied to existing and assumed new landscaping acreage at the original design application disposal rate following completion of the Proposed Project
- Recycled water is disposed of to the leach/spray/drip fields; based on established estimated design application rates

Table 5-1: Summary of Seasonal Storage Requirements – Existing Facilities Plus Proposed Project

Criteria	Units	Proposed Project	
		Average Rainfall Conditions	100-year Rainfall Conditions
Minimum Volume in Storage Tank[1]	ac-ft	1.8	1.8
Maximum Volume in Storage Tanks[2]	ac-ft	9.9	25.8
Storage Tank Surplus/Deficit[3]	ac-ft	15.9	0

Notes:
1. Assuming starting depth in primary Storage Tank is 7 ft for fire flow demands and operational volume capacity is 7.4 ac-ft. Operational volume capacity for secondary tanks is 8.6 ac-ft each.
2. Maximum volume does not include fire flow demands. This is storage volume capacity required with Existing Facilities and Proposed Project.
3. Negative numbers would indicate operational capacity of all 3 MG Storage Tanks are exceeded by quantity shown. This value is calculated by taking the combined tanks' operational volume capacity of 25.8 ac-ft minus the Maximum Volume in Storage Tanks. The results show that storage in the existing tanks at the higher inflow and higher recycled water demand can be balanced under the modeled conditions, subject to verification of modeling assumptions during preliminary design of facilities.

The water balance in **Appendix B** and as summarized in **Table 5-1** indicates that sufficient storage currently exists to meet the additional recycled water storage and disposal needs of the Proposed Project under the average and 100-year return period rainfall conditions. The storage tank has sufficient capacity to store the recycled water through the wet season for the project using the available recycled water use options under average precipitation conditions. The water balance also indicates sufficient recycled water storage and supply capacity during dry months. All available storage is utilized in the 100-year condition with no remaining storage available. This excludes any contingency storage provided by locating an additional recycled water tank at the residential community.

This water balance is based on the previously stated assumptions regarding landscape demands, cooling tower demands, and unit wastewater flow generation rates. Assumptions should be verified and, if necessary, the model updated during design to reflect the actual facilities and irrigation systems to be constructed.

SECTION 6 WATER SUPPLY ASSESSMENT

6.1 Existing Water Supply Distribution and Storage

Water demands are described below for the Existing Facilities. **Figure 6-1** shows the location of the existing water storage and supply distribution system.

6.1.1 Existing Water Demands

Potable water is currently used to provide drinking water to the Existing Facilities as well as the Rancheria. The Existing Facilities are metered separately from the Rancheria and data is readily available. The annual average demand for the Existing Facilities and Rancheria in 2022 and 2023 was 44,000 and 37,000 gpd, respectively. The historical average (2015-2019) demand for the Resort, prior to recent improvements, was 62,000 gpd while 31,000 gpd was delivered to the Rancheria. For the purposes of this study, it is assumed that water demands from the existing Rancheria will be unaffected by the Proposed Project.

6.1.2 Existing Water Storage

Currently, water is stored in a single 0.5 MG storage tank. The tank, while maintaining the design tank freeboard, has an operational storage capacity of approximately 1.5 acre-feet (ac-ft). Overflow discharge is conveyed to a common outlet structure, which conveys flows to a surface outlet/ditch.

Storage tank data from the last two years (2022-2023), shows that the storage tank level typically reached about 18 ft on average with a maximum of 25 ft. Inflow from EID on average was 99,000 gpd with a maximum of 213,000 which exceeds the contractual limit of the agreement. See **Table 6-1** for a summary of historical and existing water flow from EID.

Table 6-1: Historical and Existing Water Storage Tank Inflow from EID

	Average Daily Flow (gpd)	Max Daily Flow (gpd)	Contractual Limit (gpd)
Historical[1]	108,000	203,000	135,000
Existing[2]	99,000	213,000	135,000

Notes:
1. The average and maximum day flow of 2015-2018.
2. Existing includes average of year 2022 and 2023 data.
3. Rounded to the nearest 1,000 unless otherwise noted.

6.1.3 Existing Water Distribution System

As previously mentioned, the water distribution pumps station consists of four 485 gpm pumps and two 300 gpm pumps. The higher flow pumps are needed for low pressure system demands and the low flow pumps are needed for high pressure system demands. Two of the four large pumps are needed for X demands, while the smaller pumps are typically used to satisfy daily water demands. On an average day one pump is sufficient to meet daily and peak demands.

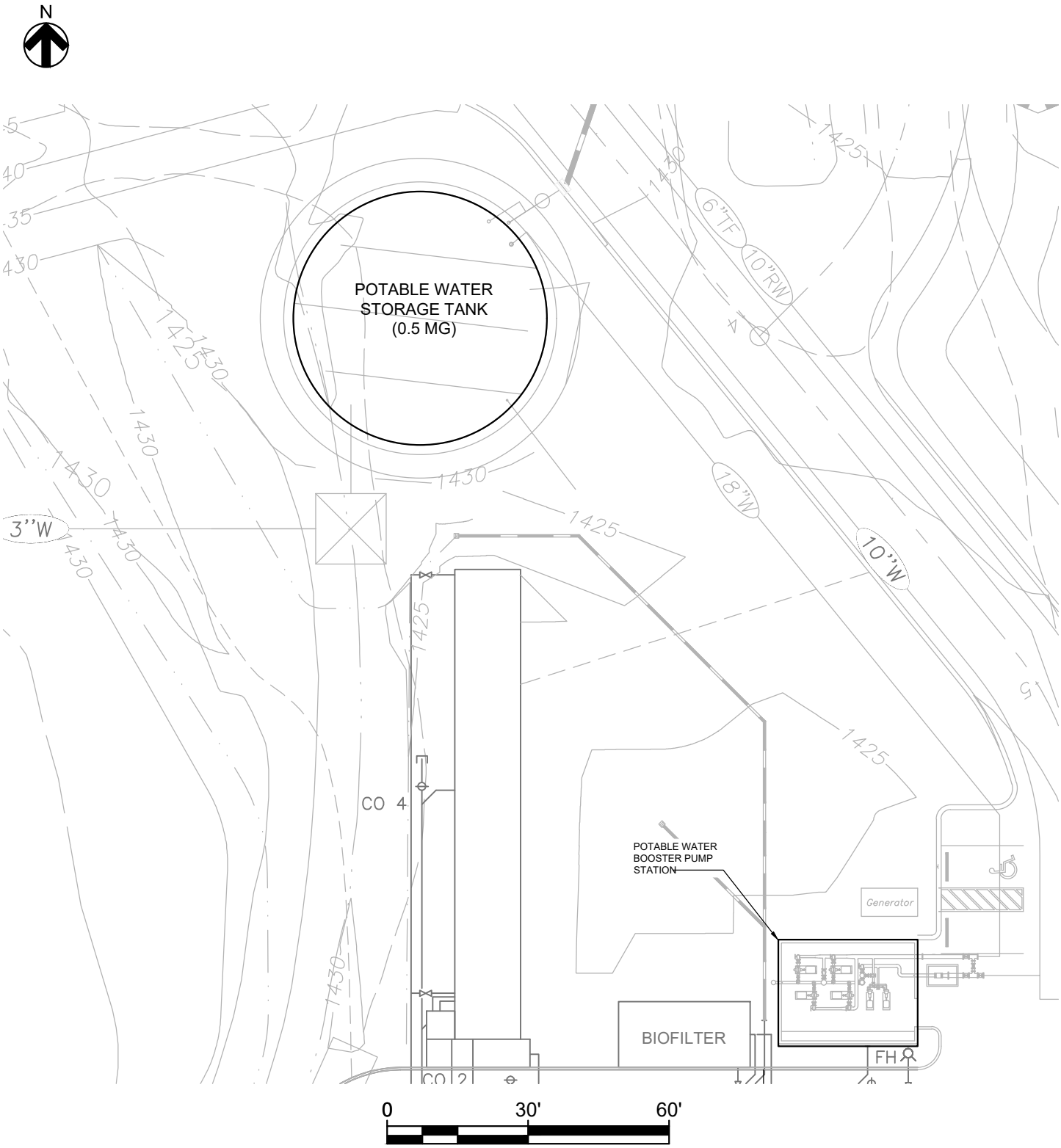


Figure 6-1
Red Hawk Casino
Water and Wastewater Feasibility Study
Existing Water Supply Storage and Distribution System

HydroScience

6.2 Water Supply Distribution and Storage Evaluation – Proposed Project

6.2.1 EID Contractual Limitations

The Proposed Project includes construction of a new Arena and support facilities, commercial space, multi-purpose shelter and maintenance operations building and residential community. These facilities are expected to use potable water for consumption and toilet and urinal flushing. The projected average day demands from Table 2-9 are incorporated into **Table 6-2** below along with calculated maximum day demands (MDD) based on a 1.5 peaking factor.

Table 6-2: Current and Projected Water Demands

Parameter	Average Day Potable Demand (gpd)	Maximum Day Potable Demand (gpd)[1]
Existing Facilities	123,000	184,500
Project (Arena and Support Facilities, Incremental)	16,600	24,900
Project (Residential, Incremental)	38,300	57,450
Total without Residential	**139,600**	**209,400**
Total with Residential	**177,900**	**266,850**

Notes:
1. Based on average day demand multiplied by a peaking factor of 1.5.
2. Refer to Table 2-9 for data sources.

With the additional demands from the Proposed Project the total potable water demand is expected to exceed the current EID contractual limit of 135,000 gpd on an average daily basis. The exceedance is projected to be 9,600 gpd after the non-residential portions of the Proposed Project are constructed, and 43,000 gpd after completion of the residential component.

6.2.2 Water Storage

Potable water demands for the Existing Facilities are typically not seasonally dependent or variable, particularly since irrigation demands are not fed from potable supplies. However, water demands of the Rancheria have shown to increase during the summer (based on historical and existing data). Historical data shows that the water storage level in the tank is typically maintained within a narrow bandwidth. The residential community is located more than a mile from the existing water storage and distribution system and at an elevation that is approximately 250 ft lower.

Potable water storage volume is typically designed to provide sufficient storage for maximum day demand (MDD). As shown in Table 6-2, the projected MDD under all Project scenarios is below the 500,000-gal capacity of the storage tank.

The optimal approach for serving the new residential community should be determined during preliminary design utilizing hydraulic modeling of the distribution system and comparing the costs and technical drivers for either installing a new potable water storage tank and distribution pumps in the vicinity of the homes, or serving the community via a transmission main from the existing distribution system with a pressure reducing valve (PRV) station near the homes to reduce pressures to the desired range of service pressures.

6.2.3 Water Distribution Pump Station

The Proposed Project will increase the water demands of the existing distribution system. With the addition of the Proposed Project Arena facilities, the existing pump station is still sufficient to meet average, peak daily and peak hour demands.

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 7 – CONCLUSIONS AND RECOMMENDATIONS

The wastewater, recycled water, and water supply system facility improvements needed for the Proposed Project are summarized in this section.

7.1 Wastewater Pumping and Treatment

The recommended wastewater facility improvements for the Proposed Project are as follows:

Influent Pump Station and WW Collection System: New dedicated influent lift station and emergency overflow tank/basins will be required for the new facilities, one located near the Arena and the other located in the residential community. Additional grease interceptors will be needed for new food facilities to protect the WWTP from excessive FOG load.

Preliminary sizing of the dedicated influent lift station and facilities is shown below:

- Arena
  - 8 ft diameter wet well approximately 18 ft deep with buried valve vault
  - Odor scrubber system
  - Buried emergency overflow tank/basin to provide 1 hour of response time at peak day flow
  - Approximately 3,300 ft of 4-inch yard piping from lift station to tie-in location including associated valves / appurtenances
- Residential community
  - 8 ft diameter wet well approximately 15 ft deep with buried valve vault
  - Odor scrubber system
  - Buried emergency overflow tank/basin to provide 1 hour of response time at peak day flow
  - Approximately 5,000 ft of 4-inch yard piping from lift station to tie-in location including associated valves / appurtenances
- Existing Yard Piping – The existing SFM is an 8-inch pipe is sufficiently sized for the increase in flows; however, a hydraulic analysis should be performed during preliminary design to determine if it is more optimal to install a separate parallel force main to convey flows from the new lift station. If the common force main approach is used, the existing ILS pumps may need an impeller change and/or motor enlargement to handle the increased pumping head during simultaneous pumping.

Treatment: The WWTP would require the following improvements and operational changes to accommodate the increase in flow from the Proposed Project:

- Headworks – Upsize fine screens to accommodate additional flows prior to residential buildout. Upgrade not required for non-residential portions of Proposed Project.
- Emergency storage – Provide additional emergency storage prior to residential buildout to restore the total storage volume to provide approximately 24 hours of total emergency

storage volume at average day flow (188,000 gallons). Supplemental storage can be located at the WWTP adjacent to the existing basin and/or as additional storage at the new lift stations.

- RAS Pump Station – Upsize pumps to accommodate additional flows. This is not required for the non-residential portions of the Proposed Project but should be implemented once housing construction begins.
- WAS Pump Station - Increase hours of operation to waste additional solids.
- Belt Press – Increase hours of operation to process additional solids.
- Disinfection, CCB, and Effluent Pump Station – Modify dosing system and controls to account for higher flows. Conduct a dye tracer study to confirm contact basin baffle factor. Evaluate measured peak hour peaking factor as non-residential components of the Proposed Project come online. Utilize equalization basin to buffer high peak hour flows if necessary. Replace effluent pumps with upgraded pumps to address increased peak hour flows. This will be required when housing construction begins and may be required sooner depending on outcome of recommended additional evaluations.
- If required stemming from outcome of dye tracer study and peaking factor evaluation, construct new CCB and effluent pump station in parallel to existing and connect via existing 12” bypass blind flange. The additional CCB and pump station would split the incoming flow such that the pump capacity for the proposed new station would match the existing and may run in parallel to meet peak hourly flow demands at reduced pump speeds. Upsizing the existing pumps to accommodate peak hourly flows of approximately 500 gpm would require a deeper wet well to provide the minimum operational volume required to prevent excessive pump cycling (typically 6 starts/hour). Wet well levels would also need to be evaluated to accommodate the anticipated new pump minimum submergence requirements. The anticipated need for higher capacity pumps should be evaluated in comparison with actual measured peaking factors as facilities are brought online and additional data becomes available.
- Yard Piping – The existing Treated Effluent discharge pipe is 6 inches, with the additional flows, the velocity would be approximately 5.7 feet per second (fps) which is still within typical design standards.

Electrical and Control Equipment: The upfront addition of the two effluent pumps will likely require an additional MCC section in an area where space is already constrained. A supplemental or external panel may be required. This will also utilize the remaining available spare analog I/O in the Plant Control Panel PLC. The other recommended upgrades to follow will be able to use the existing spare capacity. There would also need to be additional conduits installed out to the new effluent pump station. Refer to Section 4.2.3 for additional details.

7.2 Effluent Reuse and Disposal

Currently, approximately 25.8 ac-ft of active recycled water seasonal storage is available. The following reuse and disposal strategies for the WWTP effluent are available for the Proposed Project:

- Landscape irrigation (to Resort facilities, Clinic, and Tribal residential)
- Toilet/urinal flushing

- Leach/Spray fields
- Cooling Tower

Based on the results from the water balances, there is sufficient recycled water operational and seasonal storage to accommodate the increase in flow from the Proposed Project, assuming continued disposal capacity to landscape irrigation and toilet/urinal flushing, and increased use of existing leach/spray fields. Once residential buildout is achieved, there will be no remaining disposal or storage capacity available to accommodate future growth. Additional storage and disposal or recycled water demands would be needed for development above and beyond the Proposed Project.

Although the existing primary (RWF #1) and secondary (RWF #2) pump stations are still sufficient to meet average and peak daily demands, projected peak hourly demands would initiate the standby pump to operate eliminating the redundancy of the system. The RWF #2 pumps should therefore be upsized to a higher flow of approximately 500 gpm once non-residential portions of the Proposed Project are built and 660 gpm at residential buildout to meet the peak hourly demands anticipated for the Proposed Project.

The residential recycled water and fire demands will be located more than a mile and about 250 ft in elevation below the existing distribution system. The residential development should be constructed with a dedicated recycled water storage tank and booster pump station fed from a transmission main extended from the existing distribution system and a PRV or altitude valve to reduce pressure on the tank inlet.

Distribution piping upgrades to serve the residential development should include adding piping to “loop” the existing system, resolving the “dead end” at RWF #2 and providing a second flow path from those pumps to the various recycled water demands, reducing friction losses and resulting horsepower requirements. The existing recycled water discharge pipe from RWF #2 is 6 inches along Reservation Road and then upsizes to 10 inches for the remaining distribution system. With the additional flows, the velocity would be between 7-8 fps within the 6-inch pipe which is still within typical design standards, and this would be reduced by looping the piping and splitting the flow paths. A hydraulic model should be prepared to finalize system hydraulics for pumping and demands and the results used to size piping and finalize pump upgrades required.

The recommendations contained herein are based on assumed cooling tower recycled water demands. Once the cooling tower design advances, the water balance should be updated with actual values provided by the cooling tower designer. These recommendations are also based on the assumption that landscape irrigation demands will double as a result of new landscaping added primarily around the residential community. The assumed rates of recycled water use at these project components are the minimum necessary to manage reservoir storage levels and avoid the need to add an additional storage tank.

However, the recommendation to construct a new storage tank and booster pump station at the residential community will provide additional storage to the overall system as an added level of conservatism. The sizing of this tank should be finalized once assumed usage rates, fire flows, and landscape acreage are determined during preliminary design, and the water balance re-run with these values. The approximate size of this tank would be 0.5 MG.

Electrical and Control Equipment: Pump upgrades at RWF #2 will result in an increase in electrical loads. The existing MCC has sufficient space and bus capacity to increase pump horsepower from 75 HP each to either 125 or 150 HP each. The hydraulic modeling recommended earlier would be used to establish an updated system curve after implementation of distribution system looping and accounting for added recycled water demands and would allow the final pump horsepower to be determined. It is expected that the required pump upgrade would be within the acceptable range described above without triggering a power utility service upgrade.

7.3 Water Supply Distribution and Storage

The existing 0.5 MG potable water storage tank has sufficient storage volume to address the maximum day demand of the Proposed Project. The existing distribution pump station has sufficient capacity to meet average, peak day, and peak hour demands. The existing chlorine dosing system may require modification and a metering pump upgrade to address the higher rate of demand.

The EID contractual limits for instantaneous and average day flows will need to be revised to account for higher rates of demand for the Proposed Project. The exceedance of the existing 135,000 gpd limit is projected to be 9,600 gpd after the non-residential portions of the Proposed Project are constructed, and 43,000 gpd after completion of the residential component.

A transmission pipe will need to be constructed to extend water service from the existing distribution system to the Residential Community Water Supply System. A PRV will be needed upstream of the community to decrease pressures given the elevation drop.

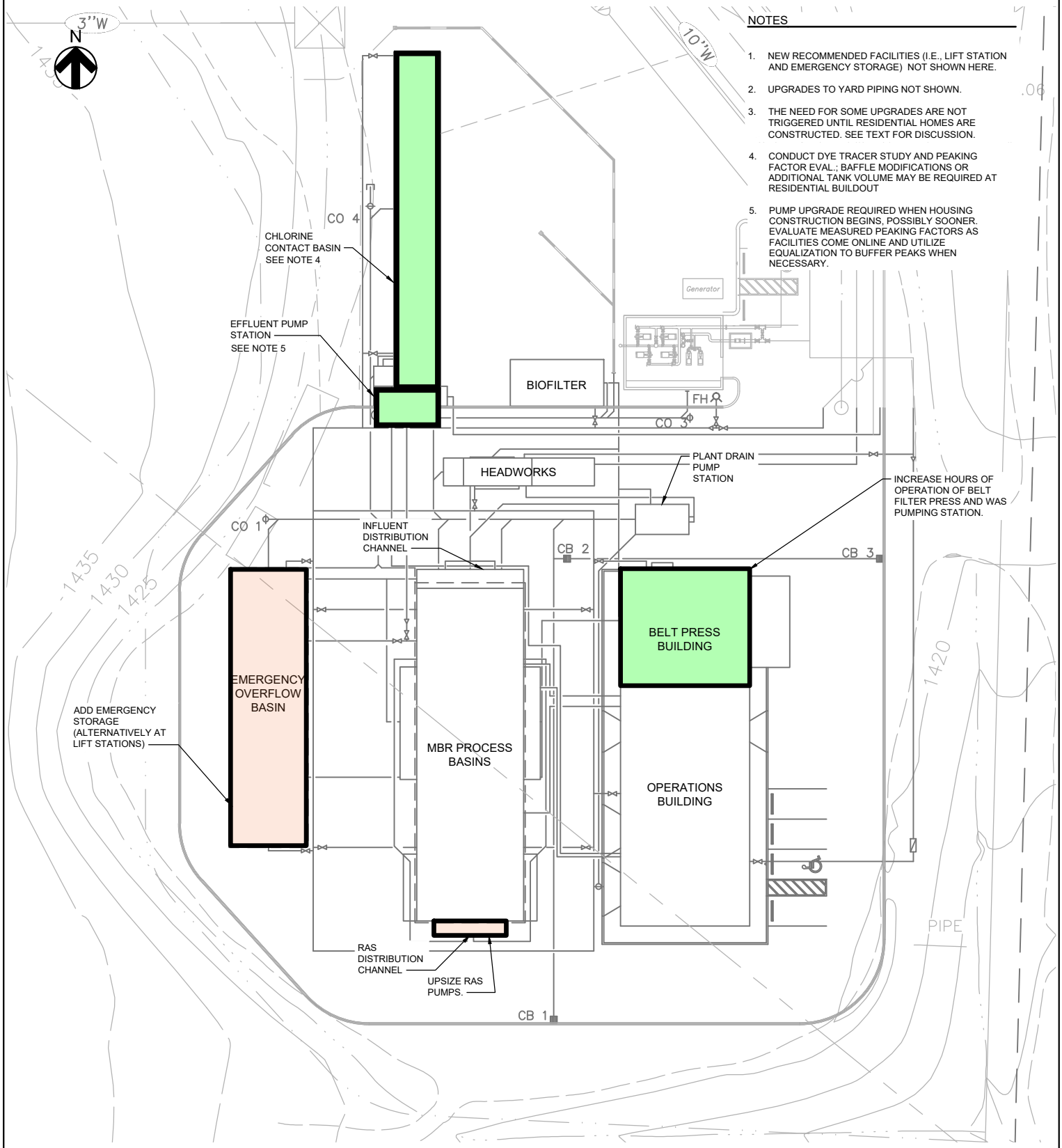


Figure 7-1
Red Hawk Casino
Water and Wastewater Feasibility Study
Recommended Upgrades to Wastewater Treatment Facilities

HydroScience

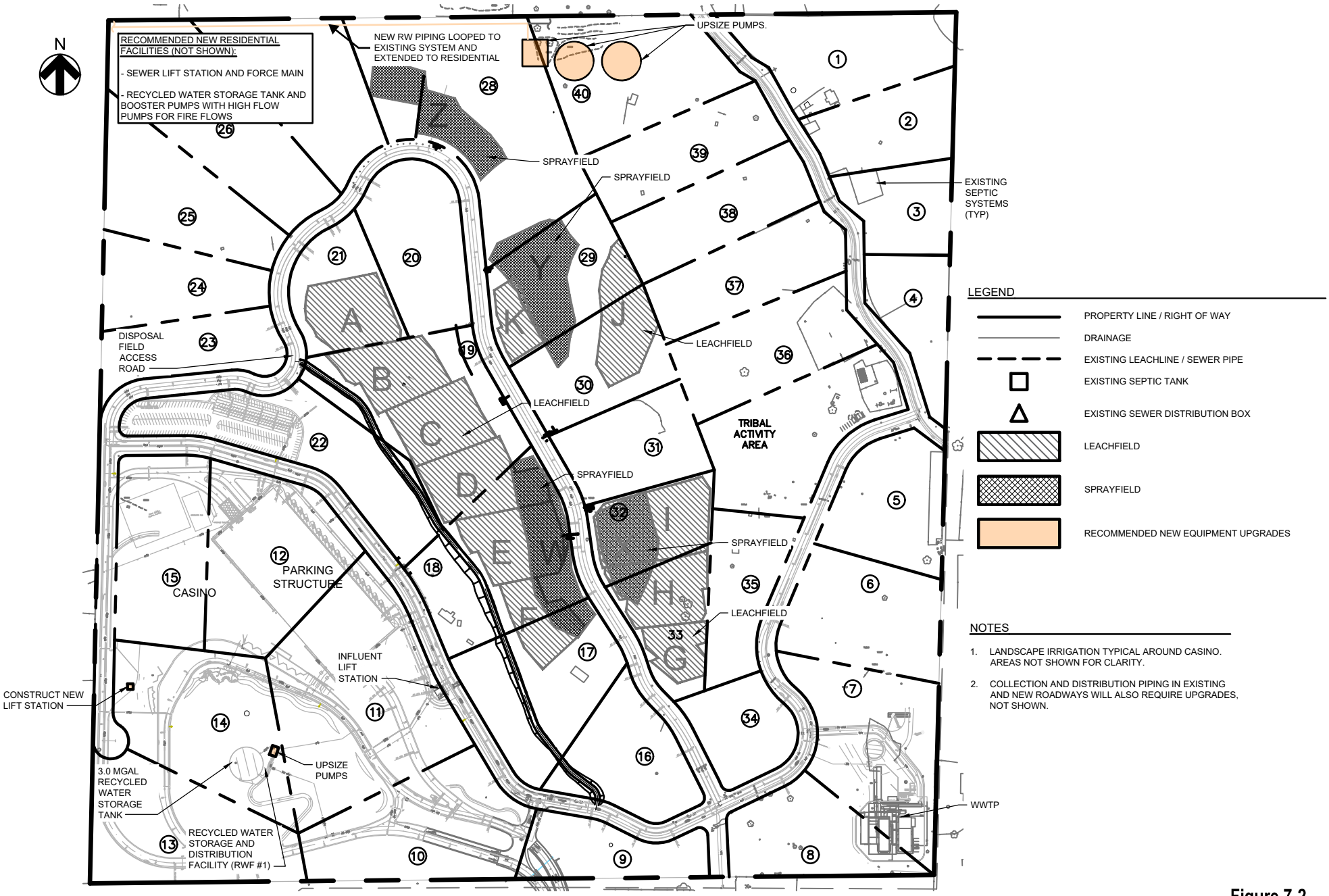


Figure 7-2

Red Hawk Casino

Water and Wastewater Feasibility Study

Recommended Upgrades to Wastewater Collection and Recycled Water Facilities

HydroScience

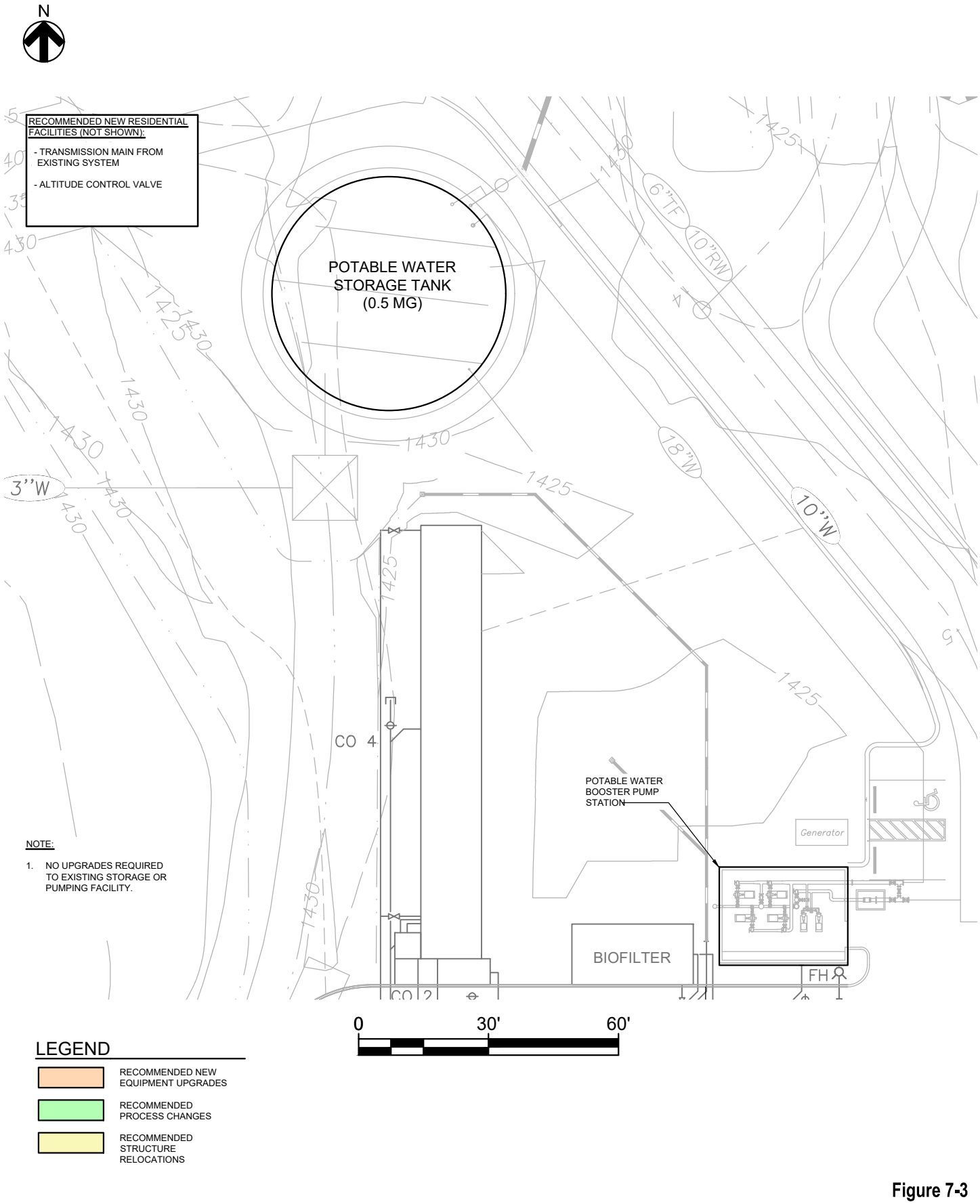


Figure 7-3
Red Hawk Casino
Water and Wastewater Feasibility Study
Recommended Upgrades to Water Supply Facilities

HydroScience

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 8 – ACRONYMS AND ABBREVIATIONS

ac-ft	acre-feet
BOD	biochemical oxygen demand
CCB	chlorine contact basin
CCR	California Code of Regulations
CDPH	California Department of Public Health
CFR	Code of Federal Regulations
CT	product of chlorine residual and modal contact time measured at the same
EPA	Environmental Protection Agency
FOG	Fats, oils, and grease
gal	gallons
gfd	gallons per square foot of membrane area per day
gpd	gallons per day
gpm	gallons per minute
I&I	inflow and infiltration
MBR	membrane bioreactor
MG	million gallons
mg/L	milligrams per liter
MG	million gallons per day
PLC	programmable logic controller
RAS	return activated sludge
TEIR	Tribal Environmental Impact Report
TSS	total suspended solids
WDR	Waste Discharge Requirement
WWTP	Wastewater Treatment Plant

APPENDIX A

Shingle Springs Rancheria
Water, Wastewater and Reclamation Study
July 2001

APPENDIX B

Red Hawk Casino
Wastewater Feasibility Study
Water Balance

www.aroscorp.com

Water Balance - Red Hawk Casino Wastewater Evaluation Project

Scenario: Proposed Arena and Support Facilities Project

April 2024 By: Jory Benitez, HydroScience

WASTEWATER INFLUENT FLOW		***OPEN BASIN DATA***		***OTHER INPUTS***		***PROJECTED RECYCLED WATER DISTRIBUTION AND DISPOSAL***					
Daily Average Wastewater Influent Flow	153,900 gpd	Overflow Basin Volume	0.4 ac-ft	100-YR Multiplier	1.94 unitless	RW for Irrigation	1.17 MG	Drip Field	14,795 GPD	Leachfields	79,400 GPD
		MBR Basin Volume	0.5 ac-ft	Pan Evap Coefficient	0.75 unitless	RW for Toilet/Urinals	11.4 MG	Residential Landscape	17.7 MG	Spray Fields	163,562 GPD

BASED ON DESIGN CRITERIA — *100-YEAR ANNUAL PRECIPITATION RETURN PERIOD*

	Units	October	November	December	January	February	March	April	May	June	July	August	September	Water Year
No. Day		31	30	31	31	28	31	30	31	30	31	31	30	
CLIMATE INPUTS														
Precipitation	in	0.54	10.25	1.17	25.00	24.26	6.87	5.11	0.59	0.74	0.00	0.00	0.01	74.55
Pan Evaporation	in	5.00	1.97	1.36	1.42	1.89	3.13	4.89	7.73	10.08	11.66	10.70	8.08	67.91
Effective Water Surface Evaporation	in	3.75	1.11	0.77	0.80	1.06	1.76	3.67	5.80	7.56	8.75	8.03	6.06	49.10
WASTEWATER GENERATION														
Facility Wastewater Influent (ADWF)	MG	4.8	4.6	4.8	4.8	4.3	4.8	4.6	4.8	4.6	4.8	4.8	4.6	56.2
I/I Contributions	MG	0.2	0.5	0.6	0.9	0.8	0.8	0.4	0.2	0.0	0.0	0.0	0.0	4.4
Cooling Tower Blowdown	MG	0.02	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.05	0.05	0.05	0.05	0.3
TOTAL Wastewater Influent	ac-ft	15.3	15.8	16.4	17.4	15.8	17.2	15.3	15.2	14.4	14.8	14.8	14.4	186.8
WWTP CONTRIBUTIONS														
Site Run-off	ac-ft	0.0	0.4	0.0	1.0	1.0	0.3	0.2	0.0	0.0	0.0	0.0	0.0	3.1
Overflow Basin Area	acre	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	
MBR Basin Area	acre	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	
Total Water Surface Area	acre	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	
Total Basin Precipitation	ac-ft	0.00	0.07	0.01	0.17	0.17	0.05	0.03	0.00	0.01	0.00	0.00	0.00	0.5
Basin Evaporation	ac-ft	-0.03	-0.01	-0.01	-0.01	-0.01	-0.01	-0.03	-0.04	-0.05	-0.06	-0.05	-0.04	-0.3
RECYCLED WATER DISTRIBUTION														
Cooling Tower Demand	ac-ft	-0.7	-0.1	-0.1	-0.1	-0.1	-0.1	-0.7	-0.7	-1.4	-1.5	-1.5	-1.4	-8.3
Casino - Dual Plumbing	ac-ft	-2.8	-2.8	-2.8	-2.9	-2.8	-3.0	-2.9	-3.1	-2.9	-3.1	-3.0	-2.9	-35.0
Casino - Landscape Irrigation	ac-ft	-3.4	-0.6	-0.6	-0.6	-0.5	-0.6	-3.3	-3.4	-3.3	-3.4	-3.4	-3.3	-26.6
Res Landscape & WWTP Process	ac-ft	-4.7	-1.9	-1.6	-2.0	-1.7	-2.1	-1.8	-3.0	-6.5	-7.6	-6.6	-5.4	-45.0
Leachfields and Drip Field	ac-ft	0.0	0.0	-9.0	-9.0	-8.1	-9.0	-8.7	0.0	0.0	0.0	0.0	0.0	-43.7
Spray Fields	ac-ft	-1.7	0.0	0.0	0.0	0.0	0.0	0.0	-5.9	-5.9	-5.9	-5.9	-5.9	-31.3
MONTHLY STORAGE BALANCE														
Beginning Storage Volume	ac-ft	0.0	1.9	12.8	15.2	19.3	23.0	25.8	23.9	23.0	17.3	10.5	4.8	
Change in Water Volume	ac-ft	1.9	10.9	2.4	4.1	3.8	2.7	-1.8	-0.9	-5.7	-6.8	-5.7	-4.6	
Final Storage Volume	ac-ft	1.9	12.8	15.2	19.3	23.0	25.8	23.9	23.0	17.3	10.5	4.8	0.2	

AVERAGE ANNUAL PRECIPITATION RETURN PERIOD

	Units	October	November	December	January	February	March	April	May	June	July	August	September	Water Year
No. Day		31	30	31	31	28	31	30	31	30	31	31	30	
CLIMATE INPUTS														
Precipitation	in	1.79	4.47	4.92	7.91	7.22	7.15	3.09	1.48	0.13	0.01	0.00	0.35	38.52
Pan Evaporation	in	5.00	1.97	1.36	1.42	1.89	3.13	4.89	7.73	10.08	11.66	10.70	8.08	67.91
Effective Water Surface Evaporation	in	3.75	1.48	1.02	1.07	1.42	2.35	3.67	5.80	7.56	8.75	8.03	6.06	50.93
WASTEWATER GENERATION														
Facility Wastewater Influent (ADWF)	MG	4.8	4.6	4.8	4.8	4.3	4.8	4.6	4.8	4.6	4.8	4.8	4.6	56.2
I/I Contributions	MG	0.2	0.5	0.6	0.9	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0
Cooling Tower Blowdown	MG	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.05	0.05	0.05	0.05	0.4
TOTAL Wastewater Influent	ac-ft	15.3	15.7	16.4	17.4	15.8	14.6	14.2	14.6	14.2	14.6	14.6	14.2	181.7
WWTP CONTRIBUTIONS														
Site Run-off	ac-ft	0.1	0.2	0.2	0.3	0.3	0.3	0.1	0.1	0.0	0.0	0.0	0.0	1.6
Overflow Basin Area	acre	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	
MBR Basin Area	acre	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	
Total Water Surface Area	acre	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	
Total Basin Precipitation	ac-ft	0.01	0.03	0.03	0.05	0.05	0.05	0.02	0.01	0.00	0.00	0.00	0.00	0.3
Basin Evaporation	ac-ft	-0.03	-0.01	-0.01	-0.01	-0.01	-0.02	-0.03	-0.04	-0.05	-0.06	-0.05	-0.04	-0.3
RECYCLED WATER DISTRIBUTION														
Cooling Tower Demand	ac-ft	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-1.4	-1.5	-1.5	-1.4	-11.5
Casino - Dual Plumbing	ac-ft	-2.8	-2.8	-2.8	-2.9	-2.8	-3.0	-2.9	-3.1	-2.9	-3.1	-3.0	-2.9	-35.0
Casino - Landscape Irrigation	ac-ft	-3.4	-3.3	-3.4	-3.4	-3.1	-3.4	-3.3	-3.4	-3.3	-3.4	-3.4	-3.3	-40.6
Res Landscape & WWTP Process	ac-ft	-4.7	-3.8	-3.3	-4.1	-3.3	-4.3	-1.8	-3.0	-6.5	-7.6	-6.6	-5.4	-54.3
Leachfields and Drip Field	ac-ft	0.0	0.0	0.0	-9.0	-8.1	-9.0	-8.7	0.0	0.0	0.0	0.0	0.0	-34.7
Spray Fields	ac-ft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-7.3	-7.3
MONTHLY STORAGE BALANCE														
Beginning Storage Volume	ac-ft	0.2	3.8	9.2	15.5	13.2	11.3	5.8	2.7	7.2	7.2	6.1	6.2	
Change in Water Volume	ac-ft	3.6	5.3	6.3	-2.3	-1.9	-5.5	-3.1	4.5	0.0	-1.0	0.1	-6.2	
Final Storage Volume	ac-ft	3.8	9.2	15.5	13.2	11.3	5.8	2.7	7.2	7.2	6.1	6.2	0.0	

Maximum Seasonal Storage (ac-ft)	25.8			
mg	8.4	8.4 mg available (Total - FF demand)		
Existing Tank Volume	9.0	mg	ac-ft (ff storage)	
Ex. Tank Volume - Fireflow demand	8.4	mg	1.84	7.058823529
Additional storage needed	0.0	mg		
Per Tank Vol	0.0	mg		
No. Additional Tanks Needed	0			

Maximum Seasonal Storage (ac-ft)	15.5
mg	5.1

INPUT
INPUT-Adjust as necessary
OUTPUT-Max Elevation

Water Balance - Red Hawk Casino Wastewater Evaluation Project

Scenario: Proposed Arena and Support Facilities Project

April 2024 By: Jory Benitez, HydroScience

WASTEWATER INFLUENT FLOW		***OPEN BASIN DATA***		***OTHER INPUTS***		***PROJECTED RECYCLED WATER DISTRIBUTION AND DISPOSAL***					
Daily Average Wastewater Influent Flow	188,400 gpd	Overflow Basin Volume	0.4 ac-ft	100-YR Multiplier	1.94 unitless	RW for Irrigation	2.32 MG	Drip Field	14,795 GPD	Leachfields	79,400 GPD
		MBR Basin Volume	0.5 ac-ft	Pan Evap Coefficient	0.75 unitless	RW for Toilet/Urinals	11.4 MG	Residential Landscape	17.7 MG	Spray Fields	163,562 GPD

BASED ON DESIGN CRITERIA — *100-YEAR ANNUAL PRECIPITATION RETURN PERIOD*

	Units	October	November	December	January	February	March	April	May	June	July	August	September	Water Year
No. Day		31	30	31	31	28	31	30	31	30	31	31	30	
CLIMATE INPUTS														
Precipitation	in	0.54	10.25	1.17	25.00	24.26	6.87	5.11	0.59	0.74	0.00	0.00	0.01	74.55
Pan Evaporation	in	5.00	1.97	1.36	1.42	1.89	3.13	4.89	7.73	10.08	11.66	10.70	8.08	67.91
Effective Water Surface Evaporation	in	3.75	1.11	0.77	0.80	1.06	1.76	3.67	5.80	7.56	8.75	8.03	6.06	49.10
WASTEWATER GENERATION														
Facility Wastewater Influent (ADWF)	MG	5.8	5.7	5.8	5.8	5.3	5.8	5.7	5.8	5.7	5.8	5.8	5.7	68.8
I/I Contributions	MG	0.3	0.6	0.7	1.1	1.0	1.0	0.4	0.2	0.0	0.0	0.0	0.0	5.4
Cooling Tower Blowdown	MG	0.02	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.05	0.05	0.05	0.05	0.3
TOTAL Wastewater Influent	ac-ft	18.8	19.3	20.1	21.3	19.3	21.0	18.7	18.6	17.5	18.1	18.1	17.6	228.5
WWTP CONTRIBUTIONS														
Site Run-off	ac-ft	0.0	0.4	0.0	1.0	1.0	0.3	0.2	0.0	0.0	0.0	0.0	0.0	3.1
Overflow Basin Area	acre	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	
MBR Basin Area	acre	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	
Total Water Surface Area	acre	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	
Total Basin Precipitation	ac-ft	0.00	0.07	0.01	0.17	0.17	0.05	0.03	0.00	0.01	0.00	0.00	0.00	0.5
Basin Evaporation	ac-ft	-0.03	-0.01	-0.01	-0.01	-0.01	-0.01	-0.03	-0.04	-0.05	-0.06	-0.05	-0.04	-0.3
RECYCLED WATER DISTRIBUTION														
Cooling Tower Demand	ac-ft	-0.7	-0.1	-0.1	-0.1	-0.1	-0.1	-0.7	-0.7	-1.4	-1.5	-1.5	-1.4	-8.3
Casino - Dual Plumbing	ac-ft	-2.8	-2.8	-2.8	-2.9	-2.8	-3.0	-2.9	-3.1	-2.9	-3.1	-3.0	-2.9	-35.0
Casino - Landscape Irrigation	ac-ft	-6.9	-1.1	-1.2	-1.2	-1.1	-1.2	-6.7	-6.9	-6.7	-6.9	-6.9	-6.7	-53.3
Res Landscape & WWTP Process	ac-ft	-4.7	-1.9	-1.6	-2.0	-1.7	-2.1	-1.8	-3.0	-6.5	-7.6	-6.6	-5.4	-45.0
Leachfields and Drip Field	ac-ft	0.0	-8.7	-9.0	-9.0	-8.1	-9.0	-8.7	0.0	0.0	0.0	0.0	0.0	-52.3
Spray Fields	ac-ft	-3.6	-5.0	0.0	0.0	0.0	0.0	0.0	-4.8	-4.8	-4.8	-4.8	-4.8	-32.4
MONTHLY STORAGE BALANCE														
Beginning Storage Volume	ac-ft	0.0	0.0	0.2	5.7	13.1	19.8	25.8	24.0	24.3	19.5	13.7	9.0	
Change in Water Volume	ac-ft	0.0	0.2	5.4	7.4	6.8	6.0	-1.8	0.2	-4.7	-5.8	-4.7	-8.5	
Final Storage Volume	ac-ft	0.0	0.2	5.7	13.1	19.8	25.8	24.0	24.3	19.5	13.7	9.0	0.5	

AVERAGE ANNUAL PRECIPITATION RETURN PERIOD

	Units	October	November	December	January	February	March	April	May	June	July	August	September	Water Year
No. Day		31	30	31	31	28	31	30	31	30	31	31	30	
CLIMATE INPUTS														
Precipitation	in	1.79	4.47	4.92	7.91	7.22	7.15	3.09	1.48	0.13	0.01	0.00	0.35	38.52
Pan Evaporation	in	5.00	1.97	1.36	1.42	1.89	3.13	4.89	7.73	10.08	11.66	10.70	8.08	67.91
Effective Water Surface Evaporation	in	3.75	1.48	1.02	1.07	1.42	2.35	3.67	5.80	7.56	8.75	8.03	6.06	50.93
WASTEWATER GENERATION														
Facility Wastewater Influent (ADWF)	MG	5.8	5.7	5.8	5.8	5.3	5.8	5.7	5.8	5.7	5.8	5.8	5.7	68.8
I/I Contributions	MG	0.3	0.6	0.7	1.1	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7
Cooling Tower Blowdown	MG	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.05	0.05	0.05	0.05	0.4
TOTAL Wastewater Influent	ac-ft	18.8	19.3	20.1	21.4	19.4	18.0	17.4	18.0	17.5	18.1	18.1	17.5	223.5
WWTP CONTRIBUTIONS														
Site Run-off	ac-ft	0.1	0.2	0.2	0.3	0.3	0.3	0.1	0.1	0.0	0.0	0.0	0.0	1.6
Overflow Basin Area	acre	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	
MBR Basin Area	acre	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	
Total Water Surface Area	acre	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	
Total Basin Precipitation	ac-ft	0.01	0.03	0.03	0.05	0.05	0.05	0.02	0.01	0.00	0.00	0.00	0.00	0.3
Basin Evaporation	ac-ft	-0.03	-0.01	-0.01	-0.01	-0.01	-0.02	-0.03	-0.04	-0.05	-0.06	-0.05	-0.04	-0.3
RECYCLED WATER DISTRIBUTION														
Cooling Tower Demand	ac-ft	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-1.4	-1.5	-1.5	-1.4	-11.5
Casino - Dual Plumbing	ac-ft	-2.8	-2.8	-2.8	-2.9	-2.8	-3.0	-2.9	-3.1	-2.9	-3.1	-3.0	-2.9	-35.0
Casino - Landscape Irrigation	ac-ft	-6.9	-6.7	-6.9	-6.9	-6.2	-6.9	-6.7	-6.9	-6.7	-6.9	-6.9	-6.7	-81.1
Res Landscape & WWTP Process	ac-ft	-4.7	-3.8	-3.3	-4.1	-3.3	-4.3	-1.8	-3.0	-6.5	-7.6	-6.6	-5.4	-54.3
Leachfields and Drip Field	ac-ft	0.0	0.0	-9.0	-9.0	-8.1	-7.6	0.0	0.0	0.0	0.0	0.0	0.0	-33.6
Spray Fields	ac-ft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-9.9	-9.9
MONTHLY STORAGE BALANCE														
Beginning Storage Volume	ac-ft	0.5	4.1	9.7	7.4	5.6	4.2	0.0	5.5	9.9	9.9	8.8	8.9	
Change in Water Volume	ac-ft	3.7	5.6	-2.3	-1.8	-1.4	-4.2	5.5	4.4	-0.1	-1.1	0.0	-8.8	
Final Storage Volume	ac-ft	4.1	9.7	7.4	5.6	4.2	0.0	5.5	9.9	9.9	8.8	8.9	0.0	

Maximum Seasonal Storage (ac-ft)	25.8		
mg	8.4	8.4 mg available (Total - FF demand)	
Existing Tank Volume	9.0	mg	ac-ft (ff storage)
Ex. Tank Volume - Fireflow demand	8.4	mg	1.84
Additional storage needed	0.0	mg	
Per Tank Vol	3.0	mg	
No. Additional Tanks Needed	0		

Maximum Seasonal Storage (ac-ft)	9.9
mg	3.2

INPUT
INPUT-Adjust as necessary
OUTPUT-Max Elevation

APPENDIX C

Red Hawk Casino
Wastewater Feasibility Study
EID Agreement Letter

FURTHER SETTLEMENT AGREEMENT
AND MEMORANDUM OF UNDERSTANDING

THIS FURTHER SETTLEMENT AGREEMENT AND MEMORANDUM OF UNDERSTANDING ("Further MOU") is made this _____ day of _____, 2013, between the Shingle Springs Band of Miwok Indians, a federally-recognized Indian tribe ("Tribe"), and El Dorado Irrigation District ("EID"), an Irrigation District formed pursuant to the relevant provisions of California's Water Code, by and through EID's Board of Directors (respectively "Party" or collectively "Parties").

RECITALS

This Further MOU is intended to provide for the full resolution of all disputes between the Tribe and EID having to do with the rights of the Tribe to purchase water for all purposes from EID. These disputes arose as a result of denial by EID of extended service requests by the Tribe, based on restrictions unilaterally imposed by El Dorado Local Agency Formation Commission ("LAFCO") when it approved the annexation of the Tribe's Rancheria. These disputes resulted in notice to EID of the Tribe's imminent plans to bring suit in 2004. The Parties thereafter have engaged in continuous settlement negotiations under the protection of successive Tolling and Confidentiality Agreements. The Parties fully intend that this Further MOU shall be a complete and final resolution of all existing claims and disputes between them relating to EID's provision of water service to the Rancheria and the Tribe, including but not limited to claims and disputes against former and present Board members and officers of EID in their individual capacities.

The Parties entered into a similar MOU in May of 2008 (the "Original MOU"). Voices for Rural Living ("VRL") subsequently challenged EID's compliance with the California Environmental Quality Act ("CEQA") and other laws as to the Original MOU, and the Superior Court of California, County of El Dorado ruled on December 15, 2009, that EID must prepare an Environmental Impact Report ("EIR") and take certain steps with the El Dorado Local Agency Formation Commission ("LAFCO") prior to executing a MOU for water service to the Tribe's Rancheria. EID has completed those actions. In July, 2012, pursuant to the California Government Code and applicable EID and LAFCO policies, EID formally applied to LAFCO for the inclusion of the Shingle Springs Rancheria in the water service district served by EID without any of the restrictions LAFCO sought to impose with the Rancheria's annexation in 1988. On December 5, 2012, LAFCO granted the application.

The Original MOU required the Tribe to pay a Facility Connection Charge to EID and to convey certain easements to EID. The Parties acknowledge and agree that the Tribe has paid this charge and conveyed these easements to the satisfaction of EID and the Tribe. The Original MOU also provided that, concurrent with EID's provision of water service under the Original MOU, the Tribe shall pay all outstanding charges on District project accounts numbers 65094 and 87530, to which the EID charges costs authorized by EID Administrative Regulation 9028.3. The Parties acknowledge and agree that the Tribe has paid these charges to the satisfaction of EID.

This Further MOU supersedes, repeals and replaces the Original MOU, provided, however, that if this Further MOU is set aside as a result of a lawsuit, the Original MOU shall automatically be reinstated.

AGREEMENT

1. Nature of Relationship. The Parties agree that this and all service agreement(s) between EID and the Tribe will be on a government-to-government basis.

2. Water Service to the Tribe. EID is willing and able to provide the Tribe the water it needs for its Rancheria property (APN 319-100-37), irrespective of how such water is used as determined by the Tribe in its sovereign authority, under the terms and conditions stated herein.

a. Rate. The Parties agree that the rate appropriate for the provision of water service to the Tribe will be the Retail Rate (gravity) or any successor, as it may be amended from time to time.

b. Quantity. Subject to Section 2(d) below, the Parties agree that EID shall provide water service to the Rancheria at a maximum rate of 95 gallons per minute, with a total average volume of 135,000 gallons per day. At no time pursuant to this Further MOU shall EID be required to deliver water in excess of the rate of 95 gallons per minute or in excess of an average of 135,000 gallons per day. However, the Tribe is entitled to apply for more water in the future, and EID is obligated to treat that application the same as it would the application of any other customer within the District's service area, selling the requested water service and delivering the water if it is available under EID's then-current and generally applicable Board Policies, Administrative Regulations, procedures and practices and applicable law governing the provision of water services and the delivery of water.

c. Method. EID shall deliver water to the Rancheria at a single point, through a three-inch meter modified to physically restrict the maximum flow to 95 gallons per minute. The 95-gallon-per-minute physical restriction was verified by EID through laboratory testing prior to installation and shall be verified periodically hereafter as EID reasonably deems necessary. The Tribe may receive water at any rates and quantities, subject to the maximum limitations set forth in Paragraph 2.b., and shall be charged only for the actual, metered quantities delivered to it.

d. Water Required for Rancheria. The Parties agree, pursuant to this Further MOU, that EID has reviewed the Facilities Plan Report presented by the Tribe in October 2002 and has reviewed and approved the improvement plans signed and submitted by the Tribe's Registered Engineer on September 21, 2007, as amended and approved by the Parties thereafter. EID has confirmed its ability to provide the Tribe an average daily volume of 135,000 gallons per day for the Rancheria through a 3-inch meter at maximum flow of 95 gpm, subject only to EID's requirements to meet off-Rancheria fire flow events. The Parties agree that this Further MOU serves as a service agreement entitling the Tribe to purchase the amount of EDUs and to receive continuous service as

identified herein, representing the total gallons per day described in this paragraph 2.d. The Parties further agree that the Tribe is entitled to seek additional water in the future, and that EID will provide it if available, all in accordance with EID's then current and generally applicable Board Policies, Administrative Regulations, procedures and practices governing the provision of water service to any customer within EID's service area, and all other applicable law, including, but not limited to, the California Environmental Quality Act. The Parties further agree and understand that the Tribe's need for an average daily volume of 135,000 gallons per day for the Rancheria is dependent upon the use of Title 22 treated recycled water for toilet flushing in the Tribe's gaming facility and hotel, and for irrigation purposes.

e. Jurisdiction over Water System. The Parties intend that jurisdiction over the water system on the Rancheria will be as follows: all service to the Rancheria will be provided through the three (3) inch meter functioning as the single point of delivery. That meter shall be located in a locked vault, with access solely controlled by EID. The Tribe will construct internal infrastructure as it sees fit but consistent with the improvement plans approved by EID, including a series of lines and storage tank(s), on the Rancheria which will provide the necessary water supply for all purposes, including fire protection, to serve the entire Rancheria. The Tribe will own and maintain all facilities downstream of the three (3) inch meter.

f. Cross-Connection Control. To protect public health and safety, including the health and safety of residents, guests and business invitees on the Rancheria, the Tribe may elect to install and maintain an air-gap separation between its internal system and EID's infrastructure that meets the requirements of California Code of Regulations, title 17, section 7602(a) or its successors. The air-gap separation shall be located at the point of delivery from the three (3) inch meter, and EID shall have sufficient access at all times to confirm that such air-gap separation exists. Unless such an air-gap separation exists, the Tribe shall implement and maintain a cross-connection control program for its internal system, including both point-of-use protection and a master backflow prevention device at the three (3) inch meter, that complies with the Uniform Plumbing Code, California Code of Regulations, title 17, section 7583 et seq., and their successors. To confirm the Tribe's ongoing compliance with the foregoing requirements, the Parties agree to the following: i) EID and Tribal representatives shall conduct a joint initial inspection of the Tribe's initial cross-connection control system installations; ii) At least annually thereafter, the Tribe shall transmit to EID for review an inspection report, prepared by a certified cross-connection control specialist, that identifies any changes in the system during the reporting period, discloses any suspected or actual failures during the reporting period, and affirms the system's ongoing compliance with the then-current Uniform Plumbing Code and Title 17 requirements; iii) If any report identifies any deficiency in the Tribe's cross-connection control system, or if any suspected or actual failure of any portion of the system is reported or occurs, EID representatives may, upon reasonable written notice, conduct a supplemental joint inspection of the relevant portions of the system; iv) At all times, EID representatives shall have authority and sufficient access to inspect and prescribe corrective action to ensure the master backflow prevention device at the three (3) inch meter meets all manufacturers' specifications.

g. Property Interests. The Tribe hereby ratifies and incorporates by reference into this Further MOU that certain Extension of Facilities Agreement – Water dated September 21, 2007 and executed by Tribal Chairman Nicholas Fonseca.

h. EID Policies and Regulations; Drought. Provision of water service to the Tribe under this Further MOU shall be subject to all then-current EID Board Policies, Administrative Regulations, procedures and practices generally applicable to all water customers, including but not limited to EID's 2008 Drought Preparedness Plan or any successor plans. The Parties agree and understand that the Drought Preparedness Plan (including any generally applicable successor plans) authorizes EID to restrict water to any customer, including the Tribe, in the event of non-compliance with mandatory water restrictions during drought conditions.

3. CEQA Compliance. EID has prepared an Environmental Impact Report ("EIR") in compliance with the California Environmental Quality Act in support of this Further MOU. The Tribe agrees to comply with all Environmental Commitments set forth in Section 2.5.1 of the EIR, all Construction Considerations set forth in Section 2.6 of the EIR, and all mitigation measures set forth in the EIR, as well as any conditions or other requirements EID may adopt in any findings made in support of approving this Further MOU.

4. Wastewater Service. The Tribe agrees to use its best efforts to procure wastewater service from EID, subject to the concurrence of the Bureau of Indian Affairs and/or the National Indian Gaming Commission (if needed). The Tribe agrees to conduct all environmental analyses required by state and/or federal environmental law for the provision of wastewater service to the Rancheria (or to arrange, in a manner consistent with applicable law, for such analysis to be completed by an environmental contractor), and further agrees to mitigate any significant environmental impacts that could reasonably result from such service to the Rancheria. The Parties acknowledge that the Rancheria is presently included within EID's service area for the limited purpose of water supply, and that the provision of wastewater service by EID is not currently authorized. Within two years of this Further MOU's execution, the Tribe agrees to initiate an application to LAFCO for the annexation of the Rancheria into the EID service area to authorize connection to, and delivery of, wastewater disposal and treatment service to the Rancheria by EID, and to diligently pursue to completion the application. The Tribe shall be deemed to have met its obligation of diligence if LAFCO renders a decision on the annexation application within eighteen months of its filing; provided, however, that the Parties agree and understand that the Tribe cannot control LAFCO, and delays may result from litigation, from administrative actions initiated by third parties, and from the need to complete environmental analyses. The Parties further agree and understand that the Tribe cannot be deemed responsible or in breach of this provision by virtue of delays caused by litigation, by the administrative action of third parties, by the need to complete additional environmental analyses, and/or by LAFCO's refusal or failure to act.

a. Conditions Precedent. The Parties agree and understand that annexation by LAFCO for wastewater service would authorize but not require the Tribe to seek wastewater service from EID and would authorize but not require EID to provide such service if requested, and that such annexation also may be contingent upon approval by the BIA. The Parties further agree and understand that any approval of such requested

annexation will require the completion of legally-required environmental analyses evaluating the impacts, if any, associated with such wastewater service. The Parties further agree that additional conditions precedent exist for the provision of wastewater service to the Tribe, including EID's determination of its ability to serve, the payment of fees and charges to EID and LAFCO, the completion of environmental review(s), the mitigation of environmental impacts, and the sale of additional needed water to the Tribe, as detailed below in subdivisions b-f.

b. EID Fees and Charges. The Parties agree and understand that EID charges to all annexation applicants EID's administrative costs incurred in processing an annexation application and that prior to the completion of an annexation, EID charges all applicants an annexation impact fee as set forth in EID Administrative Regulation 9032 or its successor, and the Tribe agrees to pay for such fee and costs as they are incurred. The Parties agree and understand that EID's standard methodology for calculating the annexation impact fee incorporates the El Dorado County Assessor's valuation of the subject property for property tax purposes, and that no such assessment is performed for the Rancheria in deference to its status as tax-exempt sovereign lands. Therefore, the Parties agree that at such time, if any, as an annexation impact fee becomes due under Administrative Regulation 9032, they shall meet and confer in good faith to determine a mutually agreed-upon substitute methodology for calculating the annexation impact fee that meets the intent of Administrative Regulation 9032 and the District's otherwise-applicable methodology, which otherwise respects the sovereign interests of the Tribe regarding the impact of such appraisal methodology on federal lands. If the Parties reach impasse in this process, the Parties agree to submit their dispute to a single retired judge with knowledge of federal Indian law or experience in Tribal matters, chosen jointly by the Parties pursuant to JAMS procedures, and if the Parties cannot agree, a judge will be selected pursuant to JAMS procedures. The Parties agree that they will voluntarily submit to mediation of their disputes, first, and only if mediation fails will they jointly retain a separate JAMS retired judge with knowledge of federal Indian law or experience in Tribal matters to arbitrate the dispute. Such arbitration will then be conducted according to the rules and procedures of JAMS then if effect at the time the request for arbitration is filed, and will be binding, subject to the review procedures then in effect by JAMS.

c. Mitigation of Impacts. The Tribe agrees to pay the costs of feasible measures identified in EID's environmental analyses to mitigate potentially significant adverse impacts directly associated with EID's provision of wastewater service to the Rancheria. This Further MOU shall not be interpreted to mean the Tribe must pay for the mitigation of secondary or cumulative environmental impacts associated with the provision of wastewater service to the Rancheria (if any), including growth inducement in areas south of Highway 50, or new EID lines or expansion-related issues to service persons south of Highway 50.

d. LAFCO Fees. The Parties agree and understand that LAFCO will, consistent with generally applicable policies in effect, charge annexation and processing fees for the application further described in paragraph 4, and the Tribe agrees to fund the cost of such LAFCO fees to the extent those fees are consistent

with LAFCO policies in effect and generally applicable to all applicants at the time of said application.

e. Eminent Domain. In the event that any use of eminent domain power is necessary for EID to provide wastewater service to the Rancheria, EID shall not be obliged to exercise that power; rather, the Tribe shall request the BIA to exercise that power on its behalf. However, EID recognizes that the Tribe cannot require BIA to take this action, and the Tribe shall have no liability in this respect in the event BIA refuses to take such action on behalf of the Tribe.

f. Water Requirements Associated with Wastewater Service. EID understands the Tribe's wastewater treatment facility enables the Tribe to use recycled water for its casino and hotel. EID further understands that the Tribe's water requirements will increase if it closes its treatment facility and secures wastewater service from EID. Therefore, the Parties agree that any obligation of the Tribe to secure wastewater service from EID is contingent upon EID's sale to the Tribe of the additional water that it would need for its operations on the Rancheria as a result of curtailing its use of recycled water and the completion of any federal or state environmental analyses necessary to support the sale of additional water to the Tribe.

g. Provision of Wastewater Service. Any provision of wastewater service by EID to the Rancheria following any annexation of the Rancheria to the District for wastewater service purposes shall be made in accordance with EID's then-current Board Policies, Administrative Regulations, procedures and practices generally applicable to all wastewater customers.

5. Authority. The undersigned warrant and certify that the signatories to this Further MOU are each fully authorized to execute this Further MOU on behalf of and bind EID and its officers, directors, and employees, and the Tribe, its Tribal Council, and Tribal members respectively, and each entity will affix its authorizing resolutions thereto.

6. Limited Waiver of Tribal Sovereign Immunity. The Tribe hereby agrees to waive its sovereign immunity (and any requirement of exhaustion of tribal remedies) in connection with any dispute vis-à-vis EID that may arise under this Further MOU, and consent to the jurisdiction of certain mediators, arbiters or courts solely for purposes of enforcing the terms of this Agreement. To that end, and for purposes of addressing disputes not resolved pursuant to the provisions of Section 4.b., the Tribe consents only to the jurisdiction of the U.S. District Court in the Eastern District of California (and all relevant courts of appeal), or alternatively, to the jurisdiction of the Sacramento County Superior Court of California (and all relevant courts of appeal), for judicial resolution of disputes with EID over this Agreement. Notwithstanding the foregoing, and with the exception of Section 4.b. involving mediation and arbitration, EID and the Tribe agree that jurisdiction and venue for any such dispute shall be in (and the Tribe's waiver of sovereign immunity shall extend to) any superior court other than El Dorado County Superior Court unless it is determined by another superior court, *sua sponte* and without motion or suggestion of any party, that the action must be heard in El Dorado County Superior Court. EID agrees to jurisdiction and venue in Sacramento County Superior Court and will not assert that jurisdiction and venue lie in El Dorado County Superior Court unless there is no other

superior court that will accept jurisdiction and venue for the matter. The waiver is also limited to amounts due under the terms of this Agreement, and in no instance shall the waiver be read to extend to allow judicial enforcement of any kind against any assets of the Tribe, other than the Revenue Stream of its casino. ("Revenue Stream" is defined as net profits due and owing to the Tribe that are derived from the operation of the casino after all costs of operation, repayment of debt service, payments to the State under any Compact, and payments to the Tribe for any necessary governmental functions associated with the operation of the casino have been made.) The Tribe also does not agree to waive any aspect of its sovereign immunity with respect to actions by parties other than EID.

7. Indemnification/Defense. To the fullest extent permitted by law (including, without limitation, California Civil Code Section 2782), the Tribe shall defend (with legal counsel reasonably acceptable to EID), indemnify and hold harmless EID and its officers, agents, departments, officials, representatives and employees (collectively "Indemnitees") from and against any and all claims, administrative actions, lawsuits, loss, cost, damage, injury (including, without limitation, injury to the Tribe or any member, employee, or agent thereof), expense and liability of every kind, nature and description (including, without limitation, incidental and consequential damages, court or administrative agency costs, attorneys' fees, litigation expenses and fees of expert consultants and/or expert witnesses incurred in connection therewith and costs of investigation) that arise from or relate to, directly or indirectly, in whole or in part, this Further MOU or the Parties' performance thereof (collectively, "Liabilities"), save and except a claim by the Tribe against EID, its employees, agents, and/or officials for breach of contract with respect to, or violation of rights provided by, the Further MOU. Such obligations to defend, hold harmless and indemnify any Indemnitee shall not apply to the extent that such Liabilities are caused in whole or in part by the sole negligence, active negligence, or willful misconduct of any Indemnitee. The Tribe's obligation to provide a defense to EID shall extend to the retention of outside legal counsel and payment of costs necessary to the defense of EID but it shall not include time spent by EID's employees, agents or officials in defense of such litigation. EID's consent with respect to the selection of such counsel may not be unreasonably withheld.

8. Forum Selection. In the event of a breach or violation of this Further MOU, or third party interference with performance by any Party to this Further MOU, the Parties hereby agree that any Party to this Further MOU is entitled to seek relief in a United States District Court to enforce the terms of this Further MOU, or seek any other appropriate relief. The Parties hereby consent to the jurisdiction of the U.S. District

Court in such an action, and only in the event the District Court determines it cannot exercise subject matter jurisdiction over such a claim, may the Parties then seek relief in the appropriate California state court consistent with the terms set forth above in Section 6.

9. Damages and Costs of Enforcement. If suit is brought to enforce or interpret any part of this Further MOU, or the rights or obligations of either Party to this Further MOU, including, without limitation, an action to recover damages for the breach of this Further MOU or to secure specific enforcement of this Further MOU, the prevailing Party shall be entitled to recover as an element of its costs of suit, and not as damages, reasonable attorneys' fees and expenses and court costs. This right shall exist in connection with both the Parties' respective

right to seek specific performance of this Further MOU, as well as the Parties' respective right to seek compensatory damages for any breach of this Further MOU.

10. No Third Party Beneficiaries. With the exception of the individual members of the Tribe, this Agreement is not intended to, and will not be construed to, confer a benefit or create any right for a third party. The Parties agree no third party, with the exception of the individual members of the Tribe, possesses the right or power to bring an action to enforce any of the terms of this Agreement. The Tribal Council's approval, duly recorded in a Tribal Council resolution or approved minutes of that body's proceedings, constitutes a prerequisite to suit by any member(s) of the Tribe against EID in connection with this Further MOU, and in the absence of such approval, any suit by any member(s) of the Tribe in connection with this Further MOU may not proceed.

11. Notices. Any notices required or permitted hereunder shall be in writing and may be personally delivered, or delivered via the U.S. Postal Service, first class postage prepaid, or by a reputable overnight delivery service (such as U.S. Express Mail, Priority Mail, Federal Express, UPS, or DHL), addressed as follows or to such other place as each Party may designate by subsequent written notice to each other:

For the Tribe:
Chairperson
Shingle Springs Band of Miwok Indians
Shingle Springs Rancheria
5281 Honpie Road
Placerville, CA 95667

For EID:
General Manager
El Dorado Irrigation District 2890
Mosquito Road
Placerville, CA 95667

12. Rule of Construction. No provision of this Further MOU shall be interpreted or construed against any Party because such Party or its counsel was the sole or principal drafter thereof. When the context requires, the plural shall include the singular, and the singular the plural.

13. Counterparts. This Further MOU may be executed in any number of counterparts, and is effective vis-à-vis each Party on the date of its execution by each Party. Additional parties may be added by mutual consent of the Parties.

14. Entire Agreement. This Further MOU represents the entire agreement between the Parties respecting the subject matter therein and supersedes any prior written and prior or contemporaneous oral understandings or agreements. This Further MOU cannot be amended except in a writing signed by authorized representatives of both Parties. The limited waiver of tribal sovereign immunity provided in Section 6, above, shall extend to any amendment of this Further MOU.

Signatures on Following Page

SHINGLE SPRINGS BAND OF MIWOK INDIANS

Dated: ~~January ____, 2013~~
2-7-13

By: _____
Nicholas H. Fonseca, Its Chairman

EL DORADO IRRIGATION DISTRICT

Dated: January ____, 2013

By: _____

Its: _____

APPROVED AS TO FORM:

General Counsel for El Dorado Irrigation District

_____
Thomas Cumpston
General Counsel, El Dorado Irrigation District

_____
Date

SNR Denton LLP

_____
Paula M. Yost
Counsel for Shingle Springs
Band of Miwok Indians

_____
Date

SHINGLE SPRINGS BAND OF MIWOK INDIANS

Shingle Springs Rancheria (Verona Tract), California
5281 Honpie Road, Placerville, CA 95667 P.O. Box 1340; Shingle Springs, CA 95682
(530) 676-8010 office ; (530)676-8033 Fax

RESOLUTION 2013-6

SUBJECT: Authorizing Entry into Further Settlement Agreement and Memorandum of Understanding Between the Shingle Springs Band of Miwok Indians.

WHEREAS, the Shingle Springs Band of Miwok Indians (the "Tribe") is a federally recognized Indian tribe eligible for the special programs and services provided by the United States to Indians because of their status as Indians and is recognized as possessing powers of self-government; and

WHEREAS, the Shingle Springs Tribal Council (the "Tribal Council") is the duly-elected governing body of the Tribe and is authorized to act on behalf of the Tribe; and

WHEREAS, on June 19, 2008, the Tribe entered into a Settlement Agreement/Memorandum of Understanding ("Original MOU") with the El Dorado Irrigation District ("EID") that was intended to be a complete and final resolution of all existing claims and disputes between them relating to EID's provision of water service to the Rancheria and the Tribe and the Tribe's rights to purchase water for all purposes from EID; and

WHEREAS, since entry into the Original MOU with EID, Voices for Rural Living has sued EID for various claims surrounding EID's service to the Tribe and Rancheria; and

WHEREAS, as part of the court proceedings, the court invalidated the Original MOU and required EID and the Tribe to complete further CEQA and LAFCO work; and

WHEREAS, the Tribe and EID have completed the CEQA work requested by the court and have received approval from LAFCO on all matters, including approval of the Tribe's re-annexation into EID's service district without restrictions; and

WHEREAS, a new MOU is required that updates and memorializes the Original MOU between the Tribe and EID and incorporates the CEQA and LAFCO work completed by the parties; and

WHEREAS, the Tribal Council has reviewed the Further Settlement Agreement and Memorandum of Understanding as attached and has determined that it is in the best interest of the Tribe and supports entry into it.

NOW, THEREFORE, BE IT RESOLVED that the Tribal Council hereby authorizes entry into the Further Settlement Agreement and Memorandum of Understanding as attached, and authorizes the Chairman or his designee to execute any and all documents and agreements necessary as may be required to give effect to the transactions, herein contemplated, and to take such other actions as may hereby be necessary and appropriate to carry out the obligations thereunder.

BE IT FURTHER RESOLVED that the Tribal Council clarifies that its authority extends to the waiver of sovereign immunity contained in the MOU, and consents to said waiver of its immunity.

BE IT FURTHER RESOLVED that this resolution shall take effect immediately.

(CERTIFICATION ON FOLLOWING PAGE)

CERTIFICATION

As a duly-elected official of the Shingle Springs Rancheria, I do hereby certify that, at a meeting duly called, noticed, and convened on the 7th day of February, 2013 at which time a quorum of 7 FOR, 0 AGAINST, 0 ABSTAINED, and said resolution has not been rescinded or amended in any form.

Tribal Chairperson — *Date* 2-7-13

ATTEST:

Tribal Secretary — *Date* 2-7-13

www.nationalreporters.com

Appendix I

Environmental Noise Assessment

Environmental Noise Assessment

Red Hawk Arena and Housing Project

El Dorado County, California

August 20, 2024

Project #240105

Prepared for:

Acorn Environmental
5170 Golden Foothill Parkway
El Dorado Hills, CA 95762

Prepared by:

Saxelby Acoustics LLC

Luke Saxelby, INCE Bd. Cert.
Principal Consultant
Board Certified, Institute of Noise Control Engineering (INCE)

Table of Contents

INTRODUCTION **1**

ENVIRONMENTAL SETTING **4**

EXISTING AND FUTURE NOISE AND VIBRATION ENVIRONMENTS **6**

EXISTING NOISE RECEPTORS *6*

EXISTING GENERAL AMBIENT NOISE LEVELS **6**

EXISTING AMBIENT NOISE LEVELS *6*

FUTURE TRAFFIC NOISE ENVIRONMENT AT OFF-SITE RECEPTORS **8**

OFF-SITE TRAFFIC NOISE IMPACT ASSESSMENT METHODOLOGY *8*

EVALUATION OF ARENA NOISE AT RESIDENTIAL RECEPTORS **10**

CONSTRUCTION NOISE ENVIRONMENT **14**

CONSTRUCTION VIBRATION ENVIRONMENT **14**

REGULATORY CONTEXT **15**

FEDERAL *15*

STATE *15*

LOCAL *15*

IMPACTS AND MITIGATION MEASURES **17**

METHODOLOGY *17*

THRESHOLDS OF SIGNIFICANCE *17*

PROJECT-SPECIFIC IMPACTS AND MITIGATION MEASURES *19*

REFERENCES **24**

Appendices

Appendix A: Acoustical Terminology
Appendix B: Field Noise Measurement Data
Appendix C: Traffic Noise Calculations

List of Figures

Figure 1: Site Plan 2
Figure 2: Noise Measurement Sites and Receptor Locations 3
Figure 3: Arena Noise Contours, dBA L_{eq} 12
Figure 4: Commercial Noise Contours, dBA L_{eq} 13
Figure 5: Recommended Wall Locations 21

List of Tables

Table 1: Typical Noise Levels 5
Table 2: Summary of Existing Background Noise Measurement Data 7
Table 3: Predicted Traffic Noise Level and Project-Related Traffic Noise Level Increases 9
Table 4: Cumulative Traffic Noise Level and Project-Related Traffic Noise Level Increases 9
Table 5: Construction Equipment Noise 14
Table 6: Vibration Levels for Various Construction Equipment 14
Table 7: Maximum Allowable Noise Exposure for Transportation Noise Sources 16
Table 8: Noise Level Performance Standards for Noise Sensitive Land Uses Affected by Non-Transportation Sources 16
Table 9: Maximum Allowable Noise Exposure For Non-Transportation Noise Sources In Rural Regions–Construction Noise 17
Table 10: Effects of Vibration on People and Buildings 19

INTRODUCTION

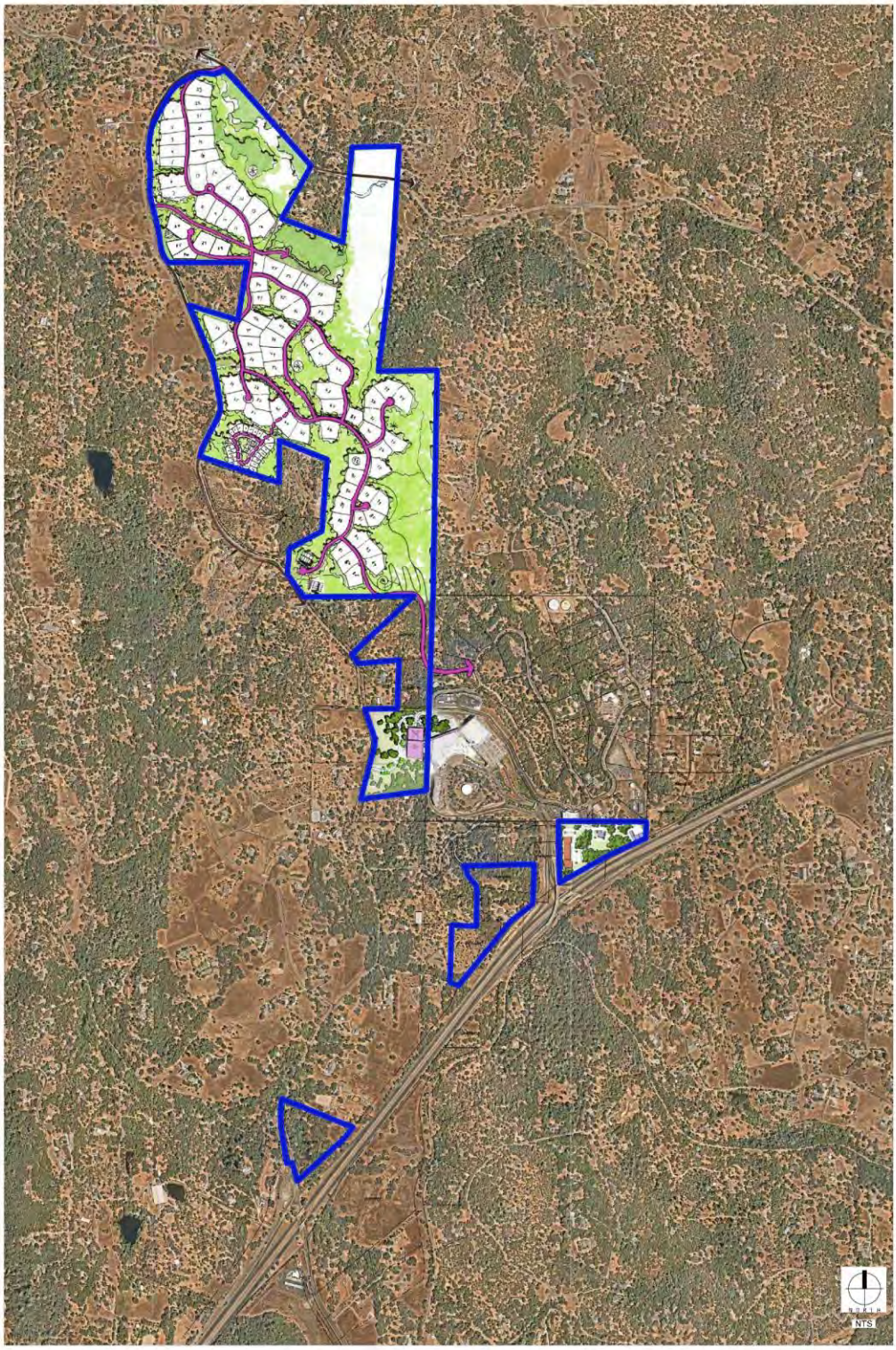
Saxelby Acoustics was retained by Acorn Environmental Planning to perform a noise study for the Redhawk Arena and Housing Project.

The project would include an arena located east of the main casino attached through a skybridge. The arena is proposed to be 80,000 square feet, including a 3-bay loading dock and 1,050-space parking garage. The proposed commercial space encompasses 30,000 square feet of land at the southern end of tribal land, which includes the construction of a parking garage. In addition, the project includes 132 residential units located north of the main casino. The Red Hawk Casino Arena and Housing project is located entirely on Tribal land on Red Hawk Parkway in El Dorado County, California.

The proposed project would primarily include new indoor uses. Any outdoor mechanical equipment would be located on the roof of the new facility and would be shielded from view by rooftop parapets and is unlikely to be audible at the nearest off-site sensitive receptors which are located more than 300 feet to the west. Any proposed residential land use is predicted to be compatible with nearby land uses.

Figure 1 shows the project site plan. **Figure 2** shows an aerial photo of the project site and existing buildings.

TRUST APPLICATION MAP



SHINGLE SPRINGS BAND OF MIWOK INDIANS
OCTOBER 2023

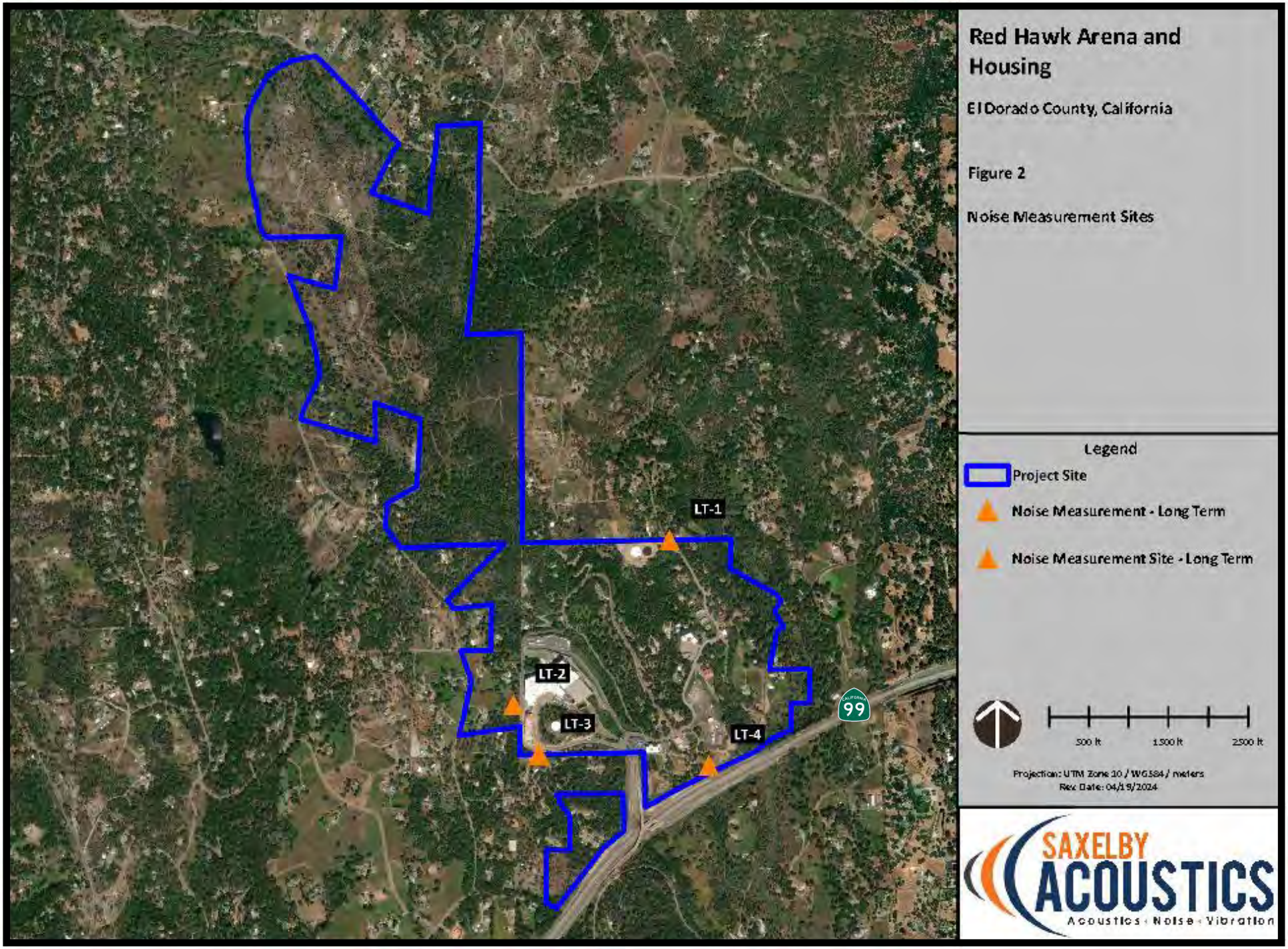
Kimley»Horn

Red Hawk Arena and Housing

El Dorado County, Nevada

Figure 1
Project Site Plan

SAXELBY ACOUSTICS
Acoustics · Noise · Vibration


LT-1
LT-2
LT-3
LT-4
99
Red Hawk Arena and Housing
El Dorado County, California
Figure 2
Noise Measurement Sites
Legend
Project Site
Noise Measurement - Long Term
Noise Measurement Site - Long Term
500 ft
1500 ft
2500 ft
Projection: UTM Zone 10 / WGS84 / meters
Rev Date: 04/19/2024
SAXELBY
ACOUSTICS
Acoustics • Noise • Vibration

ENVIRONMENTAL SETTING

Fundamentals of Acoustics

Acoustics is the science of sound. Sound may be thought of as mechanical energy of a vibrating object transmitted by pressure waves through a medium to human (or animal) ears. If the pressure variations occur frequently enough (at least 20 times per second), then they can be heard and are called sound. The number of pressure variations per second is called the frequency of sound, and is expressed as cycles per second or Hertz (Hz).

Noise is a subjective reaction to different types of sounds. Noise is typically defined as (airborne) sound that is loud, unpleasant, unexpected or undesired, and may therefore be classified as a more specific group of sounds. Perceptions of sound and noise are highly subjective from person to person.

Measuring sound directly in terms of pressure would require a very large and awkward range of numbers. To avoid this, the decibel scale was devised. The decibel scale uses the hearing threshold (20 micropascals), as a point of reference, defined as 0 dB. Other sound pressures are then compared to this reference pressure, and the logarithm is taken to keep the numbers in a practical range. The decibel scale allows a million-fold increase in pressure to be expressed as 120 dB, and changes in levels (dB) correspond closely to human perception of relative loudness.

The perceived loudness of sounds is dependent upon many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable, and can be approximated by A-weighted sound levels. There is a strong correlation between A-weighted sound levels (expressed as dBA) and the way the human ear perceives sound. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment.

The decibel scale is logarithmic, not linear. In other words, two sound levels 10-dB apart differ in acoustic energy by a factor of 10. When the standard logarithmic decibel is A-weighted, an increase of 10-dBA is generally perceived as a doubling in loudness. For example, a 70-dBA sound is half as loud as an 80-dBA sound, and twice as loud as a 60 dBA sound.

Community noise is commonly described in terms of the ambient noise level, which is defined as the all-encompassing noise level associated with a given environment. A common statistical tool is the average, or equivalent, sound level (L_{eq}), which corresponds to a steady-state A weighted sound level containing the same total energy as a time varying signal over a given time period (usually one hour). The L_{eq} is the foundation of the composite noise descriptor, L_{dn}, and shows very good correlation with community response to noise.

The day/night average level (DNL or L_{dn}) is based upon the average noise level over a 24-hour day, with a +10-decibel weighing applied to noise occurring during nighttime (10:00 p.m. to 7:00 a.m.) hours. The nighttime penalty is based upon the assumption that people react to nighttime noise exposures as though they were twice as loud as daytime exposures. Because L_{dn} represents a 24-hour average, it tends to disguise short-term variations in the noise environment.

Table 1 lists several examples of the noise levels associated with common situations. **Appendix A** provides a summary of acoustical terms used in this report.

TABLE 1: TYPICAL NOISE LEVELS

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	--110--	Rock Band
Jet Fly-over at 300 m (1,000 ft.)	--100--	
Gas Lawn Mower at 1 m (3 ft.)	--90--	
Diesel Truck at 15 m (50 ft.), at 80 km/hr. (50 mph)	--80--	Food Blender at 1 m (3 ft.) Garbage Disposal at 1 m (3 ft.)
Noisy Urban Area, Daytime Gas Lawn Mower, 30 m (100 ft.)	--70--	Vacuum Cleaner at 3 m (10 ft.)
Commercial Area Heavy Traffic at 90 m (300 ft.)	--60--	Normal Speech at 1 m (3 ft.)
Quiet Urban Daytime	--50--	Large Business Office Dishwasher in Next Room
Quiet Urban Nighttime	--40--	Theater, Large Conference Room (Background)
Quiet Suburban Nighttime	--30--	Library
Quiet Rural Nighttime	--20--	Bedroom at Night, Concert Hall (Background)
	--10--	Broadcast/Recording Studio
Lowest Threshold of Human Hearing	--0--	Lowest Threshold of Human Hearing

Source: Caltrans, Technical Noise Supplement, Traffic Noise Analysis Protocol. September, 2013.

Effects of Noise on People

The effects of noise on people can be placed in three categories:

- Subjective effects of annoyance, nuisance, and dissatisfaction
- Interference with activities such as speech, sleep, and learning
- Physiological effects such as hearing loss or sudden startling

Environmental noise typically produces effects in the first two categories. Workers in industrial plants can experience noise in the last category. There is no completely satisfactory way to measure the subjective effects of noise or the corresponding reactions of annoyance and dissatisfaction. A wide variation in individual thresholds of annoyance exists and different tolerances to noise tend to develop based on an individual's past experiences with noise.

Thus, an important way of predicting a human reaction to a new noise environment is the way it compares to the existing environment to which one has adapted: the so-called ambient noise level. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by those hearing it.

With regard to increases in A-weighted noise level, the following relationships occur:

- Except in carefully controlled laboratory experiments, a change of 1-dBA cannot be perceived;
- Outside of the laboratory, a 3-dBA change is considered a just-perceivable difference;
- A change in level of at least 5-dBA is required before any noticeable change in human response would be expected; and
- A 10-dBA change is subjectively heard as approximately a doubling in loudness, and can cause an adverse response.

Stationary point sources of noise – including stationary mobile sources such as idling vehicles – attenuate (lessen) at a rate of approximately 6-dB per doubling of distance from the source, depending on environmental conditions (i.e. atmospheric conditions and either vegetative or manufactured noise barriers, etc.). Widely distributed noises, such as a large industrial facility spread over many acres, or a street with moving vehicles, would typically attenuate at a lower rate.

EXISTING AND FUTURE NOISE AND VIBRATION ENVIRONMENTS

EXISTING NOISE RECEPTORS

Some land uses are considered more sensitive to noise than others. Land uses often associated with sensitive receptors generally include residences, schools, libraries, hospitals, and passive recreational areas. Sensitive noise receptors may also include threatened or endangered noise sensitive biological species, although many jurisdictions have not adopted noise standards for wildlife areas. Noise sensitive land uses are typically given special attention in order to achieve protection from excessive noise.

Sensitivity is a function of noise exposure (in terms of both exposure duration and insulation from noise) and the types of activities involved. In the vicinity of the project site, sensitive land uses include existing single-family residential uses located west and south of the project site, outside of the Rancheria boundaries.

EXISTING GENERAL AMBIENT NOISE LEVELS

EXISTING AMBIENT NOISE LEVELS

The existing noise environment in the project area is defined primarily by vehicle traffic, on the local roadway network, existing Red Hawk Casino operations, and construction activity on the existing Rancheria property

To quantify the existing ambient noise environment on the project site, Saxelby Acoustics conducted a continuous noise measurement survey. The noise measurement locations are shown on **Figure 2**. A summary of the noise level measurement survey is provided in **Table 2**. **Appendix B** contains the complete results of the noise monitoring.

The sound level meter was programmed to record the maximum, median, and average noise levels at each site during the survey. The maximum value, denoted L_{max}, represents the highest noise level measured. The average value, denoted L_{eq}, represents the energy average of all of the noise received by

the sound level meter microphone during the monitoring period. The median value, denoted L_{50}, represents the sound level exceeded 50 percent of the time during the monitoring period.

Larson Davis Laboratories (LDL) Model 812 and 820 precision integrating sound level meter was used for the ambient noise level measurement survey. The meter was calibrated before and after use with a CAL200 acoustical calibrator to ensure the accuracy of the measurements. The equipment used meets all pertinent specifications of the American National Standards Institute for Type 1 sound level meters (ANSI S1.4).

TABLE 2: SUMMARY OF EXISTING BACKGROUND NOISE MEASUREMENT DATA

Site	Date	Average Measured Hourly Noise Levels, dBA						
		L_{dn}	Daytime (7:00 am - 10:00 pm)			Nighttime (10:00 pm – 7:00 am)		
			L_{eq}	L_{50}	L_{max}	L_{eq}	L_{50}	L_{max}
Continuous 24-hour Noise Measurement Site								
LT-1	2/23/24	70	72	55	84	53	39	57
	2/24/24	50	49	39	64	42	39	55
	2/25/24	48	46	43	64	40	38	53
LT-2	2/23/24	55	51	47	70	49	45	64
	2/24/24	56	52	48	71	49	46	67
	2/25/24	55	52	48	71	48	45	66
LT-3	2/23/24	61	57	51	77	54	49	73
	2/24/24	63	58	53	79	56	50	77
	2/25/24	62	59	53	78	55	50	75
LT-4	2/23/24	71	68	68	78	63	59	73
	2/24/24	69	67	67	78	62	58	75
	2/25/24	68	67	67	77	60	56	71

Source: Saxelby Acoustics 2024

FUTURE TRAFFIC NOISE ENVIRONMENT AT OFF-SITE RECEPTORS

OFF-SITE TRAFFIC NOISE IMPACT ASSESSMENT METHODOLOGY

The primary source of traffic noise in the project vicinity is US-50. Green Valley Road also contributes to the ambient noise environment. Traffic noise levels were modeled in the SoundPLAN modeling software to account for multiple sources of ambient noise.

Existing and Cumulative noise levels due to traffic are calculated using the Federal Highway Administration Highway Traffic Noise Prediction Model (FHWA RD-77-108). The model is based upon the Calveno reference noise 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.

The FHWA model was developed to predict hourly L_{eq} values for free-flowing traffic conditions. To predict traffic noise levels in terms of L_{dn}, it is necessary to adjust the input volume to account for the day/night distribution of traffic.

Project trip generation volumes were provided by the project traffic engineer (Kimley Horn 2024), truck usage and vehicle speeds on the local area roadways were estimated from field observations. The predicted increases in traffic noise levels on the local roadway network for Existing and Cumulative conditions which would result from the project are provided in terms of L_{dn}.

Traffic noise levels are predicted at the sensitive receptors located at the closest typical setback distance along each project-area roadway segment. In some locations sensitive receptors may not receive full shielding from noise barriers or may be located at distances which vary from the assumed calculation distance.

Tables 3 and 4 summarize the modeled traffic noise levels at the nearest sensitive receptors along each roadway segment in the Project area. **Appendix C** provides the complete inputs and results of the FHWA traffic modeling.

TABLE 3: PREDICTED TRAFFIC NOISE LEVEL AND PROJECT-RELATED TRAFFIC NOISE LEVEL INCREASES

Roadway	Segment	Existing no Project	Existing + Project	Change
Green Valley Rd	West of Shingle Springs Dr	55.5	56.1	0.6
Shingle Springs Dr*	South Green Valley Rd	46.0	46.3	0.3
Lotus Rd	North of Green Valley Rd	56.2	56.3	0.1
Green Valley Rd	South of Lotus Rd	57.3	57.5	0.2
Greenstone Rd	South of Green Valley Rd	59.1	59.2	0.1
Green Valley Rd	East of Greenstone Rd	59.4	59.9	0.5
Missouri Flat Rd	East of Green Valley Rd	60.6	60.8	0.2
Missouri Flat Rd	East of El Dorado Rd	53.1	53.2	0.1
El Dorado Rd	South of Missouri Flat Rd	57.2	57.2	0.0
Shingle Rd	South of Green Valley Rd	62.8	62.9	0.1
Ponderosa Rd	South of Green Valley Rd	56.2	56.4	0.2
Deer Valley Rd	North of Green Valley Rd	59.1	59.2	0.1
Cameron Park Dr	South Green Valley Rd	56.6	56.9	0.3

Notes:
**Traffic noise levels were modeled in the SoundPLAN modeling software to account for traffic noise contributions from Green Valley Road.*

TABLE 4: CUMULATIVE TRAFFIC NOISE LEVEL AND PROJECT-RELATED TRAFFIC NOISE LEVEL INCREASES

Roadway	Segment	Cumulative no Project	Cumulative + Project	Change
Green Valley Rd	West of Shingle Springs Dr	55.8	56.4	0.6
Shingle Springs Dr*	South Green Valley Rd	46.1	46.4	0.3
Lotus Rd	North of Green Valley Rd	56.5	56.5	0.0
Green Valley Rd	South of Lotus Rd	57.4	57.6	0.2
Greenstone Rd	South of Green Valley Rd	58.4	60.0	1.6
Green Valley Rd	East of Greenstone Rd	59.7	60.3	0.6
Missouri Flat Rd	East of Green Valley Rd	60.9	61.1	0.2
Missouri Flat Rd	East of El Dorado Rd	54.1	54.1	0.0
El Dorado Rd	South of Missouri Flat Rd	57.7	57.7	0.0
Shingle Rd	South of Green Valley Rd	63.1	62.5	-0.6
Ponderosa Rd	South of Green Valley Rd	56.8	56.9	0.1
Deer Valley Rd	North of Green Valley Rd	61.4	61.4	0.0
Cameron Park Dr	South Green Valley Rd	57.6	57.9	0.3

NOTES :
**Traffic noise levels were modeled in the SoundPLAN modeling software to account for traffic noise contributions from Green Valley Road.*

Based upon the **Tables 3 and 4** data, the proposed project is predicted to result in an increase in a maximum traffic noise level increase of 1.6 dBA.

EVALUATION OF ARENA NOISE AT RESIDENTIAL RECEPTORS

This analysis considers the Arena and Commercial Land Use as the primary noise sources for the proposed project. Noise sources associated with each location will be described in further detail in the analysis.

Arena

The following is a list of assumptions used for noise modeling. The data used is based upon a combination of manufacturer's provided data and Saxelby Acoustics data from similar operations.

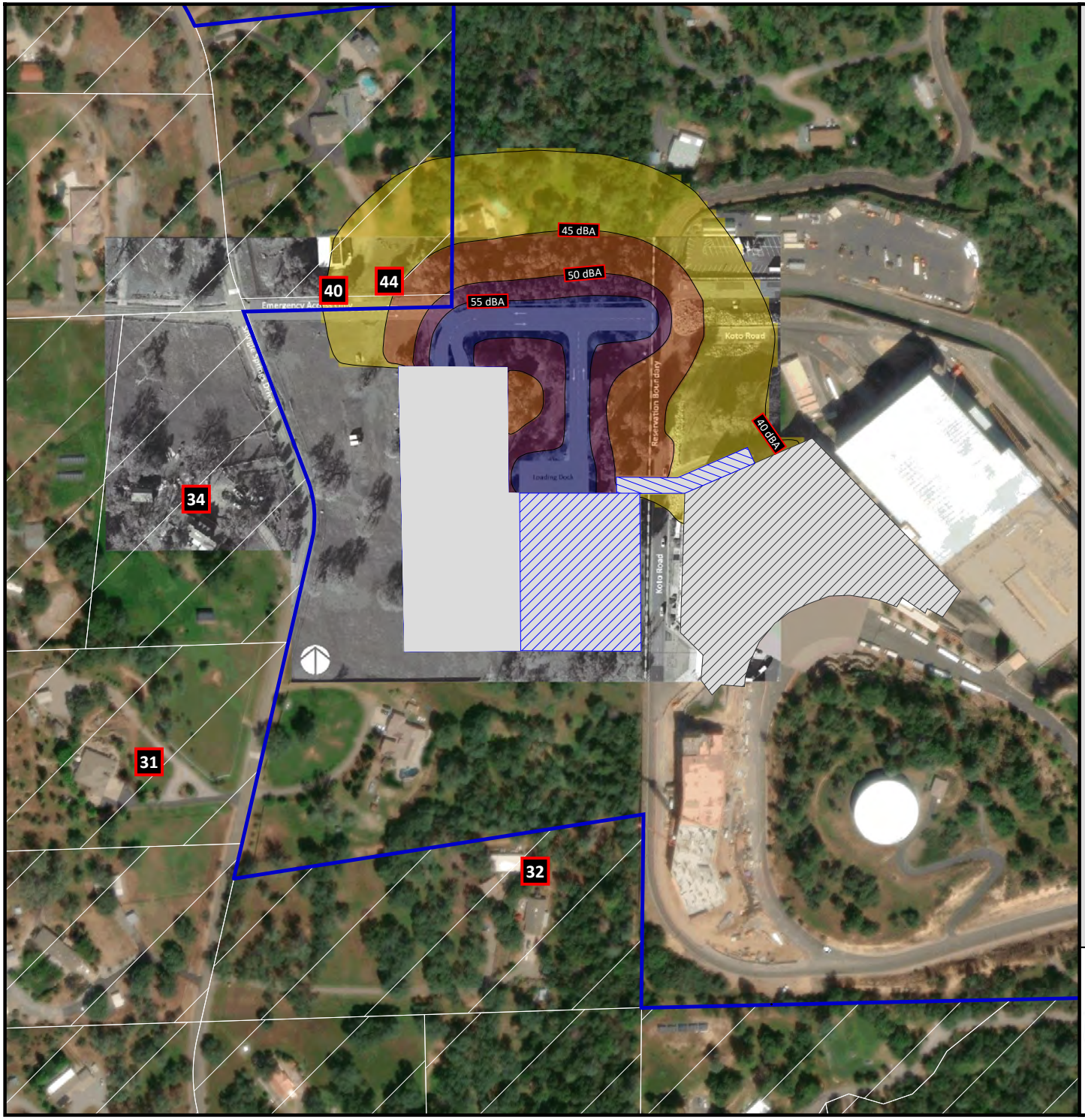
Rooftop HVAC Units:	It is assumed worst-case that all future HVAC units will be mounted atop the proposed entertainment center building. A parapet will be included in the building construction to shield these new units from view.
Loading Dock:	Saxelby Acoustics modeled the noise level increase due to the vertical expansion of the parking garage. The analysis assumes a net increase of 165 peak hour trips due to the proposed project.
On-Site Circulation:	The commercial component of the project is projected to generate 2,600 daily trips with 1,073 trips in the morning peak hour (Kimley Horn). Saxelby Acoustics assumed that 2% of these trips could be trucks. Parking lot movements are predicted to generate a sound exposure level (SEL) of 71 dBA SEL at 50 feet for cars and 85 dBA SEL at 50 feet for trucks. Saxelby Acoustics data.

Commercial Land Use

The following is a list of assumptions used for noise modeling. The data used is based upon a combination of manufacturer's provided data and Saxelby Acoustics data from similar operations.

Rooftop HVAC Units:	It is assumed worst-case that all future HVAC units will be mounted atop the proposed entertainment center building. A parapet will be included in the building construction to shield these new units from view.
On-Site Circulation:	The commercial component of the project is projected to generate 1,634 daily trips with 198 trips in the morning peak hour (Kimley Horn). Saxelby Acoustics assumed that 2% of these trips could be trucks. Parking lot movements are predicted to generate a sound exposure level (SEL) of 71 dBA SEL at 50 feet for cars and 85 dBA SEL at 50 feet for trucks. Nighttime traffic outside of the AM or PM peak hour is estimated to be approximately 1/4 of daytime trips during nighttime hours (10:00 p.m. to 7:00 a.m.). Saxelby Acoustics data.

Saxelby Acoustics used the SoundPLAN noise prediction model. Inputs to the model included sound power levels for the proposed arena, existing and proposed mechanical equipment, existing and proposed buildings, terrain type, and locations of sensitive receptors. These predictions are made in accordance with International Organization for Standardization (ISO) standard 9613-2:1996 (Acoustics – Attenuation of sound during propagation outdoors). ISO 9613 is the most commonly used method for calculating exterior noise propagation. **Figure 3** shows the arena noise contours on the project site. **Figure 4** shows predicted commercial noise contours for the proposed project.



Red Hawk Arena and Housing Project

El Dorado County, California

Figure 4

Stationary Arena Noise Contours Leq, dB(A)

Noise Level, dB(A)

40 <	<=	45
45 <	<=	50
50 <	<=	55
55 <		

Legend

- Project Building
- Neighboring Parcel
- Project Site

Scale 1:270

0 50 100 200 300 400 feet

N

SAXELBY ACOUSTICS
Acoustics · Noise · Vibration

Red Hawk Arena and Housing Project

El Dorado County, California

Figure 4

Stationary Commercial Center
Noise Contours
Leq, dB(A)

Noise Level, dB(A)

45 <	<=	50
50 <	<=	55
55 <	<=	60
60 <		

Legend

- Project Building
- Neighboring Parcel
- Project Site

Scale 1:250

0 50 100 200 300 400 feet

N

SAXELBY ACOUSTICS
Acoustics · Noise · Vibration

CONSTRUCTION NOISE ENVIRONMENT

During the construction of the proposed project noise from construction activities would temporarily add to the noise environment in the project vicinity. As shown in **Table 5**, activities involved in construction would generate maximum noise levels ranging from 76 to 90 dB at a distance of 50 feet.

TABLE 5: CONSTRUCTION EQUIPMENT NOISE

Type of Equipment	Maximum Level, dBA at 50 feet
Auger Drill Rig	84
Backhoe	78
Compactor	83
Compressor (air)	78
Concrete Saw	90
Dozer	82
Dump Truck	76
Excavator	81
Generator	81
Jackhammer	89
Pneumatic Tools	85

Source: *Roadway Construction Noise Model User's Guide*. Federal Highway Administration. FHWA-HEP-05-054. January 2006.

CONSTRUCTION VIBRATION ENVIRONMENT

Table 6 shows the typical vibration levels produced by construction equipment.

TABLE 6: VIBRATION LEVELS FOR VARIOUS CONSTRUCTION EQUIPMENT

Type of Equipment	Peak Particle Velocity at 25 feet (inches/second)	Peak Particle Velocity at 50 feet (inches/second)	Peak Particle Velocity at 100 feet (inches/second)
Large Bulldozer	0.089	0.031	0.011
Loaded Trucks	0.076	0.027	0.010
Small Bulldozer	0.003	0.001	0.000
Auger/drill Rigs	0.089	0.031	0.011
Jackhammer	0.035	0.012	0.004
Vibratory Hammer	0.070	0.025	0.009
Vibratory Compactor/roller	0.210 (Less than 0.20 at 26 feet)	0.074	0.026

Source: *Transit Noise and Vibration Impact Assessment Guidelines.* Federal Transit Administration. May 2006.

REGULATORY CONTEXT

Relevant regulations for the off-Reservation environment are discussed below. The Reservation is not subject to the State and local regulations.

FEDERAL

There are no federal regulations related to noise that apply to the Proposed Project. Federal regulations establish noise limits for medium and heavy trucks (more than 4.5 tons, gross vehicle weight rating) under 40 CFR Part 205, Subpart B. The federal truck pass-by noise standard is 80 dB at 15 meters from the vehicle pathway centerline. These controls are implemented through regulatory controls on truck manufacturers.

STATE

There are no state regulations related to noise that apply to the Proposed Project. The California Code of Regulations has guidelines for evaluating the compatibility of various off-Reservation land uses as a function of community noise exposure. The State also establishes noise limits for vehicles licensed to operate on public roads. For heavy trucks, the State pass-by standard is consistent with the federal limit of 80 dB. The State pass-by standard for light trucks and passenger cars (less than 4.5 tons, gross vehicle rating) is also 80 dB at 15 meters from the centerline. These standards are implemented through controls on vehicle manufacturers and by legal sanction of vehicle operators by State and local law enforcement officials

LOCAL

The El Dorado County General Plan establishes maximum allowable noise exposure for sensitive land uses affected by transportation noise sources. **Table 7** below shows the El Dorado County Land Use Compatibility Chart.

The El Dorado County General Plan also establishes noise level performance standards for noise sensitive land uses affected by non-transportation noise sources. **Table 8** shows the County standards. The Rural Region noise standards apply to the land adjacent to the Project.

The standards outlined in **Table 9** shall not apply to those activities associated with actual construction of a project as long as such construction occurs between the hours of 7 a.m. and 7 p.m., Monday through Friday, and 8 a.m. and 5 p.m. on weekends, and on federally recognized holidays. Further, the standards outlined in **Table 9** shall not apply to public projects to alleviate traffic congestion and safety hazards.

TABLE 7: MAXIMUM ALLOWABLE NOISE EXPOSURE FOR TRANSPORTATION NOISE SOURCES

Land Use	Outdoor Activity Areas[1] L_{dn}/CNEL, dB	Interior Spaces	
		L_{dn}/CNEL, dB	L_{eq}, dB[2]
Residential	60[3]	45	--
Transient Lodging	60[3]	45	--
Hospitals, Nursing Homes	60[3]	45	--
Theaters, Auditoriums, Music Halls	--	--	35
Churches, Meeting Halls, Schools	60[3]	--	40
Office Buildings	--	--	45
Libraries, Museums	--	--	45
Playgrounds, Neighborhood Parks	70	--	--

[1] *In Communities and Rural Centers, where the location of outdoor activity areas is not clearly defined, the exterior noise level standard shall be applied to the property line of the receiving land use. For residential uses with front yards facing the identified noise source, an exterior noise level criterion of 65 dB L_{dn} shall be applied at the building facade, in addition to a 60 dB L_{dn} criterion at the outdoor activity area. In Rural Regions, an exterior noise level criterion of 60 dB L_{dn} shall be applied at a 100 foot radius from the residence unless it is within Platted Lands where the underlying land use designation is consistent with Community Region densities in which case the 65 dB L_{dn} may apply. The 100-foot radius applies to properties which are five acres and larger; the balance will fall under the property line requirement.*

[2] *As determined for a typical worst-case hour during periods of use.*

[3] *Where it is not possible to reduce noise in outdoor activity areas to 60 dB L_{dn}/CNEL or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 65 dB L_{dn}/CNEL may be allowed provided that available exterior noise level reduction measures have been implemented and interior noise levels are in compliance with this table.*

TABLE 8: NOISE LEVEL PERFORMANCE STANDARDS FOR NOISE SENSITIVE LAND USES AFFECTED BY NON-TRANSPORTATION SOURCES

Noise Level Descriptor	Daytime 7 a.m. – 7 p.m.		Evening 7 p.m. – 10 p.m.		Night 10 p.m. – 7 a.m.	
	Community / Rural Centers	Rural Regions	Community / Rural Centers	Rural Regions	Community / Rural Centers	Rural Regions
Hourly L_{eq}, dBA	55	50	50	45	45	40
Maximum Level (L_{max}), dBA	70	60	60	55	55	50

1. *Each of the noise levels specified above shall be lowered by 5 dBA for simple tone noises, noises consisting primarily of unamplified speech or music, or for recurring impulsive noises. These noise level standards do not apply to residential units established in conjunction with industrial or commercial uses, such as caretaker dwellings.*
2. *The Director can impose noise level standards which are up to 5 dBA less than those specified above, based upon a determination of existing low ambient noise levels in the vicinity of the project site.*
3. *The exterior noise level standard shall be applied as follows:*
   a. *In Community Regions, at the property line of the receiving property;*
   b. *In Rural Centers and Regions, at a point 100 feet away from a sensitive receptor or, if the sensitive receptor is within the Platted Lands Overlay (-PL) where the underlying land use designation is consistent with Community Region densities, at the property line of the receiving property or 100 feet away from the sensitive receptor, whichever is less; or*
   c. *In all areas, at the boundary of a recorded noise easement between affected properties*

TABLE 9: MAXIMUM ALLOWABLE NOISE EXPOSURE FOR NON-TRANSPORTATION NOISE SOURCES IN RURAL REGIONS–CONSTRUCTION NOISE

Land Use Designation	Time Period	Noise Level (dB)	
		L_{eq}	L_{max}
All Residential (LDR)	7 am-7 pm	50	60
	7 pm-10 pm	45	55
	10 pm-7 am	40	50
Commercial, Recreation, and Public Facilities (C, TR, PF)	7 am-7 pm	65	75
	7 pm -7 am	60	70
Rural Land, Natural Resources, Open Space, and Agricultural Lands (RR, NR, OS, AL)	7 am-7 pm	65	75
	7 pm -7 am	60	70

IMPACTS AND MITIGATION MEASURES

METHODOLOGY

While projects located on Reservation lands are exempt from local noise-related standards and policies, a discussion of local noise standards and policies is appropriate for potential off-Reservation noise impacts. Specifically, the El Dorado County Code establishes noise standards for noise-sensitive land uses affected by transportation noise sources. Adjacent noise-sensitive single-family receptors are located within the unincorporated area. Noise level thresholds and standards applied to studied receptors would be in accordance with the jurisdiction within which they are located and specified for reference within the impact analysis.

THRESHOLDS OF SIGNIFICANCE

The El Dorado County General Plan outlines criteria for determination of significant impacts due to project and construction noise.

Noise Level Increase Criteria for Construction-Related Noise Level Increases

Policy 6.5.1.11 The standards outlined in **Table 9** shall not apply to those activities associated with actual construction of a project as long as such construction occurs between the hours of 7 a.m. and 7 p.m., Monday through Friday, and 8 a.m. and 5 p.m. on weekends, and on federally recognized holidays. Further, the standards outlined in **Table 9** shall not apply to public projects to alleviate traffic congestion and safety hazards.

Noise Level Increase Criteria for Long-Term Project-Related Noise Level Increases

Policy 6.5.1.12 When determining the significance of impacts and appropriate mitigation for new development projects, the following criteria shall be taken into consideration.

A. Where existing or projected future traffic noise levels are less than 60 dBA L_{dn} at the outdoor activity areas of residential uses, an increase of more than 5 dBA L_{dn} caused by a new transportation noise source will be considered significant;

B. Where existing or projected future traffic noise levels range between 60 and 65 dBA L_{dn} at the outdoor activity areas of residential uses, an increase of more than 3 dBA L_{dn} caused by a new transportation noise source will be considered significant; and

C. Where existing or projected future traffic noise levels are greater than 65 dBA L_{dn} at the outdoor activity areas of residential uses, an increase of more than 1.5 dBA L_{dn} caused by a new transportation noise will be considered significant.

Criteria for Acceptable Vibration

Vibration is like noise in that it involves a source, a transmission path, and a receiver. While vibration is related to noise, it differs in that in that noise is generally considered to be pressure waves transmitted through air, whereas vibration usually consists of the excitation of a structure or surface. As with noise, vibration consists of amplitude and frequency. A person's perception to the vibration will depend on their individual sensitivity to vibration, as well as the amplitude and frequency of the source and the response of the system which is vibrating.

Vibration can be measured in terms of acceleration, velocity, or displacement. A common practice is to monitor vibration measures in terms of peak particle velocities in inches per second. Standards pertaining to perception as well as damage to structures have been developed for vibration levels defined in terms of peak particle velocities.

Human and structural response to different vibration levels is influenced by a number of factors, including ground type, distance between source and receptor, duration, and the number of perceived vibration events. **Table 10**, which was developed by Caltrans, shows the vibration levels which would normally be required to result in damage to structures. The vibration levels are presented in terms of peak particle velocity in inches per second.

Table 10 indicates that the threshold for architectural damage to structures is 0.20 in/sec p.p.v. A threshold of 0.20 in/sec p.p.v. is considered to be a reasonable threshold for short-term construction projects.

TABLE 10: EFFECTS OF VIBRATION ON PEOPLE AND BUILDINGS

Peak Particle Velocity		Human Reaction	Effect on Buildings
mm/second	in/second		
0.15-0.30	0.006-0.019	Threshold of perception; possibility of intrusion	Vibrations unlikely to cause damage of any type
2.0	0.08	Vibrations readily perceptible	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected
2.5	0.10	Level at which continuous vibrations begin to annoy people	Virtually no risk of "architectural" damage to normal buildings
5.0	0.20	Vibrations annoying to people in buildings (this agrees with the levels established for people standing on bridges and subjected to relative short periods of vibrations)	Threshold at which there is a risk of "architectural" damage to normal dwelling - houses with plastered walls and ceilings. Special types of finish such as lining of walls, flexible ceiling treatment, etc., would minimize "architectural" damage
10-15	0.4-0.6	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges	Vibrations at a greater level than normally expected from traffic, but would cause "architectural" dam age and possibly minor structural damage

Source: *Transportation Related Earthborne Vibrations.* Caltrans. TAV-02-01-R9601. February 20, 2002.

PROJECT-SPECIFIC IMPACTS AND MITIGATION MEASURES

IMPACT 1: WOULD THE PROJECT GENERATE A SUBSTANTIAL TEMPORARY OR PERMANENT INCREASE IN AMBIENT NOISE LEVELS IN THE VICINITY OF THE PROJECT IN EXCESS OF STANDARDS ESTABLISHED IN THE LOCAL GENERAL PLAN OR NOISE ORDINANCE, OR APPLICABLE STANDARDS OF OTHER AGENCIES?

Traffic Noise Increases

The El Dorado County guidelines specify criteria to determine the significance of traffic noise impacts. The maximum increase in traffic noise at the nearest sensitive receptor adjacent to Greenstone Road is predicted to be 1.6 dBA as shown in **Tables 3 and 4**. The ambient noise level at this location is 58.4 dBA L_{dn}, since the existing noise levels due to traffic are below 60 dBA, an increase of 5.0 dBA or greater would be required to have a significant impact.

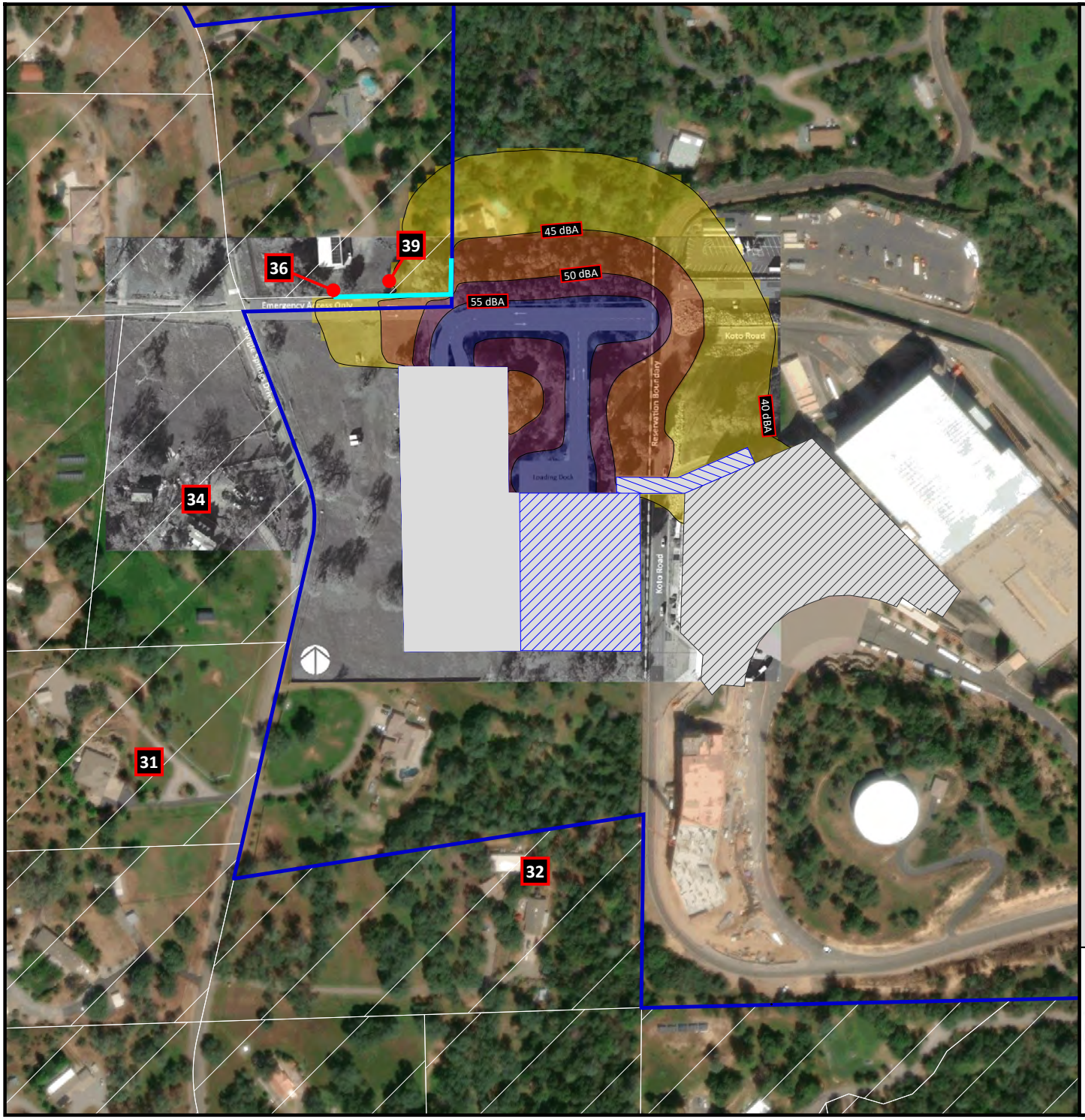
Operational Noise at Sensitive Receptors

As shown on **Figure 3**, the arena of the proposed project is predicted to expose nearby residences to noise levels up to 44 dBA, L_{eq} during both daytime (7:00 a.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) hours. The predicted project noise levels would exceed the El Dorado County General Plan noise standard for nighttime non-transportation noise of 40 dBA, $L_{eq.}$ Therefore, impacts resulting from operational noise would be considered significant and mitigation would be required.

As shown on **Figure 4**, the commercial center of the proposed project is predicted to be 32 dBA L_{eq} during both daytime (7:00 a.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) hours. The predicted project noise levels would comply with the El Dorado County General Plan noise standard for non-nighttime transportation noise sources of 40 dBA, $L_{eq.}$ Therefore, no mitigation would be required for the commercial center.

It should be noted that maximum noise levels generated by project HVAC units and on-site vehicle circulation are predicted to be no more than 10 dBA, or greater, than average (L_{eq}) values. The El Dorado County maximum (L_{max}) nighttime noise level standard is 50 dBA L_{max}, which is 10 dBA higher than the L_{eq} standard. Therefore, where average noise levels are in compliance with the L_{eq} standards, maximum noise levels will also meet the County's standards. Based upon the predicted average noise levels of 44 dBA L_{eq}, for the Arena, the maximum noise levels would be 54 dBA $L_{max.}$ This exceeds the County nighttime maximum noise standard of 50 dBA L_{max}.

Saxelby Acoustics recommends the construction of an 8-foot-tall sound wall to reduce the average maximum noise levels emanating from the project site. The wall location and resulting noise contours are shown on **Figure 5.** Implementation of this mitigation measure would reduce operational noise impacts to ***less-than-significant.***



Red Hawk Arena and Housing Project

El Dorado County, California

Figure 5

Stationary !NŜyl· Noise Contours with Sound Wall
Leq, dB(A)

Noise Level, dB(A)

40 <	<=	45
45 <	<=	50
50 <	<=	55
55 <		

Legend

- Project Building
- Neighboring Parcel
- Project Site
- 8-ft. Sound Wall

Scale 1:270

0 50 100 200 300 400 feet

N

SAXELBY ACOUSTICS
Acoustics · Noise · Vibration

CONSTRUCTION NOISE

During the construction phases of the project, noise from construction activities would add to the noise environment in the immediate project vicinity. As indicated in **Table 5**, activities involved in construction would generate maximum noise levels ranging from 76 to 90 dBA L_{max} at a distance of 50 feet. Construction activities would also be temporary in nature and are anticipated to occur during normal daytime working hours.

The nearest residential uses are located approximately 600 feet to the west, as measured from the center of the construction of the entertainment center. At this distance, maximum construction noise levels would be in the range of 35-49 dBA L_{eq} and 55-69 dBA L_{max} at the nearest residential uses. This could exceed the County's 60 dBA L_{max} construction noise level limits, as outlined in **Table 8** of the County's General Plan, shown in **Table 8**. However, as stated in the County General Plan Policy 6.5.1.11 and Chapter 130.37 of the County Code, the standards outlined in **Table 8** do not apply to noise levels generated by construction activity that occurs between the hours of 7 a.m. and 7 p.m., Monday through Friday, and 8 a.m. and 5 p.m. on weekends, and on federally recognized holidays.

While daytime construction noise is exempt under the County policies, mitigation measures have been identified to minimize noise levels due to construction activities.

<u>Mitigation Measure(s)</u>

*MM (1) Use of an 8-foot-tall sound wall, as shown on **Figure 5**, is predicted to result in compliance with the El Dorado County exterior noise standards at the nearest sensitive receptor. This wall should be constructed unless future project design changes can result in compliance with the County exterior noise standards at adjacent non-Tribal properties. Future design changes could include additional buffer distance, traffic control measures, or other measures to be determined and verified by a qualified acoustical engineer.*

MM (2) The project contractor shall ensure that the following construction noise BMPs are met on-site during all phases of construction:

- *All equipment driven by internal combustion engines shall be equipped with mufflers, air-inlet silencers where appropriate, and any other shrouds, shields, or other noise-reducing features in good operating condition that meet or exceed original factory specifications. Mobile or fixed "package" equipment (e.g., arc welders, air compressors) shall be equipped with shrouds and noise- control features that are readily available for that type of equipment.*
- *All mobile or fixed noise-producing equipment used on the project site that are regulated for noise output by a federal, state, or local agency shall comply with such regulations while in the course of project activity.*
- *The construction contractor shall utilize "quiet" models of air compressors and other stationary noise sources where technology exists.*
- *At all times during project grading and construction, stationary noise-generating equipment shall be located as far as practicable from sensitive receptors and placed so that emitted noise is directed away from residences.*
- *Unnecessary idling of internal combustion engines shall be prohibited.*

- *Construction staging areas shall be established at locations that would create the greatest distance between the construction-related noise sources and noise-sensitive receptors nearest the project site during all project construction activities, to the extent feasible.*
- *Construction site and access road speed limits shall be established and enforced during the construction period.*
- *The use of noise-producing signals, including horns, whistles, alarms, and bells, shall be for safety warning purposes only.*
- *Project-related public address or music systems shall not be audible at any adjacent receptor.*
- *Neighbors located adjacent to the construction site shall be notified of the construction schedule in writing.*
- *The construction contractor shall designate a "noise disturbance coordinator" who would be responsible for responding to any local complaints about construction noise. The disturbance coordinator shall be responsible for determining the cause of the noise complaint (e.g., starting too early, poor muffler, etc.) and instituting reasonable measures as warranted to correct the problem. A telephone number for the disturbance coordinator shall be conspicuously posted at the construction site.*

IMPACT 2: WOULD THE PROJECT GENERATE EXCESSIVE GROUNDBORNE VIBRATION OR GROUNDBORNE NOISE LEVELS?

Construction vibration impacts include human annoyance and building structural damage. Human annoyance occurs when construction vibration rises significantly above the threshold of perception. Building damage can take the form of cosmetic or structural.

The **Table 6** data indicate that construction vibration levels anticipated for the project are less than the 0.2 in/sec threshold at distances of 26 feet. Sensitive receptors which could be impacted by construction related vibrations, especially vibratory compactors/rollers, are located further than 26 feet from typical construction activities. At distances greater than 26 feet construction vibrations are not predicted to exceed acceptable levels. Additionally, construction activities would be temporary in nature and would likely occur during normal daytime working hours.

This is a **less-than-significant** impact, and no mitigation is required.

IMPACT 3: FOR A PROJECT LOCATED WITHIN THE VICINITY OF A PRIVATE AIRSTRIP OR AN AIRPORT LAND USE PLAN OR, WHERE SUCH A PLAN HAS NOT BEEN ADOPTED, WITHIN TWO MILES OF A PUBLIC AIRPORT OR PUBLIC USE AIRPORT, WOULD THE PROJECT EXPOSE PEOPLE RESIDING OR WORKING IN THE PROJECT AREA TO EXCESSIVE NOISE LEVELS?

There are no airports in the project vicinity. Therefore, this impact is not applicable to the proposed project.

REFERENCES

American National Standards Institute. (1998). *[Standard] ANSI S1.43-1997 (R2007): Specifications for integrating-averaging sound level meters*. New York: Acoustical Society of America.

American Standard Testing Methods, *Standard Guide for Measurement of Outdoor A-Weighted Sound Levels, American Standard Testing Methods (ASTM) E1014-08*, 2008.

ASTM E1014-12. *Standard Guide for Measurement of Outdoor A-Weighted Sound Levels*. ASTM International. West Conshohocken, PA. 2012.

ASTM E1780-12. *Standard Guide for Measuring Outdoor Sound Received from a Nearby Fixed Source.* ASTM International. West Conshohocken, PA. 2012.

Barry, T M. (1978). *FHWA highway traffic noise prediction model* (FHWA-RD-77-108). Washington, DC: U.S. Department of transportation, Federal highway administration, Office of research, Office of environmental policy.

California Department of Transportation (Caltrans), *Technical Noise Supplement, Traffic Noise Analysis Protocol*, September 2013.

Egan, M. D. (1988). Architectural acoustics. United States of America: McGraw-Hill Book Company.

Federal Highway Administration. *FHWA Roadway Construction Noise Model User's Guide.* FHWA-HEP-05-054 DOT-VNTSC-FHWA-05-01. January 2006.

Hanson, Carl E. (Carl Elmer). (2006). *Transit noise and vibration impact assessment*. Washington, DC: U.S. Department of Transportation, Federal Transit Administration, Office of Planning and Environment.

International Electrotechnical Commission. Technical committee 29: Electroacoustics. International Organization of Legal Metrology. (2013). *Electroacoustics: Sound level meters*.

International Organization for Standardization. (1996). *Acoustic - ISO 9613-2: Attenuation of sound during propagation outdoors. Part 2: General methods of calculation*. Ginevra: I.S.O.

Miller, L. N., Bolt, Beranek, & and Newman, Inc. (1981). *Noise control for buildings and manufacturing plants*. Cambridge, MA: Bolt, Beranek and Newman, Inc.

SoundPLAN. SoundPLAN GmbH. Backnang, Germany. http://www.soundplan.eu/english/

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.
ASTC	Apparent Sound Transmission Class. Similar to STC but includes sound from flanking paths and correct for room reverberation. A larger number means more attenuation. The scale, like the decibel scale for sound, is logarithmic.
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 +5 dBA and nighttime hours weighted by +10 dBA.
DNL	See definition of Ldn.
IIC	Impact Insulation Class. An integer-number rating of how well a building floor attenuates impact sounds, such as footsteps. A larger number means more attenuation. The scale, like the decibel scale for sound, is logarithmic.
Frequency	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz (Hz).
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.
L(n)	The sound level exceeded a described percentile over a measurement period. For instance, an hourly L50 is the sound level exceeded 50% of the time during the one-hour period.
Loudness	A subjective term for the sensation of the magnitude of sound.
NIC	Noise Isolation Class. A rating of the noise reduction between two spaces. Similar to STC but includes sound from flanking paths and no correction for room reverberation.
NNIC	Normalized Noise Isolation Class. Similar to NIC but includes a correction for room reverberation.
Noise	Unwanted sound.
NRC	Noise Reduction Coefficient. NRC is a single-number rating of the sound-absorption of a material equal to the arithmetic mean of the sound-absorption coefficients in the 250, 500, 1000, and 2,000 Hz octave frequency bands rounded to the nearest multiple of 0.05. It is a representation of the amount of sound energy absorbed upon striking a particular surface. An NRC of 0 indicates perfect reflection; an NRC of 1 indicates perfect absorption.
RT60	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	Sound Exposure Level. SEL is a rating, in decibels, of a discrete event, such as an aircraft flyover or train pass by, that compresses the total sound energy into a one-second event.
SPC	Speech Privacy Class. SPC is a method of rating speech privacy in buildings. It is designed to measure the degree of speech privacy provided by a closed room, indicating the degree to which conversations occurring within are kept private from listeners outside the room.
STC	Sound Transmission Class. STC is an integer rating of how well a building partition attenuates airborne sound. It is widely used to rate interior partitions, ceilings/floors, doors, windows and exterior wall configurations. The STC rating is typically used to rate the sound transmission of a specific building element when tested in laboratory conditions where flanking paths around the assembly don't exist. A larger number means more attenuation. The scale, like the decibel scale for sound, is logarithmic.
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.
Impulsive	Sound of short duration, usually less than one second, with an abrupt onset and rapid decay.
Simple Tone	Any sound which can be judged as audible as a single pitch or set of single pitches.

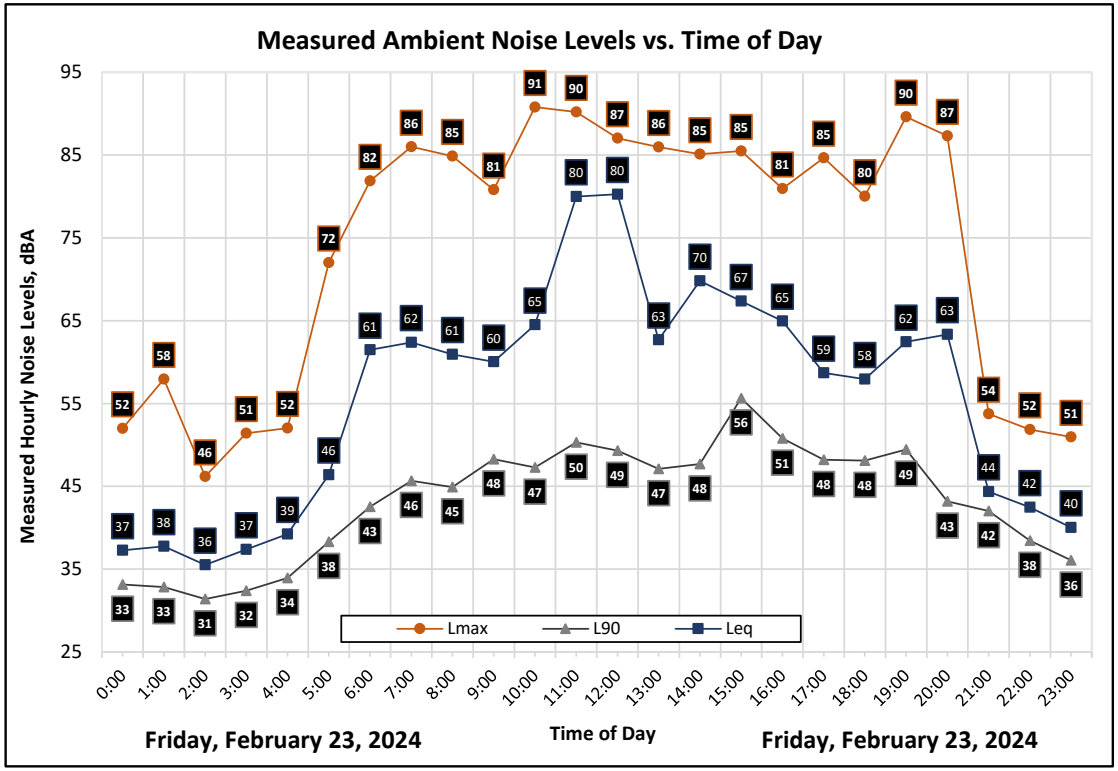
Appendix B: Continuous Ambient Noise Measurement Results

Appendix B1a: Continuous Noise Monitoring Results

Site: LT-1
Project: Red Hawk Arena and Housing Project
Location: Northern Project Boundary
Coordinates: 38.700383°, -120.902830°
Meter: LDL 820-7
Calibrator: CAL200

Date	Time	Measured Level, dBA			
		L_{eq}	L_{max}	L_{50}	L_{90}
Friday, February 23, 2024	0:00	37	52	36	33
Friday, February 23, 2024	1:00	38	58	35	33
Friday, February 23, 2024	2:00	36	46	34	31
Friday, February 23, 2024	3:00	37	51	36	32
Friday, February 23, 2024	4:00	39	52	38	34
Friday, February 23, 2024	5:00	46	72	41	38
Friday, February 23, 2024	6:00	61	82	47	43
Friday, February 23, 2024	7:00	62	86	49	46
Friday, February 23, 2024	8:00	61	85	48	45
Friday, February 23, 2024	9:00	60	81	50	48
Friday, February 23, 2024	10:00	65	91	51	47
Friday, February 23, 2024	11:00	80	90	69	50
Friday, February 23, 2024	12:00	80	87	79	49
Friday, February 23, 2024	13:00	63	86	50	47
Friday, February 23, 2024	14:00	70	85	63	48
Friday, February 23, 2024	15:00	67	85	62	56
Friday, February 23, 2024	16:00	65	81	61	51
Friday, February 23, 2024	17:00	59	85	50	48
Friday, February 23, 2024	18:00	58	80	50	48
Friday, February 23, 2024	19:00	62	90	51	49
Friday, February 23, 2024	20:00	63	87	48	43
Friday, February 23, 2024	21:00	44	54	44	42
Friday, February 23, 2024	22:00	42	52	41	38
Friday, February 23, 2024	23:00	40	51	39	36

Statistics	Leq	Lmax	L50	L90
Day Average	72	84	55	48
Night Average	53	57	39	35
Day Low	44	54	44	42
Day High	80	91	79	56
Night Low	36	46	34	31
Night High	61	82	47	43
Ldn	70	Day %		99
CNEL	70	Night %		1

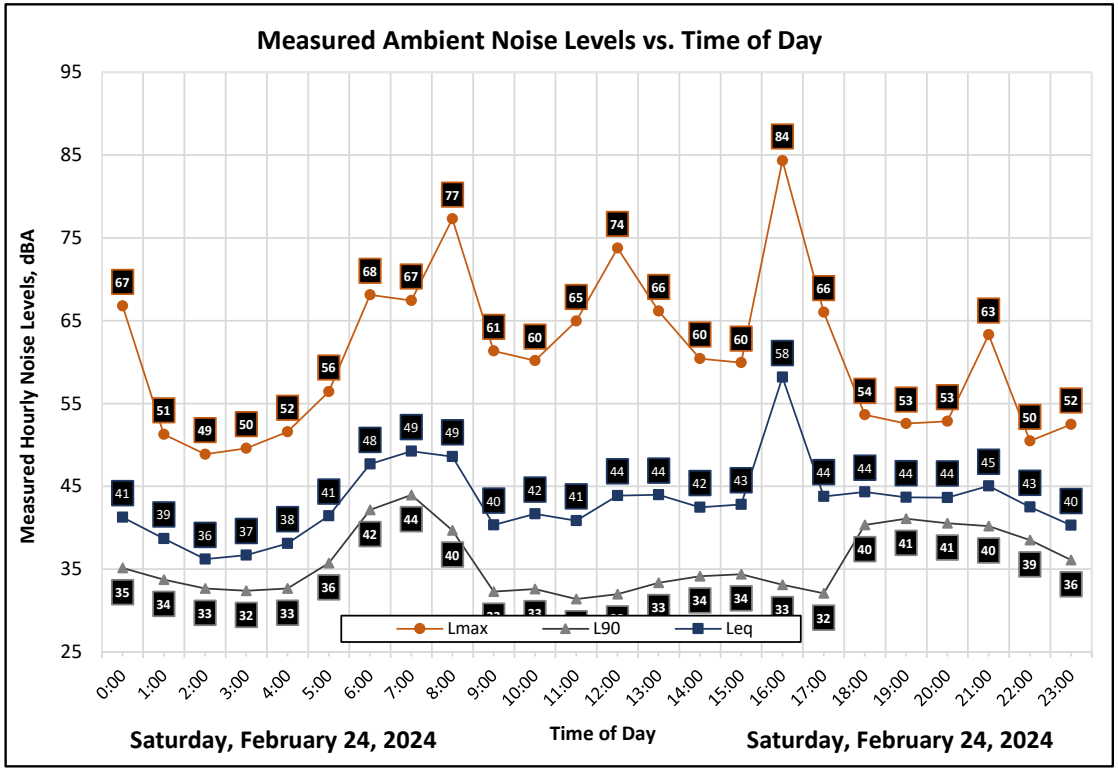


Appendix B1b: Continuous Noise Monitoring Results

Site: LT-1
Project: Red Hawk Arena and Housing Project
Location: Northern Project Boundary
Coordinates: 38.700383°, -120.902830°
Meter: LDL 820-7
Calibrator: CAL200

Date	Time	Measured Level, dBA			
		L_{eq}	L_{max}	L_{50}	L_{90}
Saturday, February 24, 2024	0:00	41	67	39	35
Saturday, February 24, 2024	1:00	39	51	37	34
Saturday, February 24, 2024	2:00	36	49	35	33
Saturday, February 24, 2024	3:00	37	50	35	32
Saturday, February 24, 2024	4:00	38	52	36	33
Saturday, February 24, 2024	5:00	41	56	40	36
Saturday, February 24, 2024	6:00	48	68	46	42
Saturday, February 24, 2024	7:00	49	67	46	44
Saturday, February 24, 2024	8:00	49	77	44	40
Saturday, February 24, 2024	9:00	40	61	36	32
Saturday, February 24, 2024	10:00	42	60	36	33
Saturday, February 24, 2024	11:00	41	65	36	31
Saturday, February 24, 2024	12:00	44	74	35	32
Saturday, February 24, 2024	13:00	44	66	37	33
Saturday, February 24, 2024	14:00	42	60	38	34
Saturday, February 24, 2024	15:00	43	60	38	34
Saturday, February 24, 2024	16:00	58	84	37	33
Saturday, February 24, 2024	17:00	44	66	37	32
Saturday, February 24, 2024	18:00	44	54	43	40
Saturday, February 24, 2024	19:00	44	53	43	41
Saturday, February 24, 2024	20:00	44	53	43	41
Saturday, February 24, 2024	21:00	45	63	42	40
Saturday, February 24, 2024	22:00	43	50	42	39
Saturday, February 24, 2024	23:00	40	52	39	36

Statistics	Leq	Lmax	L50	L90
Day Average	49	64	39	36
Night Average	42	55	39	35
Day Low	40	53	35	31
Day High	58	84	46	44
Night Low	36	49	35	32
Night High	48	68	46	42
Ldn	50	Day %		90
CNEL	50	Night %		10

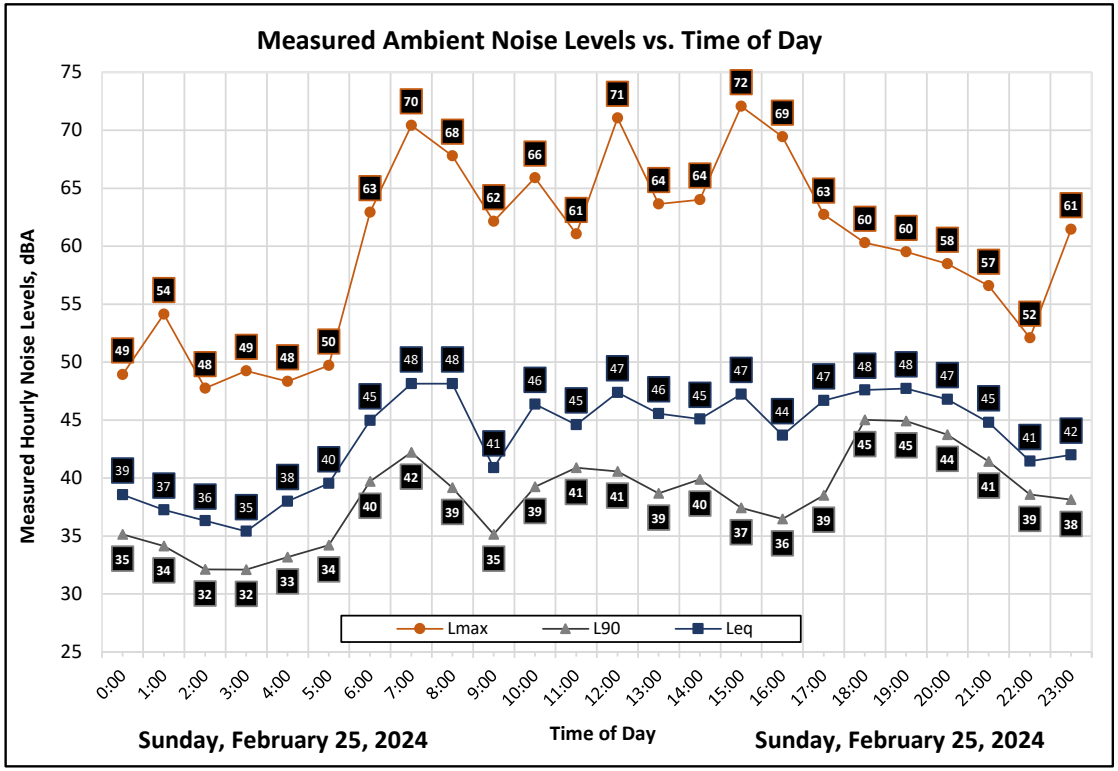


Appendix B1c: Continuous Noise Monitoring Results

Site: LT-1
Project: Red Hawk Arena and Housing Project
Location: Northern Project Boundary
Coordinates: 38.700383°, -120.902830°
Meter: LDL 820-7
Calibrator: CAL200

Date	Time	Measured Level, dBA			
		L_{eq}	L_{max}	L_{50}	L_{90}
Sunday, February 25, 2024	0:00	39	49	37	35
Sunday, February 25, 2024	1:00	37	54	36	34
Sunday, February 25, 2024	2:00	36	48	35	32
Sunday, February 25, 2024	3:00	35	49	34	32
Sunday, February 25, 2024	4:00	38	48	36	33
Sunday, February 25, 2024	5:00	40	50	38	34
Sunday, February 25, 2024	6:00	45	63	43	40
Sunday, February 25, 2024	7:00	48	70	45	42
Sunday, February 25, 2024	8:00	48	68	42	39
Sunday, February 25, 2024	9:00	41	62	38	35
Sunday, February 25, 2024	10:00	46	66	42	39
Sunday, February 25, 2024	11:00	45	61	44	41
Sunday, February 25, 2024	12:00	47	71	43	41
Sunday, February 25, 2024	13:00	46	64	42	39
Sunday, February 25, 2024	14:00	45	64	42	40
Sunday, February 25, 2024	15:00	47	72	41	37
Sunday, February 25, 2024	16:00	44	69	40	36
Sunday, February 25, 2024	17:00	47	63	43	39
Sunday, February 25, 2024	18:00	48	60	47	45
Sunday, February 25, 2024	19:00	48	60	47	45
Sunday, February 25, 2024	20:00	47	58	46	44
Sunday, February 25, 2024	21:00	45	57	44	41
Sunday, February 25, 2024	22:00	41	52	41	39
Sunday, February 25, 2024	23:00	42	61	40	38

Statistics	Leq	Lmax	L50	L90
Day Average	46	64	43	40
Night Average	40	53	38	35
Day Low	41	57	38	35
Day High	48	72	47	45
Night Low	35	48	34	32
Night High	45	63	43	40
Ldn	48	Day %		89
CNEL	49	Night %		11

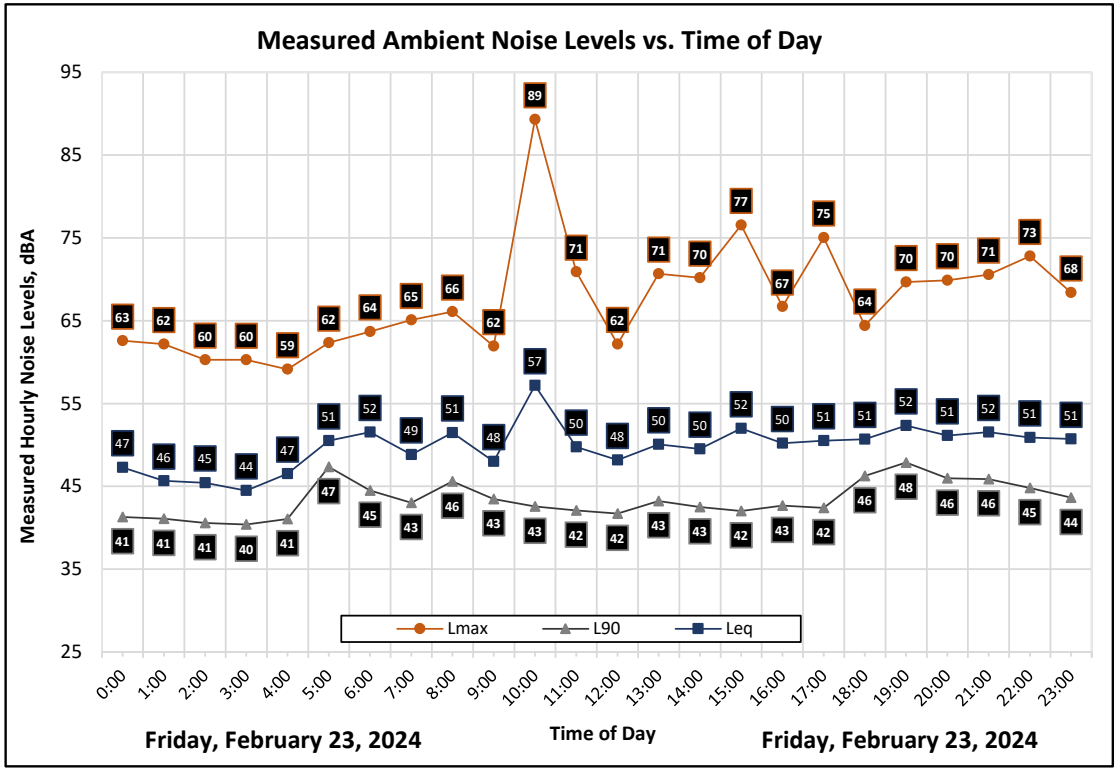


Appendix B2a: Continuous Noise Monitoring Results

Site: LT-2
Project: Red Hawk Arena and Housing Project
Location: Northern Project Boundary
Coordinates: 38.694824°, -120.909868°
Meter: LDL 820-6
Calibrator: CAL200

Date	Time	Measured Level, dBA			
		L_{eq}	L_{max}	L_{50}	L_{90}
Friday, February 23, 2024	0:00	47	63	45	41
Friday, February 23, 2024	1:00	46	62	43	41
Friday, February 23, 2024	2:00	45	60	43	41
Friday, February 23, 2024	3:00	44	60	42	40
Friday, February 23, 2024	4:00	47	59	42	41
Friday, February 23, 2024	5:00	51	62	49	47
Friday, February 23, 2024	6:00	52	64	49	45
Friday, February 23, 2024	7:00	49	65	45	43
Friday, February 23, 2024	8:00	51	66	50	46
Friday, February 23, 2024	9:00	48	62	46	43
Friday, February 23, 2024	10:00	57	89	47	43
Friday, February 23, 2024	11:00	50	71	45	42
Friday, February 23, 2024	12:00	48	62	45	42
Friday, February 23, 2024	13:00	50	71	47	43
Friday, February 23, 2024	14:00	50	70	46	43
Friday, February 23, 2024	15:00	52	77	47	42
Friday, February 23, 2024	16:00	50	67	47	43
Friday, February 23, 2024	17:00	51	75	47	42
Friday, February 23, 2024	18:00	51	64	49	46
Friday, February 23, 2024	19:00	52	70	50	48
Friday, February 23, 2024	20:00	51	70	49	46
Friday, February 23, 2024	21:00	52	71	49	46
Friday, February 23, 2024	22:00	51	73	49	45
Friday, February 23, 2024	23:00	51	68	48	44

Statistics	Leq	Lmax	L50	L90
Day Average	51	70	47	44
Night Average	49	64	45	43
Day Low	48	62	45	42
Day High	57	89	50	48
Night Low	44	59	42	40
Night High	52	73	49	47
Ldn	55	Day %		79
CNEL	56	Night %		21

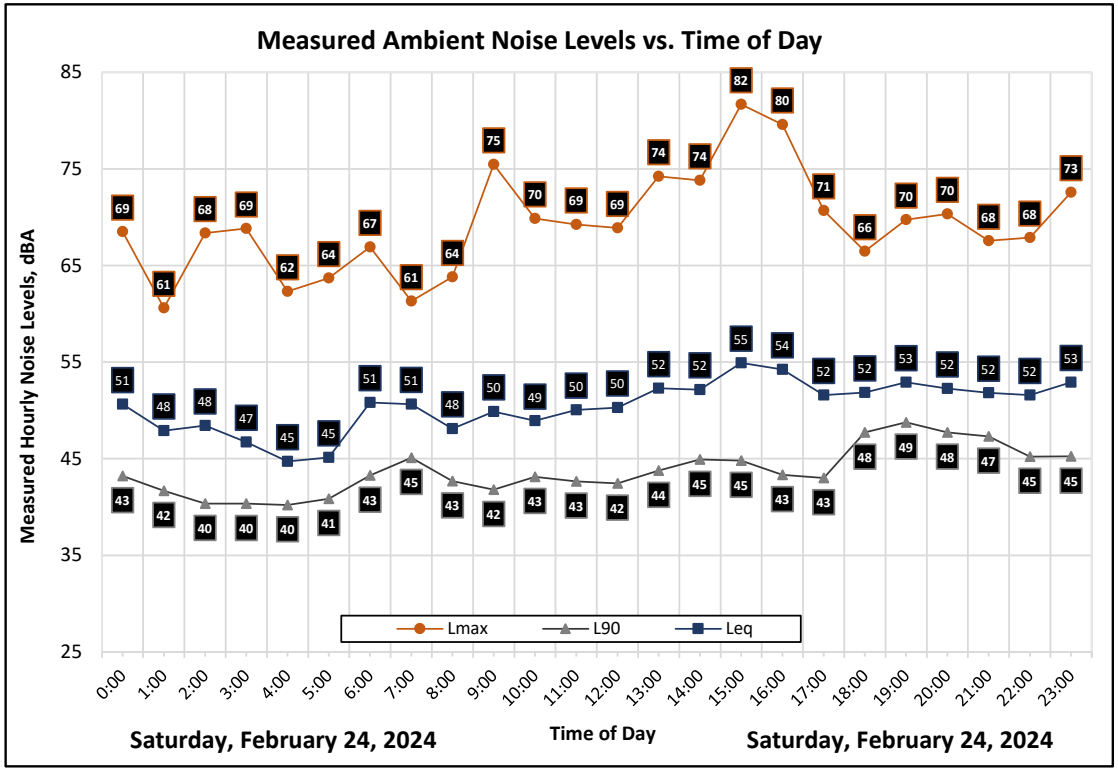


Appendix B2b: Continuous Noise Monitoring Results

Site: LT-2
Project: Red Hawk Arena and Housing Project
Location: Northern Project Boundary
Coordinates: 38.694824°, -120.909868°
Meter: LDL 820-6
Calibrator: CAL200

Date	Time	Measured Level, dBA			
		L_{eq}	L_{max}	L_{50}	L_{90}
Saturday, February 24, 2024	0:00	51	69	48	43
Saturday, February 24, 2024	1:00	48	61	45	42
Saturday, February 24, 2024	2:00	48	68	45	40
Saturday, February 24, 2024	3:00	47	69	42	40
Saturday, February 24, 2024	4:00	45	62	41	40
Saturday, February 24, 2024	5:00	45	64	42	41
Saturday, February 24, 2024	6:00	51	67	48	43
Saturday, February 24, 2024	7:00	51	61	49	45
Saturday, February 24, 2024	8:00	48	64	45	43
Saturday, February 24, 2024	9:00	50	75	46	42
Saturday, February 24, 2024	10:00	49	70	47	43
Saturday, February 24, 2024	11:00	50	69	46	43
Saturday, February 24, 2024	12:00	50	69	47	42
Saturday, February 24, 2024	13:00	52	74	48	44
Saturday, February 24, 2024	14:00	52	74	48	45
Saturday, February 24, 2024	15:00	55	82	49	45
Saturday, February 24, 2024	16:00	54	80	49	43
Saturday, February 24, 2024	17:00	52	71	48	43
Saturday, February 24, 2024	18:00	52	66	51	48
Saturday, February 24, 2024	19:00	53	70	51	49
Saturday, February 24, 2024	20:00	52	70	50	48
Saturday, February 24, 2024	21:00	52	68	50	47
Saturday, February 24, 2024	22:00	52	68	49	45
Saturday, February 24, 2024	23:00	53	73	50	45

Statistics	Leq	Lmax	L50	L90
Day Average	52	71	48	45
Night Average	49	67	46	42
Day Low	48	61	45	42
Day High	55	82	51	49
Night Low	45	61	41	40
Night High	53	73	50	45
Ldn	56	Day %		77
CNEL	56	Night %		23

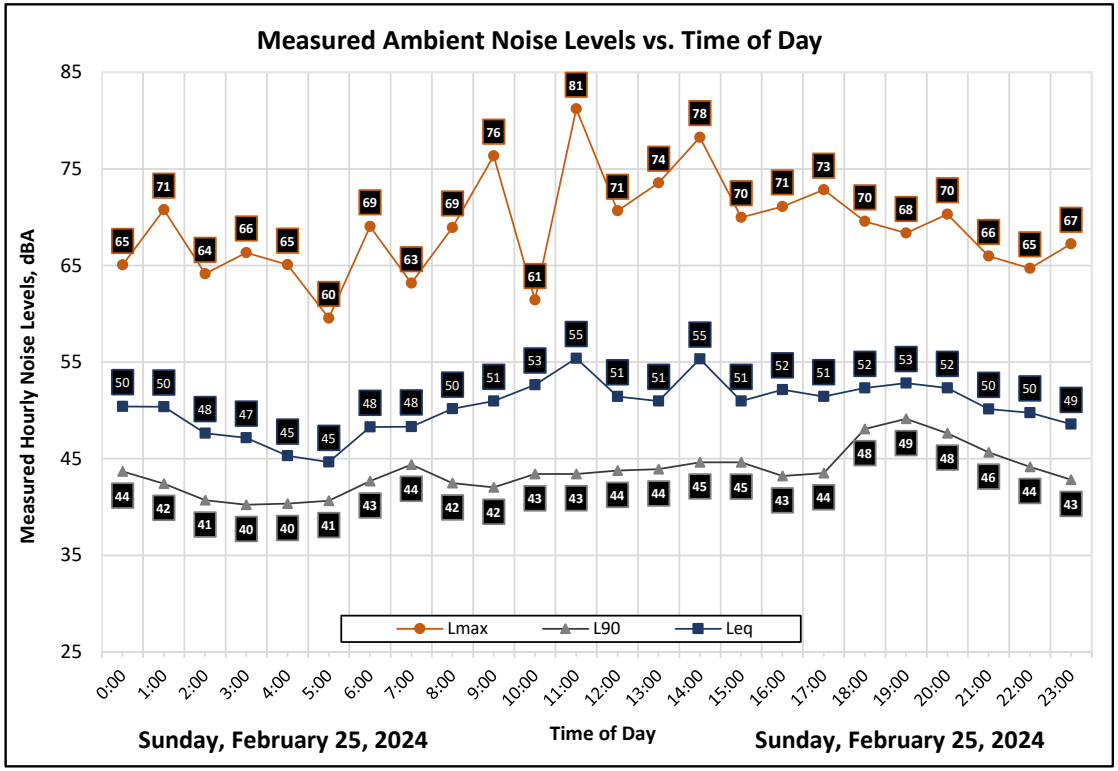


Appendix B2c: Continuous Noise Monitoring Results

Site: LT-2
Project: Red Hawk Arena and Housing Project
Location: Northern Project Boundary
Coordinates: 38.694824°, -120.909868°
Meter: LDL 820-6
Calibrator: CAL200

Date	Time	Measured Level, dBA			
		L_{eq}	L_{max}	L_{50}	L_{90}
Sunday, February 25, 2024	0:00	50	65	49	44
Sunday, February 25, 2024	1:00	50	71	47	42
Sunday, February 25, 2024	2:00	48	64	45	41
Sunday, February 25, 2024	3:00	47	66	43	40
Sunday, February 25, 2024	4:00	45	65	42	40
Sunday, February 25, 2024	5:00	45	60	42	41
Sunday, February 25, 2024	6:00	48	69	45	43
Sunday, February 25, 2024	7:00	48	63	47	44
Sunday, February 25, 2024	8:00	50	69	46	42
Sunday, February 25, 2024	9:00	51	76	45	42
Sunday, February 25, 2024	10:00	53	61	49	43
Sunday, February 25, 2024	11:00	55	81	46	43
Sunday, February 25, 2024	12:00	51	71	47	44
Sunday, February 25, 2024	13:00	51	74	48	44
Sunday, February 25, 2024	14:00	55	78	49	45
Sunday, February 25, 2024	15:00	51	70	48	45
Sunday, February 25, 2024	16:00	52	71	48	43
Sunday, February 25, 2024	17:00	51	73	49	44
Sunday, February 25, 2024	18:00	52	70	51	48
Sunday, February 25, 2024	19:00	53	68	51	49
Sunday, February 25, 2024	20:00	52	70	50	48
Sunday, February 25, 2024	21:00	50	66	49	46
Sunday, February 25, 2024	22:00	50	65	48	44
Sunday, February 25, 2024	23:00	49	67	47	43

Statistics	Leq	Lmax	L50	L90
Day Average	52	71	48	45
Night Average	48	66	45	42
Day Low	48	61	45	42
Day High	55	81	51	49
Night Low	45	60	42	40
Night High	50	71	49	44
Ldn	55	Day %		82
CNEL	56	Night %		18

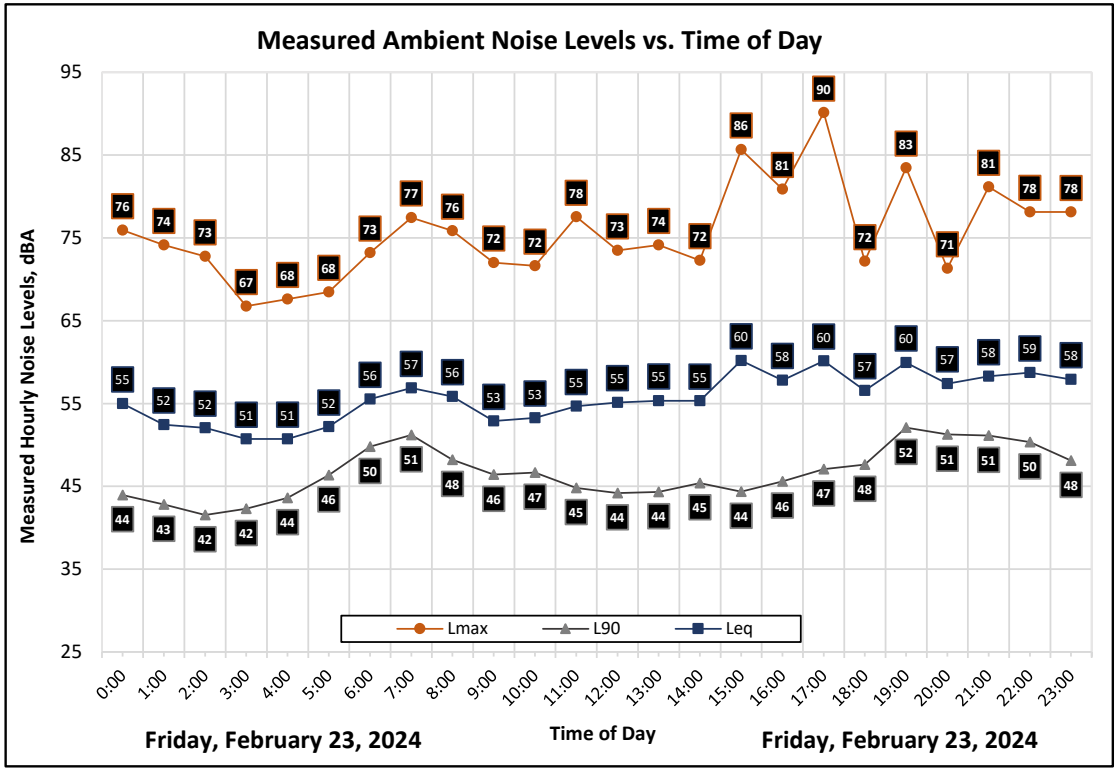


Appendix B3a: Continuous Noise Monitoring Results

Site: LT-3
Project: Red Hawk Arena and Housing Project
Meter: LDL 812-2
Location: Northern Project Boundary
Calibrator: CAL200
Coordinates: 38.693074°, -120.908792°

Date	Time	Measured Level, dBA			
		L_{eq}	L_{max}	L_{50}	L_{90}
Friday, February 23, 2024	0:00	55	76	48	44
Friday, February 23, 2024	1:00	52	74	47	43
Friday, February 23, 2024	2:00	52	73	45	42
Friday, February 23, 2024	3:00	51	67	45	42
Friday, February 23, 2024	4:00	51	68	46	44
Friday, February 23, 2024	5:00	52	68	49	46
Friday, February 23, 2024	6:00	56	73	52	50
Friday, February 23, 2024	7:00	57	77	53	51
Friday, February 23, 2024	8:00	56	76	51	48
Friday, February 23, 2024	9:00	53	72	49	46
Friday, February 23, 2024	10:00	53	72	49	47
Friday, February 23, 2024	11:00	55	78	47	45
Friday, February 23, 2024	12:00	55	73	47	44
Friday, February 23, 2024	13:00	55	74	49	44
Friday, February 23, 2024	14:00	55	72	50	45
Friday, February 23, 2024	15:00	60	86	49	44
Friday, February 23, 2024	16:00	58	81	50	46
Friday, February 23, 2024	17:00	60	90	51	47
Friday, February 23, 2024	18:00	57	72	52	48
Friday, February 23, 2024	19:00	60	83	55	52
Friday, February 23, 2024	20:00	57	71	54	51
Friday, February 23, 2024	21:00	58	81	54	51
Friday, February 23, 2024	22:00	59	78	55	50
Friday, February 23, 2024	23:00	58	78	54	48

Statistics	Leq	Lmax	L50	L90
Day Average	57	77	51	47
Night Average	54	73	49	45
Day Low	53	71	47	44
Day High	60	90	55	52
Night Low	51	67	45	42
Night High	58	78	55	50
Ldn	61	Day %		80
CNEL	61	Night %		20

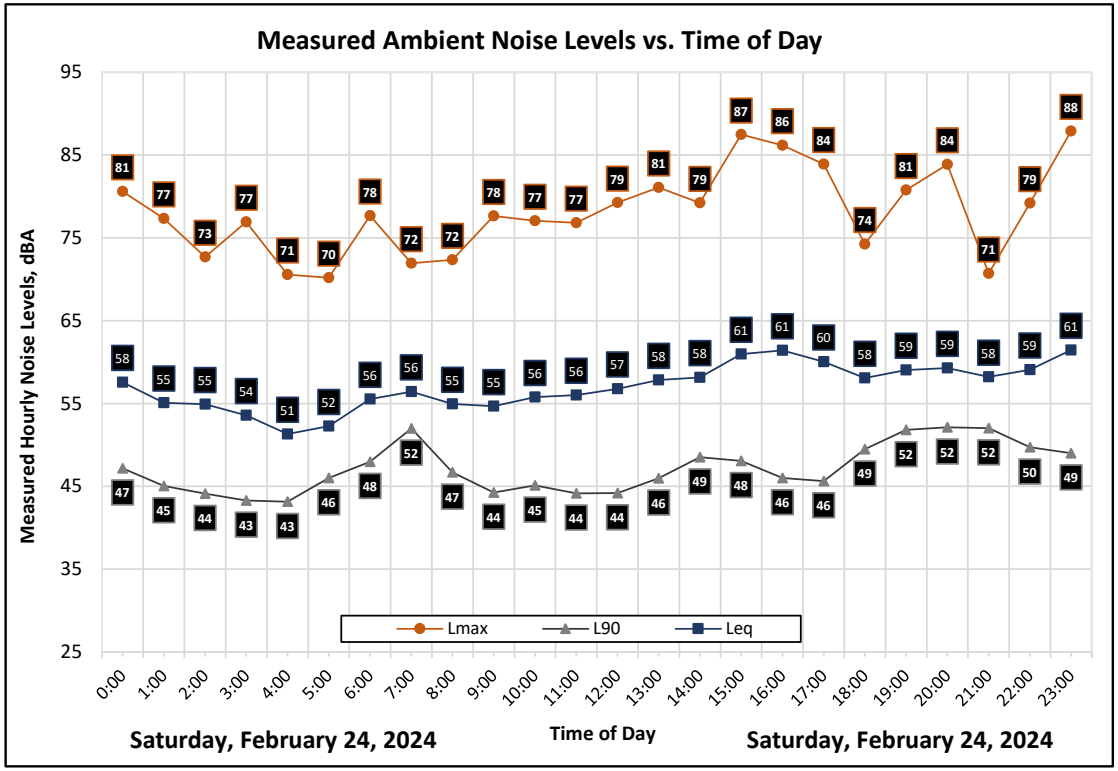


Appendix B3b: Continuous Noise Monitoring Results

Site: LT-3
Project: Red Hawk Arena and Housing Project
Location: Northern Project Boundary
Coordinates: 38.693074°, -120.908792°
Meter: LDL 812-2
Calibrator: CAL200

Date	Time	Measured Level, dBA			
		L_{eq}	L_{max}	L_{50}	L_{90}
Saturday, February 24, 2024	0:00	58	81	53	47
Saturday, February 24, 2024	1:00	55	77	49	45
Saturday, February 24, 2024	2:00	55	73	48	44
Saturday, February 24, 2024	3:00	54	77	46	43
Saturday, February 24, 2024	4:00	51	71	46	43
Saturday, February 24, 2024	5:00	52	70	49	46
Saturday, February 24, 2024	6:00	56	78	52	48
Saturday, February 24, 2024	7:00	56	72	55	52
Saturday, February 24, 2024	8:00	55	72	50	47
Saturday, February 24, 2024	9:00	55	78	47	44
Saturday, February 24, 2024	10:00	56	77	48	45
Saturday, February 24, 2024	11:00	56	77	48	44
Saturday, February 24, 2024	12:00	57	79	49	44
Saturday, February 24, 2024	13:00	58	81	51	46
Saturday, February 24, 2024	14:00	58	79	53	49
Saturday, February 24, 2024	15:00	61	87	55	48
Saturday, February 24, 2024	16:00	61	86	55	46
Saturday, February 24, 2024	17:00	60	84	53	46
Saturday, February 24, 2024	18:00	58	74	55	49
Saturday, February 24, 2024	19:00	59	81	56	52
Saturday, February 24, 2024	20:00	59	84	56	52
Saturday, February 24, 2024	21:00	58	71	56	52
Saturday, February 24, 2024	22:00	59	79	56	50
Saturday, February 24, 2024	23:00	61	88	56	49

Statistics	Leq	Lmax	L50	L90
Day Average	58	79	53	48
Night Average	56	77	50	46
Day Low	55	71	47	44
Day High	61	87	56	52
Night Low	51	70	46	43
Night High	61	88	56	50
Ldn	63	Day %		74
CNEL	63	Night %		26

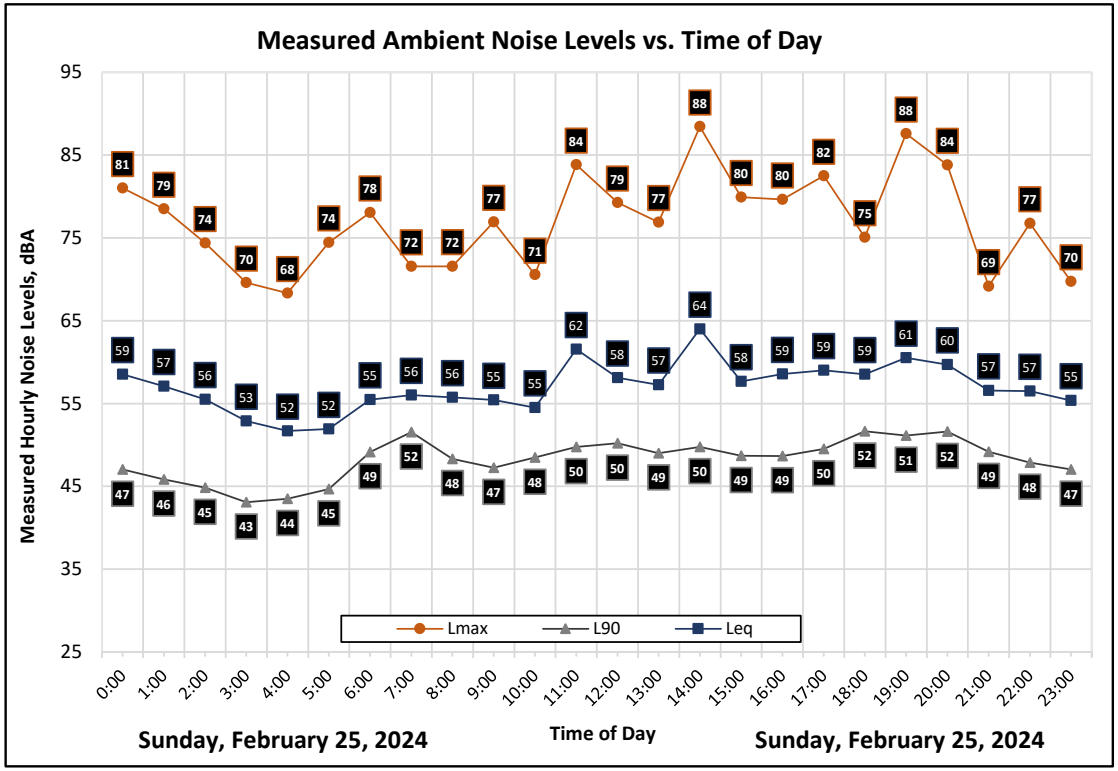


Appendix B3c: Continuous Noise Monitoring Results

Site: LT-3
Project: Red Hawk Arena and Housing Project
Location: Northern Project Boundary
Coordinates: 38.693074°, -120.908792°
Meter: LDL 812-2
Calibrator: CAL200

Date	Time	Measured Level, dBA			
		L_{eq}	L_{max}	L_{50}	L_{90}
Sunday, February 25, 2024	0:00	59	81	54	47
Sunday, February 25, 2024	1:00	57	79	51	46
Sunday, February 25, 2024	2:00	56	74	49	45
Sunday, February 25, 2024	3:00	53	70	46	43
Sunday, February 25, 2024	4:00	52	68	46	44
Sunday, February 25, 2024	5:00	52	74	48	45
Sunday, February 25, 2024	6:00	55	78	52	49
Sunday, February 25, 2024	7:00	56	72	54	52
Sunday, February 25, 2024	8:00	56	72	51	48
Sunday, February 25, 2024	9:00	55	77	50	47
Sunday, February 25, 2024	10:00	55	71	51	48
Sunday, February 25, 2024	11:00	62	84	53	50
Sunday, February 25, 2024	12:00	58	79	53	50
Sunday, February 25, 2024	13:00	57	77	53	49
Sunday, February 25, 2024	14:00	64	88	54	50
Sunday, February 25, 2024	15:00	58	80	53	49
Sunday, February 25, 2024	16:00	59	80	53	49
Sunday, February 25, 2024	17:00	59	82	54	50
Sunday, February 25, 2024	18:00	59	75	55	52
Sunday, February 25, 2024	19:00	61	88	55	51
Sunday, February 25, 2024	20:00	60	84	55	52
Sunday, February 25, 2024	21:00	57	69	53	49
Sunday, February 25, 2024	22:00	57	77	52	48
Sunday, February 25, 2024	23:00	55	70	51	47

Statistics	Leq	Lmax	L50	L90
Day Average	59	78	53	50
Night Average	55	75	50	46
Day Low	55	69	50	47
Day High	64	88	55	52
Night Low	52	68	46	43
Night High	59	81	54	49
Ldn	62	Day %		81
CNEL	63	Night %		19

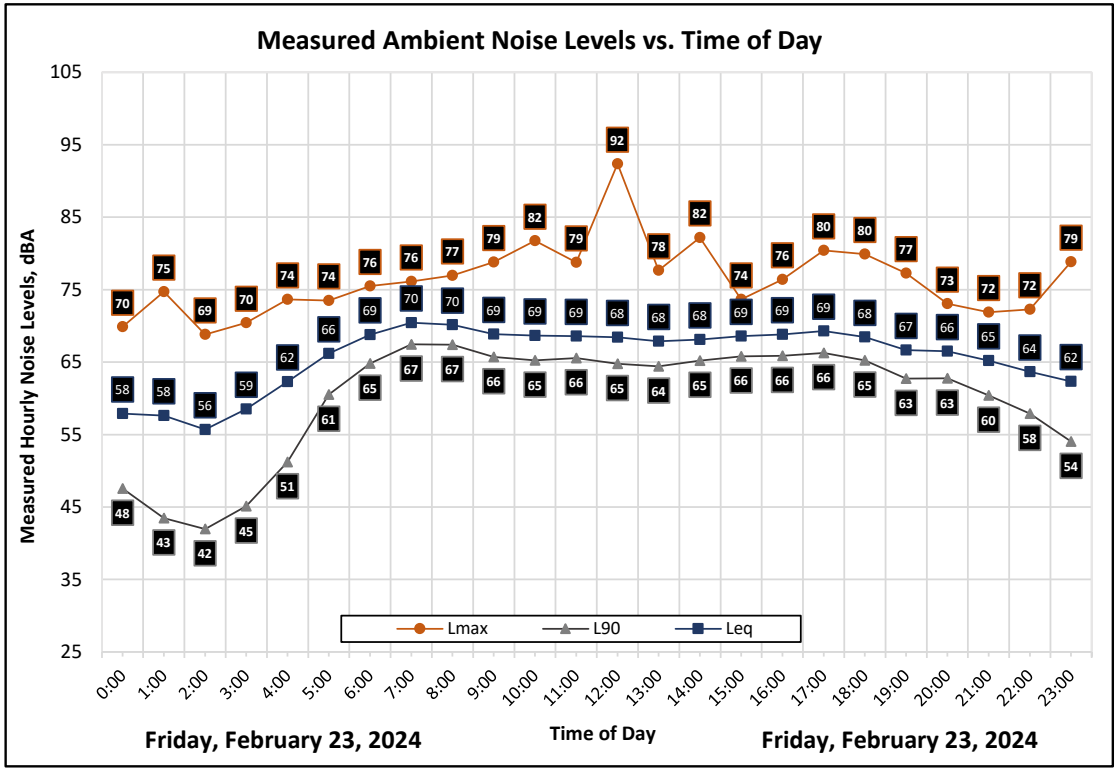


Appendix B4a: Continuous Noise Monitoring Results

Site: LT-4
Project: Red Hawk Arena and Housing Project
Location: Northern Project Boundary
Coordinates: 38.692576°, -120.901322°
Meter: LDL 820-5
Calibrator: CAL200

Date	Time	Measured Level, dBA			
		L_{eq}	L_{max}	L_{50}	L_{90}
Friday, February 23, 2024	0:00	58	70	55	48
Friday, February 23, 2024	1:00	58	75	53	43
Friday, February 23, 2024	2:00	56	69	49	42
Friday, February 23, 2024	3:00	59	70	55	45
Friday, February 23, 2024	4:00	62	74	61	51
Friday, February 23, 2024	5:00	66	74	66	61
Friday, February 23, 2024	6:00	69	76	68	65
Friday, February 23, 2024	7:00	70	76	70	67
Friday, February 23, 2024	8:00	70	77	70	67
Friday, February 23, 2024	9:00	69	79	69	66
Friday, February 23, 2024	10:00	69	82	68	65
Friday, February 23, 2024	11:00	69	79	68	66
Friday, February 23, 2024	12:00	68	92	68	65
Friday, February 23, 2024	13:00	68	78	68	64
Friday, February 23, 2024	14:00	68	82	68	65
Friday, February 23, 2024	15:00	69	74	68	66
Friday, February 23, 2024	16:00	69	76	69	66
Friday, February 23, 2024	17:00	69	80	69	66
Friday, February 23, 2024	18:00	68	80	68	65
Friday, February 23, 2024	19:00	67	77	66	63
Friday, February 23, 2024	20:00	66	73	66	63
Friday, February 23, 2024	21:00	65	72	65	60
Friday, February 23, 2024	22:00	64	72	63	58
Friday, February 23, 2024	23:00	62	79	61	54

Statistics	Leq	Lmax	L50	L90
Day Average	68	78	68	65
Night Average	63	73	59	52
Day Low	65	72	65	60
Day High	70	92	70	67
Night Low	56	69	49	42
Night High	69	79	68	65
Ldn	71	Day %		86
CNEL	71	Night %		14

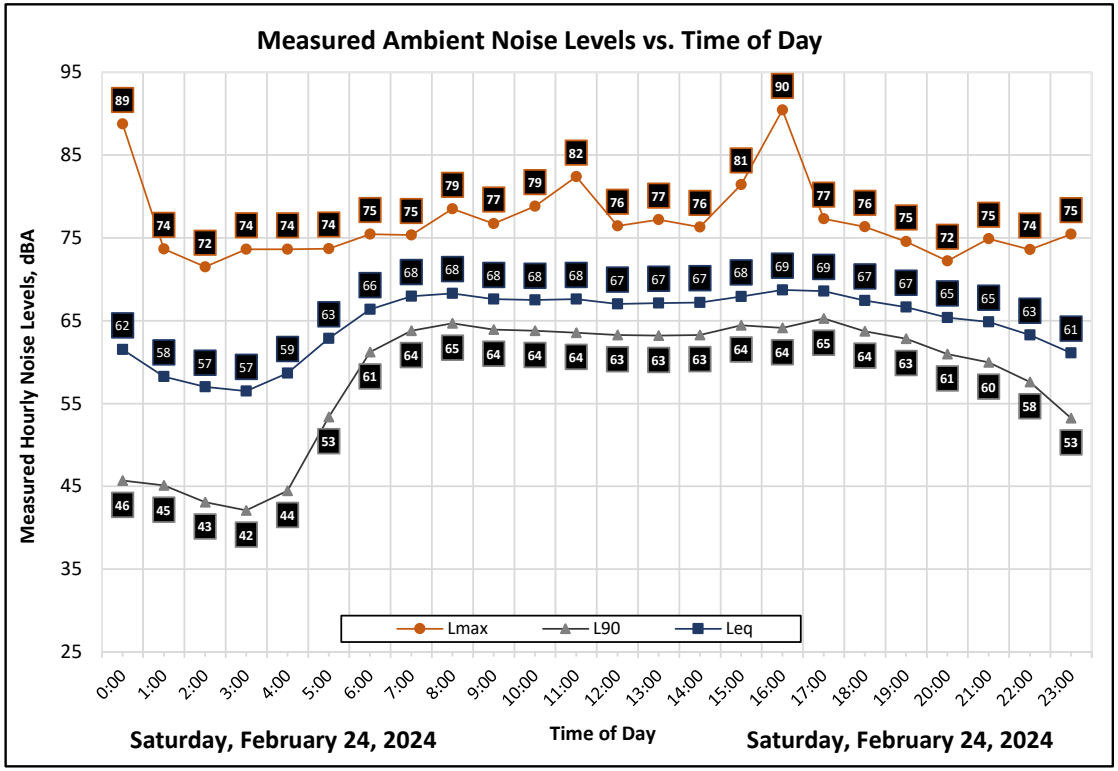


Appendix B4b: Continuous Noise Monitoring Results

Site: LT-4
Project: Red Hawk Arena and Housing Project
Location: Northern Project Boundary
Coordinates: 38.692576°, -120.901322°
Meter: LDL 820-5
Calibrator: CAL200

Date	Time	Measured Level, dBA			
		L_{eq}	L_{max}	L_{50}	L_{90}
Saturday, February 24, 2024	0:00	62	89	58	46
Saturday, February 24, 2024	1:00	58	74	55	45
Saturday, February 24, 2024	2:00	57	72	52	43
Saturday, February 24, 2024	3:00	57	74	51	42
Saturday, February 24, 2024	4:00	59	74	55	44
Saturday, February 24, 2024	5:00	63	74	62	53
Saturday, February 24, 2024	6:00	66	75	66	61
Saturday, February 24, 2024	7:00	68	75	68	64
Saturday, February 24, 2024	8:00	68	79	68	65
Saturday, February 24, 2024	9:00	68	77	67	64
Saturday, February 24, 2024	10:00	68	79	67	64
Saturday, February 24, 2024	11:00	68	82	67	64
Saturday, February 24, 2024	12:00	67	76	67	63
Saturday, February 24, 2024	13:00	67	77	67	63
Saturday, February 24, 2024	14:00	67	76	67	63
Saturday, February 24, 2024	15:00	68	81	67	64
Saturday, February 24, 2024	16:00	69	90	67	64
Saturday, February 24, 2024	17:00	69	77	68	65
Saturday, February 24, 2024	18:00	67	76	67	64
Saturday, February 24, 2024	19:00	67	75	66	63
Saturday, February 24, 2024	20:00	65	72	65	61
Saturday, February 24, 2024	21:00	65	75	64	60
Saturday, February 24, 2024	22:00	63	74	63	58
Saturday, February 24, 2024	23:00	61	75	60	53

Statistics	Leq	Lmax	L50	L90
Day Average	67	78	67	63
Night Average	62	75	58	50
Day Low	65	72	64	60
Day High	69	90	68	65
Night Low	57	72	51	42
Night High	66	89	66	61
Ldn	69	Day %		88
CNEL	70	Night %		12

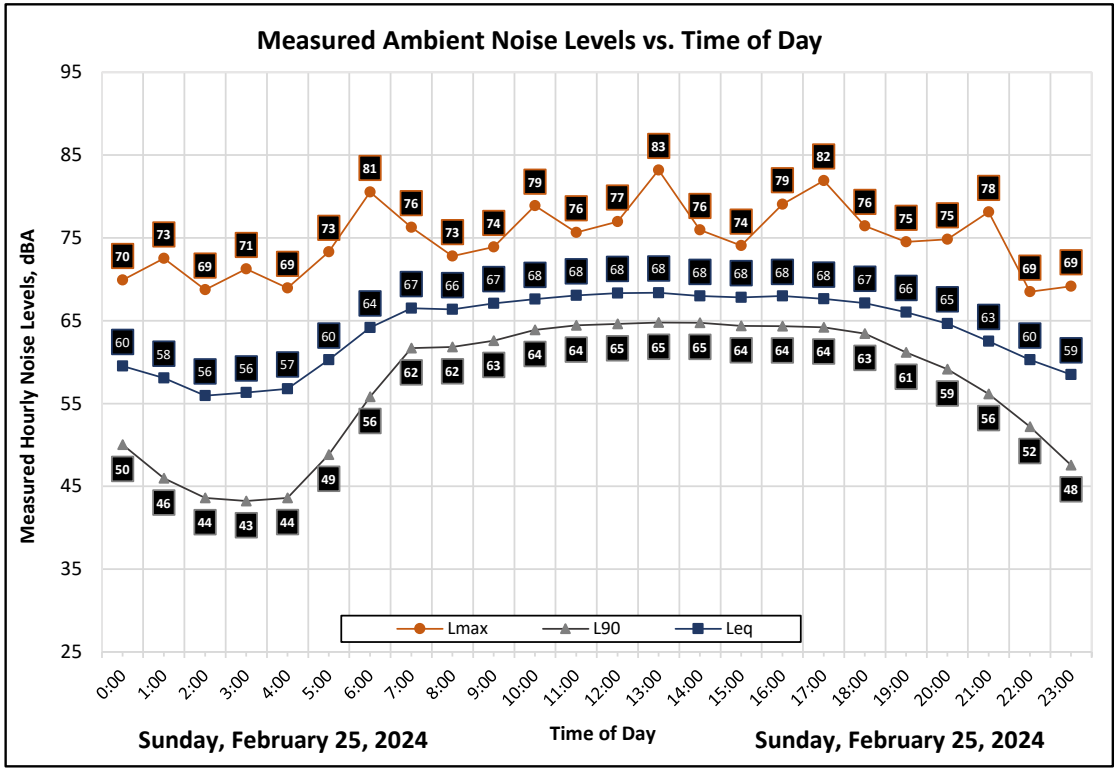


Appendix B4c: Continuous Noise Monitoring Results

Site: LT-4
Project: Red Hawk Arena and Housing Project
Location: Northern Project Boundary
Coordinates: 38.692576°, -120.901322°
Meter: LDL 820-5
Calibrator: CAL200

Date	Time	Measured Level, dBA			
		L_{eq}	L_{max}	L_{50}	L_{90}
Sunday, February 25, 2024	0:00	60	70	58	50
Sunday, February 25, 2024	1:00	58	73	56	46
Sunday, February 25, 2024	2:00	56	69	51	44
Sunday, February 25, 2024	3:00	56	71	51	43
Sunday, February 25, 2024	4:00	57	69	53	44
Sunday, February 25, 2024	5:00	60	73	58	49
Sunday, February 25, 2024	6:00	64	81	63	56
Sunday, February 25, 2024	7:00	67	76	66	62
Sunday, February 25, 2024	8:00	66	73	66	62
Sunday, February 25, 2024	9:00	67	74	67	63
Sunday, February 25, 2024	10:00	68	79	67	64
Sunday, February 25, 2024	11:00	68	76	68	64
Sunday, February 25, 2024	12:00	68	77	68	65
Sunday, February 25, 2024	13:00	68	83	68	65
Sunday, February 25, 2024	14:00	68	76	68	65
Sunday, February 25, 2024	15:00	68	74	68	64
Sunday, February 25, 2024	16:00	68	79	68	64
Sunday, February 25, 2024	17:00	68	82	67	64
Sunday, February 25, 2024	18:00	67	76	67	63
Sunday, February 25, 2024	19:00	66	75	66	61
Sunday, February 25, 2024	20:00	65	75	64	59
Sunday, February 25, 2024	21:00	63	78	61	56
Sunday, February 25, 2024	22:00	60	69	59	52
Sunday, February 25, 2024	23:00	59	69	56	48

Statistics	Leq	Lmax	L50	L90
Day Average	67	77	67	63
Night Average	60	71	56	48
Day Low	63	73	61	56
Day High	68	83	68	65
Night Low	56	69	51	43
Night High	64	81	63	56
Ldn	68	Day %		92
CNEL	68	Night %		8



Appendix C: Traffic Noise Calculation Inputs and Results

Appendix C-1

FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Project #: 240105 - Red Hawk Arena and Housing Project
Description: Existing Traffic
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway	Segment	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)	Contours (ft.) - No Offset 60 dBA	65 dBA	70 dBA	Level, dBA
1	Green Valley Rd	West of Shingle Springs Dr	3,480	84	0	16	1.0%	1.0%	45	150	0	75	35	16	55.5
2	Shinigle Springs Dr	South Green Valley Rd	30	84	0	16	1.0%	1.0%	15	380	0	1	0	0	19.6
3	Lotus Rd	North of Green Valley Rd	7,870	84	0	16	1.0%	1.0%	45	230	0	129	60	28	56.2
4	Green Valley Rd	South of Lotus Rd	7,480	84	0	16	1.0%	1.0%	45	190	0	125	58	27	57.3
5	Greenstone Rd	South of Green Valley Rd	2,580	84	0	16	1.0%	1.0%	45	70	0	61	28	13	59.1
6	Green Valley Rd	East of Greenstone Rd	3,390	84	0	16	1.0%	1.0%	45	80	0	74	34	16	59.4
7	Missouri Flat Rd	East of Green Valley Rd	4,280	84	0	16	1.0%	1.0%	55	110	0	121	56	26	60.6
8	Missouri Flat Rd	East of El Dorado Rd	1,270	84	0	16	1.0%	1.0%	45	110	0	38	18	8	53.1
9	El Dorado Rd	South of Missouri Flat Rd	2,810	84	0	16	1.0%	1.0%	45	100	0	65	30	14	57.2
10	Shingle Rd	South of Green Valley Rd	6,670	84	0	16	1.0%	1.0%	50	90	0	138	64	30	62.8
11	Ponderosa Rd	South of Green Valley Rd	2,370	84	0	16	1.0%	1.0%	40	85	0	48	22	10	56.2
12	Deer Valley Rd	North of Green Valley Rd	5,070	84	0	16	1.0%	1.0%	45	110	0	96	45	21	59.1
13	Cameron Park Dr	South Green Valley Rd	860	84	0	16	1.0%	1.0%	45	50	0	29	14	6	56.6

SAXELBY ACOUSTICS
Acoustics · Noise · Vibration

Appendix C-2

FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Project #: 240105 - Red Hawk Arena and Housing Project
Description: Existing Plus Project Traffic
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway	Segment	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)	Contours (ft.) - No Offset 60 dBA	65 dBA	70 dBA	Level, dBA
1	Green Valley Rd	West of Shingle Springs Dr	4,020	84	0	16	1.0%	1.0%	45	150	0	82	38	18	56.1
2	Shinigle Springs Dr	South Green Valley Rd	970	84	0	16	1.0%	1.0%	15	380	0	8	4	2	34.7
3	Lotus Rd	North of Green Valley Rd	7,940	84	0	16	1.0%	1.0%	45	230	0	130	60	28	56.3
4	Green Valley Rd	South of Lotus Rd	7,950	84	0	16	1.0%	1.0%	45	190	0	130	60	28	57.5
5	Greenstone Rd	South of Green Valley Rd	2,650	84	0	16	1.0%	1.0%	45	70	0	62	29	13	59.2
6	Green Valley Rd	East of Greenstone Rd	3,730	84	0	16	1.0%	1.0%	45	80	0	78	36	17	59.9
7	Missouri Flat Rd	East of Green Valley Rd	4,490	84	0	16	1.0%	1.0%	55	110	0	125	58	27	60.8
8	Missouri Flat Rd	East of El Dorado Rd	1,400	84	0	16	1.0%	1.0%	45	110	0	41	19	9	53.5
9	El Dorado Rd	South of Missouri Flat Rd	2,810	84	0	16	1.0%	1.0%	45	100	0	65	30	14	57.2
10	Shingle Rd	South of Green Valley Rd	6,800	84	0	16	1.0%	1.0%	50	90	0	140	65	30	62.9
11	Ponderosa Rd	South of Green Valley Rd	2,440	84	0	16	1.0%	1.0%	40	85	0	49	23	10	56.4
12	Deer Valley Rd	North of Green Valley Rd	5,140	84	0	16	1.0%	1.0%	45	110	0	97	45	21	59.2
13	Cameron Park Dr	South Green Valley Rd	930	84	0	16	1.0%	1.0%	45	50	0	31	14	7	56.9

SAXELBY ACOUSTICS
Acoustics · Noise · Vibration

Appendix C-3

FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Project #: 240105 - Red Hawk Arena and Housing Project
Description: Cumulative Traffic
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway	Segment	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)	Contours (ft.) - No Offset 60 dBA	65 dBA	70 dBA	Level, dBA
1	Green Valley Rd	West of Shingle Springs Dr	3,800	84	0	16	1.0%	1.0%	45	150	0	79	37	17	55.8
2	Shinigle Springs Dr	South Green Valley Rd	300	84	0	16	1.0%	1.0%	15	380	0	4	2	1	29.6
3	Lotus Rd	North of Green Valley Rd	8,300	84	0	16	1.0%	1.0%	45	230	0	134	62	29	56.5
4	Green Valley Rd	South of Lotus Rd	7,700	84	0	16	1.0%	1.0%	45	190	0	127	59	27	57.4
5	Greenstone Rd	South of Green Valley Rd	2,200	84	0	16	1.0%	1.0%	45	70	0	55	26	12	58.4
6	Green Valley Rd	East of Greenstone Rd	3,600	84	0	16	1.0%	1.0%	45	80	0	77	36	16	59.7
7	Missouri Flat Rd	East of Green Valley Rd	4,600	84	0	16	1.0%	1.0%	55	110	0	127	59	27	60.9
8	Missouri Flat Rd	East of El Dorado Rd	1,600	84	0	16	1.0%	1.0%	45	110	0	45	21	10	54.1
9	El Dorado Rd	South of Missouri Flat Rd	3,200	84	0	16	1.0%	1.0%	45	100	0	71	33	15	57.7
10	Shingle Rd	South of Green Valley Rd	7,100	84	0	16	1.0%	1.0%	50	90	0	144	67	31	63.1
11	Ponderosa Rd	South of Green Valley Rd	2,700	84	0	16	1.0%	1.0%	40	85	0	52	24	11	56.8
12	Deer Valley Rd	North of Green Valley Rd	8,500	84	0	16	1.0%	1.0%	45	110	0	136	63	29	61.4
13	Cameron Park Dr	South Green Valley Rd	1,100	84	0	16	1.0%	1.0%	45	50	0	35	16	7	57.6

SAXELBY ACOUSTICS
Acoustics · Noise · Vibration

Appendix C-4

FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Project #: 240105 - Red Hawk Arena and Housing Project
Description: Cumulative Plus Project Traffic
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway	Segment	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)	Contours (ft.) - No Offset 60 dBA	65 dBA	70 dBA	Level, dBA
1	Green Valley Rd	West of Shingle Springs Dr	4,340	84	0	16	1.0%	1.0%	45	150	0	87	40	19	56.4
2	Shinigle Springs Dr	South Green Valley Rd	1,240	84	0	16	1.0%	1.0%	15	380	0	9	4	2	35.8
3	Lotus Rd	North of Green Valley Rd	8,370	84	0	16	1.0%	1.0%	45	230	0	134	62	29	56.5
4	Green Valley Rd	South of Lotus Rd	8,170	84	0	16	1.0%	1.0%	45	190	0	132	61	28	57.6
5	Greenstone Rd	South of Green Valley Rd	3,170	84	0	16	1.0%	1.0%	45	70	0	70	33	15	60.0
6	Green Valley Rd	East of Greenstone Rd	4,140	84	0	16	1.0%	1.0%	45	80	0	84	39	18	60.3
7	Missouri Flat Rd	East of Green Valley Rd	4,810	84	0	16	1.0%	1.0%	55	110	0	131	61	28	61.1
8	Missouri Flat Rd	East of El Dorado Rd	1,730	84	0	16	1.0%	1.0%	45	110	0	47	22	10	54.5
9	El Dorado Rd	South of Missouri Flat Rd	3,200	84	0	16	1.0%	1.0%	45	100	0	71	33	15	57.7
10	Shingle Rd	South of Green Valley Rd	6,230	84	0	16	1.0%	1.0%	50	90	0	132	61	28	62.5
11	Ponderosa Rd	South of Green Valley Rd	2,770	84	0	16	1.0%	1.0%	40	85	0	53	25	11	56.9
12	Deer Valley Rd	North of Green Valley Rd	8,570	84	0	16	1.0%	1.0%	45	110	0	136	63	29	61.4
13	Cameron Park Dr	South Green Valley Rd	1,170	84	0	16	1.0%	1.0%	45	50	0	36	17	8	57.9

SAXELBY ACOUSTICS
Acoustics · Noise · Vibration