Appendix A Air Quality and Greenhouse Gas Emissions Technical Report

Winding Ranch Project

Air Quality and Greenhouse Gas Emissions Technical Report

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TABLE OF CONTENTS

Section **Page**

TABLE OF CONTENTS (cont.)

TABLE OF CONTENTS (cont.)

LIST OF APPENDICES

LIST OF FIGURES

LIST OF TABLES

ACRONYMS AND ABBREVIATIONS

AB	Assembly Bill
BCECP	Basic Construction Emissions Control Practices
BMPs	Best Management Practices
C_2F_6	hexafluoroethane
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CAFE	Corporate Average Fuel Economy
CalEEMod	California Emissions Estimator Model
CALGreen	California Green Building Standards Code
Caltrans	California Department of Transportation
CAP	Climate Action Plan
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CBSC	California Building Standards Commission
CCR	California Code of Regulations
CEC	California energy Commission
CEQA	California Environmental Quality Act
CF_4	tetraflouromethane
CFC	chlorofluorocarbon
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
County	County of Sacramento
DPM	diesel particulate matter
DU	dwelling unit
EO	Executive Order
GHG	greenhouse gas
GWP	global warming potential
HFC	hydrofluorocarbon
I-80	Interstate 80
IPCC	Intergovernmental Panel on Climate Change
kBTU	kilo British Thermal Unit
kW	kilowatt
kWhr	kilowatts-hour

ACRONYMS AND ABBREVIATIONS (cont.)

LCFS	Low Carbon Fuel Standard
LOS	Level of Service
LST	localized significance threshold
mg/m^3	milligrams per cubic meter
MMT	million metric tons
mpg	miles per gallon
mph	miles per hour
MT	metric ton
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
NHTSA	National Highway Traffic Safety Administration
NO	nitrogen oxide
NO_2	nitrogen dioxide
NO_X	nitrogen oxides
O_3	ozone
Pb	lead
PFC	perfluorocarbon
PM_{10}	particulate matter less than 10 microns
$PM_{2.5}$	particulate matter less than 2.5 microns
ppm	parts per million
ROG	reactive organic gas
RTP	Regional Transportation Plan
SB	Senate Bill
SCS	Sustainable Communities Strategy
SF	square feet/square foot
SF_6	hexafluoride
SIP	State Implementation Plan
SO_2	sulfur dioxide
SO_X	sulfur oxides
SRA	source receptor area
TACs	toxic air contaminants
USEPA	U.S. Environmental Protection Agency
VMT	vehicle miles traveled
VOC	volatile organic compound

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EXECUTIVE SUMMARY

This report presents an assessment of potential air quality and greenhouse gas (GHG) emissions impacts during construction and operation of the proposed Winding Ranch Project (project), located on an approximately 24.8-acre site in the unincorporated community of Carmichael in Sacramento County (County). The project would construct a convenience store/gas station and five retail/restaurant buildings with drive-through access potential on the western portion of the project site, and an 81-lot single-family subdivision on the eastern portion of the project site.

The project's construction-period emissions of nitrogen oxides (NO_X), course particulate matter (PM_{10}), and fine particulate matter ($PM_{2.5}$) and operational-period emissions of reactive organic gases (ROG) and NO_X would not exceed the Sacramento Metropolitan Air Quality Management District's (SMAQMD's) thresholds. The SMAQMD considers project that do not exceed the mass emissions thresholds to not conflict with or obstruct implementation of the District's air quality planning efforts. Therefore, the project would not conflict with or obstruct implementation of SMAQMD's Regional Ozone Plan.

The SMAQMD recommends a set of Basic Construction Emissions Control Practices (BCECPs), allowing the use of the non-zero particulate matter significance thresholds. Without implementation of the BCECPs, construction emissions of PM_{10} and $PM_{2.5}$ would be potentially significant. Mitigation measure AQ-1 would require implementation of the SMAQMD's recommended BCECPs. With mitigation measure AQ-1 implemented, the project would not result in a cumulatively considerable net increase of any criteria pollutant for which the Sacramento Region is in non-attainment.

Construction and operation of the project would not result in exposure of sensitive receptors to significant quantities of localized criteria pollutant and precursor concentrations, or significant quantities of toxic air contaminants (TACs), including TACs resulting from operation of the proposed gas station. Impacts related to exposure of sensitive receptors to substantial pollutant concentrations, or other emissions such as odors, would be less than significant.

The project-related construction GHG emissions would not exceed the SMAQMD's threshold for land use development project construction activities. The project operational GHG emissions for the first full year of operation (anticipated to be 2026) would exceed the SMAQMD's screening level for land use development project operational activities. Projects which exceed the SMAQMD operational screening level are required to comply with the Tier 2 GHG reduction best management practice (BMP). The project's residential development portion vehicle miles traveled (VMT) would be 15 percent or more lower that regional average, and the project's retail development portion would be local serving and would not result in a net increase in regional VMT. Therefore, the project would comply with the SMAQMD Tier 2 GHG reduction BMP. However, the SMAQMD requires all development projects to implement the Tier 1 GHG reduction best management practices (BMPs). Mitigation measure GHG-1 would require implementation of the Tier 1 BMPs, including the requirement for all-electric buildings or offsetting GHG emissions resulting from the use of natural gas allowed for restaurant cooking appliances only. With mitigation measure GHG-1 implemented, the project would not result in significant GHG emissions, and the project would not conflict with or obstruct implementation of applicable GHG reduction plans, policies, or regulations, including the Sacramento Council of Government's (SACOG's) 2020 Metropolitan Transportation Plan and Sustainable Communities Strategy or the California Air Resource Boards (CARB's) Climate Change Scoping Plan.

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1.0 INTRODUCTION

This report presents an assessment of potential air quality and greenhouse gas (GHG) emissions impacts during construction and operation of the proposed Winding Ranch Project (project).

1.1 PROJECT LOCATION

The project site is located at the southeast corner of the Winding Way and Manzanita Avenue intersection in the unincorporated community of Carmichael in Sacramento County (County). See Figure 1, *Vicinity Map*, and Figure 2, *Aerial Map*. The project site is located within the Manzanita District of the Fair Oaks Corridor Plan (Corridor Plan) area. The 24.8-acre project site consists of four parcels, Assessor's Parcel Numbers (APNs) 245-0011-012, 245-0011-018, 245-0011-020, and 245-0011-021.

1.2 PROJECT DESCRIPTION

The project would develop commercial retail uses on approximately 6.8 acres in the northwest portion of the project site and single-family residences on approximately 12.4 acres in the northeast portion of the project site. The project would include rough grading of the entire project site, including approximately 6.2 acres designated as Lot A on the site plan located in the southern portion of the project site. Further development of Lot A is not a part of the project.

1.2.1 Commercial Retail Development

The proposed project's commercial retail development would include a retail gasoline dispensing facility (gas station) located at the southeast corner of Winding Way and Manzanita Avenue. The gas station would include an approximately 5,200-square foot (SF) convenience store, an approximately 1,460-SF car wash, 8 fuel pumps (16 dispensing positions) covered by a canopy, and underground fuel storage tanks. The gas station would operate 24 hours a day, 7 days a week. In addition, five retail/restaurant buildings are proposed along the eastern project boundary adjacent to Manzanita Avenue. All retail buildings would have outdoor patios, associated parking, and the capacity to accommodate a drive-through. The building areas for the 5 retail/restaurant buildings would be approximately 5,000 SF for pad 2, 2,200 SF for pad 3, 5,000 SF for pad 4, 3,200 SF for pad 5, and 7,500 SF for pad 6. Total area for the 5 retail/restaurant buildings would be approximately 22,900 SF. Additional site features would include sidewalks within the public right of way on Manzanita Avenue, pedestrian sidewalks and crosswalks connecting to buildings within the project site, outdoor lighting, signage, and landscaping. Access to commercial retail space would be from four driveways along Manzanita Avenue and one driveway on Winding Avenue. See Figure 3, *Retail Site Plan*.

1.2.2 Residential Development

The proposed project's residential development would include a tentative subdivision map for 81 single-family residential lots. Residential lots would range from a minimum 3,375 SF (45 feet by 75 feet) to a maximum of 9,321 SF. The proposed project's residential development would also include internal streets and sidewalks, an approximately 0.9-acre storm water detention basin, and approximately 0.3 acre of landscape buffer along Winding Way and Rampart Drive. Primary access to the residential development would be via Winding Way. A secondary access is proposed connecting to Rampart Drive directly east of the project site and existing residential development. An emergency access corridor would be provided to the south, connecting to Jan Drive. See Figure 4, *Residential Site Plan*.

1.3 CONSTRUCTION ACTIVITIES AND PHASING

Project construction start and phasing was unknown at the time of this analysis. Project construction is anticipated to commence in late summer 2023 and be completed in one phase (including both the retail and the residential development) lasting approximately 18 months, completing in early 2025. Construction activities would include demolition (removal of existing asphalt pavement), site preparation, grading, paving, building construction, and architectural coating (e.g., painting). The project applicant anticipates grading cut/fill to be balanced on-site (no import or export of soil). Detailed construction activity and equipment assumptions are summarized in Section 4.1, *Methodology*, and provided in Appendix A, *CalEEMod Output*.

2.0 REGULATORY SETTING

2.1 AIR QUALITY

The project site is located within the southern portion of the Sacramento Valley Air Basin (SVAB). Air quality in the Sacramento County portion of the SVAB is regulated by the U.S. Environmental Protection Agency (USEPA) at the federal level, by the California Air Resources Board (CARB) at the state level, and by the Sacramento Metropolitan Air Quality Management District (SMAQMD) at the regional level.

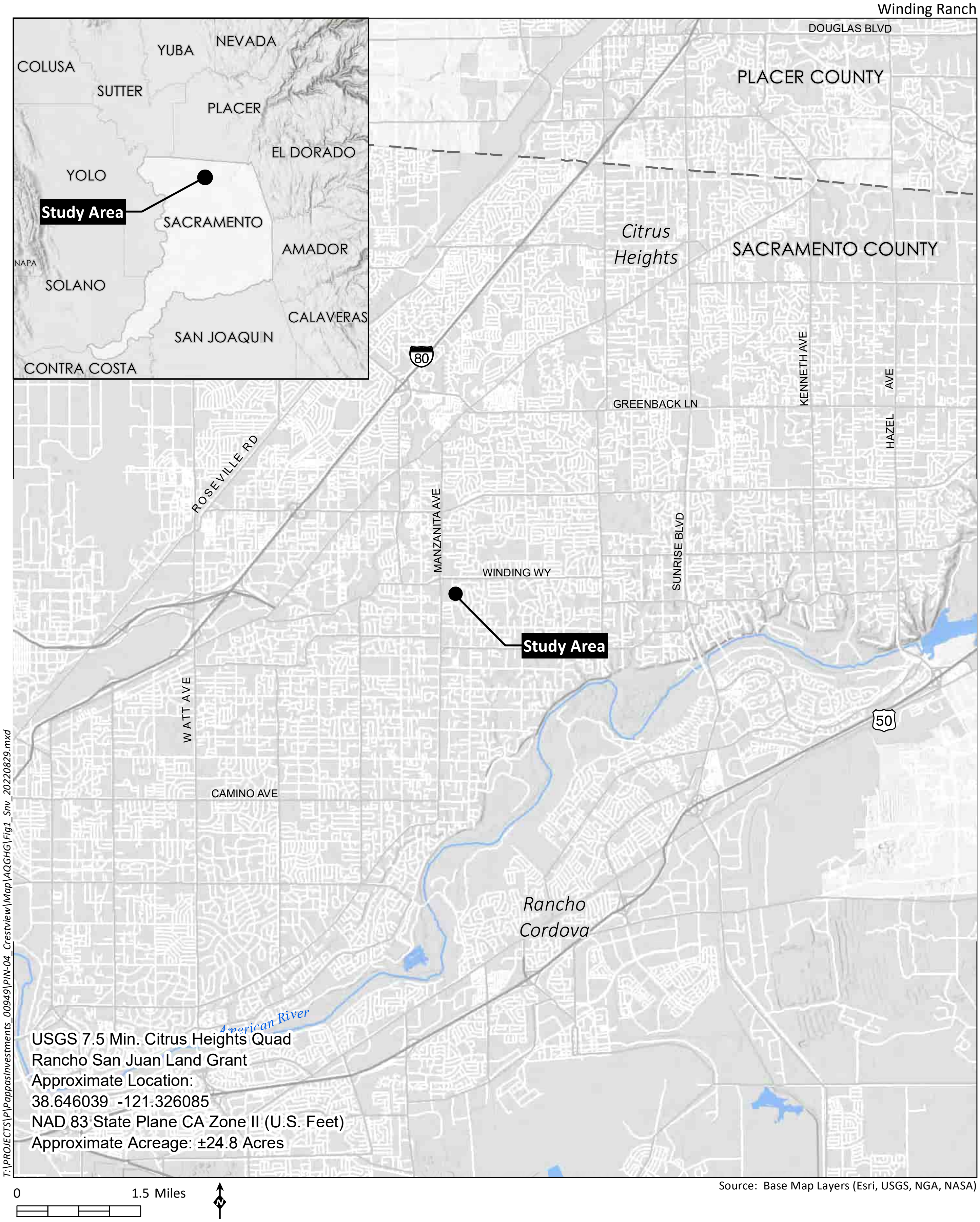
2.1.1 Air Pollutants of Concern

2.1.1.1 Criteria Pollutants

Criteria pollutants are defined by state and federal law as a risk to the health and welfare of the general public. In general, criteria air pollutants include the following compounds:

- Ozone (O_3)
- Carbon monoxide (CO)
- Nitrogen dioxide (NO_2)
- PM, which is further subdivided:
    - o Coarse PM, 10 micrometers or less in diameter (PM_{10})
    - o Fine PM, 2.5 micrometers or less in diameter ($PM_{2.5}$)
- Sulfur dioxide (SO_2)
- Lead (Pb)

Criteria pollutants can be emitted directly from sources (primary pollutants; e.g., CO, SO_2, PM_{10}, $PM_{2.5}$, and lead), or they may be formed through chemical and photochemical reactions of precursor pollutants in the atmosphere (secondary pollutants; e.g., ozone, NO_2, PM_{10}, and $PM_{2.5}$). PM_{10} and $PM_{2.5}$ can be both



Source: Base Map Layers (Esri, USGS, NGA, NASA)

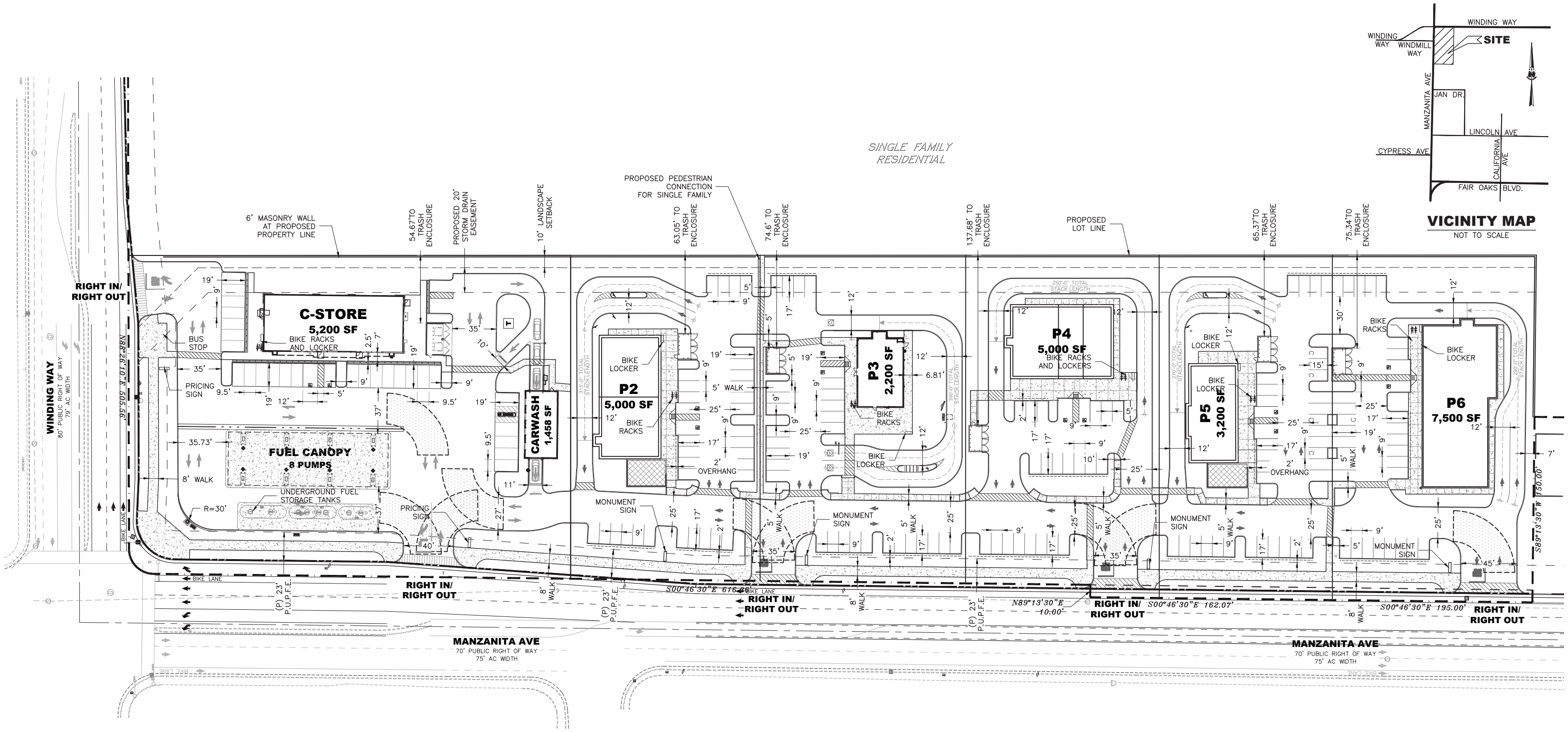
Vicinity Map

Figure 1

Source: Aerial (DigitalGlobe 4/26/2022)

Aerial Map

Figure 2



PROJECT SUMMARY:

OWNER/DEVELOPMENT

PAPPAS GATEWAY LP
PAPPAS ARIZONA LIMITED PARTNERSHIP
2020 L STREET, 5TH FLOOR
SACRAMENTO, CA 95811
CONTACT: THAD JOHNSON
(916) 447-7100

ENGINEER/APPLICANT

RSC ENGINEERING, INC.
1420 ROCKY RIDGE DRIVE, SUITE 150
ROSEVILLE, CA 95661
CONTACT: TIFFANY WILSON
(916) 788-2884

ASSESSOR'S PARCEL NUMBER

245-0011-018
245-0011-20 AND 021 (PORTION OF)

EXISTING AND PROPOSED ZONE

FAIR OAKS CORRIDOR PLAN
COMMERCIAL MIXED USE

EXISTING AND PROPOSED LAND USE

TRANSIT ORIENTED DEVELOPMENT CORRIDOR PLAN

SITE AREA

6.801± AC
(296,248± SF)

SERVICE PROVIDERS

WATER:	CARMICHAEL WATER DISTRICT
SEWER:	SACRAMENTO AREA SEWER DISTRICT (SASD)
DRAINAGE:	COUNTY OF SACRAMENTO
ELECTRICITY:	SMUD
GAS:	PG&E
SCHOOL DISTRICT:	SAN JUAN UNIFIED SCHOOL DISTRICT
PARKS	CARMICHAEL PARKS DISTRICT
FIRE	SACRAMENTO METRO FIRE DISTRICT
SOLID WASTE:	COUNTY OF SACRAMENTO WASTE MANAGEMENT AND RECYCLING

FLOOD PLAIN DESIGNATION

ZONE X 0606C0089H
DATED AUGUST 16, 2012

BUILDING SUMMARY

C-STORE:	5,200± SF
CARWASH:	1,458± SF
P2 W/DRIVE THRU:	5,000± SF
P3 W/DRIVE THRU:	2,200± SF
P4 W/DRIVE THRU:	5,000± SF
P5 W/DRIVE THRU:	3,200± SF
P6 W/DRIVE THRU:	7,500± SF
TOTAL:	29,558± SF

PARKING PROPOSED

C-STORE/CARWASH:	38 STALLS
P2 W/DRIVE THRU:	35 STALLS
P3 W/DRIVE THRU:	31 STALLS
P4 W/ DRIVE THRU:	23 STALLS
P5 W/DRIVE THRU:	36 STALLS
P6 W/ DRIVE THRU:	31 STALLS
TOTAL:	194 STALLS

C-STORE AND RETAIL: 1/250 SF (12,870 SF, 69 STALLS)
FOOD USE: 1 PER 3 SEATS (375 SEATS, 125 STALLS)
OVERALL TOTAL: 194 STALLS PROPOSED

PARKING REQUIRED

C-STORE/CARWASH:	21 STALLS
P2 W/DRIVE THRU:	35 STALLS
P3 W/DRIVE THRU:	31 STALLS
P4 W/ DRIVE THRU:	23 STALLS
P5 W/DRIVE THRU:	36 STALLS
P6 W/ DRIVE THRU:	31 STALLS
TOTAL:	177 STALLS

C-STORE AND RETAIL: 1/250 SF (12,870 SF, 52 STALLS)
FOOD USE: 1 PER 3 SEATS (375 SEATS, 125 STALLS)
OVERALL TOTAL: 177 STALLS REQUIRED

BIKE PARKING PROPOSED

6 BIKE LOCKERS AND 12 BIKE RACKS

BIKE PARKING REQUIRED

6 BIKE LOCKERS AND 12 BIKE RACKS

LEGEND:

EXISTING PARCEL LINE
PROPOSED PARCEL LINE
EXISTING RIGHT-OF-WAY
EXISTING EASEMENT
PROPOSED SITE LIGHT
PROPOSED TRASH ENCLSOURE
PROPOSED BIO-RETENTION
25'
PROPOSED FIRE TRUCK ROUTE
INSIDE RADIUS = 25'
OUTSIDE RADIUS = 50'
PROPOSED 6' MASONRY WALL

40 0 20 40 80
1 inch = 40 ft.

SHEET INDEX:

1. SP1 PRELIMINARY SITE PLAN
2. GR1 PRELIMINARY OVERALL GRADING PLAN
3. GR2 PRELIMINARY GRADING PLAN
4. SEC1 PRELIMINARY CROSS SECTIONS
5. UT1 PRELIMINARY UTILITY PLAN
6. SWQ1 PRELIMINARY STORMWATER QUALITY PLAN
7. PL1 PRELIMINARY LANDSCAPE PLAN
8. CE1 PHOTOMETRIC PLAN – NORTH
9. CE2 PHOTOMETRIC PLAN – SOUTH
10. CE3 TL-24 NRCC-LTO-E

Source: RSC Engineering, 2022

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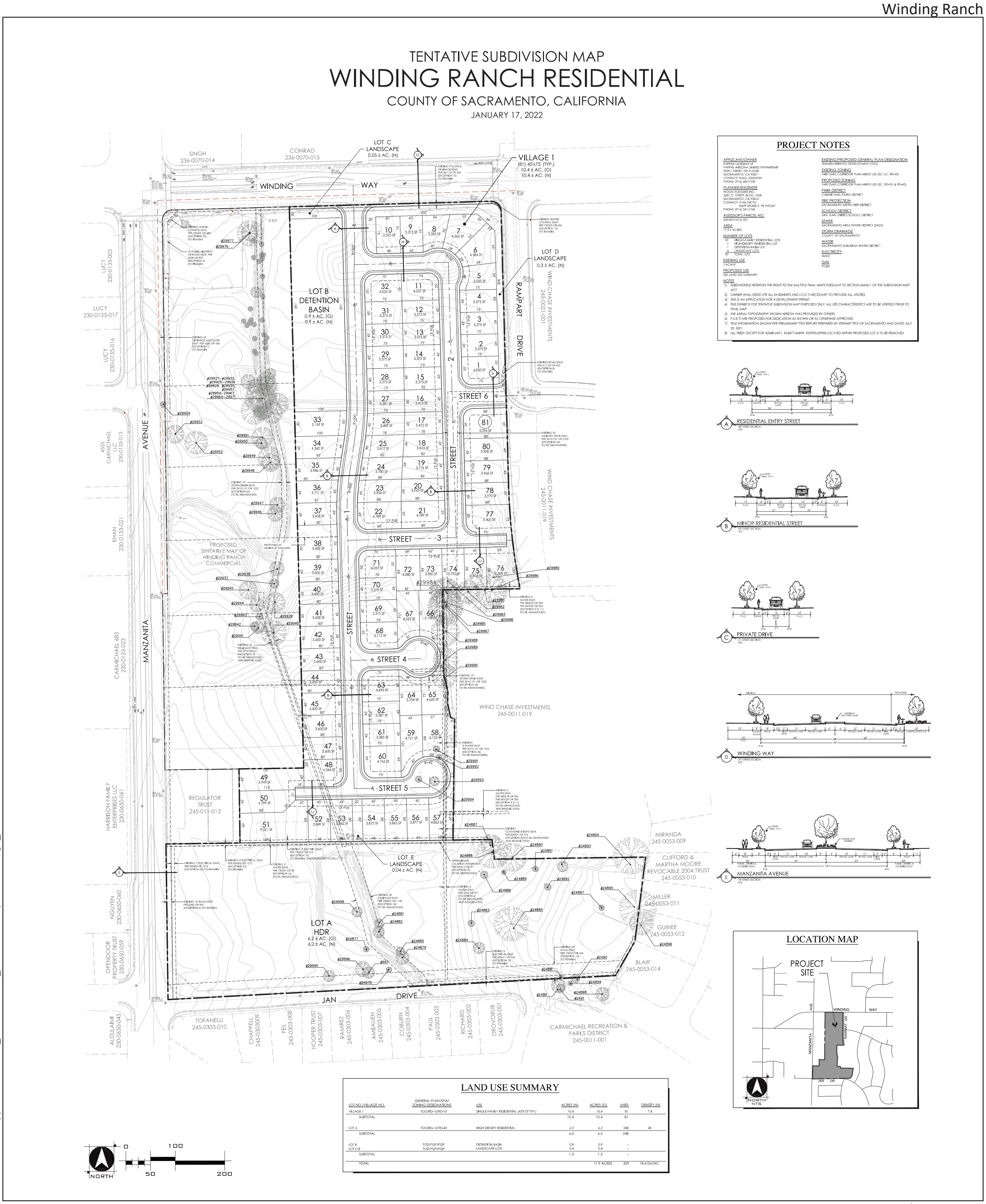
Retail Site Plan

Figure 3



Source: Wood Rogers, 2022

HELIX
Environmental Planning

Residential Site Plan

Figure 4

primary and secondary pollutants. The principal precursor pollutants of concern are reactive organic gases ([ROGs] also known as volatile organic compounds [VOCs])[1] and nitrogen oxides (NO_X).

The descriptions of sources and general health effects for each of the criteria air pollutants are shown in Table 1, *Summary of Common Sources and Human Health Effects of Criteria Air Pollutants*, based on information provided by the California Air Pollution Control Officers Association ([CAPCOA] 2022). Specific adverse health effects on individuals or population groups induced by criteria pollutant emissions are highly dependent on a multitude of interconnected variables such as cumulative concentrations, local meteorology and atmospheric conditions, and the number and characteristics of exposed individuals (e.g., age, gender). Criteria pollutant precursors (ROG and NO_X) affect air quality on a regional scale, typically after significant delay and distance from the pollutant source emissions. Health effects related to ozone and NO_2 are, therefore, the product of emissions generated by numerous sources throughout a region. Emissions of criteria pollutants from vehicles traveling to or from the project site (mobile emissions) are distributed nonuniformly in location and time throughout the region, wherever the vehicles may travel. As such, specific health effects from these criteria pollutant emissions cannot be meaningfully correlated to the incremental contribution from the project.

Table 1
SUMMARY OF COMMON SOURCES AND HUMAN HEALTH EFFECTS OF CRITERIA AIR POLLUTANTS

Pollutant	Major Man-Made Sources	Human Health Effects
Carbon Monoxide (CO)	An odorless, colorless gas formed when carbon in fuel is not burned completely; a component of motor vehicle exhaust.	Reduces the ability of blood to deliver oxygen to vital tissues, affecting the cardiovascular and nervous system. Impairs vision, causes dizziness, and can lead to unconsciousness or death.
Nitrogen Dioxide (NO_2)	A reddish-brown gas formed during fuel combustion for motor vehicles and industrial sources. Sources include motor vehicles, electric utilities, and other sources that burn fuel.	Respiratory irritant; aggravates lung and heart problems. Precursor to ozone and acid rain. Contributes to climate change and nutrient overloading, which deteriorates water quality. Causes brown discoloration of the atmosphere.
Ozone (O_3)	Formed by a chemical reaction between reactive organic gases (ROGs) and nitrogen oxides (NO_X) in the presence of sunlight. Common sources of these precursor pollutants include motor vehicle exhaust, industrial emissions, gasoline storage and transport, solvents, paints, and landfills.	Irritates and causes inflammation of the mucous membranes and lung airways; causes wheezing, coughing, and pain when inhaling deeply; decreases lung capacity; aggravates lung and heart problems. Damages plants; reduces crop yield. Damages rubber, some textiles, and dyes.
Particulate Matter (PM_{10} and $PM_{2.5}$)	Produced by power plants, steel mills, chemical plants, unpaved roads and parking lots, wood-burning stoves and fireplaces, automobiles, and other sources.	Increased respiratory symptoms, such as irritation of the airways, coughing, or difficulty breathing; aggravated asthma; development of chronic bronchitis; irregular heartbeat; nonfatal heart attacks; and premature death in people with heart or lung disease. Impairs visibility (haze).

[1] CARB defines and uses the term ROGs while the USEPA defines and uses the term VOCs. The compounds included in the lists of ROGs and VOCs and the methods of calculation are slightly different. However, for the purposes of estimating criteria pollutant precursor emissions, the two terms are often used interchangeably.

Pollutant	Major Man-Made Sources	Human Health Effects
Sulfur Dioxide (SO_2)	A colorless, nonflammable gas formed when fuel containing sulfur is burned, when gasoline is extracted from oil, or when metal is extracted from ore. Examples are petroleum refineries, cement manufacturing, metal processing facilities, locomotives, and ships.	Respiratory irritant. Aggravates lung and heart problems. In the presence of moisture and oxygen, sulfur dioxide converts to sulfuric acid, which can damage marble, iron, and steel. Damages crops and natural vegetation. Impairs visibility. Precursor to acid rain.
Lead	Metallic element emitted from metal refineries, smelters, battery manufacturers, iron and steel producers, use of leaded fuels by racing and aircraft industries.	Anemia, high blood pressure, brain and kidney damage, neurological disorders, cancer, lowered IQ. Affects animals, plants, and aquatic ecosystems.

Source: CAPCOA 2022

2.1.1.2 Toxic Air Contaminants

The Health and Safety Code (§39655, subd. (a).) defines a toxic air contaminant (TAC) as "an air pollutant which may cause or contribute to an increase in mortality or in serious illness, or which may pose a present or potential hazard to human health." A substance that is listed as a hazardous air pollutant pursuant to subsection (b) of Section 112 of the Federal Clean Air Act (CAA) (42 United States Code Section 7412[b]) is a TAC. Under State law, the California Environmental Protection Agency (CalEPA), acting through CARB, is authorized to identify a substance as a TAC if it determines the substance is an air pollutant that may cause or contribute to an increase in mortality or an increase in serious illness, or that may pose a present or potential hazard to human health.

Diesel engines emit a complex mixture of air pollutants, including both gaseous and solid material. The solid material in diesel exhaust is referred to as diesel particulate matter (DPM). Almost all DPM is 10 microns or less in diameter, and 90 percent of DPM is less than 2.5 microns in diameter (CARB 2022a). Because of their extremely small size, these particles can be inhaled and eventually trapped in the bronchial and alveolar regions of the lung. In 1998, CARB identified DPM as a TAC based on published evidence of a relationship between diesel exhaust exposure and lung cancer and other adverse health effects. DPM has a notable effect on California's population—it is estimated that about 70 percent of total known cancer risk related to air toxics in California is attributable to DPM (CARB 2022a).

Activities at gasoline dispensing facilities can release TACs into the air, including the organic compounds benzene, toluene, and xylene.[2] Benzene is a potent carcinogen and is one of the highest risk air pollutants regulated by CARB. Toluene and xylenes are not considered carcinogens, but they (along with benzene) can contribute to chronic health conditions. Emissions of benzene are known to be the dominate source of health risks from gasoline vapors. Not until the benzene emissions are several orders of magnitude above the 10 in 1 million cancer risk threshold do the emissions of other TACs in gasoline begin to cause adverse health effects. Therefore, other TAC concentrations and resulting health risks do not need to be determined unless the cancer risk from benzene emissions exceeds 100 in 1 million (CAPCOA 1997). Note that, although the proposed gas station would include diesel dispensing, TACs associated with diesel vapor are not released in quantities sufficient enough to require analysis or

[2] Gasoline vapor can contain as many as 16 different TACs, including 3 carcinogens. Benzene, toluene, and xylenes are the focus of the 1997 CAPCOA Gas Station Risk Assessment Guidelines, which concluded that only cancer risk from benzene needs to be evaluated.

reporting. For example, gasoline in the U.S. contains 0.6 to 1.3 percent benzene by volume, diesel fuel contains less than 0.02 percent benzene (International Agency on Research for Cancer [IARC] 1989).

2.1.2 Federal Air Quality Regulations

2.1.2.1 Federal Clean Air Act

Air quality is defined by ambient air concentrations of specific pollutants identified by the USEPA to be of concern with respect to health and welfare of the general public. The USEPA is responsible for enforcing the CAA of 1970 and its 1977 and 1990 Amendments. The CAA required the USEPA to establish National Ambient Air Quality Standards (NAAQS), which identify concentrations of pollutants in the ambient air below which no adverse effects on the public health and welfare are anticipated. In response, the USEPA established both primary and secondary standards for several criteria pollutants. Table 2, *Ambient Air Quality Standards*, shows the federal and state ambient air quality standards for these pollutants.

Table 2
AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	California Standards	Federal Standards Primary[1]	Federal Standards Secondary[2]
O_3	1 Hour	0.09 ppm (180 μg/m^3)	–	–
	8 Hour	0.070 ppm (137 μg/m^3)	0.070 ppm (137 μg/m^3)	Same as Primary
PM_{10}	24 Hour	50 μg/m^3	150 μg/m^3	Same as Primary
	AAM	20 μg/m^3	–	Same as Primary
$PM_{2.5}$	24 Hour	–	35 μg/m^3	Same as Primary
	AAM	12 μg/m^3	12.0 μg/m^3	15.0 μg/m^3
CO	1 Hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	–
	8 Hour	9.0 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	–
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)	–	–
NO_2	1 Hour	0.18 ppm (339 μg/m^3)	0.100 ppm (188 μg/m^3)	–
	AAM	0.030 ppm (57 μg/m^3)	0.053 ppm (100 μg/m^3)	Same as Primary
SO_2	1 Hour	0.25 ppm (655 μg/m^3)	0.075 ppm (196 μg/m^3)	–
	3 Hour	–	–	0.5 ppm (1,300 μg/m^3)
	24 Hour	0.04 ppm (105 μg/m^3)	–	–
Lead	30-day Avg.	1.5 μg/m^3	–	–
	Calendar Quarter	–	1.5 μg/m^3	Same as Primary
	Rolling 3-month Avg.	–	0.15 μg/m^3	Same as Primary
Visibility Reducing Particles	8 Hour	Extinction coefficient of 0.23 per km – visibility ≥ 10 miles (0.07 per km – ≥30 miles for Lake Tahoe)	No Federal Standards	No Federal Standards

Pollutant	Averaging Time	California Standards	Federal Standards Primary[1]	Federal Standards Secondary[2]
Sulfates	24 Hour	25 μg/m^3	No Federal Standards	No Federal Standards
Hydrogen Sulfide	1 Hour	0.03 ppm (42 μg/m^3)	No Federal Standards	No Federal Standards
Vinyl Chloride	24 Hour	0.01 ppm (26 μg/m^3)	No Federal Standards	No Federal Standards

Source: CARB 2016

1 National Primary Standards: The levels of air quality necessary, within an adequate margin of safety, to protect the public health.

2 National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

O_3 = ozone; ppm: parts per million; μg/m^3 = micrograms per cubic meter; PM_{10} = particulate matter with an aerodynamic diameter of 10 microns or less; AAM = Annual Arithmetic Mean; $PM_{2.5}$ = fine particulate matter; CO = carbon monoxide; mg/m^3 = milligrams per cubic meter; NO_2 = nitrogen dioxide; SO_2 = sulfur dioxide; km = kilometer; – = No Standard

The USEPA has classified air basins (or portions thereof) as being in "attainment," "nonattainment," "maintenance," or "unclassified" for each criteria air pollutant, based on whether or not the NAAQS have been achieved. Upon attainment of a standard for which an area was previously designated nonattainment, the area will be classified as a maintenance area. If an area is designated unclassified, it is because inadequate air quality data were available as a basis for a nonattainment or attainment designation. The project site is located within the Sacramento County portion of the SVAB and, as such, is in an area designated as a nonattainment area for certain pollutants that are regulated under the CAA. Table 3, *Sacramento County Attainment Status*, lists the federal and state attainment status of Sacramento County for the criteria pollutants. Sacramento County is designated as nonattainment for the state and federal ozone standards, the state PM_{10} standards, and the federal $PM_{2.5}$ standards.

Table 3
SACRAMENTO COUNTY ATTAINMENT STATUS

Pollutant	State of California Attainment Status	Federal Attainment Status
Ozone (1 hour)	Nonattainment	No Federal Standard
Ozone (8 hour)	Nonattainment	Nonattainment
Coarse Particulate Matter (PM_{10})	Nonattainment	Attainment
Fine Particulate Matter ($PM_{2.5}$)	Attainment	Nonattainment
Carbon Monoxide (CO)	Attainment	Attainment
Nitrogen Dioxide (NO_2)	Attainment	Attainment
Lead	Attainment	Attainment
Sulfur Dioxide (SO_2)	Attainment	Attainment
Sulfates	Attainment	No Federal Standard
Hydrogen Sulfide	Unclassified	No Federal Standard
Visibility Reducing Particles	Unclassified	No Federal Standard

Source: SMAQMD 2020a

2.1.3 California Air Quality Regulations

2.1.3.1 California Clean Air Act

The federal CAA allows states to adopt ambient air quality standards and other regulations provided that they are at least as stringent as federal standards. CARB, a part of the CalEPA, is responsible for the coordination and administration of both federal and state air pollution control programs within California, including setting the California Ambient Air Quality Standards (CAAQS). CARB also conducts research, compiles emission inventories, develops suggested control measures, and provides oversight of local programs. CARB establishes emissions standards for motor vehicles sold in California, consumer products (such as hairspray, aerosol paints, and barbecue lighter fluid), and various types of commercial equipment. It also sets fuel specifications to further reduce vehicular emissions.

In addition to primary and secondary AAQS, the state has established a set of episode criteria for ozone, CO, NO_2, SO_2, and PM. These criteria refer to episode levels representing periods of short-term exposure to air pollutants that actually threaten public health. Table 3, above, lists the state attainment status of Sacramento County for the criteria pollutants. Under state designation, Sacramento County is currently in attainment for CO, NO_2, SO_2, $PM_{2.5}$, and lead; and in nonattainment for ozone and PM_{10}.

2.1.3.2 State Implementation Plan

The CAA requires areas with unhealthy levels of ozone, inhalable particulate matter, carbon monoxide, nitrogen dioxide, and sulfur dioxide to develop plans, known as State Implementation Plans (SIPs). SIPs are comprehensive plans that describe how an area will attain the NAAQS. The 1990 amendments to the CAA set deadlines for attainment based on the severity of an area's air pollution problem.

SIPs are not single documents—they are a compilation of new and previously submitted plans, programs (e.g., monitoring, modeling, permitting), district rules, state regulations and federal controls. Many of California's SIPs rely on a core set of control strategies, including emission standards for cars and heavy trucks, fuel regulations and limits on emissions from consumer products. State law makes CARB the lead agency for all purposes related to the SIP. Local air districts and other agencies prepare SIP elements and submit them to CARB for review and approval. CARB forwards the SIP revisions to the USEPA for approval and publication in the Federal Register. The Code of Federal Regulations (CFR) Title 40, Chapter I, Part 52, Subpart F, Section 52.220 lists all of the items that are included in the California SIP (CARB 2009). At any one time, several California submittals are pending USEPA approval.

2.1.3.3 California Energy Code

California Code of Regulations (CCR) Title 24 Part 6, California's Energy Efficiency Standards for Residential and Nonresidential Buildings, were first established in 1978 in response to a legislative mandate to reduce California's energy consumption. Energy-efficient buildings require less electricity, natural gas, and other fuels. Electricity production from fossil fuels and on-site fuel combustion (typically for space and water heating) results primarily in GHG emissions. The California Energy Code is discussed in further detail in Section 2.2.4, below.

2.1.4 Local Regulations

2.1.4.1 Sacramento Metropolitan Air Quality Management District

Air quality in Sacramento County is regulated by the SMAQMD. As a regional agency, the SMAQMD works directly with the Sacramento Area Council of Governments (SACOG), County transportation commissions, and local governments and cooperates actively with all federal and state government agencies. The SMAQMD develops rules and regulations; establishes permitting requirements for stationary sources; inspects emissions sources; and enforces such measures through educational programs or fines, when necessary.

Air Quality Plans

The current air quality plan applicable to the project, the *Sacramento Regional 2008 NAAQS 8-Hour Ozone Attainment and Reasonable Further Progress Plan* (Regional Ozone Plan), was developed by the SMAQMD and adjacent air district to describe how the air districts in and near the Sacramento metropolitan area will continue the progress toward attaining state and national ozone air quality standards (SMAQMD 2017). In addition to not attaining the federal or state ozone standards, the region is classified nonattainment for the federal $PM_{2.5}$ standard and the state PM_{10} standard. The SMAQMD and other Sacramento region air districts have submitted a $PM_{2.5}$ Implementation/Maintenance Plan and Re-Designation Requests to fulfill CAA requirements to re-designate the region from nonattainment to attainment of the $PM_{2.5}$ NAAQS (SMAQMD 2013).

Rules and Regulations

The following rules promulgated by the SMAQMD would be applicable to construction and/or operation of the project.

Rule 202 – New Source Review: Provides for the issuance of authorities to construct and permits to operate at new and modified stationary air pollution sources, including for the construction and operation of a retail gasoline dispensing facility (SMAQMD 2012).

Rule 402 – Nuisance: Prohibits the discharge of such quantities of air contaminants or other materials which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or the public (SMAQMD 1977a).

Rule 403 – Fugitive Dust: Requires actions to prevent, reduce or mitigate anthropogenic fugitive dust emissions, including emissions from construction activities. (SMAQMD 1977b).

Rule 442 – Architectural Coating: Establishes VOC limits for architectural coatings (e.g., paints, stains, preservatives). Building interior and exterior paint is limited to a maximum VOC content of 50 grams per liter for flat coatings and 100 grams per liter for non-flat coatings (SMAQMD 2015).

Rule 448 – Gasoline Transfer into Stationary Storage Containers: Limits emissions resulting from the transfer of gasoline into any stationary storage container by requiring implementation of CARB certified Phase I vapor recovery systems (SMAQMD 2009a).

Rule 449 – Transfer of Gasoline in vehicle Fuel Tanks: Limits emissions resulting from the transfer of gasoline into vehicle fuel tanks by requiring implementation of CARB certified Phase II vapor recovery systems (SMAQMD 2009b).

Best Management Practices

Because Sacramento County is in nonattainment for ozone, PM_{10}, and $PM_{2.5}$, the SMAQMD requires the implementation of the following Basic Construction Emission Control Practices (BCECPs), regardless of the project's significance determination under CEQA (SMAQMD 2019):

- Water all exposed surfaces two times daily. Exposed surfaces include, but are not limited to, soil piles, graded areas, unpaved parking areas, staging areas, and access roads;

- Cover or maintain at least two feet of free board space on haul trucks transporting soil, sand, or other loose material on the site. Any haul trucks that would be traveling along freeways or major roadways should be covered;

- Use wet power vacuum street sweepers to remove any visible trackout mud or dirt onto adjacent public roads at least once a day. Use of dry power sweeping is prohibited;

- Limit vehicle speeds on unpaved roads to 15 miles per hour (mph);

- All roadways, driveways, sidewalks, and parking lots to be paved should be completed as soon as possible. In addition, building pads should be laid as soon as possible after grading unless seeding or soil binders are used;

- Minimize idling time by either shutting equipment off when not in use or reducing time of idling to 5 minutes. Provide clear signage that posts this requirement for workers at the entrances to the site; and

- Maintain all construction equipment in proper working condition according to manufacturer's specifications. The equipment must be checked by a certified mechanic and determine to be running in proper condition before it is operated.

2.1.4.2 Sacramento County General Plan

The Sacramento County General Plan Air Quality Element contains the following policies relevant to the project (County 2020):

AQ-1 New development shall be designed to promote pedestrian/bicycle access and circulation to encourage community residents to use alternative modes of transportation to conserve air quality and minimize direct and indirect emission of air contaminants.

AQ-4 Developments which meet or exceed thresholds of significance for ozone precursor pollutants, and/or GHG as adopted by the SMAQMD, shall be deemed to have a significant environmental impact. An Air Quality Mitigation Plan and/or a Greenhouse Gas Reduction Plan shall be submitted to the County of Sacramento prior to project approval, subject to review and recommendation as to technical adequacy by the Sacramento Metropolitan Air Quality Management District.

AQ-3 Buffers and/or other appropriate exposure reduction measures shall be established on a project-by project basis and incorporated during review to provide for protection of sensitive receptors from sources of air pollution or odor. The California Air Resources Board's "Strategies to Reduce Air Pollution Exposure Near High Volume Roadways" Technical Advisory and the SMAQMD's "Mobile Sources Air Toxics Protocol" or County of Sacramento General Plan 2 Air Quality Element Amended December 16, 2020 applicable AQMD guidance shall be utilized when establishing these exposure reduction measures.

AQ-4B Land uses with sensitive receptors (such as residences, schools, senior care facilities and day care centers) which are proposed within 500 feet of a freeway or other high-volume roadway (defined as an urban roadway with more than 100,000 average daily trips or a rural roadway with more than 50,000 average daily trips), a railyard or an active railroad shall incorporate exposure reduction measures consistent with the guidance listed in Air Quality Element policy AQ-3.

AQ-16 Prohibit the idling of on-and off-road engines when the vehicle is not moving or when the off-road equipment is not performing work for a period of time greater than five minutes in any one-hour period.

2.2 GREENHOUSE GASES

2.2.1 Climate Change Overview

Global climate change refers to changes in average climatic conditions on Earth including temperature, wind patterns, precipitation, and storms. Global temperatures are moderated by atmospheric gases. These gases are commonly referred to as GHGs because they function like a greenhouse by letting sunlight in but preventing heat from escaping, thus warming the Earth's atmosphere.

GHGs are emitted by natural processes and human (anthropogenic) activities. Anthropogenic GHG emissions are primarily associated with: (1) the burning of fossil fuels during motorized transport, electricity generation, natural gas consumption, industrial activity, manufacturing, and other activities; (2) deforestation; (3) agricultural activity; and (4) solid waste decomposition.

The temperature record shows a decades-long trend of warming, with 2016 global surface temperatures ranking as the warmest year on record since 1880. The newest release in long-term warming trends announced 2020 ranked as tied with 2016 for the warmest year on record with an increase of 1.84 degrees Fahrenheit compared to the 1951-1980 average (National Aeronautics and Space Administration [NASA] 2021). GHG emissions from human activities are the most significant driver of observed climate change since the mid-20th century (United Nations Intergovernmental Panel on Climate Change [IPCC] 2013). The IPCC constructed several emission trajectories of GHGs needed to stabilize global temperatures and climate change impacts. The statistical models show a "high confidence" that temperature increase caused by anthropogenic GHG emissions could be kept to less than two degrees Celsius relative to pre-industrial levels if atmospheric concentrations are stabilized at about 450 parts per million (ppm) carbon dioxide equivalent (CO_2e) by the year 2100 (IPCC 2014).

2.2.2 Types of Greenhouse Gases

The GHGs defined under California's AB 32 include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6).

Carbon Dioxide. CO_2 is the most important and common anthropogenic GHG. CO_2 is an odorless, colorless GHG. Natural sources include the decomposition of dead organic matter; respiration of bacteria, plants, animals, and fungi; evaporation from oceans; and volcanic outgassing. Anthropogenic sources of CO_2 include burning fuels, such as coal, oil, natural gas, and wood. Data from ice cores indicate that CO_2 concentrations remained steady prior to the current period for approximately 10,000 years. The atmospheric CO_2 concentration in 2010 was 390 ppm, 39 percent above the concentration at the start of the Industrial Revolution (approximately 280 ppm in 1750). In July 2022, the CO_2 concentration was 419 ppm, a 50 percent increase since 1750 (National Oceanic and Atmospheric Administration [NOAA] 2022).

Methane. CH_4 is the main component of natural gas used in homes. A natural source of methane is from the decay of organic matter. Geological deposits known as natural gas fields contain methane, which is extracted for fuel. Other sources are from decay of organic material in landfills, fermentation of manure, and cattle digestion.

Nitrous Oxide. N_2O is produced by both natural and human-related sources. N_2O is emitted during agricultural and industrial activities, as well as during the combustion of fossil fuels and solid waste. Primary human-related sources of N_2O are agricultural soil management, animal manure management, sewage treatment, mobile and stationary combustion of fossil fuel, adipic (fatty) acid production, and nitric acid production.

Hydrofluorocarbons. Hydrofluorocarbons are commonly used by federal agencies in a wide variety of applications, including refrigeration, air-conditioning (AC), building insulation, fire extinguishing systems, and aerosols. HFCs have high global warming potential (GWP), raising concern about their impacts as they become increasingly used as replacements for ozone-depleting substances (ODS), and as economic growth spurs demand for new equipment, especially in the refrigeration/AC sector.

Perfluorocarbons. Perfluorocarbons are synthetic compounds containing just fluorine and carbon. They are generally colorless, odorless, non-flammable gases at environmental temperatures and for the most part chemically unreactive. PFCs replace chlorofluorocarbons (CFCs) in manufacturing semiconductors. They are also used as solvents in the electronics industry, and as refrigerants of some specialized refrigeration systems.

Sulfur Hexafluoride. SF_6 is an inorganic, odorless, colorless, nontoxic, nonflammable gas. SF_6 is used for insulation in electric power transmission and distribution equipment, in the magnesium industry, in semi-conductor manufacturing, and as a tracer gas for leak detection.

GHGs have long atmospheric lifetimes that range from one year to several thousand years. Long atmospheric lifetimes allow for GHG emissions to disperse around the globe. Because GHG emissions vary widely in the power of their climatic effects, climate scientists have established a unit called GWP. The GWP of a gas is a measure of both potency and lifespan in the atmosphere as compared to CO_2. For example, a gas with a GWP of 10 is 10 times more potent than CO_2 over 100 years. CO_2e is a quantity that enables all GHG emissions to be considered as a group despite their varying GWP. The GWP of each GHG is multiplied by the prevalence of that gas to produce CO_2e.

Historically, GHG emission inventories have been calculated using the GWPs from the IPCC's Second Assessment Report (SAR). In 2007, IPCC updated the GWP values based on the latest science at the time in its Fourth Assessment Report (AR4). The updated GWPs in the IPCC AR4 have begun to be used in recent GHG emissions inventories. In 2013, IPCC again updated the GWP values based on the latest science in its Fifth Assessment Report (AR5) (IPCC 2013). However, United Nations Framework Convention on Climate Change (UNFCCC) reporting guidelines for national inventories require the use of GWP values from the AR4. To comply with international reporting standards under the UNFCCC, official emission estimates for California and the U.S. are reported using AR4 GWP values, and statewide and national GHG inventories have not yet updated their GWP values to the AR5 values. Project GHG emissions in this analysis are reported using the AR4 GWP values (IPCC 2007).

By applying the GWP ratios, project-related CO_2e emissions can be tabulated in metric tons per year. Typically, the GWP ratio corresponding to the warming potential of CO_2 over a 100-year period is used as a baseline. The atmospheric lifetime and GWP of selected GHGs are summarized in Table 4, *Global Warming Potentials and Atmospheric Lifetimes*.

Table 4
GLOBAL WARMING POTENTIALS AND ATMOSPHERIC LIFETIMES

Greenhouse Gas	Atmospheric Lifetime (years)	IPCC SAR GWP	IPCC AR4 GWP	IPCC AR5 GWP
Carbon Dioxide (CO_2)	50-200	1	1	1
Methane (CH_4)	12	21	25	28
Nitrous Oxide (N_2O)	114	310	298	265
HFC-134a	14	1,300	1,430	1,300
PFC: Tetraflouromethane (CF_4)	50,000	6,500	7,390	6,630
PFC: Hexafluoroethane (C_2F_6)	10,000	9,200	12,200	11,100
Sulfur Hexafluoride (SF_6)	3,200	23,900	22,800	23,500

Source: IPCC 2007
IPCC = Intergovernmental Panel on Climate Change; GWP = global warming potential; HFC = hydrofluorocarbon; PFC = perfluorocarbon

2.2.3 Federal Greenhouse Gas Regulations

2.2.3.1 Federal Clean Air Act

The U.S. Supreme Court ruled on April 2, 2007, in *Massachusetts v. U.S. Environmental Protection Agency* that CO_2 is an air pollutant, as defined under the CAA, and that the USEPA has the authority to regulate emissions of GHGs. The USEPA announced that GHGs (including CO_2, CH_4, N_2O, HFC, PFC, and SF_6) threaten the public health and welfare of the American people (USEPA 2021). This action was a prerequisite to finalizing the USEPA's GHG emissions standards for light-duty vehicles, which were jointly proposed by the USEPA and the United States Department of Transportation's National Highway Traffic Safety Administration (NHTSA).

2.2.3.2 Light-Duty Vehicle Greenhouse Gas Emissions Standards and Corporate Average Fuel Economy Standards

The USEPA and the NHTSA worked together on developing a national program of regulations to reduce GHG emissions and to improve fuel economy of light-duty vehicles. The USEPA established the first-ever national GHG emissions standards under the CAA, and the NHTSA established CAFE standards under the

Energy Policy and Conservation Act. On April 1, 2010, the USEPA and NHTSA announced a joint Final Rulemaking that established standards for 2012 through 2016 model year vehicles. This was followed up on October 15, 2012, when the agencies issued a Final Rulemaking with standards for model years 2017 through 2025. On August 2, 2018, the agencies released a notice of proposed rulemaking—the Safer Affordable Fuel-Efficient Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks (SAFE Vehicles Rule). The purpose of the SAFE Vehicles Rule is "to correct the national automobile fuel economy and greenhouse gas emissions standards to give the American people greater access to safer, more affordable vehicles that are cleaner for the environment." The direct effect of the rule is to eliminate the standards that were put in place to gradually raise average fuel economy for passenger cars and light trucks under test conditions from 37 miles per gallon (mpg) in 2020 to 50 mpg in 2025 (USEPA and NHTSA 2020).

On March 9, 2022, the USEPA withdrew the SAFE Vehicles Rule Part I (SAFE-1) and restored California's (and other states) authority under the CAA to implement its own GHG emission standards and zero emission vehicle (ZEV) sales mandate.

2.2.4 California Greenhouse Gas Regulations

2.2.4.1 California Code of Regulations, Title 24, Part 6

CCR Title 24 Part 6: California's Energy Efficiency Standards for Residential and Nonresidential Buildings were first established in 1978 in response to a legislative mandate to reduce California's energy consumption. Energy-efficient buildings require less electricity, natural gas, and other fuels. Electricity production from fossil fuels and on-site fuel combustion (typically for space or water heating) results in GHG emissions.

The Title 24 standards are updated approximately every three years to allow consideration and possible incorporation of new energy efficiency technologies and methods. The 2019 Title 24 standards went into effect on January 1, 2020. The 2019 update to the Building Energy Efficiency Standards focuses on several key areas to improve the energy efficiency of newly constructed buildings and additions and alterations to existing buildings. The most significant efficiency improvement to the residential standards is a requirement for onsite photovoltaic electricity generation (e.g., solar panels) for most new or modified residential building up to three stories high (California Energy Commission [CEC] 2019). On August 11, 2021, the CEC adopted the 2022 Title 24 Building Energy Efficiency Standards. Buildings whose permit applications are applied for on or after January 1, 2023, must comply with the 2022 Title 24 standards. Additions to the 2022 Title 24 Standards include establishing electric-ready requirements when natural gas is installed, expanding solar photovoltaic (PV) system requirements to include more land use types (including commercial office and retail buildings), and strengthening ventilation standards to improve indoor air quality (CEC 2022).

The standards are divided into three basic sets. First, there is a basic set of mandatory requirements that apply to all buildings. Second, there is a set of performance standards—the energy budgets—that vary by climate zone (of which there are 16 in California) and building type; thus, the standards are tailored to local conditions. Finally, the third set constitutes an alternative to the performance standards, which is a set of prescriptive packages that are basically a recipe or a checklist compliance approach.

2.2.4.2 California Green Building Standards Code

The California Green Building Standards Code (CALGreen; CCR Title 24, Part 11) is a code with mandatory requirements for all nonresidential buildings (including industrial buildings) and residential buildings for which no other state agency has authority to adopt green building standards. The current 2019 Standards for new construction of, and additions and alterations to, residential and nonresidential buildings went into effect on January 1, 2020 (California Building Standards Commission [CBSC] 2019). The CBSC approved the 2022 CALGreen standards on October 22, 2021. Buildings whose permit applications are applied for on or after January 1, 2023, must comply with the 2022 CALGreen standards.

The development of CALGreen is intended to (1) cause a reduction in GHG emissions from buildings; (2) promote environmentally responsible, cost-effective, healthier places to live and work; (3) reduce energy and water consumption; and (4) respond to the directives by the Governor. In short, the code is established to reduce construction waste; make buildings more efficient in the use of materials and energy; and reduce environmental impact during and after construction.

CALGreen contains requirements for storm water control during construction; construction waste reduction; indoor water use reduction; material selection; natural resource conservation; site irrigation conservation; and more. The code provides for design options allowing the designer to determine how best to achieve compliance for a given site or building condition. The code also requires building commissioning, which is a process for the verification that all building systems, like heating and cooling equipment and lighting systems, are functioning at their maximum efficiency.

2.2.4.3 Executive Order S-3-05

On June 1, 2005, Executive Order (EO) S-3-05 proclaimed that California is vulnerable to climate change impacts. It declared that increased temperatures could reduce snowpack in the Sierra Nevada, further exacerbate California’s air quality problems, and potentially cause a rise in sea levels. To avoid or reduce climate change impacts, EO S-3-05 calls for a reduction in GHG emissions to the year 2000 level by 2010, to year 1990 levels by 2020, and to 80 percent below 1990 levels by 2050.

2.2.4.4 Assembly Bill 32 – Global Warming Solution Act of 2006

The California Global Warming Solutions Act of 2006, widely known as AB 32, requires that CARB develop and enforce regulations for the reporting and verification of statewide GHG emissions. CARB is directed by AB 32 to set a GHG emission limit, based on 1990 levels, to be achieved by 2020. The bill requires CARB to adopt rules and regulations in an open public process to achieve the maximum technologically feasible and cost-effective GHG emission reductions.

2.2.4.5 Executive Order B-30-15

On April 29, 2015, EO B-30-15 established a California GHG emission reduction target of 40 percent below 1990 levels by 2030. The EO aligns California’s GHG emission reduction targets with those of leading international governments, including the 28 nation European Union. California exceeded the target of reducing GHGs emissions to 1990 levels by 2020, as established in AB 32. California’s new emission reduction target of 40 percent below 1990 levels by 2030 will make it possible to reach the goal established by EO S-3-05 of reducing emissions 80 percent under 1990 levels by 2050.

2.2.4.6 Senate Bill 32

Senate Bill (SB) 32 (Amendments to the California Global Warming Solutions Action of 2006) extends California's GHG reduction programs beyond 2020. SB 32 amended the Health and Safety Code to include Section 38566, which contains language to authorize CARB to achieve a statewide GHG emission reduction of at least 40 percent below 1990 levels by no later than December 31, 2030. SB 32 codified the targets established by EO B-30-15 for 2030, which set the next interim step in the State's continuing efforts to pursue the long-term target expressed in EO B-30-15 of 80 percent below 1990 emissions levels by 2050.

2.2.4.7 Assembly Bill 197

A condition of approval for SB 32 was the passage of AB 197. AB 197 requires that CARB consider the social costs of GHG emissions and prioritize direct reductions in GHG emissions at mobile sources and large stationary sources. AB 197 also gives the California legislature more oversight over CARB through the addition of two legislatively appointed members to the CARB Board and the establishment a legislative committee to make recommendations about CARB programs to the legislature.

2.2.4.8 Assembly Bill 1493 – Vehicular Emissions of Greenhouse Gases

AB 1493 (Pavley) requires that CARB develop and adopt regulations that achieve "the maximum feasible reduction of GHGs emitted by passenger vehicles and light-duty truck and other vehicles determined by CARB to be vehicles whose primary use is noncommercial personal transportation in the State." On September 24, 2009, CARB adopted amendments to the Pavley regulations that intend to reduce GHG emissions in new passenger vehicles from 2009 through 2016. The amendments bind California's enforcement of AB 1493 (starting in 2009), while providing vehicle manufacturers with new compliance flexibility. In January 2012, CARB approved a new emissions-control program for model years 2017 through 2025. The program combines the control of smog, soot, and global warming gases and requirements for greater numbers of zero-emission vehicles into a single packet of standards called Advanced Clean Cars (CARB 2021b).

2.2.4.9 Assembly Bill 341

The state legislature enacted AB 341 (California Public Resource Code Section 42649.2), increasing the diversion target to 75 percent statewide. AB 341 requires all businesses and public entities that generate 4 cubic yards or more of waste per week to have a recycling program in place. The final regulation was approved by the Office of Administrative Law on May 7, 2012 and went into effect on July 1, 2012.

2.2.4.10 Executive Order S-01-07

This EO, signed by Governor Schwarzenegger on January 18, 2007, directs that a statewide goal be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by the year 2020. It orders that a Low Carbon Fuel Standard (LCFS) for transportation fuels be established for California and directs CARB to determine whether a LCFS can be adopted as a discrete early action measure pursuant to AB 32. CARB approved the LCFS as a discrete early action item with a regulation adopted and implemented in April 2010. Although challenged in 2011, the Ninth Circuit reversed the District Court's opinion and rejected arguments that implementing LCFS violates the interstate commerce clause in September 2013. CARB is therefore continuing to implement the LCFS statewide.

2.2.4.11 Senate Bill 350

Approved by Governor Brown on October 7, 2015, SB 350 increases California's renewable electricity procurement goal from 33 percent by 2020 to 50 percent by 2030. This will increase the use of Renewables Portfolio Standard eligible resources, including solar, wind, biomass, and geothermal. In addition, large utilities are required to develop and submit Integrated Resource Plans to detail how each entity will meet their customers resource needs, reduce GHG emissions, and increase the use of clean energy.

2.2.4.12 Senate Bill 375

SB 375, the Sustainable Communities and Climate Protection Act of 2008, supports the State's climate action goals to reduce GHG emissions through coordinated transportation and land use planning with the goal of more sustainable communities.

Under the Sustainable Communities Act, CARB sets regional targets for GHG emissions reductions from passenger vehicle use. In 2010, CARB established these targets for 2020 and 2035 for each region covered by one of the State's metropolitan planning organizations (MPOs). CARB periodically reviews and updates the targets, as needed.

Each of California's MPOs must prepare a Sustainable Communities Strategy (SCS) as an integral part of its regional transportation plan (RTP). The SCS contains land use, housing, and transportation strategies that, if implemented, would allow the region to meet its GHG emission reduction targets. Once adopted by the MPO, the RTP/SCS guides the transportation policies and investments for the region. CARB must review the adopted SCS to confirm and accept the MPOs' determination that the SCS, if implemented, would meet the regional GHG targets. If the combination of measures in the SCS would not meet the regional targets, the MPO must prepare a separate alternative planning strategy (APS) to meet the targets. The APS is not a part of the RTP. Qualified projects consistent with an approved SCS or Alternative Planning Strategy categorized as "transit priority projects" would receive incentives to streamline CEQA processing.

2.2.4.13 Senate Bill 100

Approved by Governor Brown on September 10, 2018, SB 100 extends the renewable electricity procurement goals and requirements of SB 350. SB 100 requires that all retail sale of electricity to California end-use customers be procured from 100 percent eligible renewable energy resources and zero-carbon resources by the end of 2045.

2.2.4.14 California Air Resources Board: Scoping Plan

On December 11, 2008, the CARB adopted the Scoping Plan (CARB 2008) as directed by AB 32. The Scoping Plan proposes a set of actions designed to reduce overall GHG emissions in California to the levels required by AB 32. Measures applicable to development projects include those related to energy-efficiency building and appliance standards, the use of renewable sources for electricity generation, regional transportation targets, and green building strategy. Relative to transportation, the Scoping Plan includes nine measures or recommended actions related to reducing VMT and vehicle GHGs through fuel and efficiency measures. These measures would be implemented statewide rather than on a project-by-project basis.

In response to EO B-30-15 and SB 32, all state agencies with jurisdiction over sources of GHG emissions were directed to implement measures to achieve reductions of GHG emissions to meet the 2030 and 2050 targets. CARB was directed to update the Scoping Plan to reflect the 2030 target and, therefore, is moving forward with the update process (CARB 2014). The mid-term target is critical to help frame the suite of policy measures, regulations, planning efforts, and investments in clean technologies and infrastructure needed to continue driving down emissions. CARB is moving forward with a second update to the Scoping Plan to reflect the 2030 target set by EO B-30-15 and codified by SB 32. The 2017 Climate Change Scoping Plan Update, Proposed Strategy for Achieving California's 2030 Greenhouse Gas Target, was adopted in December 2017. The Scoping Plan Update establishes a proposed framework for California to meet a 40 percent reduction in GHGs by 2030 compared to 1990 levels (CARB 2017).

2.2.5 Regional GHG Policies and Plans

2.2.5.1 Sacramento Area Council of Governments

As required by the Sustainable Communities and Climate Protection Act of 2008 (SB 375), SACOG has developed the 2020 Metropolitan Transportation Plan and Sustainable Communities Strategy (MTP/SCS). This plan seeks to reduce GHG and other mobile source emissions through coordinated transportation and land use planning to reduce VMT (SACOG 2019).

2.2.5.2 County of Sacramento

In November 2011, the County approved the Phase 1 Climate Action Plan Strategy and Framework (CAP), which is the first phase of developing a community-level Climate Action Plan. The Phase 1 CAP provides a framework and overall policy strategy for reducing GHG emissions and managing our resources in order to comply with AB 32. It also highlights actions already taken to become more efficient and targets future mitigation and adaptation strategies. In September 2012, the County adopted the Phase 2A CAP to address reducing GHG emissions for County operations. Neither the Phase 1 CAP nor the Phase 2A CAP are "qualified" GHG reduction plans for the purposes of streamlined impact analysis of GHG emissions per Section 15183.5 of the CEQA Guidelines.

As part of an update to the General Plan, the County is preparing a new Community Wide CAP which will be a qualified GHG reduction plan in accordance with Section 15183.5 of the CEQA Guidelines (County 2021). As of this analysis, the new Community Wide CAP and Addendum to the General Plan Update Environmental Impact Report is in progress with a public comment period ending in late September 2022 and the County Board of Supervisors to consider adoption in November or December 2022. At the time of this analysis, the addendum EIR has not been certified and the new Community Wide CAP has not been adopted.

2.2.5.3 Sacramento Municipal Utility District

In April 2021, the Sacramento Municipal Utility District (SMUD; the electricity provider for Sacramento County, including the project site) Board of Directors approved the 2030 Zero Carbon Plan to achieve a goal of carbon neutral operations and carbon free electricity delivered to customers by 2030. The 2030 Zero Carbon Plan includes the retirement of natural gas-powered generation plants, installation of utility-owned and customer-owned renewable energy generation and energy storage, and research on new technologies and business models (SMUD 2021).

3.0 EXISTING CONDITIONS

3.1 SURROUNDING LAND USES

The project site is located in a generally suburban residential area. The project site currently is currently vacant, contains no structures, and is primarily covered by grass/ruderal vegetation. Land uses surrounding the project site include: multi-family residences adjacent to the project site to the east, across Manzanita Avenue to the west, and across Manzanita Avenue and Winding Way to the northwest; single-family residences to the south across Jan Drive, and to the southwest across Manzanita Avenue; senior living apartments to the northeast across Winding Way; and retail development to the north across Winding Way, to the west across Manzanita Avenue, and adjacent to the project site to the south (see Figure 2).

3.2 SENSITIVE RECEPTORS

Some land uses are considered more sensitive to air pollution than others due to the types of population groups or activities involved and are referred to as sensitive receptors. Examples of these sensitive receptors are residences, schools, hospitals, and daycare centers. CARB and the Office of Environmental Health Hazard Assessment (OEHHA) have identified the following groups of individuals as the most likely to be affected by air pollution: the elderly over 65, children under 14, infants (including in utero in the third trimester of pregnancy), and persons with cardiovascular and chronic respiratory diseases such as asthma, emphysema, and bronchitis (CARB 2005; OEHHA 2015).

Residential areas are considered sensitive receptors to air pollution because residents (including children and the elderly) tend to be at home for extended periods of time, resulting in sustained exposure to any pollutants present. Children and infants are considered more susceptible to health effects of air pollution due to their immature immune systems, developing organs, and higher breathing rates. As such, schools are also considered sensitive receptors, as children are present for extended durations and engage in regular outdoor activities.

The closest sensitive receptors to the project site are multi-family houses adjacent to the project site to the east. The closest existing sensitive receptors to the proposed gas station are multi-family residences approximately 385 feet northwest (across Manzanita Avenue and Winding Way) of the proposed project gas pump location. The closest school to the project site is the Sacramento Adventist Academy, approximately 1,600 feet to the west.

3.3 CLIMATE AND METEOROLOGY

The climate of the SVAB is characterized by hot dry summers and mild rainy winters. During the year, the temperature may range from 20 to 115 degrees Fahrenheit with summer highs usually in the 90s and winter lows occasionally below freezing. Average annual rainfall is about 20 inches with snowfall being very rare. The prevailing winds are moderate in strength and vary from moist breezes from the south to dry land flows from the north. The mountains surrounding the Sacramento Valley create a barrier to airflow, which can trap air pollutants in the valley when certain meteorological conditions are right, and a temperature inversion (areas of warm air overlying areas of cooler air) exists. Air stagnation in the autumn and early winter occurs when large high-pressure cells lie over the valley. The lack of surface wind during these periods and the reduced vertical flow caused by less surface heating reduces the influx of outside air and allows pollutants to become concentrated in the air. The surface concentrations of pollutants are highest when these conditions are combined with increased levels of smoke or when temperature inversions trap cool air, fog, and pollutants near the ground. The ozone season (May through October) in the SVAB is characterized by stagnant morning air or light winds with the breeze arriving in the afternoon out of the southwest from the San Francisco Bay. Usually, the evening breeze transports the airborne pollutants to the north out of the SVAB. During about half of the days from July to September, however, a phenomenon called the “Schultz Eddy” prevents this from occurring. Instead of allowing for the prevailing wind patterns to move north carrying the pollutants out of the valley, the Schultz Eddy causes the wind pattern and pollutants to circle back southward. This phenomenon’s effect exacerbates the pollution levels in the area and increases the likelihood of violating the federal and state air quality standards (SMAQMD 2020a).

The predominant wind direction in the vicinity of the project site is from the southeast and the average wind speed is approximately 6.1 mph, as measured at the Sacramento McClellan Airport, approximately 4 miles northwest of the project site (Iowa Environmental Mesonet [IEM] 2021). The annual average maximum temperature in the project area, as measured at the Sacramento 5 ESE climatic station, approximately 8 miles southwest of the project site, is approximately 73.1 degrees Fahrenheit (°F), and the annual average minimum temperature is approximately 49.8°F. Total precipitation in the project area averages approximately 18.2 inches annually. Precipitation occurs mostly during the winter and relatively infrequently during the summer (Western Regional Climate Center [WRCC] 2017).

3.4 EXISTING AIR QUALITY

3.4.1 Criteria Pollutants

3.4.1.1 Attainment Designations

Attainment designations are discussed in Section 2.1 and Table 2. Sacramento County is a federal nonattainment area for 8-hour ozone and $PM_{2.5}$. Sacramento County is also a state nonattainment area for 1-hour and 8-hour ozone and PM_{10}.

3.4.1.2 Monitored Air Quality

The SMAQMD maintains monitoring stations to measure ambient concentrations of pollutants in the county. The closest monitoring station is the Sacramento-Del Paso Manor monitoring station, approximately 3 miles southwest of the project site. Table 5, *Air Quality Monitoring Data*, presents a summary of the ambient pollutant concentrations monitored at Del Paso Manor monitoring station during the most recent three years (2019 through 2021) for which the SMAQMD has reported data.

Table 5
AIR QUALITY MONITORING DATA

Pollutant Standard	2018	2019	2020
Ozone (O_3)			
Maximum concentration 1-hour period (ppm)	0.087	0.120	0.110
Maximum concentration 8-hour period (ppm)	0.069	0.085	0.090
Days above 1-hour state standard (>0.09 ppm)	0	4	7
Days above 8-hour state/federal standard (>0.070 ppm)	0	10	17
Coarse Particulate Matter (PM_{10})			
Maximum 24-hour concentration (μg/m^3)	53.0	188.0	63.0
Measured Days above 24-hr state standard (>50 μg/m^3)	5	17	2
Measured Days above 24-hr federal standard (>150 μg/m^3)	0	1	0
Annual average (μg/m^3)	20.2	30.5	18.3
Exceed state annual standard (20 μg/m^3)	Yes	Yes	No
Fine Particulate Matter ($PM_{2.5}$)			
Maximum 24-hour concentration (μg/m^3)	41.4	147.3	90.0
Measured Days above 24-hour federal standard (>35 μg/m^3)	3	27	5
Annual average (μg/m^3)	8.2	14.6	10.2
Exceed state and federal annual standard (12 μg/m^3)	No	Yes	No
Nitrogen Dioxide (NO_2)			
Maximum 1-hour concentration (ppm)	0.051	0.046	0.024
Days above state 1-hour standard (0.18 ppm)	0	0	0
Days above federal 1-hour standard (0.100 ppm)	0	0	0
Annual average (ppm)	0.006	0.005	*
Exceed annual federal standard (0.053 ppm)	No	No	*
Exceed annual state standard (0.030 ppm)	No	No	*

Source: CARB 2022b
ppb = parts per billion; ppm = parts per million; μg/m^3 = micrograms per cubic meter; * = insufficient data available

As shown in Table 5, The 1- and 8-hour ozone, PM_{10}, and $PM_{2.5}$ standards were exceeded numerous times in each of the sample years. Data for NO_2 showed no exceedances.

3.4.2 Greenhouse Gases

In 2019, total GHG emissions worldwide were estimated at 49,760 million metric tons (MMT) of CO_2e emissions (Climate Watch 2022). The U.S. contributed the second largest portion (12 percent) of global GHG emissions in 2019 with 5,770 MMT CO_2e, of which 82 percent was CO_2 emission (Climate Watch 2022).

CARB performed statewide inventories for the years 1990 to 2019, as shown in Table 6, *California Greenhouse Gas Emissions by Sector*. The inventory is divided into five broad sectors of economic activity: agriculture, commercial and residential, electricity generation, industrial, and transportation. Emissions are quantified in MMT CO_2e.

Table 6
CALIFORNIA GREENHOUSE GAS EMISSIONS BY SECTOR

Sector	1990 Emissions (MMT CO_2e)	2000 Emissions (MMT CO_2e)	2010 Emissions (MMT CO_2e)	2019 Emissions (MMT CO_2e)
Agriculture and Forestry	18.9 (4%)	31.0 (7%)	33.7 (8%)	31.8 (8%)
Commercial and Residential	44.1 (10%)	45.8 (10%)	52.2 (12%)	43.8 (43.8%)
Electricity Generation	110.5 (26%)	105.4 (22%)	90.6 (20%)	58.8 (14%)
Industrial	105.3 (24%)	105.8 (22%)	101.8 (23%)	88.2 (21%)
Transportation	150.6 (35%)	183.2 (39%)	170.2 (38%)	166.1 (40%)
Unspecified Remaining	1.3 (<1%)	0.0 (0%)	0.0 (0%)	0.0 (0%)
TOTAL	**430.7**	**471.1**	**448.5**	**418.2**

Source: CARB 2007 and CARB 2022c
MMT = million metric tons; CO2e = carbon dioxide equivalent

As shown in Table 6, statewide GHG source emissions totaled 431 MMT CO_2e in 1990, 471 MMT CO_2e in 2000, 449 MMT CO_2e in 2010, and 418 MMT CO_2e in 2019. Transportation-related emissions consistently contribute the most GHG emissions, followed by electricity generation and industrial emissions (CARB 2007; CARB 2022c).

A GHG emissions inventory for unincorporated communities of Sacramento County was prepared as part of the General Plan Update/draft CAP. The 2015 baseline emissions inventory is shown below in Table 7, *Sacramento County Greenhouse Gas Emissions by Sector*. The sectors included in this inventory are somewhat different from those in the statewide inventory. Similar to the statewide emissions, transportation (on-road vehicles) related GHG emissions contributed the most in Sacramento County with 34 percent of the total (County 2021).

Table 7
SACRAMENTO COUNTY GREENHOUSE GAS EMISSIONS BY SECTOR (MT CO_2e)

Sector	2015
Residential Energy	1,193,311 (24.6%)
Commercial Energy	890,603 (18.3%)
On-Road Vehicles	1,671,596 (34.3%)
Off-Road Vehicles	196,769 (4.1%)
Solid Waste	352,909 (7.3%)
Agriculture	254,899 (5.3%)
High-GWP Gasses	251,085 (5.2%)
Wastewater	27,253 (0.6%)
Water Related	2,219 (<0.1%)
TOTAL	**4,853,647**

Source: Sacramento County 2021
MT = metric tons; CO_2e = carbon dioxide equivalent

4.0 METHODOLOGY AND SIGNIFICANCE CRITERIA

4.1 METHODOLOGY

Criteria pollutant and GHG emissions were calculated using the California Emissions Estimator Model (CalEEMod), Version 2020.4.0. CalEEMod is a computer model used to estimate air emissions resulting from land development projects throughout the state of California. CalEEMod was developed by CAPCOA in collaboration with the California air quality management and pollution control districts. The calculation methodology, source of emission factors used, and default data is described in the CalEEMod User's Guide, and User's Guide Appendices A, D, and E (CAPCOA 2021).

In brief, CalEEMod is a computer model that estimates criteria air pollutant and greenhouse gas emissions from mobile (i.e., vehicular) sources, area sources (fireplaces, woodstoves, and landscape maintenance equipment), energy use (electricity and natural gas used in space heating, ventilation, and cooling; lighting; and plug-in appliances), water use and wastewater generation, and solid waste disposal. Emissions are estimated based on land use information input to the model by the user.

In the first module, the user defines the specific land uses that will occur at the project site. The user also selects the appropriate land use setting (urban or rural), operational year, location, climate zone, and utility provider. The input land uses, size features, and population are used throughout CalEEMod in determining default parameters and calculations in each of the subsequent modules. The input land use information consists of land use subtypes (such as the residential subtypes of single-family residential and multi-family medium-rise residential) and their unit or square footage quantities.

Subsequent modules include construction (including off-road vehicle emissions), mobile (on-road vehicle emissions), area sources (architectural coatings [painting], consumer products [cleansers, aerosols, solvents]), water and wastewater, and solid waste. Each module comprises multiple components including an associated mitigation module to account for further reductions in the reported baseline calculations. Other inputs include trip generation rates, trip lengths, vehicle fleet mix (percentage autos, trucks, etc.), trip distribution (percent work to home, etc.), duration of construction phases, construction equipment usage, grading areas, season, and ambient temperature, as well as other parameters.

In various places the user can input additional information and/or override the default assumptions to account for project- or location-specific parameters. For this assessment, the default parameters were not changed unless otherwise noted. The CalEEMod output files are included in Appendix A to this report.

4.1.1 Construction Emissions

CalEEMod has the capability to calculate reductions in construction emissions from the effects of dust control, diesel-engine classifications, and other selected emissions reduction measures. CalEEMod estimates construction emissions for each year of construction activity based on the annual construction equipment profile and other factors determined as needed to complete all phases of construction by the target completion year. As such, each year of construction activity has varying quantities of GHG emissions.

4.1.1.1 Construction Activities

Construction emissions were calculated based on an estimated earliest feasible construction start date of January 2023, and on CalEEMod default construction activity lengths for the project land uses and size. The quantity, duration, and intensity of construction activity influence the amount of construction emissions and related pollutant concentrations that occur at any one time. As such, the emission forecasts provided herein reflect a specific set of conservative assumptions based on the expected construction scenario wherein a relatively large amount of construction activity is occurring in a relatively intensive manner. Because of this conservative assumption, actual emissions could be less than those forecasted. If construction is delayed or occurs over a longer time period, emissions could be reduced because of: (1) a more modern and cleaner-burning construction equipment fleet mix than assumed in CalEEMod; and/or (2) a less intensive buildout schedule (i.e., fewer daily emissions occurring over a longer time interval).

The construction activities and schedule were modeled using CalEEMod defaults and assumptions based on project characteristics. Construction activities would include demolition, site preparation, grading, paving, building construction, and architectural coatings. The project site is currently vacant and contains no structures, however, demolition activities would remove approximately 1,510 cubic yards (CY) of old asphalt. Construction is assumed to occur five days per week with equipment operating up to eight hours per day. Per estimates from the project applicant, grading would result in approximately 45,000 CY of cut and 45,000 CY of fill, balanced on-site (no import or export of soil). Based on estimates using aerial images, an export of 3,100 CY of vegetation was assumed during site preparation. Architectural coating was assumed to occur concurrently with the last 6 months of building construction. The construction schedule assumed in the modeling is shown in Table 8, *Anticipated Construction Schedule*.

Table 8
ANTICIPATED CONSTRUCTION SCHEDULE

Construction Activity	Construction Period Start	Construction Period End	Number of Working Days
Demolition	8/1/2023	8/28/2023	20
Site Preparation	8/29/2023	9/11/2023	10
Grading	9/12/2023	10/23/2023	30
Paving	10/24/2023	11/20/2023	20
Building Construction	11/21/2023	1/13/2025	300
Architectural Coatings	7/30/2024	1/13/2025	120

Source: CalEEMod

4.1.1.2 Construction Off-Road Equipment

Construction would require the use of heavy off-road equipment. Construction equipment estimates are based on CalEEMod defaults. A water truck was assumed to be used during demolition, site preparation, and grading. Table 9, *Construction Equipment Assumptions*, presents a summary of the assumed equipment that would be involved in each stage of construction.

Table 9
CONSTRUCTION EQUIPMENT ASSUMPTIONS

Equipment	Horsepower	Number	Hours/Day
Demolition			
Concrete/Industrial Saws	81	1	8
Excavators	158	3	8
Rubber-Tired dozers	247	2	8
Water Trucks	402	1	4
Site Preparation			
Water Truck	402	1	4
Rubber Tired Dozers	247	3	8
Tractors/Loaders/Backhoes	97	4	8
Grading			
Excavators	158	2	8
Graders	187	1	8
Water Trucks	402	1	4
Rubber Tired Dozers	247	1	8
Scrapers	367	2	8
Tractors/Loaders/Backhoes	97	2	8
Paving			
Pavers	130	2	8
Paving Equipment	132	2	8
Rollers	80	2	8
Building Construction			
Cranes	231	1	7
Forklifts	89	3	8
Generator Sets	84	1	8
Tractors/Loaders/Backhoes	97	3	7
Welders	46	1	8
Architectural Coating			
Air Compressors	78	1	6

Source: CalEEMod

4.1.1.3 Construction On-Road Trips

Worker commute trips and vendor delivery trips were modeled based on CalEEMod defaults. Worker trips are anticipated to vary between 15 and 197 trips per day, depending on construction activity. Approximately 150 truckloads of old asphalt would be exported over 20 days during demolition and approximately 194 truckloads of vegetation would be exported over 10 days during site preparation. The CalEEMod default worker, vendor and haul trip distances were used in the model.

4.1.2 Operation Emissions

Operational GHG emissions impacts were estimated using CalEEMod. Operational sources of emissions include area, energy, transportation, water use, and solid waste. Operational emissions were estimated for the first anticipated full year of project operation (2025).

4.1.2.1 Area Source Emissions

Area sources include emissions from landscaping equipment, the use of consumer products, the reapplication of architectural coatings for maintenance, and hearths. Emissions associated with area sources were estimated using the CalEEMod default values.

4.1.2.2 Energy Emissions

Development within the project would use electricity for lighting, heating, cooling, and other appliances. Electricity generation typically entails the combustion of fossil fuels, including natural gas and coal, which is then transmitted to end users. A building's electricity use is thus associated with the off-site, or indirect, emission of GHGs at the source of electricity generation (power plant).

Energy source emissions were estimated assuming implementation of energy-reducing project design features to comply with the 2019 Title 24 standards which include a requirement for new residential buildings with three or fewer residential floors to have on-site generation of electricity through photovoltaic (solar) panels. Based on the anticipated average home size of 2,000 SF (per the project applicant), the project's residential building (81 dwelling units) total approximately 129,600 SF of conditioned space (building floor area less unconditioned garage space) and would require solar panels producing a minimum of 193 kilowatts (kW).[3] The annual electricity generated by a rooftop mounted solar power system varies by the climate, amount of sunlight available per day, the pitch and orientation of the roof, and the efficiency of the electrical transmission. Assuming a capacity factor (CF) of 20 percent, which accounts for climate, daylight hours, roof pitch and orientation, and transmission loss, the power produced by the project's solar panels would be approximately 337,864 kilowatt-hours (kWhr) per year.[4] The complete solar power requirement calculations are included in Appendix B to this report.

As described in the GHG impact analysis, below, all projects which utilize the SMAQMD's standards to determine the significance of GHG emissions must implement project energy BMPs, including the requirement that all new land use development be designed without natural gas appliances or natural gas infrastructure, or offset the GHG emissions resulting from any use of natural gas required by the project. Accordingly, for the project residential component and the commercial retail convenience market/gas station/car wash, the CalEEMod default natural gas use was converted to equivalent kWhr of electricity (1 kilo British Thermal Unit [kBTU] of natural gas equals approximately 0.293 KWhr of electricity) which was added to the CalEEMod default electricity use. The project natural gas use for the residential and commercial retail convenience market/gas station/car wash was then set to zero. The project's 5 retail/restaurant buildings may require the use of natural gas for cooking appliances. Therefore, the default CalEEMod natural gas use was used for the project's retail/restaurant component non-Title 24 natural gas, and the Title-24 natural gas use was converted to kWhr and added to the Title 24 default electricity use.

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[3] Per the 2019 Title 24 residential building energy efficiency requirements, the minimum solar electrical generation required is calculated by kW = (CFA x A)/1000 + (DU * B), where CFA is the conditioned floor area, A is 0.613 (climate zone 12 adjustment factor), DU is the total number of dwelling units, and B is 1.4 (climate zone 12 dwelling unit factor).

[4] Solar kWhr per year can be calculated by: kWhr/year = Power Output (kW) x 24 hours/day x 365 days/year x CF, where CF is a capacity factor which accounts for climate, daylight hours, roof pitch and orientation, and transmission loss. For typical California residential systems, the CF can range between 17% and 22.5%. A CF of 20% was used in the project calculations.

4.1.2.3 Vehicular (Mobile) Sources

Operational emissions from mobile source emissions are associated with project-related vehicle trip generation and trip length. A Focused Access and Circulation Study and Queue Management Plan (traffic study) was prepared for the project. According to the traffic study, the project would generate 6,513 average daily trips, including reductions for internal capture trips and pass-by trips for the retail portion of the project (Wood Rodgers 2022). The CalEEMod default trip distances were used. Because the traffic study trip generation accounts for retail pass-by trips, all project retail trips were assumed to be 100 percent primary trips.

4.1.2.4 Solid Waste Sources

The disposal of solid waste produces GHG emissions from anaerobic decomposition in landfills, incineration, and transportation of waste. CalEEMod determines the GHG emissions associated with disposal of solid waste into landfills. Portions of these emissions are biogenic. CalEEMod methods for quantifying GHG emissions from solid waste are based on the IPCC method using the degradable organic content of waste. A conservative 25 percent solid waste diversion rate was applied in CalEEMod to account for mandatory compliance with AB 341 which is not included in the model defaults.

4.1.2.5 Water Sources

Water-related GHG emissions are from the conveyance and treatment of water. CalEEMod uses the CEC's 2006 *Refining Estimates of Water-Related Energy Use in California* to establish default water-related emission factors. Modeling was conducted using these defaults and a 20 percent reduction in potable water use and wastewater generation in accordance with 2019 CALGreen requirements not accounted for in the model defaults.

4.1.2.6 Car Wash Energy and Water Use

Data from professional car wash industry surveys and reports was used to estimate the energy and water requirements for the proposed car wash. The annual number vehicles washed for the project was estimated based on a 2015 industry survey which reported an average of approximately 80,000 vehicles per year for exterior-only automated conveyor car washes (Professional Car Washing 2017). The energy requirements for the car wash were estimated using car wash industry survey cost averages of $0.50 per vehicle for electricity and $0.12 per vehicle for natural gas (Professional Car Washing 2014). The cost of $0.50 for electricity was converted to 4.69 kWhr per vehicle for electricity based on an average cost of $0.1066 per kwh for commercial customers in the U.S. in 2017 (USEIA 2018a) for a total annual electricity use of 375,200 kWhr per year. The cost of $0.12 for natural gas was converted to 15.79 kBtu per vehicle for natural gas based average cost of $7.88 per 1,000 cubic feet for commercial customers in the U.S. in 2017 (USEIA 2018b) for a total annual natural gas use of 1,263,200 kBTU per year. Because the project would be required to be all-electric, the car wash natural gas use was converted to the equivalent electricity use of 370,200 kWhr, resulting in a total project car wash electricity use of 745,400 kWhr per year. According to a report on water conservation from the International Car wash association, typical freshwater use for an automated conveyor car wash without water reclamation is 65.8 gallons per vehicle (International Carwash Association 2000). California AB 2230, signed by the Governor in 2012, requires that any conveyor car wash installed after 2013 reuse a minimum of 60 percent of the water previously used in the wash or rinse cycles. Therefore, the proposed car wash would reclaim at least 39.5 gallons per vehicle for a total water use of 26.3 gallons per vehicle. Based on

80,000 vehicles washed per year, the estimated water use for the proposed car wash would be 2,104,000 gallons per year.

4.2 SIGNIFICANCE CRITERIA

4.2.1 Air Quality

Thresholds used to evaluate potential air quality and odor impacts are based on applicable criteria in the State's California Environmental Quality Act (CEQA) Guidelines Appendix G. A significant air quality and/or odor impact could occur if the implementation of the proposed project would:

1. Conflict with or obstruct implementation of the Regional Ozone Plan, or applicable portions of the SIP; or
2. Result in a cumulatively considerable net increase of any criteria pollutant for which Sacramento County is non-attainment under an applicable NAAQS or CAAQS; or
3. Expose sensitive receptors to substantial pollutant concentrations; or
4. Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

Appendix G of the State CEQA Guidelines states that the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the above determinations. The SMAQMD has established significance thresholds to assess the regional and localized impacts of project-related air pollutant emissions. The significance thresholds are updated, as needed, to appropriately represent the most current technical information and attainment status in Sacramento County. Table 10, *SMAQMD Thresholds of Significance*, presents the most current significance thresholds, including regional daily thresholds for short-term construction and long-term operational emissions; maximum incremental cancer risk and hazard indices for TACs; and maximum ambient concentrations for exposure of sensitive receptors to localized pollutants. A project with daily emission rates, risk values, or concentrations below these thresholds is generally considered to have a less than significant effect on air quality (SMAQMD 2020b).

Table 10
SMAQMD THRESHOLDS OF SIGNIFICANCE

Pollutant	Construction	Operation
Mass Daily Thresholds (pounds per day)		
VOC	85	65
NO_X	None	65
PM_{10}	80[1]	80[1]
$PM_{2.5}$	82[1]	82[1]
Toxic Air Contaminants		
TACs	Maximum Incremental Cancer Risk ≥ 10 in 1 million Chronic & Acute Hazard Index ≥ 1.0 (project increment)	
Ambient Air Quality for Criteria Pollutants		
NO_2	1-hour average ≥ 0.18 ppm Annual average ≥ 0.03 ppm	
CO	1-hour average ≥ 20.0 ppm (state) 8-hour average ≥ 9.0 ppm (state/federal)	
SO_2	1-hour average ≥ 0.075 ppm 24-hour average ≥ 0.04 ppm	
Lead	1.5 μg/m³ 30-day average	

Source: SMAQMD 2020b

[1] PM thresholds are zero (0) unless all feasible Beast Available Control Practices/Best Management Practices are applied.

lbs/day = pounds per day; VOC = volatile organic compound; NO_X = nitrogen oxides; CO = carbon monoxide; PM_{10} = respirable particulate matter with a diameter of 10 microns or less; $PM_{2.5}$ = fine particulate matter with a diameter of 2.5 microns or less; SO_X = sulfur oxides; TACs = toxic air contaminants; GHG = greenhouse gas emissions; MT/yr = metric tons per year; CO_2e = carbon dioxide equivalent; NO_2 = nitrogen dioxide; ppm = parts per million; $\mu g/m^3$ = micrograms per cubic meter

4.2.2 Greenhouse Gases

Given the relatively small levels of emissions generated by a typical development in relationship to the total amount of GHG emissions generated on a national or global basis, individual development projects are not expected to result in significant, direct impacts with respect to climate change. However, given the magnitude of the impact of GHG emissions on the global climate, GHG emissions from new development could result in significant, cumulative impacts with respect to climate change. Therefore, the potential for a significant GHG impact is limited to cumulative impacts.

According to Appendix G of the CEQA Guidelines, a project would have a significant environmental impact if it would:

(1) Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment; or

(2) Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs.

The determination of significance is governed by CEQA Guidelines 15064.4, entitled "Determining the Significance of Impacts from Greenhouse Gas Emissions." CEQA Guidelines 15064.4(a) states, "[t]he determination of the significance of greenhouse gas emissions calls for a careful judgment by the lead agency consistent with the provisions in Section 15064. A lead agency should make a good-faith effort, based to the extent possible on scientific and factual data, to describe, calculate or estimate the amount of greenhouse gas emissions resulting from a project. A lead agency shall have discretion to determine, in the context of a particular project, whether to … [use a quantitative model or qualitative model]" (emphasis added). In turn, CEQA Guidelines 15064.4(b) clarifies that a lead agency should consider "Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project." Therefore, consistent with CEQA Guidelines 15064.4, the GHG analysis for the project appropriately relies upon a threshold based on the exercise of careful judgement and believed to be appropriate in the context of this particular project.

The SMAQMD has developed GHG emissions standards of significance for land use development projects that lead agencies can use to determine the significance of a project's emissions in relation to the County meeting the State GHG reduction mandates for the year 2030. The SMAQMD recommends a construction period GHG emissions threshold of 1,100 MT CO_2e per year. Where a qualified GHG Reduction Plan has not been adopted by the lead agency, for operational period GHG emissions, the SMAQMD recommends a screening level of 1,100 MT CO_2e per year. For all projects, regardless of project GHG emission levels, the SMAQMD requires implementation of Tier 1 Best Management Practices (BMPs). Projects that do not implement the Tier 1 Best Management Practices must conduct additional calculations to determine excess GHG emissions and provide measures either on-site or off-site to provide equivalent mitigation (SMAQMD 2020b):

- BMP 1 - projects shall be designed and constructed without natural gas infrastructure.
- BMP 2 - projects shall meet the current CALGreen Tier 2 standards, except all electric vehicle capable spaces shall instead be electric vehicle ready.

For projects which exceed 1,100 MT CO_2e per year operational screening level emissions, the SMAQMD requires implementation of Tier 2 BMPs (SMAQMD 2020b):

- BMP 3 - residential projects shall achieve a 15 percent reduction in vehicle miles traveled per resident, office projects shall achieve a 15 percent reduction in vehicle miles traveled per worker compared to existing average vehicle miles traveled for the county, and retail projects shall achieve a no net increase in total vehicle miles traveled to show consistency with SB 743.

5.0 AIR QUALITY IMPACT ANALYSIS

This section evaluates potential direct impacts of the proposed project related to the air pollutant emissions. Project-level air quality modeling was completed as part of this analysis. Complete modeling results are included as Appendix A of this report.

5.1 ISSUE 1: CONSISTENCY WITH AIR QUALITY PLANS

5.1.1 Impacts

In accordance with SMAQMD's CEQA Guide, construction-generated NO_X, PM_{10}, and $PM_{2.5}$, and operational-generated ROG and NO_X (ozone precursors) are used to determine consistency with the Regional Ozone Plan. The Guide states (SMAQMD 2020a, p. 4-6):

> *By exceeding the District's mass emission thresholds for operational emissions of ROG, NO_X, PM_{10}, or $PM_{2.5}$, the project would be considered to conflict with or obstruct implementation of the District's air quality planning efforts.*

As shown in the Section 5.2, below, the project's construction-generated emissions of NO_X, PM_{10}, and $PM_{2.5}$ and operation-generated emissions ROG and NO_X would not exceed SMAQMD thresholds. Therefore, the project would not conflict with or obstruct implementation of SMAQMD's Regional Ozone Plan.

5.1.2 Significance of Impacts

Implementation of the project would not conflict with or obstruct implementation of the SMAQMD's Regional Ozone Plan or applicable portions of the SIP, and the impact would be less than significant.

5.1.3 Mitigation Framework

Impacts would be less than significant; therefore, no mitigation measures are required.

5.1.4 Significance After Mitigation

Impacts related to conflicts with the applicable air quality plan would be less than significant without mitigation.

5.2 ISSUE 2: CUMULATIVELY CONSIDERABLE NET INCREASE OF NONATTAINMENT CRITERIA POLLUTANTS

By its very nature, air pollution is largely a cumulative impact. The nonattainment status of regional pollutants is a result of past and present development within Sacramento County. The Sacramento region is in non-attainment for ozone (ozone precursors NO_X and ROG) and particulate matter ($PM_{2.5}$ and PM_{10}). The project's emissions of these criteria pollutants and precursors during construction and operation are evaluated below.

The project would generate criteria pollutants and precursors in the short-term during construction and the long-term during operation. To determine whether a project would result in cumulatively considerable emissions that would violate an air quality standard or contribute substantially to an existing or projected air quality violation, a project's emissions are evaluated based on the quantitative emission thresholds established by the SMAQMD (as shown in Table 10).

5.2.1.1 Construction

The project's construction emissions were estimated using the CalEEMod model as described in Section 4.1.1. Model outputs are provided in Appendix A to this report. The results of the project construction modeling are shown in Table 11, *Maximum Daily Construction Emissions*. The data are presented as the maximum anticipated daily emissions for comparison with the SMAQMD thresholds. The modeling assumes implementation of the fugitive dust control measures which are quantifiable in CalEEMod, specifically watering exposed surfaces twice daily.

Table 11
MAXIMUM DAILY CONSTRUCTION EMISSIONS

Activity	ROG (lbs/day)	NO_X (lbs/day)	CO (lbs/day)	SO_X (lbs/day)	PM_{10} (lbs/day)	$PM_{2.5}$ (lbs/day)
Demolition – 2023	2.6	25.7	22.2	<0.1	3.0	1.3
Site Preparation – 2023	3.1	35.7	21.6	<0.1	11.1	6.0
Grading – 2023	3.6	36.3	30.2	<0.1	5.8	3.1
Paving – 2023	2.0	10.2	14.9	<0.1	0.6	0.5
Building Construction – 2023	2.1	17.7	21.0	<0.1	2.3	1.1
Building Construction – 2024	2.0	16.7	20.7	<0.1	2.3	1.0
Building Construction – 2025	1.9	15.6	20.3	<0.1	2.2	1.0
Architectural Coating – 2024	20.1	1.3	2.5	<0.1	0.3	0.1
Architectural Coating – 2025	20.1	1.2	2.5	<0.1	0.3	0.1
Maximum Daily Emissions[1]	**22.1**	**36.3**	**30.2**	**<0.1**	**11.1**	**6.0**
SMAQMD Thresholds	*None*	*85*	*None*	*None*	*80*	*82*
Exceed Threshold?	***No***	***No***	***No***	***No***	***No***	***No***

Source: CalEEMod; Thresholds SMAQMD 2020b
[1] Maximum daily emissions of ROG would occur during concurrent 2024 building construction and architectural coating.
lbs/day = pounds per day; ROG = reactive organic gas; NO_X = nitrogen oxides; CO = carbon monoxide; SO_X = sulfur oxides; PM_{10} = particulate matter 10 microns or less in diameter; $PM_{2.5}$ = particulate matter 2.5 microns or less in diameter

As shown in Table 11, emissions of criteria pollutants and precursors would not exceed the SMAQMD significance thresholds. Nevertheless, the SMAQMD recommends a set of BCECPs, considered by the SMAQMD to be feasible for controlling fugitive dust from a construction site. The practices also serve as BMPs, allowing the use of the non-zero particulate matter significance thresholds. The SMAQMD recommends lead agencies should add these emission control practices as Conditions of Approval (COA) or include in a mitigation measure (SMAQMD 2019). Because Sacramento County is in nonattainment for PM_{10} (CAAQS) and $PM_{2.5}$ (NAAQS), the SMAQMD requires the implementation of the BCECPs for any project that results in a net increase of particulate matter emissions, regardless of whether the project's emissions exceed the significance thresholds. Without implementation of the BCECPs, construction emissions of PM_{10} and $PM_{2.5}$ would be potentially significant. Mitigation Measure AQ-1 would require implementation of the SMAQMD's recommended BCECPs.

5.2.1.2 Operation

The project's operational emissions were estimated using CalEEMod as described in Section 4.1.2. Model outputs are provided in Appendix A to this report. Table 12, *Maximum Daily Operational Emissions*, presents the summary of maximum daily operational emissions compared to the SMAQMD thresholds.

Table 12
MAXIMUM DAILY OPERATIONAL EMISSIONS

Source	ROG	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
Area	5.1	<0.1	6.7	<0.1	<0.1	<0.1
Energy	0.1	0.7	<0.1	<0.1	<0.1	<0.1
Mobile	11.1	11.8	89.9	0.1	14.9	4.1
Total Daily Emissions[1]	**16.3**	**12.7**	**97.3**	**0.1**	**15.0**	**4.1**
SMAQMD Thresholds	*65*	*65*	*None*	*None*	*80*	*82*
Exceed Threshold?	***No***	***No***	***No***	***No***	***No***	***No***

Source: CalEEMod; Thresholds SMAQMD 2020b
[1] Totals may not sum due to rounding.
ROG = reactive organic gas; NO_X = nitrogen oxides; CO = carbon monoxide; SO_X = sulfur oxides;
PM_{10} = particulate matter 10 microns or less in diameter; $PM_{2.5}$ = particulate matter 2.5 microns or less in diameter

As shown in Table 12, long-term emissions of criteria pollutants and precursors would not exceed the SMAQMD thresholds.

5.2.2 Significance of Impacts

While long-term operation of the project would not result in criteria pollutant and precursor pollutant emissions that would exceed the SMAQMD significance thresholds, short-term construction activities would result in an increase of emissions of PM_{10} and $PM_{2.5}$ compared to existing conditions. The SMAQMD considers any increase in construction PM emissions to be significant unless the BCECPs are implemented. Therefore, mitigation measures AQ-1 would be required to enforce implantation of the SMAQMD construction BCECPs.

5.2.3 Mitigation Framework

The following mitigation measures would be required to reduce particulate matter (fugitive dust) emissions during project construction.

AQ-1 **Basic Construction Emissions Control Practices.** The following Basic Construction Emissions Control Practices are considered feasible for controlling fugitive dust from a construction site. Control of fugitive dust is required by SMAQMD Rule 403 and enforced by SMAQMD staff. Prior to issuing grading or construction permits the County shall verify the following measures are specified on construction contracts and/or construction documentation.

- Water all exposed surfaces two times daily. Exposed surfaces include, but are not limited to soil piles, graded areas, unpaved parking areas, staging areas, and access roads.
- Cover or maintain at least two feet of free board space on haul trucks transporting soil, sand, or other loose material on the site. Any haul trucks that would be traveling along freeways or major roadways should be covered.
- Use wet power vacuum street sweepers to remove any visible trackout mud or dirt onto adjacent public roads at least once a day. Use of dry power sweeping is prohibited.
- Limit vehicle speeds on unpaved roads to 15 mph.

- All roadways, driveways, sidewalks, parking lots to be paved should be completed as soon as possible. In addition, building pads should be laid as soon as possible after grading unless seeding or soil binders are used.
- Minimize idling time by either shutting equipment off when not in use or reducing time of idling to 5 minutes. Provide clear signage that posts this requirement for workers at the entrances to the site; and
- Maintain all construction equipment in proper working condition according to manufacturer's specifications. The equipment must be checked by a certified mechanic and determine to be running in proper condition before it is operated.

5.2.4 Significance After Mitigation

With the implementation of mitigation measure AQ-1, the project would not result in a cumulatively considerable net increase of any criteria pollutant for which Sacramento Region is non-attainment, and the impact would less than significant.

5.3 ISSUE 3: IMPACTS TO SENSITIVE RECEPTORS

5.3.1 Impacts

5.3.1.1 Construction Activities

Implementation of the project would result in the use of heavy-duty construction equipment, haul trucks, on-site generators, and construction worker vehicles. These vehicles and equipment could generate the TAC DPM. Generation of DPM from construction projects typically occurs in a localized area (e.g., at the project site) for a short period of time. Because construction activities and subsequent emissions vary depending on the phase of construction (e.g., grading, building construction), the construction-related emissions to which nearby receptors are exposed to would also vary throughout the construction period. During some equipment-intensive phases such as grading, construction-related emissions would be higher than other less equipment-intensive phases such as building construction. Concentrations of mobile-source DPM emissions are typically reduced by 70 percent at approximately 500 feet (CARB 2005).

The dose (of TAC) to which receptors are exposed is the primary factor used to determine health risk. Dose is a function of the concentration of a substance in the environment and the extent of exposure a person has with the substance; a longer exposure period to a fixed quantity of emissions would result in higher health risks. Current models and methodologies for conducting cancer health risk assessments are associated with longer-term exposure periods (typically 30 years for individual residents based on guidance from OEHHA) and are best suited for evaluation of long duration TAC emissions with predictable schedules and locations. These assessment models and methodologies do not correlate well with the temporary and highly variable nature of construction activities. Cancer potency factors are based on animal lifetime studies or worker studies where there is long-term exposure to the carcinogenic agent. There is considerable uncertainty in trying to evaluate the cancer risk from projects that will only last a small fraction of a lifetime (OEHHA 2015). Considering this information, the highly dispersive nature of DPM, and the fact that construction activities would occur at various locations throughout the project site for short periods, it is not anticipated that construction of the project would expose sensitive receptors to substantial DPM concentrations.

5.3.1.2 Operational Activities

Localized Criteria Pollutants

According to the SMAQMD, land use development projects do not typically have the potential to result in localized concentrations of criteria air pollutants that expose sensitive receptors to substantial pollutant concentrations. This is because criteria air pollutants are predominantly generated in the form of mobile-source exhaust from vehicle trips associated with the land use development project. These vehicle trips occur throughout a paved network of roads, and, therefore, associated exhaust emissions of criteria air pollutants are not generated in a single location where high concentrations could be formed (SMAQMD 2020a). Therefore, localized concentration of CO from exhaust emissions, or "CO hotspots," would only be a concern on high-volume roadways where vertical and/or horizontal mixing is substantially limited, such as tunnels or below grade highways. There are no high-volume roadways in the region with limited mixing that would be affected by project-generated traffic. Once operational, the project would not be a significant source of TACs.

TAC Emissions

The project would include a retail gas station. Gasoline refueling stations can be a source of TAC emissions with emissions of benzene primarily driving health risks. The health risks associated with emissions from gasoline refueling stations are related to the anticipated volume of gasoline dispensed and to the distance to the nearest sensitive receptors. CARB provides a risk assessment screening tool to estimate potential health risks based on gasoline throughput, distance to receptors, and gasoline vapor control technology (CARB 2022d). Per the project applicant, the proposed gas station would have a maximum annual throughput of gasoline of 3 million gallons per year. For all gasoline dispensing from stationary storage tanks larger than 250 gallons, CARB and SMAQMD regulations require a permit and the installation of Enhanced Vapor Recovery Systems (EVR) for the storage tank (EVR Phase I) and the dispensing nozzle (EVR Phase II) to control emissions of gasoline vapor. Based on the highest anticipated throughput, distance to the closest off-site sensitive receptors (385 feet), and required gasoline vapor control technology, the CARB screening tool calculated that maximum increased residential cancer risk would be 0.16 in 1 million and the maximum Acute Hazard Index would be 0.02, below the SMAQMD thresholds of 10 in 1 million increased cancer risk and 1.0 Hazard Index. The CARB Gasoline Service Station Assessment Tool printout is included as Appendix C to this report. Diesel refueling stations are not a significant source of TAC emissions. Therefore, operation of the project gas station would not expose sensitive receptors to substantial concentrations of TACs.

New Sensitive Receptors

As a residential development, the project would site new sensitive receptors. The CARB siting recommendations within the Air Quality and Land Use Handbook suggest a detailed health risk assessment should be conducted for proposed sensitive receptors within 1,000 feet of a warehouse distribution center, within 300 feet of a large gas station (defined as a facility with a throughput of 3.6 million gallons per year or greater), within 50 feet of a typical gas dispensing facilities, within 300 feet of a dry cleaning facility that uses perchloroethylene (PCE), or 500 feet of an urban road with 100,000 or more vehicles per day (CARB 2005). The closest existing gas station to the project site (a small gas station with 8 dispensing stations) is located approximately 200 feet northwest of the project residential lots, beyond of the CARB minimum sensitive receptor siting distance from typical gas stations. The proposed project gas station would be approximately 140 feet from the closest project residential lot, beyond of the CARB minimum sensitive receptor siting distance from typical gas stations. There are no dry-cleaning facilities that use perchloroethylene within 1,000 feet of the project site. In addition, the closest high-volume urban roadway would be interstate 80 (I-80), approximately 1.9 miles northwest of the project site. Therefore, future project residents would not be exposed to substantial concentrations of TACs.

5.3.2 Significance of Impacts

Implementation of the project would not expose sensitive receptors to substantial pollutant concentrations, and the impact would be less than significant.

5.3.3 Mitigation Framework

Impacts would be less than significant; therefore, no mitigation measures are required.

5.3.4 Significance After Mitigation

Impacts related to exposure of sensitive receptors to substantial pollutant concentrations would be less than significant.

5.4 ISSUE 4: OTHER EMISSIONS (SUCH AS THOSE LEADING TO ODORS)

5.4.1 Impacts

Odors associated with diesel exhaust and ROG from application of asphalt and architectural coatings would be emitted during project construction. The odor of these emissions is objectionable to some; however, emissions would disperse rapidly from the project site and therefore should not be at a level that would affect a substantial number of people. Further, construction activities would be temporary. As a result, impacts associated with temporary odors during construction are not considered significant.

According to SMAQMD, typical land uses which could generate significant odor impacts include wastewater treatment plants, sanitary landfills, composting/green waste facilities, recycling facilities, petroleum refineries, chemical manufacturing plants, painting/coating operations, rendering plants, and food packaging plants (SMAQMD 2020a). The project would not include any of these land uses. The project would not result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

5.4.2 Significance of Impacts

Implementation of the project would not result in other emissions (such as those leading to odors) adversely affecting a substantial number of people, and the impact would be less than significant.

5.4.3 Mitigation Framework

Impacts would be less than significant; therefore, no mitigation measures are required.

5.4.4 Significance After Mitigation

Implementation of the project would not result in other emissions (such as those leading to odors) adversely affecting a substantial number of people, and the impact would be less than significant.

6.0 GREENHOUSE GAS IMPACT ANALYSIS

This section evaluates potential impacts of the proposed project related to the generation of GHG emissions. Complete modeling results are included as Appendix A of this report.

6.1 ISSUE 1: GREENHOUSE GAS EMISSIONS

6.1.1 Construction Emissions

Project construction GHG emissions were estimated using the CalEEMod model as described in Section 4.1.1. Project-specific input was based on general information provided in Section 1.0 and default model settings to estimate reasonably conservative conditions. Additional details of construction activity, selection of construction equipment, and other input parameters, are included in the CalEEMod output in Appendix A.

Emissions of GHGs related to the construction of the project would be temporary. As shown in Table 13, *Construction GHG Emissions*, the annual project construction emissions would not exceed the SMAQMD threshold.

Table 13
CONSTRUCTION GHG EMISSIONS

Year	Emissions (MT CO_2e)
2023	263.1
2024	604.0
2025	21.6
Maximum	**888.8**
SMAQMD Threshold	*1,100*
Exceed Threshold?	**No**

Source: CalEEMod; Threshold SMAQMD 2020b
GHG = greenhouse gas; MT = metric tons; CO_2e = carbon dioxide equivalent

6.1.2 Operational Emissions

Project operational GHG emissions were estimated using the CalEEMod model as described in Section 4.1.2. Project operational emissions are compared to the SMAQMD threshold in Table 14, *Operational GHG Emissions*.

Table 14
OPERATIONAL GHG EMISSIONS

Emission Sources	2020 Emissions ($MT\ CO_2e$)
Area Sources	1.4
Energy Sources	652.7
Vehicular (Mobile) Sources	2,325.9
Solid Waste Sources	130.9
Water Sources	18.3
TOTAL[1]	**3,129.3**
SMAQMD Screening Level	*1,100*
Exceed Screening Level?	**Yes**

Source: CalEEMod; Threshold SMAQMD 2020b
[1] Totals may not sum due to rounding.
GHG = greenhouse gas; MT = metric tons; CO_2e = carbon dioxide equivalent

To use the SMAQMD's land use development project GHG emissions significance criteria, SMAQMD requires all project to implement the Tier 1 GHG reduction BMPs, regardless of the projects' GHG emission levels, or provide measures to implement equivalent mitigation. The project's 5 retail/restaurant buildings may require the use of natural gas, primarily for cooking appliances. The actual amount of natural gas use depends on the tenants for the buildings and the type of cooking appliance installed, neither of which has been determined at the time of this analysis. CalEEMod calculations using default natural gas use setting for the 5 restaurant buildings (totaling 22,900 SF) show a total natural gas use of 4,055,820 kBTU per year, resulting in 218 MT CO_2e per year from the use of natural gas. However, the default CalEEMod setting for restaurant energy use is conservative and includes the use of natural gas for building heat and hot water, as well as for cooking appliances. Based on the CalEEMod default non-title 24 (e.g., cooking appliance) natural gas use for restaurants, project restaurant cooking appliances would result approximately 145.1 MT CO_2e per year from the use of natural gas, or approximately 4,353 MT CO_2e over the typical 30-year lifespan of commercial/retail projects. The actual project natural gas use may be lower than calculated in CalEEMod. Mitigation measure GHG-1 would require the project to implement the SMAQMD's Tier 1 GHG reduction BMP 1 and BMP 2 with no natural gas use allowed for building heating or hot water and options to either offset the 145 MT CO_2e calculated in CalEEMod from cooking appliances, or offset GHG emissions calculated using natural gas consumption specifications for actual restaurant appliances. As shown in Table 14, the project's operational GHG emissions would exceed the SMAQMD operational screening level of 1,100 MT CO_2e per year and the project would be required to implement the SMAQMD's Tier 2 BMPs.

Tier 2 GHG reduction BMP 3 requires residential projects to achieve a 15 percent reduction in vehicle miles traveled per resident compared to existing average vehicle miles traveled for the county, and retail projects to achieve a no net increase in total vehicle miles traveled. The Sacramento County Department of Transportation evaluated the project's VMT impacts under CEQA and concluded the residential portion of the project is located in an area that produces VMT that is 85 percent or less than the regional average. The Department of Transportation concluded that the retail portion of the project site would comply with the existing land use of the Fair Oaks Boulevard Corridor Plan's certified Environmental Impact Report (Sacramento County Department of Transportation 2022). In addition, the California Office of Planning and Research's (OPR's) *Technical Advisory on Evaluating Transportation Impacts in CEQA* considers that local serving retail tends to shorten trips and reduce VMT and stores larger than 50,000 SF generally would not be considered local serving (OPR 2018). The project's total retail space would be approximately 28,100 SF and would be considered local serving. Therefore, the project retail portion would not result in a net increase in total VMT, and the project would meet the requirements of SMAQMD's Tier 2 GHG reduction BMP 3.

6.1.3 Significance of Impacts

Project construction GHG impacts would not exceed the SMAQMD's threshold and would be less than significant. Project operational GHG emissions would exceed the SMAQMD's screening level of 1,100 MT CO_2e threshold. However, the project would meet the VMT requirements of the SMAQMD's Tier 2 GHG reduction BMP 3. Because SMAQMD requires all land use development projects to implement the Tier 1 GHG reduction BMPs, the project's operational GHG emissions impact would be considered potentially significant.

6.1.4 Mitigation Framework

The following mitigation measure would require the project to implement the SMAQMD Tier 1 GHG reduction BMPs or equivalent alternatives:

GHG-1 SMAQMD Tier 1 Best Management Practices for GHG Emission Reductions. The project shall implement the SMAQMD Tier 1 GHG Reduction Best Management Practices or implement equivalent alternate mitigation approved by the County. Prior to issuing each project building permit, the County shall verify that project documentation includes the following BMPs, or alternate equivalent mitigation described below for natural gas used by cooking appliances, and all applicable offset evidence has been submitted and meets standards defined below:

- **SMAQMD Tier 1 BMP 1** – The project buildings shall be designed and constructed without natural gas infrastructure, with exceptions only for natural gas required for restaurant cooking equipment. In the event that the project applicant has determined that use of natural gas is necessary for operation of any of the project's restaurant buildings (for cooking equipment only), the restaurant building(s) shall include the necessary electrical infrastructure to facilitate the replacement of natural gas appliances with electrical appliances in the future, and the project applicant shall retire carbon offsets in a quantity sufficient to offset 100 percent of the project's GHG emissions resulting from the use of natural gas over the project building lifespan of 30 years. Building electrical infrastructure shall include sufficient power supply for the addition of electric commercial cooking appliances, sufficient panel space for electric cooking appliance circuits, and prewiring for electric cooking appliances from the panel to the kitchen area(s). The carbon offsets retired shall total a minimum of 0.19 MT CO_2e per square foot of restaurant space in any project building which would use natural gas for cooking appliances (based on project modeling disclosed within this analysis—4,353 MT CO_2e total over a 30-year period for all 5 restaurant buildings totaling 22,900 square feet).

  Alternately, a lower amount of carbon offsets shall be retired based on calculations prepared by a qualified expert (and submitted to the County for verification) using natural gas consumption data for actual natural gas appliances to be installed (if any) in any project building restaurant space.

Payment of fees for the retirement of carbon offsets for each project building which would use natural gas shall be made:

- In the full amount to offset 30 years of natural gas use (as described above) prior to the issuance of the building permit; or
- At the discretion of the County, in periodic payments, provided that the quantities of carbon offsets retired, and the payment periods are specified in a contract entered into between the project Applicant, the County, and a County-approved carbon offset program or broker. Periodic payments shall continue for 30 years commencing with issuance of the building permit, or until the project Applicant submits updated plans to the County that verifies all natural gas appliances have been removed from the building or natural gas supply has been terminated.

Carbon offset retirement shall be accomplished through an accredited carbon offset program approved by the County. Prior to the issuance of any building permit that includes a restaurant using natural gas cooking equipment, the project applicant shall provide evidence to County that carbon offsets in the amounts discussed above have been retired. Such evidence must comply with the requirements described under *Reporting and Enforcement Standards* below.

Carbon Offset Standards – Eligible Registries, Acceptable Protocols and Defined Terms

"Carbon offset" shall mean an instrument, credit or other certification verifying the reduction of GHG emissions issued by the Climate Action Reserve, the American Carbon Registry, or Verra (previously, the Verified Carbon Standard). This shall include, but is not limited to, an instrument, credit or other certification issued by these registries for GHG reduction activities. The project shall neither purchase offsets from the Clean Development Mechanism (CDM) registry nor purchase offsets generated under CDM protocols. Further, no carbon offsets shall originate from international areas, as discussed under *Locational Performance Standards*, below. Qualifying carbon offsets presented for compliance with this mitigation measure may be used provided that the evidence required by the *Reporting and Enforcement Standards* below is submitted to the County demonstrating that each registry shall continue its existing practice of requiring the following for the development and approval of protocols or methodologies:

1) Adherence to established GHG accounting principles set forth in the International Organization for Standardization (ISO) 14064, Part 2 or the World Resources Institute/World Business Council for Sustainable Development (WRI/WBCSD) Greenhouse Gas Protocol for Project Accounting; and

2) Oversight of the implementation of protocols and methodologies that define the eligibility of carbon offset projects and set forth standards for the estimation, monitoring and verification of GHG reductions achieved from such projects. The protocols and methodologies shall:

    a) Be developed by the registries through a transparent public and expert stakeholder review process that affords an opportunity for comment and is informed by science;

b) Incorporate standardized offset crediting parameters that define whether and how much emissions reduction credit a carbon offset project should receive, having identified conservative project baselines and the length of the crediting period and considered potential leakage and quantification uncertainties;

c) Establish data collection and monitoring procedures, mechanisms to ensure permanency in reductions, and additionality and geographic boundary provisions; and

d) Adhere to the principles set forth in the program manuals of each of the aforementioned registries; as such manuals are updated from time to time. The current registry documentation includes the Climate Action Reserve's *Reserve Offset Program Manual* (November 2019) and *Climate Forward Program Manual* (March 2020); the American Carbon Registry's *Requirements and Specifications for the Quantification, Monitoring, Reporting, Verification, and Registration of Project-Based GHG Emissions Reductions and Removals* (July 2019); and Verra's *VCS Standard*, *Program Guide* and *Methodology Requirements* (September 2019).

The registry-administered protocols and methodologies for the carbon offset project types cited above – including updates to those protocols and methodologies as may occur from time to time by the registries in accordance with the registry documentation listed in the prior paragraph to ensure the continuing efficacy of the reduction activities – are eligible for use under this mitigation measure, provided that any updated protocols shall be provided for County review as required by *Reporting and Enforcement Standards* below prior to the County's acceptance of offsets based on such updated protocols.

Further, any carbon offset used to reduce the project's GHG emissions shall be a carbon offset that represents the past or forecasted reduction or sequestration of one metric ton of carbon dioxide equivalent that is "not otherwise required" (CEQA Guidelines §15126.4(c)(3)). Each carbon offset used to reduce GHG emissions shall achieve additional, real, permanent, quantifiable, verifiable, and enforceable reductions, which are defined for purposes of this mitigation measure as follows:

1) Additional means that the carbon offset is not otherwise required by law or regulation, and not any other GHG emissions reduction that otherwise would occur.

2) Real means that the GHG reduction underlying the carbon offset results from a demonstrable action or set of actions, and is quantified under the protocol or methodology using appropriate, accurate, and conservative methodologies that account for all GHG emissions sources and sinks within the boundary of the applicable carbon offset project, uncertainty, and the potential for activity-shifting leakage and market-shifting leakage.

3) Verifiable means that the GHG reduction underlying the carbon offset is well documented, transparent and set forth in a document prepared by an independent verification body that is accredited through the American National Standards Institute (ANSI).

4) Permanent means that the GHG reduction underlying the carbon offset is not reversible; or, when GHG reduction may be reversible, that a mechanism is in place to replace any reversed GHG emission reduction.

5) Quantifiable means the ability to accurately measure and calculate the GHG reduction relative to a project baseline in a reliable and replicable manner for all GHG emission sources and sinks included within the boundary of the carbon offset project, while accounting for uncertainty and leakage.

6) Enforceable means that the implementation of the GHG reduction activity must represent the legally binding commitment of the offset project developer to undertake and carry it out.

The protocols and methodologies cited previously establish and require carbon offset projects to comply with standards designed to achieve additional, real, permanent, quantifiable, verifiable and enforceable reductions. Additionally, the *Reporting and Enforcement Standards* below ensure that the emissions reductions required by this mitigation measure are enforceable against the project applicant, as the County has authority to hold the project applicant accountable and to take appropriate corrective action if the County determines that any carbon offsets do not comply with the requirements set forth in this mitigation measure.

The above definitions are provided as criteria and performance standards associated with the use of carbon offsets. Such criteria and performance standards are intended only to further construe the standards under CEQA for mitigation related to GHG emissions (see, e.g., CEQA Guidelines §15126.4(a), (c)), and are not intended to apply or incorporate the requirements of any other statutory or regulatory scheme not applicable to the project (e.g., the Cap-and-Trade Program).

Locational Performance Standards

All carbon offsets required to reduce the project's GHG emissions shall originate from the following geographic locations (in order of priority): (1) off-site, unincorporated areas of the County of Sacramento; (2) off-site, incorporated areas of the County of Sacramento; (3) off-site areas within the State of California; and (4) off-site areas within the United States. No carbon offsets shall originate from off-site, international areas. As listed, geographic priorities would focus first on local reduction options to ensure that reduction efforts achieved locally would provide cross-over, co-benefits to other environmental resource areas.

For purposes of implementing this mitigation measure, the County shall require the carbon offsets to adhere to the following locational performance standards in order to reduce the project's operational GHG emissions:

1) The project shall use all feasible available carbon offsets within the County of Sacramento (the first priority is within unincorporated areas of the County and the second priority is within incorporated areas of the County). "Available," for purposes of this subdivision, means that the project applicant provides objective, verifiable evidence to the County documenting that such carbon offsets are available for retirement from

carbon offset projects within the subject geography no later than at the time of application for grading permit issuance. The objective, verifiable evidence to be provided includes a market survey report that shall comply with the following content requirements:

a) Identification of the carbon registry listings reviewed for carbon offset availability, including the related date of inquiry; and

b) Identification of the geographic attributes of carbon offsets that are offered for sale and available for retirement.

2) In the event that a sufficient quantity of carbon offsets is not "available" in the County of Sacramento, the project shall obtain the remaining carbon offsets needed from within the State of California (third priority). For the definition of "available," see subdivision 1) immediately above.

3) In the event that a sufficient quantity of carbon offsets is not "available" in the County of Sacramento or State of California, the project shall obtain the remaining carbon offsets needed from within the United States (fourth priority). For the definition of "available," see subdivision 1) immediately above.

Reporting and Enforcement Standards

Over the course of build out of the project and prior to issuance of requested building permits, the project applicant shall submit reports to the County that identify the quantity of emission reductions required by this mitigation measure, as well as the carbon offsets to be retired to achieve compliance with this measure. For purposes of demonstrating that each offset is additional, real, permanent, quantifiable, verifiable and enforceable, the reports shall include: (i) the applicable protocol(s) and methodologies associated with the carbon offsets, (ii) the third-party verification report(s) and statement(s) affiliated with the carbon offset projects, (iii) the unique serial numbers assigned by the registry(ies) to the carbon offsets to be retired, which serves as evidence that the registry has determined the carbon offset project to have been implemented in accordance with the applicable protocol or methodology and ensures that the offsets cannot be further used in any manner, and (iv) the locational attributes of the carbon offsets. The reports also shall append the market survey report described in the *Locational Performance Standards* provision above.

If the County determines that the project's carbon offsets do meet the requirements of this mitigation measure, the offsets can be used to reduce project GHG emissions and project permits shall be issued. If the County determines that the project's carbon offsets do not meet the requirements of this mitigation measure, the offsets cannot be used to reduce project GHG emissions and project permits shall not be issued. Additionally, the County may issue a notice of non-consistency and cease permitting activities in the event that the County determines the carbon offsets provided to reduce project GHG emissions are not compliant with the aforementioned standards. In the event of such an occurrence, project permitting activities shall not resume until the project applicant has demonstrated that the previously provided carbon offsets are compliant with the standards herein *or* has provided substitute carbon offsets achieving the standards of this mitigation measure in the quantity needed to achieve the required emission reduction.

- **SMAQMD Tier 1 BMP 2** – The project shall meet the current CALGreen Tier 2 standards, except the minimum number of electric vehicle capable spaces shall instead be electric vehicle ready, defined below:
  - Electric vehicle capable means that a raceway (the enclosed conduit that forms the physical pathway for electrical wiring to protect it from damage) and adequate panel capacity to accommodate future installation of a dedicated branch circuit and charging station(s) has been installed.
  - Electric vehicle ready means that all electric vehicle capable features have been installed and dedicated branch circuit(s) (electrical pre-wiring), circuit breakers, and other electrical components, including a receptacle (240-volt outlet) or junction box, needed to support future charging station(s) have been installed.

6.1.5 Significance After Mitigation

With implementation of mitigation measure GHG-1, the project would not generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment, and the impact would be less than significant with mitigation implemented.

6.2 ISSUE 2: CONFLICT WITH APPLICABLE PLANS ADOPTED FOR THE PURPOSE OF REDUCING GHG EMISSIONS

6.2.1 Impacts

There are numerous State plans, policies, and regulations adopted for the purpose of reducing GHG emissions. The principal overall State plan and policy is AB 32, the California Global Warming Solutions Act of 2006. The quantitative goal of AB 32 is to reduce GHG emissions to 1990 levels by 2020. SB 32 would require further reductions of 40 percent below 1990 levels by 2030. Because the project's operational year is post-2020, the project aims to reach the quantitative goals set by SB 32. Statewide plans and regulations such as GHG emissions standards for vehicles (AB 1493), the LCFS, and regulations requiring an increasing fraction of electricity to be generated from renewable sources are being implemented at the statewide level; as such, compliance at the project level is not addressed. Therefore, the proposed project would not conflict with those plans and regulations.

The project site has a General Plan land use designation of Transit Oriented Development (TOD) and is zoned Shopping Center (SC), Light Commercial (LC), and Multiple Family Residential 40 (RD-40) The project would be consistent with the General Plan designations for the site. The project's retail portion would be consistent with the SC zone. However, the project's single-family residential portion would require a rezone from SC and LC to Residential 10 (RD-10). As discussed in Section 6.1.2, above, the Sacramento County Department of Transportation concluded that the project's residential portion would result in VMT 15 percent or more below the regional average. The project's retail portion would be considered local serving and would not result in a net increase in regional VMT. Therefore, changes in regional VMT as a result of the project would be accounted for in the SACOG's RTP/SCS.

The project must also be constructed in accordance with the energy-efficiency standards, water reduction goals, and other standards contained in the applicable Title 24 Part 6 Building Energy Efficiency Standards and Part 11 (CALGreen) Building Standards, including the requirement for onsite solar electricity generation. As discussed in Issue 1, implementation of mitigation measure GHG-1, would require the project to meet the CALGreen Tier 2 standards and be designed and constructed without natural gas infrastructure, and would ensure the project's compliance with SMAQMD's policies for the reduction of GHG emissions. The project's GHG emissions, in relation to the County meeting the State GHG reduction mandates for the year 2030, would be less than significant. Therefore, the project would not conflict with CARB's Scoping Plan.

6.2.2 Significance of Impacts

With the implementation of mitigation measure GHG-1, the project would not conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs, and the impact would be less than significant.

6.2.3 Mitigation Framework

Impacts would be less than significant with the implementation of GHG-1.

6.2.4 Significance After Mitigation

Impacts related to conflicts with GHG reduction plans, policies, and regulations would be less than significant with the implementation of GHG-1.

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Appendix A

CalEEMod Output

The following section contains content that was obtained from a third party and may not achieve the same level of Americans with Disabilities Act (ADA) and Section 508 accessibility as other parts of this document.

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Winding Ranch

Sacramento County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Parking Lot	292.35	1000sqft	6.71	292,350.00	0
Fast Food Restaurant with Drive Thru	22.90	1000sqft	0.53	22,900.00	0
Single Family Housing	81.00	Dwelling Unit	8.83	162,000.00	216
Automobile Care Center	1.46	1000sqft	0.03	1,460.00	0
Convenience Market with Gas Pumps	16.00	Pump	0.05	5,200.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	3.5	**Precipitation Freq (Days)**	58
Climate Zone	6			**Operational Year**	2026
Utility Company	Sacramento Municipal Utility District				
CO2 Intensity (lb/MWhr)	357.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Run 2 - All electric assumption for fast food restaurants removed; construction start date pushed back to August 2023.

Land Use - Land uses and sizes per site plan and project description.
Automobile Care Center = car wash portion of convenience store/gas station.
Parking lot includes retail area driveways, parking lots and sidewalks, and residential area streets and sidewalks.

Construction Phase - Architectural coating assumed to occur concurrently with last 6 months of building construction.

Off-road Equipment -

Off-road Equipment -

Off-road Equipment - Off-Highway Truck = water truck

Off-road Equipment - Off-Highway Truck = water truck

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Off-road Equipment - Off-Highway Truck = water truck

Trips and VMT -

Demolition - Approximately 1,510 CY (about 2 tons per CY) of old asphalt to be removed during demolition.

Grading - 3,100 CY vegetation exported during site prep, estimated from total project area and aerial image of exising conditions.

Vehicle Trips - Project trip genration per traffic study.
Trip generation for retail uses includes internal trip capture and pass-by trips.

Vehicle Emission Factors -

Vehicle Emission Factors -

Vehicle Emission Factors -

Energy Use - Default natural gas for market, residences, and restaurant title 24 converted to KWh and added to electricity use.
Energy use for car wash (automobile care center) estimated from industry data.

Water And Wastewater - Water use for car wash (automobile care center) estimated from industry survey data.

Solid Waste -

Construction Off-road Equipment Mitigation - Fugitive dust mitigation per SMAQMD BMPs

Energy Mitigation - On-site solar requirements for 81 residential DU estimated per 2019 Title 24.

Water Mitigation - 20% water use reduction per 2019 Title 24 and CalGreen not accounted for in model defaults.

Waste Mitigation - 25% solid waste generation reduction per AB 341 and othe state/local regulations not accounted for in model defaults.

Fleet Mix -

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	20.00	120.00
tblEnergyUse	LightingElect	4.57	0.00
tblEnergyUse	LightingElect	1,608.84	2,396.32
tblEnergyUse	NT24E	7.20	510.55
tblEnergyUse	NT24E	2.98	3.25
tblEnergyUse	NT24NG	12.42	0.00
tblEnergyUse	NT24NG	0.93	0.00
tblEnergyUse	NT24NG	2,687.00	0.00
tblEnergyUse	T24E	3.05	0.00
tblEnergyUse	T24E	2.91	4.21

tblEnergyUse	T24E	7.86	25.17
tblEnergyUse	T24E	142.58	6,288.81
tblEnergyUse	T24NG	23.15	0.00
tblEnergyUse	T24NG	4.44	0.00
tblEnergyUse	T24NG	59.07	0.00
tblEnergyUse	T24NG	20,971.81	0.00
tblGrading	MaterialExported	0.00	3,100.00
tblLandUse	LandUseSquareFeet	145,800.00	162,000.00
tblLandUse	LandUseSquareFeet	2,258.80	5,200.00
tblLandUse	LotAcreage	26.30	8.83
tblVehicleTrips	DV_TP	21.00	0.00
tblVehicleTrips	PB_TP	65.00	0.00
tblVehicleTrips	PR_TP	14.00	100.00
tblVehicleTrips	ST_TR	23.72	0.00
tblVehicleTrips	ST_TR	322.50	48.19
tblVehicleTrips	ST_TR	616.12	214.45
tblVehicleTrips	ST_TR	9.54	10.26
tblVehicleTrips	SU_TR	11.88	0.00
tblVehicleTrips	SU_TR	322.50	48.19
tblVehicleTrips	SU_TR	472.58	214.45
tblVehicleTrips	SU_TR	8.55	10.26
tblVehicleTrips	WD_TR	23.72	0.00
tblVehicleTrips	WD_TR	322.50	48.19
tblVehicleTrips	WD_TR	470.95	214.45
tblVehicleTrips	WD_TR	9.44	10.26
tblWater	IndoorWaterUseRate	137,358.42	2,104,000.00
tblWater	OutdoorWaterUseRate	84,187.42	0.00

2.0 Emissions Summary

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2023	0.1464	1.3376	1.2364	2.9100e-003	0.3045	0.0556	0.3601	0.1197	0.0515	0.1712	0.0000	259.6687	259.6687	0.0633	6.3200e-003	263.1360
2024	1.3772	2.2474	2.8358	6.6200e-003	0.2180	0.0866	0.3047	0.0591	0.0817	0.1408	0.0000	594.5265	594.5265	0.0801	0.0250	603.9888
2025	0.0988	0.0754	0.1022	2.4000e-004	8.1200e-003	2.7100e-003	0.0108	2.2000e-003	2.5600e-003	4.7600e-003	0.0000	21.3002	21.3002	2.7700e-003	8.5000e-004	21.6229
Maximum	**1.3772**	**2.2474**	**2.8358**	**6.6200e-003**	**0.3045**	**0.0866**	**0.3601**	**0.1197**	**0.0817**	**0.1712**	**0.0000**	**594.5265**	**594.5265**	**0.0801**	**0.0250**	**603.9888**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2023	0.1464	1.3376	1.2364	2.9100e-003	0.1558	0.0556	0.2114	0.0590	0.0515	0.1105	0.0000	259.6685	259.6685	0.0633	6.3200e-003	263.1358
2024	1.3772	2.2474	2.8358	6.6200e-003	0.2180	0.0866	0.3047	0.0591	0.0817	0.1408	0.0000	594.5261	594.5261	0.0801	0.0250	603.9884
2025	0.0988	0.0754	0.1022	2.4000e-004	8.1200e-003	2.7100e-003	0.0108	2.2000e-003	2.5600e-003	4.7600e-003	0.0000	21.3001	21.3001	2.7700e-003	8.5000e-004	21.6229
Maximum	**1.3772**	**2.2474**	**2.8358**	**6.6200e-003**	**0.2180**	**0.0866**	**0.3047**	**0.0591**	**0.0817**	**0.1408**	**0.0000**	**594.5261**	**594.5261**	**0.0801**	**0.0250**	**603.9884**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	28.02	0.00	22.01	33.57	0.00	19.18	0.00	0.00	0.00	0.00	0.00	0.00

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	8-1-2023	10-31-2023	1.1076	1.1076
2	11-1-2023	1-31-2024	0.5854	0.5854
3	2-1-2024	4-30-2024	0.5994	0.5994
4	5-1-2024	7-31-2024	0.6236	0.6236
5	8-1-2024	10-31-2024	1.3139	1.3139
6	11-1-2024	1-31-2025	1.0543	1.0543
		Highest	1.3139	1.3139

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.9116	9.6500e-003	0.8388	4.0000e-005		4.6500e-003	4.6500e-003		4.6500e-003	4.6500e-003	0.0000	1.3728	1.3728	1.3300e-003	0.0000	1.4060
Energy	0.0146	0.1325	0.1113	8.0000e-004		0.0101	0.0101		0.0101	0.0101	0.0000	703.8638	703.8638	0.0544	8.9000e-003	707.8741
Mobile	2.1600	2.0177	14.7452	0.0246	2.6009	0.0210	2.6218	0.6952	0.0196	0.7147	0.0000	2,277.4147	2,277.4147	0.2215	0.1442	2,325.9205
Waste						0.0000	0.0000		0.0000	0.0000	70.4622	0.0000	70.4622	4.1642	0.0000	174.5672
Water						0.0000	0.0000		0.0000	0.0000	5.1300	13.9324	19.0624	0.0189	0.0113	22.9069
Total	**3.0862**	**2.1598**	**15.6953**	**0.0254**	**2.6009**	**0.0357**	**2.6365**	**0.6952**	**0.0343**	**0.7295**	**75.5922**	**2,996.5836**	**3,072.1758**	**4.4603**	**0.1644**	**3,232.6745**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.9116	9.6500e-003	0.8388	4.0000e-005		4.6500e-003	4.6500e-003		4.6500e-003	4.6500e-003	0.0000	1.3728	1.3728	1.3300e-003	0.0000	1.4060
Energy	0.0146	0.1325	0.1113	8.0000e-004		0.0101	0.0101		0.0101	0.0101	0.0000	649.0024	649.0024	0.0493	8.2800e-003	652.7036
Mobile	2.1600	2.0177	14.7452	0.0246	2.6009	0.0210	2.6218	0.6952	0.0196	0.7147	0.0000	2,277.4147	2,277.4147	0.2215	0.1442	2,325.9205
Waste						0.0000	0.0000		0.0000	0.0000	52.8467	0.0000	52.8467	3.1232	0.0000	130.9254
Water						0.0000	0.0000		0.0000	0.0000	4.1040	11.1459	15.2500	0.0152	9.0500e-003	18.3255
Total	**3.0862**	**2.1598**	**15.6953**	**0.0254**	**2.6009**	**0.0357**	**2.6365**	**0.6952**	**0.0343**	**0.7295**	**56.9507**	**2,938.9358**	**2,995.8865**	**3.4104**	**0.1615**	**3,129.2809**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**24.66**	**1.92**	**2.48**	**23.54**	**1.75**	**3.20**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	8/1/2023	8/28/2023	5	20	
2	Site Preparation	Site Preparation	8/29/2023	9/11/2023	5	10	
3	Grading	Grading	9/12/2023	10/23/2023	5	30	

4	Paving	Paving	10/24/2023	11/20/2023		5	20	
5	Building Construction	Building Construction	11/21/2023	1/13/2025		5	300	
6	Architecural Coating	Architectural Coating	7/30/2024	1/13/2025		5	120	

Acres of Grading (Site Preparation Phase): 15

Acres of Grading (Grading Phase): 90

Acres of Paving: 6.71

Residential Indoor: 328,050; Residential Outdoor: 109,350; Non-Residential Indoor: 44,340; Non-Residential Outdoor: 14,780; Striped Parking Area: 17,541 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	3	8.00	158	0.38
Demolition	Off-Highway Trucks	1	4.00	402	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Site Preparation	Off-Highway Trucks	1	4.00	402	0.38
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading	Excavators	2	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Off-Highway Trucks	1	4.00	402	0.38
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Scrapers	2	8.00	367	0.48
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Building Construction	Cranes	1	7.00	231	0.29

Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Architecural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	7	18.00	0.00	299.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	8	20.00	0.00	388.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Grading	9	23.00	0.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	164.00	61.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Architecural Coating	1	33.00	0.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Demolition - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0337	0.0000	0.0337	5.1000e-003	0.0000	5.1000e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0252	0.2327	0.2129	4.5000e-004		0.0106	0.0106		9.8700e-003	9.8700e-003	0.0000	39.7975	39.7975	0.0114	0.0000	40.0825
Total	**0.0252**	**0.2327**	**0.2129**	**4.5000e-004**	**0.0337**	**0.0106**	**0.0443**	**5.1000e-003**	**9.8700e-003**	**0.0150**	**0.0000**	**39.7975**	**39.7975**	**0.0114**	**0.0000**	**40.0825**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	4.0000e-004	0.0238	4.7800e-003	9.0000e-005	2.5300e-003	1.7000e-004	2.7000e-003	6.9000e-004	1.7000e-004	8.6000e-004	0.0000	9.2885	9.2885	3.7000e-004	1.4700e-003	9.7366
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.2000e-004	3.2000e-004	4.1900e-003	1.0000e-005	1.3200e-003	1.0000e-005	1.3300e-003	3.5000e-004	1.0000e-005	3.6000e-004	0.0000	1.0474	1.0474	3.0000e-005	3.0000e-005	1.0573
Total	**9.2000e-004**	**0.0241**	**8.9700e-003**	**1.0000e-004**	**3.8500e-003**	**1.8000e-004**	**4.0300e-003**	**1.0400e-003**	**1.8000e-004**	**1.2200e-003**	**0.0000**	**10.3359**	**10.3359**	**4.0000e-004**	**1.5000e-003**	**10.7939**

3.2 Demolition - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0152	0.0000	0.0152	2.3000e-003	0.0000	2.3000e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0252	0.2327	0.2129	4.5000e-004		0.0106	0.0106		9.8700e-003	9.8700e-003	0.0000	39.7975	39.7975	0.0114	0.0000	40.0824
Total	**0.0252**	**0.2327**	**0.2129**	**4.5000e-004**	**0.0152**	**0.0106**	**0.0258**	**2.3000e-003**	**9.8700e-003**	**0.0122**	**0.0000**	**39.7975**	**39.7975**	**0.0114**	**0.0000**	**40.0824**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	4.0000e-004	0.0238	4.7800e-003	9.0000e-005	2.5300e-003	1.7000e-004	2.7000e-003	6.9000e-004	1.7000e-004	8.6000e-004	0.0000	9.2885	9.2885	3.7000e-004	1.4700e-003	9.7366
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.2000e-004	3.2000e-004	4.1900e-003	1.0000e-005	1.3200e-003	1.0000e-005	1.3300e-003	3.5000e-004	1.0000e-005	3.6000e-004	0.0000	1.0474	1.0474	3.0000e-005	3.0000e-005	1.0573
Total	**9.2000e-004**	**0.0241**	**8.9700e-003**	**1.0000e-004**	**3.8500e-003**	**1.8000e-004**	**4.0300e-003**	**1.0400e-003**	**1.8000e-004**	**1.2200e-003**	**0.0000**	**10.3359**	**10.3359**	**4.0000e-004**	**1.5000e-003**	**10.7939**

3.3 Site Preparation - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0986	0.0000	0.0986	0.0506	0.0000	0.0506	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0146	0.1465	0.0994	2.2000e-004		6.6500e-003	6.6500e-003		6.1200e-003	6.1200e-003	0.0000	19.6281	19.6281	6.3500e-003	0.0000	19.7868
Total	**0.0146**	**0.1465**	**0.0994**	**2.2000e-004**	**0.0986**	**6.6500e-003**	**0.1053**	**0.0506**	**6.1200e-003**	**0.0567**	**0.0000**	**19.6281**	**19.6281**	**6.3500e-003**	**0.0000**	**19.7868**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	5.2000e-004	0.0309	6.2000e-003	1.2000e-004	3.2800e-003	2.3000e-004	3.5100e-003	9.0000e-004	2.2000e-004	1.1200e-003	0.0000	12.0533	12.0533	4.8000e-004	1.9100e-003	12.6348
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.9000e-004	1.8000e-004	2.3300e-003	1.0000e-005	7.3000e-004	0.0000	7.4000e-004	2.0000e-004	0.0000	2.0000e-004	0.0000	0.5819	0.5819	2.0000e-005	2.0000e-005	0.5874
Total	**8.1000e-004**	**0.0311**	**8.5300e-003**	**1.3000e-004**	**4.0100e-003**	**2.3000e-004**	**4.2500e-003**	**1.1000e-003**	**2.2000e-004**	**1.3200e-003**	**0.0000**	**12.6352**	**12.6352**	**5.0000e-004**	**1.9300e-003**	**13.2222**

3.3 Site Preparation - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0444	0.0000	0.0444	0.0228	0.0000	0.0228	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0146	0.1465	0.0994	2.2000e-004		6.6500e-003	6.6500e-003		6.1200e-003	6.1200e-003	0.0000	19.6281	19.6281	6.3500e-003	0.0000	19.7868
Total	**0.0146**	**0.1465**	**0.0994**	**2.2000e-004**	**0.0444**	**6.6500e-003**	**0.0510**	**0.0228**	**6.1200e-003**	**0.0289**	**0.0000**	**19.6281**	**19.6281**	**6.3500e-003**	**0.0000**	**19.7868**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	5.2000e-004	0.0309	6.2000e-003	1.2000e-004	3.2800e-003	2.3000e-004	3.5100e-003	9.0000e-004	2.2000e-004	1.1200e-003	0.0000	12.0533	12.0533	4.8000e-004	1.9100e-003	12.6348
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.9000e-004	1.8000e-004	2.3300e-003	1.0000e-005	7.3000e-004	0.0000	7.4000e-004	2.0000e-004	0.0000	2.0000e-004	0.0000	0.5819	0.5819	2.0000e-005	2.0000e-005	0.5874
Total	**8.1000e-004**	**0.0311**	**8.5300e-003**	**1.3000e-004**	**4.0100e-003**	**2.3000e-004**	**4.2500e-003**	**1.1000e-003**	**2.2000e-004**	**1.3200e-003**	**0.0000**	**12.6352**	**12.6352**	**5.0000e-004**	**1.9300e-003**	**13.2222**

3.4 Grading - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1381	0.0000	0.1381	0.0548	0.0000	0.0548	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0536	0.5445	0.4454	1.0300e-003		0.0223	0.0223		0.0206	0.0206	0.0000	90.5110	90.5110	0.0293	0.0000	91.2429
Total	**0.0536**	**0.5445**	**0.4454**	**1.0300e-003**	**0.1381**	**0.0223**	**0.1604**	**0.0548**	**0.0206**	**0.0754**	**0.0000**	**90.5110**	**90.5110**	**0.0293**	**0.0000**	**91.2429**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	9.9000e-004	6.1000e-004	8.0200e-003	2.0000e-005	2.5300e-003	1.0000e-005	2.5500e-003	6.7000e-004	1.0000e-005	6.9000e-004	0.0000	2.0075	2.0075	6.0000e-005	6.0000e-005	2.0264
Total	**9.9000e-004**	**6.1000e-004**	**8.0200e-003**	**2.0000e-005**	**2.5300e-003**	**1.0000e-005**	**2.5500e-003**	**6.7000e-004**	**1.0000e-005**	**6.9000e-004**	**0.0000**	**2.0075**	**2.0075**	**6.0000e-005**	**6.0000e-005**	**2.0264**

3.4 Grading - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0621	0.0000	0.0621	0.0247	0.0000	0.0247	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0536	0.5445	0.4454	1.0300e-003		0.0223	0.0223		0.0206	0.0206	0.0000	90.5109	90.5109	0.0293	0.0000	91.2428
Total	**0.0536**	**0.5445**	**0.4454**	**1.0300e-003**	**0.0621**	**0.0223**	**0.0845**	**0.0247**	**0.0206**	**0.0452**	**0.0000**	**90.5109**	**90.5109**	**0.0293**	**0.0000**	**91.2428**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	9.9000e-004	6.1000e-004	8.0200e-003	2.0000e-005	2.5300e-003	1.0000e-005	2.5500e-003	6.7000e-004	1.0000e-005	6.9000e-004	0.0000	2.0075	2.0075	6.0000e-005	6.0000e-005	2.0264
Total	**9.9000e-004**	**6.1000e-004**	**8.0200e-003**	**2.0000e-005**	**2.5300e-003**	**1.0000e-005**	**2.5500e-003**	**6.7000e-004**	**1.0000e-005**	**6.9000e-004**	**0.0000**	**2.0075**	**2.0075**	**6.0000e-005**	**6.0000e-005**	**2.0264**

3.5 Paving - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0103	0.1019	0.1458	2.3000e-004		5.1000e-003	5.1000e-003		4.6900e-003	4.6900e-003	0.0000	20.0269	20.0269	6.4800e-003	0.0000	20.1888
Paving	8.7900e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0191**	**0.1019**	**0.1458**	**2.3000e-004**		**5.1000e-003**	**5.1000e-003**		**4.6900e-003**	**4.6900e-003**	**0.0000**	**20.0269**	**20.0269**	**6.4800e-003**	**0.0000**	**20.1888**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.3000e-004	2.7000e-004	3.4900e-003	1.0000e-005	1.1000e-003	1.0000e-005	1.1100e-003	2.9000e-004	1.0000e-005	3.0000e-004	0.0000	0.8728	0.8728	3.0000e-005	3.0000e-005	0.8811
Total	**4.3000e-004**	**2.7000e-004**	**3.4900e-003**	**1.0000e-005**	**1.1000e-003**	**1.0000e-005**	**1.1100e-003**	**2.9000e-004**	**1.0000e-005**	**3.0000e-004**	**0.0000**	**0.8728**	**0.8728**	**3.0000e-005**	**3.0000e-005**	**0.8811**

3.5 Paving - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0103	0.1019	0.1458	2.3000e-004		5.1000e-003	5.1000e-003		4.6900e-003	4.6900e-003	0.0000	20.0268	20.0268	6.4800e-003	0.0000	20.1888
Paving	8.7900e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0191**	**0.1019**	**0.1458**	**2.3000e-004**		**5.1000e-003**	**5.1000e-003**		**4.6900e-003**	**4.6900e-003**	**0.0000**	**20.0268**	**20.0268**	**6.4800e-003**	**0.0000**	**20.1888**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.3000e-004	2.7000e-004	3.4900e-003	1.0000e-005	1.1000e-003	1.0000e-005	1.1100e-003	2.9000e-004	1.0000e-005	3.0000e-004	0.0000	0.8728	0.8728	3.0000e-005	3.0000e-005	0.8811
Total	**4.3000e-004**	**2.7000e-004**	**3.4900e-003**	**1.0000e-005**	**1.1000e-003**	**1.0000e-005**	**1.1100e-003**	**2.9000e-004**	**1.0000e-005**	**3.0000e-004**	**0.0000**	**0.8728**	**0.8728**	**3.0000e-005**	**3.0000e-005**	**0.8811**

3.6 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0228	0.2086	0.2355	3.9000e-004		0.0102	0.0102		9.5500e-003	9.5500e-003	0.0000	33.6117	33.6117	8.0000e-003	0.0000	33.8116
Total	**0.0228**	**0.2086**	**0.2355**	**3.9000e-004**		**0.0102**	**0.0102**		**9.5500e-003**	**9.5500e-003**	**0.0000**	**33.6117**	**33.6117**	**8.0000e-003**	**0.0000**	**33.8116**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.1500e-003	0.0431	0.0130	1.7000e-004	5.1800e-003	2.3000e-004	5.4100e-003	1.5000e-003	2.2000e-004	1.7200e-003	0.0000	16.4048	16.4048	4.0000e-004	2.4100e-003	17.1322
Worker	6.8200e-003	4.2200e-003	0.0553	1.5000e-004	0.0175	9.0000e-005	0.0176	4.6500e-003	9.0000e-005	4.7300e-003	0.0000	13.8373	13.8373	4.4000e-004	4.0000e-004	13.9677
Total	**7.9700e-003**	**0.0473**	**0.0683**	**3.2000e-004**	**0.0226**	**3.2000e-004**	**0.0230**	**6.1500e-003**	**3.1000e-004**	**6.4500e-003**	**0.0000**	**30.2421**	**30.2421**	**8.4000e-004**	**2.8100e-003**	**31.0999**

3.6 Building Construction - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0228	0.2086	0.2355	3.9000e-004		0.0102	0.0102		9.5500e-003	9.5500e-003	0.0000	33.6117	33.6117	8.0000e-003	0.0000	33.8115
Total	**0.0228**	**0.2086**	**0.2355**	**3.9000e-004**		**0.0102**	**0.0102**		**9.5500e-003**	**9.5500e-003**	**0.0000**	**33.6117**	**33.6117**	**8.0000e-003**	**0.0000**	**33.8115**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.1500e-003	0.0431	0.0130	1.7000e-004	5.1800e-003	2.3000e-004	5.4100e-003	1.5000e-003	2.2000e-004	1.7200e-003	0.0000	16.4048	16.4048	4.0000e-004	2.4100e-003	17.1322
Worker	6.8200e-003	4.2200e-003	0.0553	1.5000e-004	0.0175	9.0000e-005	0.0176	4.6500e-003	9.0000e-005	4.7300e-003	0.0000	13.8373	13.8373	4.4000e-004	4.0000e-004	13.9677
Total	**7.9700e-003**	**0.0473**	**0.0683**	**3.2000e-004**	**0.0226**	**3.2000e-004**	**0.0230**	**6.1500e-003**	**3.1000e-004**	**6.4500e-003**	**0.0000**	**30.2421**	**30.2421**	**8.4000e-004**	**2.8100e-003**	**31.0999**

3.6 Building Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1928	1.7611	2.1179	3.5300e-003		0.0803	0.0803		0.0756	0.0756	0.0000	303.7223	303.7223	0.0718	0.0000	305.5179
Total	**0.1928**	**1.7611**	**2.1179**	**3.5300e-003**		**0.0803**	**0.0803**		**0.0756**	**0.0756**	**0.0000**	**303.7223**	**303.7223**	**0.0718**	**0.0000**	**305.5179**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	9.9700e-003	0.3818	0.1138	1.4900e-003	0.0468	2.0400e-003	0.0488	0.0135	1.9600e-003	0.0155	0.0000	145.3937	145.3937	3.5500e-003	0.0214	151.8541
Worker	0.0576	0.0339	0.4641	1.3200e-003	0.1578	8.0000e-004	0.1586	0.0420	7.4000e-004	0.0427	0.0000	120.9306	120.9306	3.6300e-003	3.3600e-003	122.0238
Total	**0.0675**	**0.4157**	**0.5779**	**2.8100e-003**	**0.2046**	**2.8400e-003**	**0.2074**	**0.0555**	**2.7000e-003**	**0.0582**	**0.0000**	**266.3243**	**266.3243**	**7.1800e-003**	**0.0247**	**273.8779**

3.6 Building Construction - 2024

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1928	1.7611	2.1179	3.5300e-003		0.0803	0.0803		0.0756	0.0756	0.0000	303.7220	303.7220	0.0718	0.0000	305.5175
Total	**0.1928**	**1.7611**	**2.1179**	**3.5300e-003**		**0.0803**	**0.0803**		**0.0756**	**0.0756**	**0.0000**	**303.7220**	**303.7220**	**0.0718**	**0.0000**	**305.5175**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	9.9700e-003	0.3818	0.1138	1.4900e-003	0.0468	2.0400e-003	0.0488	0.0135	1.9600e-003	0.0155	0.0000	145.3937	145.3937	3.5500e-003	0.0214	151.8541
Worker	0.0576	0.0339	0.4641	1.3200e-003	0.1578	8.0000e-004	0.1586	0.0420	7.4000e-004	0.0427	0.0000	120.9306	120.9306	3.6300e-003	3.3600e-003	122.0238
Total	**0.0675**	**0.4157**	**0.5779**	**2.8100e-003**	**0.2046**	**2.8400e-003**	**0.2074**	**0.0555**	**2.7000e-003**	**0.0582**	**0.0000**	**266.3243**	**266.3243**	**7.1800e-003**	**0.0247**	**273.8779**

3.6 Building Construction - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	6.1500e-003	0.0561	0.0724	1.2000e-004		2.3700e-003	2.3700e-003		2.2300e-003	2.2300e-003	0.0000	10.4364	10.4364	2.4500e-003	0.0000	10.4977
Total	**6.1500e-003**	**0.0561**	**0.0724**	**1.2000e-004**		**2.3700e-003**	**2.3700e-003**		**2.2300e-003**	**2.2300e-003**	**0.0000**	**10.4364**	**10.4364**	**2.4500e-003**	**0.0000**	**10.4977**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.3000e-004	0.0129	3.8200e-003	5.0000e-005	1.6100e-003	7.0000e-005	1.6800e-003	4.6000e-004	7.0000e-005	5.3000e-004	0.0000	4.8934	4.8934	1.2000e-004	7.2000e-004	5.1112
Worker	1.8600e-003	1.0400e-003	0.0149	4.0000e-005	5.4200e-003	3.0000e-005	5.4500e-003	1.4400e-003	2.0000e-005	1.4700e-003	0.0000	4.0138	4.0138	1.1000e-004	1.1000e-004	4.0488
Total	**2.1900e-003**	**0.0139**	**0.0187**	**9.0000e-005**	**7.0300e-003**	**1.0000e-004**	**7.1300e-003**	**1.9000e-003**	**9.0000e-005**	**2.0000e-003**	**0.0000**	**8.9072**	**8.9072**	**2.3000e-004**	**8.3000e-004**	**9.1600**

3.6 Building Construction - 2025

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	6.1500e-003	0.0561	0.0724	1.2000e-004		2.3700e-003	2.3700e-003		2.2300e-003	2.2300e-003	0.0000	10.4364	10.4364	2.4500e-003	0.0000	10.4977
Total	**6.1500e-003**	**0.0561**	**0.0724**	**1.2000e-004**		**2.3700e-003**	**2.3700e-003**		**2.2300e-003**	**2.2300e-003**	**0.0000**	**10.4364**	**10.4364**	**2.4500e-003**	**0.0000**	**10.4977**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.3000e-004	0.0129	3.8200e-003	5.0000e-005	1.6100e-003	7.0000e-005	1.6800e-003	4.6000e-004	7.0000e-005	5.3000e-004	0.0000	4.8934	4.8934	1.2000e-004	7.2000e-004	5.1112
Worker	1.8600e-003	1.0400e-003	0.0149	4.0000e-005	5.4200e-003	3.0000e-005	5.4500e-003	1.4400e-003	2.0000e-005	1.4700e-003	0.0000	4.0138	4.0138	1.1000e-004	1.1000e-004	4.0488
Total	**2.1900e-003**	**0.0139**	**0.0187**	**9.0000e-005**	**7.0300e-003**	**1.0000e-004**	**7.1300e-003**	**1.9000e-003**	**9.0000e-005**	**2.0000e-003**	**0.0000**	**8.9072**	**8.9072**	**2.3000e-004**	**8.3000e-004**	**9.1600**

3.7 Architecural Coating - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	1.1020					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0100	0.0676	0.1005	1.6000e-004		3.3800e-003	3.3800e-003		3.3800e-003	3.3800e-003	0.0000	14.1706	14.1706	8.0000e-004	0.0000	14.1905
Total	**1.1120**	**0.0676**	**0.1005**	**1.6000e-004**		**3.3800e-003**	**3.3800e-003**		**3.3800e-003**	**3.3800e-003**	**0.0000**	**14.1706**	**14.1706**	**8.0000e-004**	**0.0000**	**14.1905**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.9100e-003	2.8900e-003	0.0396	1.1000e-004	0.0135	7.0000e-005	0.0135	3.5800e-003	6.0000e-005	3.6400e-003	0.0000	10.3093	10.3093	3.1000e-004	2.9000e-004	10.4025
Total	**4.9100e-003**	**2.8900e-003**	**0.0396**	**1.1000e-004**	**0.0135**	**7.0000e-005**	**0.0135**	**3.5800e-003**	**6.0000e-005**	**3.6400e-003**	**0.0000**	**10.3093**	**10.3093**	**3.1000e-004**	**2.9000e-004**	**10.4025**

3.7 Architecural Coating - 2024

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	1.1020					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0100	0.0676	0.1005	1.6000e-004		3.3800e-003	3.3800e-003		3.3800e-003	3.3800e-003	0.0000	14.1705	14.1705	8.0000e-004	0.0000	14.1905
Total	**1.1120**	**0.0676**	**0.1005**	**1.6000e-004**		**3.3800e-003**	**3.3800e-003**		**3.3800e-003**	**3.3800e-003**	**0.0000**	**14.1705**	**14.1705**	**8.0000e-004**	**0.0000**	**14.1905**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.9100e-003	2.8900e-003	0.0396	1.1000e-004	0.0135	7.0000e-005	0.0135	3.5800e-003	6.0000e-005	3.6400e-003	0.0000	10.3093	10.3093	3.1000e-004	2.9000e-004	10.4025
Total	**4.9100e-003**	**2.8900e-003**	**0.0396**	**1.1000e-004**	**0.0135**	**7.0000e-005**	**0.0135**	**3.5800e-003**	**6.0000e-005**	**3.6400e-003**	**0.0000**	**10.3093**	**10.3093**	**3.1000e-004**	**2.9000e-004**	**10.4025**

3.7 Architecural Coating - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0894					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.7000e-004	5.1500e-003	8.1400e-003	1.0000e-005		2.3000e-004	2.3000e-004		2.3000e-004	2.3000e-004	0.0000	1.1490	1.1490	6.0000e-005	0.0000	1.1505
Total	**0.0901**	**5.1500e-003**	**8.1400e-003**	**1.0000e-005**		**2.3000e-004**	**2.3000e-004**		**2.3000e-004**	**2.3000e-004**	**0.0000**	**1.1490**	**1.1490**	**6.0000e-005**	**0.0000**	**1.1505**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.7000e-004	2.1000e-004	2.9900e-003	1.0000e-005	1.0900e-003	1.0000e-005	1.1000e-003	2.9000e-004	0.0000	2.9000e-004	0.0000	0.8077	0.8077	2.0000e-005	2.0000e-005	0.8147
Total	**3.7000e-004**	**2.1000e-004**	**2.9900e-003**	**1.0000e-005**	**1.0900e-003**	**1.0000e-005**	**1.1000e-003**	**2.9000e-004**	**0.0000**	**2.9000e-004**	**0.0000**	**0.8077**	**0.8077**	**2.0000e-005**	**2.0000e-005**	**0.8147**

3.7 Architecural Coating - 2025

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0894					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.7000e-004	5.1500e-003	8.1400e-003	1.0000e-005		2.3000e-004	2.3000e-004		2.3000e-004	2.3000e-004	0.0000	1.1490	1.1490	6.0000e-005	0.0000	1.1505
Total	**0.0901**	**5.1500e-003**	**8.1400e-003**	**1.0000e-005**		**2.3000e-004**	**2.3000e-004**		**2.3000e-004**	**2.3000e-004**	**0.0000**	**1.1490**	**1.1490**	**6.0000e-005**	**0.0000**	**1.1505**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.7000e-004	2.1000e-004	2.9900e-003	1.0000e-005	1.0900e-003	1.0000e-005	1.1000e-003	2.9000e-004	0.0000	2.9000e-004	0.0000	0.8077	0.8077	2.0000e-005	2.0000e-005	0.8147
Total	**3.7000e-004**	**2.1000e-004**	**2.9900e-003**	**1.0000e-005**	**1.0900e-003**	**1.0000e-005**	**1.1000e-003**	**2.9000e-004**	**0.0000**	**2.9000e-004**	**0.0000**	**0.8077**	**0.8077**	**2.0000e-005**	**2.0000e-005**	**0.8147**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	2.1600	2.0177	14.7452	0.0246	2.6009	0.0210	2.6218	0.6952	0.0196	0.7147	0.0000	2,277.414 7	2,277.414 7	0.2215	0.1442	2,325.920 5
Unmitigated	2.1600	2.0177	14.7452	0.0246	2.6009	0.0210	2.6218	0.6952	0.0196	0.7147	0.0000	2,277.414 7	2,277.414 7	0.2215	0.1442	2,325.920 5

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Automobile Care Center	0.00	0.00	0.00		
Convenience Market with Gas Pumps	771.04	771.04	771.04	1,494,507	1,494,507
Fast Food Restaurant with Drive Thru	4,910.91	4,910.91	4910.91	3,392,427	3,392,427
Parking Lot	0.00	0.00	0.00		
Single Family Housing	831.06	831.06	831.06	2,132,591	2,132,591
Total	6,513.01	6,513.01	6,513.01	7,019,524	7,019,524

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Automobile Care Center	10.00	5.00	6.50	33.00	48.00	19.00	21	51	28
Convenience Market with Gas	10.00	5.00	6.50	0.80	80.20	19.00	100	0	0

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Fast Food Restaurant with Drive Thru	10.00	5.00	6.50	2.20	78.80	19.00	29	21	50
Parking Lot	10.00	5.00	6.50	0.00	0.00	0.00	0	0	0
Single Family Housing	10.00	5.00	6.50	46.50	12.50	41.00	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Automobile Care Center	0.550065	0.056538	0.183073	0.126916	0.023794	0.005777	0.013314	0.009484	0.000878	0.000597	0.025554	0.000937	0.003071
Convenience Market with Gas Pumps	0.550065	0.056538	0.183073	0.126916	0.023794	0.005777	0.013314	0.009484	0.000878	0.000597	0.025554	0.000937	0.003071
Fast Food Restaurant with Drive Thru	0.550065	0.056538	0.183073	0.126916	0.023794	0.005777	0.013314	0.009484	0.000878	0.000597	0.025554	0.000937	0.003071
Parking Lot	0.550065	0.056538	0.183073	0.126916	0.023794	0.005777	0.013314	0.009484	0.000878	0.000597	0.025554	0.000937	0.003071
Single Family Housing	0.550065	0.056538	0.183073	0.126916	0.023794	0.005777	0.013314	0.009484	0.000878	0.000597	0.025554	0.000937	0.003071

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Kilowatt Hours of Renewable Electricity Generated

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	504.7539	504.7539	0.0465	5.6400e-003	507.5978
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	559.6152	559.6152	0.0516	6.2500e-003	562.7683
NaturalGas Mitigated	0.0146	0.1325	0.1113	8.0000e-004		0.0101	0.0101		0.0101	0.0101	0.0000	144.2486	144.2486	2.7600e-003	2.6400e-003	145.1058
NaturalGas Unmitigated	0.0146	0.1325	0.1113	8.0000e-004		0.0101	0.0101		0.0101	0.0101	0.0000	144.2486	144.2486	2.7600e-003	2.6400e-003	145.1058

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Automobile Care Center	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Convenience Market with Gas Pumps	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Fast Food Restaurant with Drive Thru	2.70312e+006	0.0146	0.1325	0.1113	8.0000e-004		0.0101	0.0101		0.0101	0.0101	0.0000	144.2486	144.2486	2.7600e-003	2.6400e-003	145.1058
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0146**	**0.1325**	**0.1113**	**8.0000e-004**		**0.0101**	**0.0101**		**0.0101**	**0.0101**	**0.0000**	**144.2486**	**144.2486**	**2.7600e-003**	**2.6400e-003**	**145.1058**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Automobile Care Center	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Convenience Market with Gas Pumps	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Fast Food Restaurant with Drive Thru	2.70312e+006	0.0146	0.1325	0.1113	8.0000e-004		0.0101	0.0101		0.0101	0.0101	0.0000	144.2486	144.2486	2.7600e-003	2.6400e-003	145.1058
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0146**	**0.1325**	**0.1113**	**8.0000e-004**		**0.0101**	**0.0101**		**0.0101**	**0.0101**	**0.0000**	**144.2486**	**144.2486**	**2.7600e-003**	**2.6400e-003**	**145.1058**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Automobile Care Center	745403	121.0363	0.0112	1.3500e-003	121.7183
Convenience Market with Gas Pumps	66508	10.7994	1.0000e-003	1.2000e-004	10.8602
Fast Food Restaurant with Drive Thru	1.33003e+006	215.9666	0.0199	2.4100e-003	217.1834
Parking Lot	102323	16.6148	1.5300e-003	1.9000e-004	16.7084
Single Family Housing	1.20213e+006	195.1981	0.0180	2.1800e-003	196.2979
Total		**559.6152**	**0.0516**	**6.2500e-003**	**562.7683**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Automobile Care Center	677830	110.0640	0.0102	1.2300e-003	110.6842
Convenience Market with Gas Pumps	-1064.8	-0.1729	0.0000	0.0000	-0.1739
Fast Food Restaurant with Drive Thru	1.26246e+006	204.9943	0.0189	2.2900e-003	206.1494
Parking Lot	34749.7	5.6426	5.2000e-004	6.0000e-005	5.6743
Single Family Housing	1.13456e+006	184.2258	0.0170	2.0600e-003	185.2639
Total		**504.7539**	**0.0465**	**5.6400e-003**	**507.5979**

6.0 Area Detail

6.1 Mitigation Measures Area

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.9116	9.6500e-003	0.8388	4.0000e-005		4.6500e-003	4.6500e-003		4.6500e-003	4.6500e-003	0.0000	1.3728	1.3728	1.3300e-003	0.0000	1.4060
Unmitigated	0.9116	9.6500e-003	0.8388	4.0000e-005		4.6500e-003	4.6500e-003		4.6500e-003	4.6500e-003	0.0000	1.3728	1.3728	1.3300e-003	0.0000	1.4060

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.1191					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.7670					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0255	9.6500e-003	0.8388	4.0000e-005		4.6500e-003	4.6500e-003		4.6500e-003	4.6500e-003	0.0000	1.3728	1.3728	1.3300e-003	0.0000	1.4060
Total	**0.9116**	**9.6500e-003**	**0.8388**	**4.0000e-005**		**4.6500e-003**	**4.6500e-003**		**4.6500e-003**	**4.6500e-003**	**0.0000**	**1.3728**	**1.3728**	**1.3300e-003**	**0.0000**	**1.4060**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.1191					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.7670					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0255	9.6500e-003	0.8388	4.0000e-005		4.6500e-003	4.6500e-003		4.6500e-003	4.6500e-003	0.0000	1.3728	1.3728	1.3300e-003	0.0000	1.4060
Total	**0.9116**	**9.6500e-003**	**0.8388**	**4.0000e-005**		**4.6500e-003**	**4.6500e-003**		**4.6500e-003**	**4.6500e-003**	**0.0000**	**1.3728**	**1.3728**	**1.3300e-003**	**0.0000**	**1.4060**

7.0 Water Detail

7.1 Mitigation Measures Water

Apply Water Conservation Strategy

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	15.2500	0.0152	9.0500e-003	18.3255
Unmitigated	19.0624	0.0189	0.0113	22.9069

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Automobile Care Center	2.104 / 0	2.4467	2.7200e-003	1.6400e-003	3.0027
Convenience Market with Gas Pumps	0.167315 / 0.102548	0.2528	2.2000e-004	1.3000e-004	0.2974
Fast Food Restaurant with Drive Thru	6.95092 / 0.443676	8.3351	9.0100e-003	5.4100e-003	10.1736
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	5.27748 / 3.3271	8.0278	6.9900e-003	4.1300e-003	9.4332
Total		**19.0624**	**0.0189**	**0.0113**	**22.9069**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Automobile Care Center	1.6832 / 0	1.9573	2.1800e-003	1.3100e-003	2.4022
Convenience Market with Gas Pumps	0.133852 / 0.0820383	0.2023	1.8000e-004	1.0000e-004	0.2379
Fast Food Restaurant with Drive Thru	5.56074 / 0.354941	6.6681	7.2000e-003	4.3300e-003	8.1388
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	4.22198 / 2.66168	6.4223	5.6000e-003	3.3000e-003	7.5466
Total		**15.2500**	**0.0152**	**9.0400e-003**	**18.3255**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	52.8467	3.1232	0.0000	130.9254
Unmitigated	70.4622	4.1642	0.0000	174.5672

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Automobile Care Center	5.58	1.1327	0.0669	0.0000	2.8062
Fast Food Restaurant with Drive Thru	263.78	53.5450	3.1644	0.0000	132.6554
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	77.76	15.7846	0.9328	0.0000	39.1056
Total		**70.4622**	**4.1642**	**0.0000**	**174.5672**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Automobile Care Center	4.185	0.8495	0.0502	0.0000	2.1046
Fast Food Restaurant with Drive Thru	197.835	40.1587	2.3733	0.0000	99.4915
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	58.32	11.8384	0.6996	0.0000	29.3292
Total		**52.8467**	**3.1232**	**0.0000**	**130.9254**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Equipment Type	Number

11.0 Vegetation

Winding Ranch

Sacramento County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Parking Lot	292.35	1000sqft	6.71	292,350.00	0
Fast Food Restaurant with Drive Thru	22.90	1000sqft	0.53	22,900.00	0
Single Family Housing	81.00	Dwelling Unit	8.83	162,000.00	216
Automobile Care Center	1.46	1000sqft	0.03	1,460.00	0
Convenience Market with Gas Pumps	16.00	Pump	0.05	5,200.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	3.5	**Precipitation Freq (Days)**	58
Climate Zone	6			**Operational Year**	2026
Utility Company	Sacramento Municipal Utility District				
CO2 Intensity (lb/MWhr)	357.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Run 2 - All electric assumption for fast food restaurants removed; construction start date pushed back to August 2023.

Land Use - Land uses and sizes per site plan and project description.
Automobile Care Center = car wash portion of convenience store/gas station.
Parking lot includes retail area driveways, parking lots and sidewalks, and residential area streets and sidewalks.

Construction Phase - Architectural coating assumed to occur concurrently with last 6 months of building construction.

Off-road Equipment -

Off-road Equipment -

Off-road Equipment - Off-Highway Truck = water truck

Off-road Equipment - Off-Highway Truck = water truck

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Off-road Equipment - Off-Highway Truck = water truck

Trips and VMT -

Demolition - Approximately 1,510 CY (about 2 tons per CY) of old asphalt to be removed during demolition.

Grading - 3,100 CY vegetation exported during site prep, estimated from total project area and aerial image of exising conditions.

Vehicle Trips - Project trip genration per traffic study.
Trip generation for retail uses includes internal trip capture and pass-by trips.

Vehicle Emission Factors -

Vehicle Emission Factors -

Vehicle Emission Factors -

Energy Use - Default natural gas for market, residences, and restaurant title 24 converted to KWh and added to electricity use.
Energy use for car wash (automobile care center) estimated from industry data.

Water And Wastewater - Water use for car wash (automobile care center) estimated from industry survey data.

Solid Waste -

Construction Off-road Equipment Mitigation - Fugitive dust mitigation per SMAQMD BMPs

Energy Mitigation - On-site solar requirements for 81 residential DU estimated per 2019 Title 24.

Water Mitigation - 20% water use reduction per 2019 Title 24 and CalGreen not accounted for in model defaults.

Waste Mitigation - 25% solid waste generation reduction per AB 341 and othe state/local regulations not accounted for in model defaults.

Fleet Mix -

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	20.00	120.00
tblEnergyUse	LightingElect	4.57	0.00
tblEnergyUse	LightingElect	1,608.84	2,396.32
tblEnergyUse	NT24E	7.20	510.55
tblEnergyUse	NT24E	2.98	3.25
tblEnergyUse	NT24NG	12.42	0.00
tblEnergyUse	NT24NG	0.93	0.00
tblEnergyUse	NT24NG	2,687.00	0.00
tblEnergyUse	T24E	3.05	0.00
tblEnergyUse	T24E	2.91	4.21

tblEnergyUse	T24E	7.86	25.17
tblEnergyUse	T24E	142.58	6,288.81
tblEnergyUse	T24NG	23.15	0.00
tblEnergyUse	T24NG	4.44	0.00
tblEnergyUse	T24NG	59.07	0.00
tblEnergyUse	T24NG	20,971.81	0.00
tblGrading	MaterialExported	0.00	3,100.00
tblLandUse	LandUseSquareFeet	145,800.00	162,000.00
tblLandUse	LandUseSquareFeet	2,258.80	5,200.00
tblLandUse	LotAcreage	26.30	8.83
tblVehicleTrips	DV_TP	21.00	0.00
tblVehicleTrips	PB_TP	65.00	0.00
tblVehicleTrips	PR_TP	14.00	100.00
tblVehicleTrips	ST_TR	23.72	0.00
tblVehicleTrips	ST_TR	322.50	48.19
tblVehicleTrips	ST_TR	616.12	214.45
tblVehicleTrips	ST_TR	9.54	10.26
tblVehicleTrips	SU_TR	11.88	0.00
tblVehicleTrips	SU_TR	322.50	48.19
tblVehicleTrips	SU_TR	472.58	214.45
tblVehicleTrips	SU_TR	8.55	10.26
tblVehicleTrips	WD_TR	23.72	0.00
tblVehicleTrips	WD_TR	322.50	48.19
tblVehicleTrips	WD_TR	470.95	214.45
tblVehicleTrips	WD_TR	9.44	10.26
tblWater	IndoorWaterUseRate	137,358.42	2,104,000.00
tblWater	OutdoorWaterUseRate	84,187.42	0.00

2.0 Emissions Summary

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2023	3.6423	36.3452	30.2399	0.0703	20.5499	1.4899	21.9263	10.3378	1.3707	11.6058	0.0000	7,110.4778	7,110.4778	2.1564	0.4255	7,275.0160
2024	22.1330	17.9869	23.2101	0.0531	1.8661	0.6973	2.5633	0.5033	0.6596	1.1629	0.0000	5,252.7675	5,252.7675	0.6903	0.2168	5,334.6384
2025	21.9828	16.8439	22.8241	0.0525	1.8660	0.6014	2.4674	0.5033	0.5689	1.0722	0.0000	5,188.6739	5,188.6739	0.6821	0.2111	5,268.6367
Maximum	**22.1330**	**36.3452**	**30.2399**	**0.0703**	**20.5499**	**1.4899**	**21.9263**	**10.3378**	**1.3707**	**11.6058**	**0.0000**	**7,110.4778**	**7,110.4778**	**2.1564**	**0.4255**	**7,275.0160**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2023	3.6423	36.3452	30.2399	0.0703	9.7032	1.4899	11.0797	4.7761	1.3707	6.0441	0.0000	7,110.4778	7,110.4778	2.1564	0.4255	7,275.0160
2024	22.1330	17.9869	23.2101	0.0531	1.8661	0.6973	2.5633	0.5033	0.6596	1.1629	0.0000	5,252.7675	5,252.7675	0.6903	0.2168	5,334.6384
2025	21.9828	16.8439	22.8241	0.0525	1.8660	0.6014	2.4674	0.5033	0.5689	1.0722	0.0000	5,188.6739	5,188.6739	0.6821	0.2111	5,268.6367
Maximum	**22.1330**	**36.3452**	**30.2399**	**0.0703**	**9.7032**	**1.4899**	**11.0797**	**4.7761**	**1.3707**	**6.0441**	**0.0000**	**7,110.4778**	**7,110.4778**	**2.1564**	**0.4255**	**7,275.0160**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	44.67	0.00	40.24	49.03	0.00	40.18	0.00	0.00	0.00	0.00	0.00	0.00

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	5.0593	0.0772	6.7102	3.6000e-004		0.0372	0.0372		0.0372	0.0372	0.0000	12.1056	12.1056	0.0117	0.0000	12.3984
Energy	0.0799	0.7261	0.6099	4.3600e-003		0.0552	0.0552		0.0552	0.0552		871.2703	871.2703	0.0167	0.0160	876.4478
Mobile	11.0881	11.8515	89.9340	0.1329	14.7968	0.1155	14.9123	3.9441	0.1077	4.0518		13,572.7691	13,572.7691	1.4854	0.9216	13,884.5255
Total	**16.2273**	**12.6548**	**97.2540**	**0.1377**	**14.7968**	**0.2078**	**15.0047**	**3.9441**	**0.2001**	**4.1441**	**0.0000**	**14,456.1449**	**14,456.1449**	**1.5138**	**0.9375**	**14,773.3717**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	5.0593	0.0772	6.7102	3.6000e-004		0.0372	0.0372		0.0372	0.0372	0.0000	12.1056	12.1056	0.0117	0.0000	12.3984
Energy	0.0799	0.7261	0.6099	4.3600e-003		0.0552	0.0552		0.0552	0.0552		871.2703	871.2703	0.0167	0.0160	876.4478
Mobile	11.0881	11.8515	89.9340	0.1329	14.7968	0.1155	14.9123	3.9441	0.1077	4.0518		13,572.7691	13,572.7691	1.4854	0.9216	13,884.5255
Total	**16.2273**	**12.6548**	**97.2540**	**0.1377**	**14.7968**	**0.2078**	**15.0047**	**3.9441**	**0.2001**	**4.1441**	**0.0000**	**14,456.1449**	**14,456.1449**	**1.5138**	**0.9375**	**14,773.3717**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	8/1/2023	8/28/2023	5	20	
2	Site Preparation	Site Preparation	8/29/2023	9/11/2023	5	10	
3	Grading	Grading	9/12/2023	10/23/2023	5	30	
4	Paving	Paving	10/24/2023	11/20/2023	5	20	
5	Building Construction	Building Construction	11/21/2023	1/13/2025	5	300	
6	Architecural Coating	Architectural Coating	7/30/2024	1/13/2025	5	120	

Acres of Grading (Site Preparation Phase): 15

Acres of Grading (Grading Phase): 90

Acres of Paving: 6.71

Residential Indoor: 328,050; Residential Outdoor: 109,350; Non-Residential Indoor: 44,340; Non-Residential Outdoor: 14,780; Striped Parking Area: 17,541 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	3	8.00	158	0.38
Demolition	Off-Highway Trucks	1	4.00	402	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Site Preparation	Off-Highway Trucks	1	4.00	402	0.38

Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading	Excavators	2	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Off-Highway Trucks	1	4.00	402	0.38
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Scrapers	2	8.00	367	0.48
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Architecural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	7	18.00	0.00	299.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	8	20.00	0.00	388.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Grading	9	23.00	0.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	164.00	61.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Architecural Coating	1	33.00	0.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Demolition - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.3688	0.0000	3.3688	0.5101	0.0000	0.5101			0.0000			0.0000
Off-Road	2.5210	23.2684	21.2876	0.0454		1.0620	1.0620		0.9873	0.9873		4,386.928 3	4,386.928 3	1.2563		4,418.336 8
Total	**2.5210**	**23.2684**	**21.2876**	**0.0454**	**3.3688**	**1.0620**	**4.4309**	**0.5101**	**0.9873**	**1.4974**		**4,386.928 3**	**4,386.928 3**	**1.2563**		**4,418.336 8**

3.2 Demolition - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0387	2.4297	0.4830	9.3800e-003	0.2607	0.0174	0.2781	0.0714	0.0166	0.0880		1,024.2202	1,024.2202	0.0407	0.1624	1,073.6334
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0537	0.0357	0.4261	1.1100e-003	0.1369	7.0000e-004	0.1376	0.0363	6.5000e-004	0.0370		112.5438	112.5438	4.0500e-003	3.6100e-003	113.7203
Total	**0.0923**	**2.4654**	**0.9091**	**0.0105**	**0.3976**	**0.0181**	**0.4157**	**0.1077**	**0.0173**	**0.1250**		**1,136.7640**	**1,136.7640**	**0.0448**	**0.1660**	**1,187.3537**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.5160	0.0000	1.5160	0.2295	0.0000	0.2295			0.0000			0.0000
Off-Road	2.5210	23.2684	21.2876	0.0454		1.0620	1.0620		0.9873	0.9873	0.0000	4,386.9283	4,386.9283	1.2563		4,418.3368
Total	**2.5210**	**23.2684**	**21.2876**	**0.0454**	**1.5160**	**1.0620**	**2.5780**	**0.2295**	**0.9873**	**1.2169**	**0.0000**	**4,386.9283**	**4,386.9283**	**1.2563**		**4,418.3368**

3.2 Demolition - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0387	2.4297	0.4830	9.3800e-003	0.2607	0.0174	0.2781	0.0714	0.0166	0.0880		1,024.2202	1,024.2202	0.0407	0.1624	1,073.6334
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0537	0.0357	0.4261	1.1100e-003	0.1369	7.0000e-004	0.1376	0.0363	6.5000e-004	0.0370		112.5438	112.5438	4.0500e-003	3.6100e-003	113.7203
Total	**0.0923**	**2.4654**	**0.9091**	**0.0105**	**0.3976**	**0.0181**	**0.4157**	**0.1077**	**0.0173**	**0.1250**		**1,136.7640**	**1,136.7640**	**0.0448**	**0.1660**	**1,187.3537**

3.3 Site Preparation - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					19.7211	0.0000	19.7211	10.1122	0.0000	10.1122			0.0000			0.0000
Off-Road	2.9114	29.3081	19.8886	0.0447		1.3305	1.3305		1.2241	1.2241		4,327.2524	4,327.2524	1.3995		4,362.2404
Total	**2.9114**	**29.3081**	**19.8886**	**0.0447**	**19.7211**	**1.3305**	**21.0517**	**10.1122**	**1.2241**	**11.3362**		**4,327.2524**	**4,327.2524**	**1.3995**		**4,362.2404**

3.3 Site Preparation - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1003	6.3057	1.2534	0.0244	0.6766	0.0451	0.7217	0.1853	0.0432	0.2285		2,658.1768	2,658.1768	0.1057	0.4215	2,786.4198
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0597	0.0397	0.4734	1.2400e-003	0.1521	7.8000e-004	0.1529	0.0404	7.2000e-004	0.0411		125.0487	125.0487	4.5000e-003	4.0100e-003	126.3559
Total	**0.1600**	**6.3454**	**1.7269**	**0.0256**	**0.8287**	**0.0459**	**0.8747**	**0.2256**	**0.0439**	**0.2695**		**2,783.2255**	**2,783.2255**	**0.1102**	**0.4255**	**2,912.7756**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.8745	0.0000	8.8745	4.5505	0.0000	4.5505			0.0000			0.0000
Off-Road	2.9114	29.3081	19.8886	0.0447		1.3305	1.3305		1.2241	1.2241	0.0000	4,327.2524	4,327.2524	1.3995		4,362.2404
Total	**2.9114**	**29.3081**	**19.8886**	**0.0447**	**8.8745**	**1.3305**	**10.2050**	**4.5505**	**1.2241**	**5.7746**	**0.0000**	**4,327.2524**	**4,327.2524**	**1.3995**		**4,362.2404**

3.3 Site Preparation - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1003	6.3057	1.2534	0.0244	0.6766	0.0451	0.7217	0.1853	0.0432	0.2285		2,658.176 8	2,658.176 8	0.1057	0.4215	2,786.419 8
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0597	0.0397	0.4734	1.2400e-003	0.1521	7.8000e-004	0.1529	0.0404	7.2000e-004	0.0411		125.0487	125.0487	4.5000e-003	4.0100e-003	126.3559
Total	**0.1600**	**6.3454**	**1.7269**	**0.0256**	**0.8287**	**0.0459**	**0.8747**	**0.2256**	**0.0439**	**0.2695**		**2,783.225 5**	**2,783.225 5**	**0.1102**	**0.4255**	**2,912.775 6**

3.4 Grading - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					9.2036	0.0000	9.2036	3.6538	0.0000	3.6538			0.0000			0.0000
Off-Road	3.5737	36.2996	29.6954	0.0687		1.4890	1.4890		1.3699	1.3699		6,651.422 0	6,651.422 0	2.1512		6,705.202 1
Total	**3.5737**	**36.2996**	**29.6954**	**0.0687**	**9.2036**	**1.4890**	**10.6926**	**3.6538**	**1.3699**	**5.0236**		**6,651.422 0**	**6,651.422 0**	**2.1512**		**6,705.202 1**

3.4 Grading - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0686	0.0457	0.5445	1.4200e-003	0.1750	9.0000e-004	0.1759	0.0464	8.3000e-004	0.0472		143.8060	143.8060	5.1700e-003	4.6100e-003	145.3093
Total	**0.0686**	**0.0457**	**0.5445**	**1.4200e-003**	**0.1750**	**9.0000e-004**	**0.1759**	**0.0464**	**8.3000e-004**	**0.0472**		**143.8060**	**143.8060**	**5.1700e-003**	**4.6100e-003**	**145.3093**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					4.1416	0.0000	4.1416	1.6442	0.0000	1.6442			0.0000			0.0000
Off-Road	3.5737	36.2996	29.6954	0.0687		1.4890	1.4890		1.3699	1.3699	0.0000	6,651.4220	6,651.4220	2.1512		6,705.2021
Total	**3.5737**	**36.2996**	**29.6954**	**0.0687**	**4.1416**	**1.4890**	**5.6306**	**1.6442**	**1.3699**	**3.0141**	**0.0000**	**6,651.4220**	**6,651.4220**	**2.1512**		**6,705.2021**

3.4 Grading - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0686	0.0457	0.5445	1.4200e-003	0.1750	9.0000e-004	0.1759	0.0464	8.3000e-004	0.0472		143.8060	143.8060	5.1700e-003	4.6100e-003	145.3093
Total	**0.0686**	**0.0457**	**0.5445**	**1.4200e-003**	**0.1750**	**9.0000e-004**	**0.1759**	**0.0464**	**8.3000e-004**	**0.0472**		**143.8060**	**143.8060**	**5.1700e-003**	**4.6100e-003**	**145.3093**

3.5 Paving - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.0327	10.1917	14.5842	0.0228		0.5102	0.5102		0.4694	0.4694		2,207.5841	2,207.5841	0.7140		2,225.4336
Paving	0.8790					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.9118**	**10.1917**	**14.5842**	**0.0228**		**0.5102**	**0.5102**		**0.4694**	**0.4694**		**2,207.5841**	**2,207.5841**	**0.7140**		**2,225.4336**

3.5 Paving - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0447	0.0298	0.3551	9.3000e-004	0.1141	5.9000e-004	0.1147	0.0303	5.4000e-004	0.0308		93.7865	93.7865	3.3700e-003	3.0100e-003	94.7669
Total	**0.0447**	**0.0298**	**0.3551**	**9.3000e-004**	**0.1141**	**5.9000e-004**	**0.1147**	**0.0303**	**5.4000e-004**	**0.0308**		**93.7865**	**93.7865**	**3.3700e-003**	**3.0100e-003**	**94.7669**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.0327	10.1917	14.5842	0.0228		0.5102	0.5102		0.4694	0.4694	0.0000	2,207.5841	2,207.5841	0.7140		2,225.4336
Paving	0.8790					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.9118**	**10.1917**	**14.5842**	**0.0228**		**0.5102**	**0.5102**		**0.4694**	**0.4694**	**0.0000**	**2,207.5841**	**2,207.5841**	**0.7140**		**2,225.4336**

3.5 Paving - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0447	0.0298	0.3551	9.3000e-004	0.1141	5.9000e-004	0.1147	0.0303	5.4000e-004	0.0308		93.7865	93.7865	3.3700e-003	3.0100e-003	94.7669
Total	**0.0447**	**0.0298**	**0.3551**	**9.3000e-004**	**0.1141**	**5.9000e-004**	**0.1147**	**0.0303**	**5.4000e-004**	**0.0308**		**93.7865**	**93.7865**	**3.3700e-003**	**3.0100e-003**	**94.7669**

3.6 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.5728	14.3849	16.2440	0.0269		0.6997	0.6997		0.6584	0.6584		2,555.2099	2,555.2099	0.6079		2,570.4061
Total	**1.5728**	**14.3849**	**16.2440**	**0.0269**		**0.6997**	**0.6997**		**0.6584**	**0.6584**		**2,555.2099**	**2,555.2099**	**0.6079**		**2,570.4061**

3.6 Building Construction - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0789	3.0357	0.9194	0.0116	0.3675	0.0160	0.3835	0.1058	0.0153	0.1210		1,247.637 3	1,247.637 3	0.0307	0.1832	1,302.995 5
Worker	0.4891	0.3256	3.8822	0.0101	1.2476	6.4100e-003	1.2540	0.3309	5.9000e-003	0.3368		1,025.399 3	1,025.399 3	0.0369	0.0329	1,036.118 2
Total	**0.5680**	**3.3613**	**4.8015**	**0.0218**	**1.6151**	**0.0224**	**1.6374**	**0.4367**	**0.0212**	**0.4579**		**2,273.036 5**	**2,273.036 5**	**0.0676**	**0.2161**	**2,339.113 8**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.5728	14.3849	16.2440	0.0269		0.6997	0.6997		0.6584	0.6584	0.0000	2,555.209 9	2,555.209 9	0.6079		2,570.406 1
Total	**1.5728**	**14.3849**	**16.2440**	**0.0269**		**0.6997**	**0.6997**		**0.6584**	**0.6584**	**0.0000**	**2,555.209 9**	**2,555.209 9**	**0.6079**		**2,570.406 1**

3.6 Building Construction - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0789	3.0357	0.9194	0.0116	0.3675	0.0160	0.3835	0.1058	0.0153	0.1210		1,247.637 3	1,247.637 3	0.0307	0.1832	1,302.995 5
Worker	0.4891	0.3256	3.8822	0.0101	1.2476	6.4100e-003	1.2540	0.3309	5.9000e-003	0.3368		1,025.399 3	1,025.399 3	0.0369	0.0329	1,036.118 2
Total	**0.5680**	**3.3613**	**4.8015**	**0.0218**	**1.6151**	**0.0224**	**1.6374**	**0.4367**	**0.0212**	**0.4579**		**2,273.036 5**	**2,273.036 5**	**0.0676**	**0.2161**	**2,339.113 8**

3.6 Building Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4716	13.4438	16.1668	0.0270		0.6133	0.6133		0.5769	0.5769		2,555.698 9	2,555.698 9	0.6044		2,570.807 7
Total	**1.4716**	**13.4438**	**16.1668**	**0.0270**		**0.6133**	**0.6133**		**0.5769**	**0.5769**		**2,555.698 9**	**2,555.698 9**	**0.6044**		**2,570.807 7**

3.6 Building Construction - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category						lb/day								lb/day		
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0754	2.9763	0.8910	0.0114	0.3675	0.0157	0.3832	0.1058	0.0150	0.1208		1,224.0314	1,224.0314	0.0298	0.1801	1,278.4506
Worker	0.4576	0.2897	3.6148	9.8100e-003	1.2476	6.0900e-003	1.2536	0.3309	5.6100e-003	0.3365		991.9828	991.9828	0.0335	0.0306	1,001.9284
Total	**0.5330**	**3.2660**	**4.5058**	**0.0212**	**1.6150**	**0.0218**	**1.6368**	**0.4367**	**0.0206**	**0.4573**		**2,216.0142**	**2,216.0142**	**0.0633**	**0.2107**	**2,280.3790**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category						lb/day								lb/day		
Off-Road	1.4716	13.4438	16.1668	0.0270		0.6133	0.6133		0.5769	0.5769	0.0000	2,555.6989	2,555.6989	0.6044		2,570.8077
Total	**1.4716**	**13.4438**	**16.1668**	**0.0270**		**0.6133**	**0.6133**		**0.5769**	**0.5769**	**0.0000**	**2,555.6989**	**2,555.6989**	**0.6044**		**2,570.8077**

3.6 Building Construction - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0754	2.9763	0.8910	0.0114	0.3675	0.0157	0.3832	0.1058	0.0150	0.1208		1,224.031 4	1,224.031 4	0.0298	0.1801	1,278.450 6
Worker	0.4576	0.2897	3.6148	9.8100e-003	1.2476	6.0900e-003	1.2536	0.3309	5.6100e-003	0.3365		991.9828	991.9828	0.0335	0.0306	1,001.928 4
Total	**0.5330**	**3.2660**	**4.5058**	**0.0212**	**1.6150**	**0.0218**	**1.6368**	**0.4367**	**0.0206**	**0.4573**		**2,216.014 2**	**2,216.014 2**	**0.0633**	**0.2107**	**2,280.379 0**

3.6 Building Construction - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.3674	12.4697	16.0847	0.0270		0.5276	0.5276		0.4963	0.4963		2,556.474 4	2,556.474 4	0.6010		2,571.498 1
Total	**1.3674**	**12.4697**	**16.0847**	**0.0270**		**0.5276**	**0.5276**		**0.4963**	**0.4963**		**2,556.474 4**	**2,556.474 4**	**0.6010**		**2,571.498 1**

3.6 Building Construction - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0725	2.9166	0.8700	0.0112	0.3674	0.0154	0.3828	0.1058	0.0147	0.1205		1,199.3463	1,199.3463	0.0292	0.1768	1,252.7604
Worker	0.4299	0.2598	3.3802	9.4800e-003	1.2476	5.8100e-003	1.2534	0.3309	5.3500e-003	0.3363		958.5302	958.5302	0.0305	0.0286	967.8052
Total	**0.5025**	**3.1764**	**4.2502**	**0.0207**	**1.6150**	**0.0212**	**1.6362**	**0.4367**	**0.0201**	**0.4567**		**2,157.8765**	**2,157.8765**	**0.0597**	**0.2054**	**2,220.5655**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.3674	12.4697	16.0847	0.0270		0.5276	0.5276		0.4963	0.4963	0.0000	2,556.4744	2,556.4744	0.6010		2,571.4981
Total	**1.3674**	**12.4697**	**16.0847**	**0.0270**		**0.5276**	**0.5276**		**0.4963**	**0.4963**	**0.0000**	**2,556.4744**	**2,556.4744**	**0.6010**		**2,571.4981**

3.6 Building Construction - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0725	2.9166	0.8700	0.0112	0.3674	0.0154	0.3828	0.1058	0.0147	0.1205		1,199.3463	1,199.3463	0.0292	0.1768	1,252.7604
Worker	0.4299	0.2598	3.3802	9.4800e-003	1.2476	5.8100e-003	1.2534	0.3309	5.3500e-003	0.3363		958.5302	958.5302	0.0305	0.0286	967.8052
Total	**0.5025**	**3.1764**	**4.2502**	**0.0207**	**1.6150**	**0.0212**	**1.6362**	**0.4367**	**0.0201**	**0.4567**		**2,157.8765**	**2,157.8765**	**0.0597**	**0.2054**	**2,220.5655**

3.7 Architecural Coating - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	19.8556					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1808	1.2188	1.8101	2.9700e-003		0.0609	0.0609		0.0609	0.0609		281.4481	281.4481	0.0159		281.8443
Total	**20.0364**	**1.2188**	**1.8101**	**2.9700e-003**		**0.0609**	**0.0609**		**0.0609**	**0.0609**		**281.4481**	**281.4481**	**0.0159**		**281.8443**

3.7 Architecural Coating - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0921	0.0583	0.7274	1.9700e-003	0.2510	1.2300e-003	0.2523	0.0666	1.1300e-003	0.0677		199.6063	199.6063	6.7400e-003	6.1500e-003	201.6075
Total	**0.0921**	**0.0583**	**0.7274**	**1.9700e-003**	**0.2510**	**1.2300e-003**	**0.2523**	**0.0666**	**1.1300e-003**	**0.0677**		**199.6063**	**199.6063**	**6.7400e-003**	**6.1500e-003**	**201.6075**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	19.8556					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1808	1.2188	1.8101	2.9700e-003		0.0609	0.0609		0.0609	0.0609	0.0000	281.4481	281.4481	0.0159		281.8443
Total	**20.0364**	**1.2188**	**1.8101**	**2.9700e-003**		**0.0609**	**0.0609**		**0.0609**	**0.0609**	**0.0000**	**281.4481**	**281.4481**	**0.0159**		**281.8443**

3.7 Architecural Coating - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0921	0.0583	0.7274	1.9700e-003	0.2510	1.2300e-003	0.2523	0.0666	1.1300e-003	0.0677		199.6063	199.6063	6.7400e-003	6.1500e-003	201.6075
Total	**0.0921**	**0.0583**	**0.7274**	**1.9700e-003**	**0.2510**	**1.2300e-003**	**0.2523**	**0.0666**	**1.1300e-003**	**0.0677**		**199.6063**	**199.6063**	**6.7400e-003**	**6.1500e-003**	**201.6075**

3.7 Architecural Coating - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	19.8556					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1709	1.1455	1.8091	2.9700e-003		0.0515	0.0515		0.0515	0.0515		281.4481	281.4481	0.0154		281.8319
Total	**20.0265**	**1.1455**	**1.8091**	**2.9700e-003**		**0.0515**	**0.0515**		**0.0515**	**0.0515**		**281.4481**	**281.4481**	**0.0154**		**281.8319**

3.7 Architecural Coating - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0865	0.0523	0.6802	1.9100e-003	0.2510	1.1700e-003	0.2522	0.0666	1.0800e-003	0.0677		192.8750	192.8750	6.1300e-003	5.7500e-003	194.7413
Total	**0.0865**	**0.0523**	**0.6802**	**1.9100e-003**	**0.2510**	**1.1700e-003**	**0.2522**	**0.0666**	**1.0800e-003**	**0.0677**		**192.8750**	**192.8750**	**6.1300e-003**	**5.7500e-003**	**194.7413**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	19.8556					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1709	1.1455	1.8091	2.9700e-003		0.0515	0.0515		0.0515	0.0515	0.0000	281.4481	281.4481	0.0154		281.8319
Total	**20.0265**	**1.1455**	**1.8091**	**2.9700e-003**		**0.0515**	**0.0515**		**0.0515**	**0.0515**	**0.0000**	**281.4481**	**281.4481**	**0.0154**		**281.8319**

3.7 Architecural Coating - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0865	0.0523	0.6802	1.9100e-003	0.2510	1.1700e-003	0.2522	0.0666	1.0800e-003	0.0677		192.8750	192.8750	6.1300e-003	5.7500e-003	194.7413
Total	**0.0865**	**0.0523**	**0.6802**	**1.9100e-003**	**0.2510**	**1.1700e-003**	**0.2522**	**0.0666**	**1.0800e-003**	**0.0677**		**192.8750**	**192.8750**	**6.1300e-003**	**5.7500e-003**	**194.7413**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	11.0881	11.8515	89.9340	0.1329	14.7968	0.1155	14.9123	3.9441	0.1077	4.0518		13,572.7691	13,572.7691	1.4854	0.9216	13,884.5255
Unmitigated	11.0881	11.8515	89.9340	0.1329	14.7968	0.1155	14.9123	3.9441	0.1077	4.0518		13,572.7691	13,572.7691	1.4854	0.9216	13,884.5255

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Automobile Care Center	0.00	0.00	0.00		
Convenience Market with Gas Pumps	771.04	771.04	771.04	1,494,507	1,494,507
Fast Food Restaurant with Drive Thru	4,910.91	4,910.91	4910.91	3,392,427	3,392,427
Parking Lot	0.00	0.00	0.00		
Single Family Housing	831.06	831.06	831.06	2,132,591	2,132,591
Total	6,513.01	6,513.01	6,513.01	7,019,524	7,019,524

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Automobile Care Center	10.00	5.00	6.50	33.00	48.00	19.00	21	51	28
Convenience Market with Gas	10.00	5.00	6.50	0.80	80.20	19.00	100	0	0
Fast Food Restaurant with Drive	10.00	5.00	6.50	2.20	78.80	19.00	29	21	50
Parking Lot	10.00	5.00	6.50	0.00	0.00	0.00	0	0	0
Single Family Housing	10.00	5.00	6.50	46.50	12.50	41.00	86	11	3

4.4 Fleet Mix

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Automobile Care Center	0.550065	0.056538	0.183073	0.126916	0.023794	0.005777	0.013314	0.009484	0.000878	0.000597	0.025554	0.000937	0.003071
Convenience Market with Gas Pumps	0.550065	0.056538	0.183073	0.126916	0.023794	0.005777	0.013314	0.009484	0.000878	0.000597	0.025554	0.000937	0.003071
Fast Food Restaurant with Drive Thru	0.550065	0.056538	0.183073	0.126916	0.023794	0.005777	0.013314	0.009484	0.000878	0.000597	0.025554	0.000937	0.003071
Parking Lot	0.550065	0.056538	0.183073	0.126916	0.023794	0.005777	0.013314	0.009484	0.000878	0.000597	0.025554	0.000937	0.003071
Single Family Housing	0.550065	0.056538	0.183073	0.126916	0.023794	0.005777	0.013314	0.009484	0.000878	0.000597	0.025554	0.000937	0.003071

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Kilowatt Hours of Renewable Electricity Generated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0799	0.7261	0.6099	4.3600e-003		0.0552	0.0552		0.0552	0.0552		871.2703	871.2703	0.0167	0.0160	876.4478
NaturalGas Unmitigated	0.0799	0.7261	0.6099	4.3600e-003		0.0552	0.0552		0.0552	0.0552		871.2703	871.2703	0.0167	0.0160	876.4478

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Automobile Care Center	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Convenience Market with Gas Pumps	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Fast Food Restaurant with Drive Thru	7405.8	0.0799	0.7261	0.6099	4.3600e-003		0.0552	0.0552		0.0552	0.0552		871.2703	871.2703	0.0167	0.0160	876.4478
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0799**	**0.7261**	**0.6099**	**4.3600e-003**		**0.0552**	**0.0552**		**0.0552**	**0.0552**		**871.2703**	**871.2703**	**0.0167**	**0.0160**	**876.4478**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Automobile Care Center	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Convenience Market with Gas Pumps	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Fast Food Restaurant with Drive Thru	7.4058	0.0799	0.7261	0.6099	4.3600e-003		0.0552	0.0552		0.0552	0.0552		871.2703	871.2703	0.0167	0.0160	876.4478
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0799**	**0.7261**	**0.6099**	**4.3600e-003**		**0.0552**	**0.0552**		**0.0552**	**0.0552**		**871.2703**	**871.2703**	**0.0167**	**0.0160**	**876.4478**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	5.0593	0.0772	6.7102	3.6000e-004		0.0372	0.0372		0.0372	0.0372	0.0000	12.1056	12.1056	0.0117	0.0000	12.3984
Unmitigated	5.0593	0.0772	6.7102	3.6000e-004		0.0372	0.0372		0.0372	0.0372	0.0000	12.1056	12.1056	0.0117	0.0000	12.3984

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.6528					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	4.2029					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.2036	0.0772	6.7102	3.6000e-004		0.0372	0.0372		0.0372	0.0372		12.1056	12.1056	0.0117		12.3984
Total	**5.0593**	**0.0772**	**6.7102**	**3.6000e-004**		**0.0372**	**0.0372**		**0.0372**	**0.0372**	**0.0000**	**12.1056**	**12.1056**	**0.0117**	**0.0000**	**12.3984**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.6528					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	4.2029					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.2036	0.0772	6.7102	3.6000e-004		0.0372	0.0372		0.0372	0.0372		12.1056	12.1056	0.0117		12.3984
Total	**5.0593**	**0.0772**	**6.7102**	**3.6000e-004**		**0.0372**	**0.0372**		**0.0372**	**0.0372**	**0.0000**	**12.1056**	**12.1056**	**0.0117**	**0.0000**	**12.3984**

7.0 Water Detail

7.1 Mitigation Measures Water

Apply Water Conservation Strategy

8.0 Waste Detail

8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Winding Ranch

Sacramento County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Parking Lot	292.35	1000sqft	6.71	292,350.00	0
Fast Food Restaurant with Drive Thru	22.90	1000sqft	0.53	22,900.00	0
Single Family Housing	81.00	Dwelling Unit	8.83	162,000.00	216
Automobile Care Center	1.46	1000sqft	0.03	1,460.00	0
Convenience Market with Gas Pumps	16.00	Pump	0.05	5,200.00	0

1.2 Other Project Characteristics

Urbanization Urban **Wind Speed (m/s)** 3.5 **Precipitation Freq (Days)** 58

Climate Zone 6 **Operational Year** 2026

Utility Company Sacramento Municipal Utility District

CO2 Intensity (lb/MWhr) 357.98 **CH4 Intensity (lb/MWhr)** 0.033 **N2O Intensity (lb/MWhr)** 0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Run 2 - All electric assumption for fast food restaurants removed; construction start date pushed back to August 2023.

Land Use - Land uses and sizes per site plan and project description.
Automobile Care Center = car wash portion of convenience store/gas station.
Parking lot includes retail area driveways, parking lots and sidewalks, and residential area streets and sidewalks.

Construction Phase - Architectural coating assumed to occur concurrently with last 6 months of building construction.

Off-road Equipment -

Off-road Equipment -

Off-road Equipment - Off-Highway Truck = water truck

Off-road Equipment - Off-Highway Truck = water truck

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Off-road Equipment - Off-Highway Truck = water truck

Trips and VMT -

Demolition - Approximately 1,510 CY (about 2 tons per CY) of old asphalt to be removed during demolition.

Grading - 3,100 CY vegetation exported during site prep, estimated from total project area and aerial image of exising conditions.

Vehicle Trips - Project trip genration per traffic study.
Trip generation for retail uses includes internal trip capture and pass-by trips.

Vehicle Emission Factors -

Vehicle Emission Factors -

Vehicle Emission Factors -

Energy Use - Default natural gas for market, residences, and restaurant title 24 converted to KWh and added to electricity use.
Energy use for car wash (automobile care center) estimated from industry data.

Water And Wastewater - Water use for car wash (automobile care center) estimated from industry survey data.

Solid Waste -

Construction Off-road Equipment Mitigation - Fugitive dust mitigation per SMAQMD BMPs

Energy Mitigation - On-site solar requirements for 81 residential DU estimated per 2019 Title 24.

Water Mitigation - 20% water use reduction per 2019 Title 24 and CalGreen not accounted for in model defaults.

Waste Mitigation - 25% solid waste generation reduction per AB 341 and othe state/local regulations not accounted for in model defaults.

Fleet Mix -

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	20.00	120.00
tblEnergyUse	LightingElect	4.57	0.00
tblEnergyUse	LightingElect	1,608.84	2,396.32
tblEnergyUse	NT24E	7.20	510.55
tblEnergyUse	NT24E	2.98	3.25
tblEnergyUse	NT24NG	12.42	0.00
tblEnergyUse	NT24NG	0.93	0.00
tblEnergyUse	NT24NG	2,687.00	0.00
tblEnergyUse	T24E	3.05	0.00
tblEnergyUse	T24E	2.91	4.21

tblEnergyUse	T24E	7.86	25.17
tblEnergyUse	T24E	142.58	6,288.81
tblEnergyUse	T24NG	23.15	0.00
tblEnergyUse	T24NG	4.44	0.00
tblEnergyUse	T24NG	59.07	0.00
tblEnergyUse	T24NG	20,971.81	0.00
tblGrading	MaterialExported	0.00	3,100.00
tblLandUse	LandUseSquareFeet	145,800.00	162,000.00
tblLandUse	LandUseSquareFeet	2,258.80	5,200.00
tblLandUse	LotAcreage	26.30	8.83
tblVehicleTrips	DV_TP	21.00	0.00
tblVehicleTrips	PB_TP	65.00	0.00
tblVehicleTrips	PR_TP	14.00	100.00
tblVehicleTrips	ST_TR	23.72	0.00
tblVehicleTrips	ST_TR	322.50	48.19
tblVehicleTrips	ST_TR	616.12	214.45
tblVehicleTrips	ST_TR	9.54	10.26
tblVehicleTrips	SU_TR	11.88	0.00
tblVehicleTrips	SU_TR	322.50	48.19
tblVehicleTrips	SU_TR	472.58	214.45
tblVehicleTrips	SU_TR	8.55	10.26
tblVehicleTrips	WD_TR	23.72	0.00
tblVehicleTrips	WD_TR	322.50	48.19
tblVehicleTrips	WD_TR	470.95	214.45
tblVehicleTrips	WD_TR	9.44	10.26
tblWater	IndoorWaterUseRate	137,358.42	2,104,000.00
tblWater	OutdoorWaterUseRate	84,187.42	0.00

2.0 Emissions Summary

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2023	3.6511	36.3368	30.3205	0.0704	20.5499	1.4899	21.9261	10.3378	1.3707	11.6056	0.0000	7,124.4956	7,124.4956	2.1557	0.4247	7,288.7952
2024	22.2054	17.7148	23.7907	0.0546	1.8661	0.6971	2.5631	0.5033	0.6594	1.1627	0.0000	5,399.2601	5,399.2601	0.6849	0.2117	5,479.4758
2025	22.0503	16.5819	23.3479	0.0539	1.8660	0.6013	2.4673	0.5033	0.5688	1.0720	0.0000	5,329.6932	5,329.6932	0.6771	0.2063	5,408.1084
Maximum	**22.2054**	**36.3368**	**30.3205**	**0.0704**	**20.5499**	**1.4899**	**21.9261**	**10.3378**	**1.3707**	**11.6056**	**0.0000**	**7,124.4956**	**7,124.4956**	**2.1557**	**0.4247**	**7,288.7952**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2023	3.6511	36.3368	30.3205	0.0704	9.7032	1.4899	11.0795	4.7761	1.3707	6.0439	0.0000	7,124.4956	7,124.4956	2.1557	0.4247	7,288.7951
2024	22.2054	17.7148	23.7907	0.0546	1.8661	0.6971	2.5631	0.5033	0.6594	1.1627	0.0000	5,399.2601	5,399.2601	0.6849	0.2117	5,479.4758
2025	22.0503	16.5819	23.3479	0.0539	1.8660	0.6013	2.4673	0.5033	0.5688	1.0720	0.0000	5,329.6932	5,329.6932	0.6771	0.2063	5,408.1084
Maximum	**22.2054**	**36.3368**	**30.3205**	**0.0704**	**9.7032**	**1.4899**	**11.0795**	**4.7761**	**1.3707**	**6.0439**	**0.0000**	**7,124.4956**	**7,124.4956**	**2.1557**	**0.4247**	**7,288.7951**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	44.67	0.00	40.24	49.03	0.00	40.18	0.00	0.00	0.00	0.00	0.00	0.00

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	5.0593	0.0772	6.7102	3.6000e-004		0.0372	0.0372		0.0372	0.0372	0.0000	12.1056	12.1056	0.0117	0.0000	12.3984
Energy	0.0799	0.7261	0.6099	4.3600e-003		0.0552	0.0552		0.0552	0.0552		871.2703	871.2703	0.0167	0.0160	876.4478
Mobile	15.6247	10.2938	82.4280	0.1447	14.7968	0.1152	14.9120	3.9441	0.1074	4.0515		14,763.1728	14,763.1728	1.2316	0.8387	15,043.8918
Total	**20.7638**	**11.0970**	**89.7481**	**0.1494**	**14.7968**	**0.2075**	**15.0043**	**3.9441**	**0.1998**	**4.1438**	**0.0000**	**15,646.5486**	**15,646.5486**	**1.2600**	**0.8547**	**15,932.7379**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	5.0593	0.0772	6.7102	3.6000e-004		0.0372	0.0372		0.0372	0.0372	0.0000	12.1056	12.1056	0.0117	0.0000	12.3984
Energy	0.0799	0.7261	0.6099	4.3600e-003		0.0552	0.0552		0.0552	0.0552		871.2703	871.2703	0.0167	0.0160	876.4478
Mobile	15.6247	10.2938	82.4280	0.1447	14.7968	0.1152	14.9120	3.9441	0.1074	4.0515		14,763.1728	14,763.1728	1.2316	0.8387	15,043.8918
Total	**20.7638**	**11.0970**	**89.7481**	**0.1494**	**14.7968**	**0.2075**	**15.0043**	**3.9441**	**0.1998**	**4.1438**	**0.0000**	**15,646.5486**	**15,646.5486**	**1.2600**	**0.8547**	**15,932.7379**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	8/1/2023	8/28/2023	5	20	
2	Site Preparation	Site Preparation	8/29/2023	9/11/2023	5	10	
3	Grading	Grading	9/12/2023	10/23/2023	5	30	
4	Paving	Paving	10/24/2023	11/20/2023	5	20	
5	Building Construction	Building Construction	11/21/2023	1/13/2025	5	300	
6	Architecural Coating	Architectural Coating	7/30/2024	1/13/2025	5	120	

Acres of Grading (Site Preparation Phase): 15

Acres of Grading (Grading Phase): 90

Acres of Paving: 6.71

Residential Indoor: 328,050; Residential Outdoor: 109,350; Non-Residential Indoor: 44,340; Non-Residential Outdoor: 14,780; Striped Parking Area: 17,541 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	3	8.00	158	0.38
Demolition	Off-Highway Trucks	1	4.00	402	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Site Preparation	Off-Highway Trucks	1	4.00	402	0.38

Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading	Excavators	2	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Off-Highway Trucks	1	4.00	402	0.38
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Scrapers	2	8.00	367	0.48
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Architecural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	7	18.00	0.00	299.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	8	20.00	0.00	388.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Grading	9	23.00	0.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	164.00	61.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Architecural Coating	1	33.00	0.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Demolition - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.3688	0.0000	3.3688	0.5101	0.0000	0.5101			0.0000			0.0000
Off-Road	2.5210	23.2684	21.2876	0.0454		1.0620	1.0620		0.9873	0.9873		4,386.9283	4,386.9283	1.2563		4,418.3368
Total	**2.5210**	**23.2684**	**21.2876**	**0.0454**	**3.3688**	**1.0620**	**4.4309**	**0.5101**	**0.9873**	**1.4974**		**4,386.9283**	**4,386.9283**	**1.2563**		**4,418.3368**

3.2 Demolition - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0406	2.2471	0.4743	9.3800e-003	0.2607	0.0173	0.2780	0.0714	0.0166	0.0880		1,023.6381	1,023.6381	0.0408	0.1623	1,073.0240
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0606	0.0291	0.4892	1.2500e-003	0.1369	7.0000e-004	0.1376	0.0363	6.5000e-004	0.0370		126.5195	126.5195	3.5200e-003	3.1500e-003	127.5449
Total	**0.1012**	**2.2763**	**0.9636**	**0.0106**	**0.3976**	**0.0180**	**0.4157**	**0.1077**	**0.0172**	**0.1249**		**1,150.1575**	**1,150.1575**	**0.0443**	**0.1655**	**1,200.5689**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.5160	0.0000	1.5160	0.2295	0.0000	0.2295			0.0000			0.0000
Off-Road	2.5210	23.2684	21.2876	0.0454		1.0620	1.0620		0.9873	0.9873	0.0000	4,386.9283	4,386.9283	1.2563		4,418.3368
Total	**2.5210**	**23.2684**	**21.2876**	**0.0454**	**1.5160**	**1.0620**	**2.5780**	**0.2295**	**0.9873**	**1.2169**	**0.0000**	**4,386.9283**	**4,386.9283**	**1.2563**		**4,418.3368**

3.2 Demolition - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0406	2.2471	0.4743	9.3800e-003	0.2607	0.0173	0.2780	0.0714	0.0166	0.0880		1,023.638 1	1,023.638 1	0.0408	0.1623	1,073.024 0
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0606	0.0291	0.4892	1.2500e-003	0.1369	7.0000e-004	0.1376	0.0363	6.5000e-004	0.0370		126.5195	126.5195	3.5200e-003	3.1500e-003	127.5449
Total	**0.1012**	**2.2763**	**0.9636**	**0.0106**	**0.3976**	**0.0180**	**0.4157**	**0.1077**	**0.0172**	**0.1249**		**1,150.157 5**	**1,150.157 5**	**0.0443**	**0.1655**	**1,200.568 9**

3.3 Site Preparation - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					19.7211	0.0000	19.7211	10.1122	0.0000	10.1122			0.0000			0.0000
Off-Road	2.9114	29.3081	19.8886	0.0447		1.3305	1.3305		1.2241	1.2241		4,327.252 4	4,327.252 4	1.3995		4,362.240 4
Total	**2.9114**	**29.3081**	**19.8886**	**0.0447**	**19.7211**	**1.3305**	**21.0517**	**10.1122**	**1.2241**	**11.3362**		**4,327.252 4**	**4,327.252 4**	**1.3995**		**4,362.240 4**

3.3 Site Preparation - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1053	5.8320	1.2310	0.0243	0.6766	0.0450	0.7216	0.1853	0.0430	0.2283		2,656.666 1	2,656.666 1	0.1059	0.4212	2,784.838 3
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0674	0.0324	0.5436	1.3900e-003	0.1521	7.8000e-004	0.1529	0.0404	7.2000e-004	0.0411		140.5772	140.5772	3.9100e-003	3.5000e-003	141.7165
Total	**0.1726**	**5.8644**	**1.7746**	**0.0257**	**0.8287**	**0.0458**	**0.8745**	**0.2256**	**0.0438**	**0.2694**		**2,797.243 2**	**2,797.243 2**	**0.1099**	**0.4247**	**2,926.554 8**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.8745	0.0000	8.8745	4.5505	0.0000	4.5505			0.0000			0.0000
Off-Road	2.9114	29.3081	19.8886	0.0447		1.3305	1.3305		1.2241	1.2241	0.0000	4,327.252 4	4,327.252 4	1.3995		4,362.240 4
Total	**2.9114**	**29.3081**	**19.8886**	**0.0447**	**8.8745**	**1.3305**	**10.2050**	**4.5505**	**1.2241**	**5.7746**	**0.0000**	**4,327.252 4**	**4,327.252 4**	**1.3995**		**4,362.240 4**

3.3 Site Preparation - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1053	5.8320	1.2310	0.0243	0.6766	0.0450	0.7216	0.1853	0.0430	0.2283		2,656.6661	2,656.6661	0.1059	0.4212	2,784.8383
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0674	0.0324	0.5436	1.3900e-003	0.1521	7.8000e-004	0.1529	0.0404	7.2000e-004	0.0411		140.5772	140.5772	3.9100e-003	3.5000e-003	141.7165
Total	**0.1726**	**5.8644**	**1.7746**	**0.0257**	**0.8287**	**0.0458**	**0.8745**	**0.2256**	**0.0438**	**0.2694**		**2,797.2432**	**2,797.2432**	**0.1099**	**0.4247**	**2,926.5548**

3.4 Grading - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					9.2036	0.0000	9.2036	3.6538	0.0000	3.6538			0.0000			0.0000
Off-Road	3.5737	36.2996	29.6954	0.0687		1.4890	1.4890		1.3699	1.3699		6,651.4220	6,651.4220	2.1512		6,705.2021
Total	**3.5737**	**36.2996**	**29.6954**	**0.0687**	**9.2036**	**1.4890**	**10.6926**	**3.6538**	**1.3699**	**5.0236**		**6,651.4220**	**6,651.4220**	**2.1512**		**6,705.2021**

3.4 Grading - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0775	0.0372	0.6251	1.6000e-003	0.1750	9.0000e-004	0.1759	0.0464	8.3000e-004	0.0472		161.6638	161.6638	4.4900e-003	4.0200e-003	162.9740
Total	**0.0775**	**0.0372**	**0.6251**	**1.6000e-003**	**0.1750**	**9.0000e-004**	**0.1759**	**0.0464**	**8.3000e-004**	**0.0472**		**161.6638**	**161.6638**	**4.4900e-003**	**4.0200e-003**	**162.9740**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					4.1416	0.0000	4.1416	1.6442	0.0000	1.6442			0.0000			0.0000
Off-Road	3.5737	36.2996	29.6954	0.0687		1.4890	1.4890		1.3699	1.3699	0.0000	6,651.4220	6,651.4220	2.1512		6,705.2021
Total	**3.5737**	**36.2996**	**29.6954**	**0.0687**	**4.1416**	**1.4890**	**5.6306**	**1.6442**	**1.3699**	**3.0141**	**0.0000**	**6,651.4220**	**6,651.4220**	**2.1512**		**6,705.2021**

3.4 Grading - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0775	0.0372	0.6251	1.6000e-003	0.1750	9.0000e-004	0.1759	0.0464	8.3000e-004	0.0472		161.6638	161.6638	4.4900e-003	4.0200e-003	162.9740
Total	**0.0775**	**0.0372**	**0.6251**	**1.6000e-003**	**0.1750**	**9.0000e-004**	**0.1759**	**0.0464**	**8.3000e-004**	**0.0472**		**161.6638**	**161.6638**	**4.4900e-003**	**4.0200e-003**	**162.9740**

3.5 Paving - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.0327	10.1917	14.5842	0.0228		0.5102	0.5102		0.4694	0.4694		2,207.5841	2,207.5841	0.7140		2,225.4336
Paving	0.8790					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.9118**	**10.1917**	**14.5842**	**0.0228**		**0.5102**	**0.5102**		**0.4694**	**0.4694**		**2,207.5841**	**2,207.5841**	**0.7140**		**2,225.4336**

3.5 Paving - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0505	0.0243	0.4077	1.0400e-003	0.1141	5.9000e-004	0.1147	0.0303	5.4000e-004	0.0308		105.4329	105.4329	2.9300e-003	2.6200e-003	106.2874
Total	**0.0505**	**0.0243**	**0.4077**	**1.0400e-003**	**0.1141**	**5.9000e-004**	**0.1147**	**0.0303**	**5.4000e-004**	**0.0308**		**105.4329**	**105.4329**	**2.9300e-003**	**2.6200e-003**	**106.2874**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.0327	10.1917	14.5842	0.0228		0.5102	0.5102		0.4694	0.4694	0.0000	2,207.5841	2,207.5841	0.7140		2,225.4336
Paving	0.8790					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.9118**	**10.1917**	**14.5842**	**0.0228**		**0.5102**	**0.5102**		**0.4694**	**0.4694**	**0.0000**	**2,207.5841**	**2,207.5841**	**0.7140**		**2,225.4336**

3.5 Paving - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0505	0.0243	0.4077	1.0400e-003	0.1141	5.9000e-004	0.1147	0.0303	5.4000e-004	0.0308		105.4329	105.4329	2.9300e-003	2.6200e-003	106.2874
Total	**0.0505**	**0.0243**	**0.4077**	**1.0400e-003**	**0.1141**	**5.9000e-004**	**0.1147**	**0.0303**	**5.4000e-004**	**0.0308**		**105.4329**	**105.4329**	**2.9300e-003**	**2.6200e-003**	**106.2874**

3.6 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.5728	14.3849	16.2440	0.0269		0.6997	0.6997		0.6584	0.6584		2,555.2099	2,555.2099	0.6079		2,570.4061
Total	**1.5728**	**14.3849**	**16.2440**	**0.0269**		**0.6997**	**0.6997**		**0.6584**	**0.6584**		**2,555.2099**	**2,555.2099**	**0.6079**		**2,570.4061**

3.6 Building Construction - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0816	2.8245	0.8793	0.0116	0.3675	0.0158	0.3833	0.1058	0.0151	0.1209		1,246.743 7	1,246.743 7	0.0308	0.1828	1,301.975 0
Worker	0.5523	0.2653	4.4575	0.0114	1.2476	6.4100e-003	1.2540	0.3309	5.9000e-003	0.3368		1,152.732 9	1,152.732 9	0.0320	0.0287	1,162.075 4
Total	**0.6339**	**3.0899**	**5.3368**	**0.0230**	**1.6151**	**0.0222**	**1.6372**	**0.4367**	**0.0210**	**0.4577**		**2,399.476 6**	**2,399.476 6**	**0.0628**	**0.2114**	**2,464.050 4**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.5728	14.3849	16.2440	0.0269		0.6997	0.6997		0.6584	0.6584	0.0000	2,555.209 9	2,555.209 9	0.6079		2,570.406 1
Total	**1.5728**	**14.3849**	**16.2440**	**0.0269**		**0.6997**	**0.6997**		**0.6584**	**0.6584**	**0.0000**	**2,555.209 9**	**2,555.209 9**	**0.6079**		**2,570.406 1**

3.6 Building Construction - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0816	2.8245	0.8793	0.0116	0.3675	0.0158	0.3833	0.1058	0.0151	0.1209		1,246.743 7	1,246.743 7	0.0308	0.1828	1,301.975 0
Worker	0.5523	0.2653	4.4575	0.0114	1.2476	6.4100e-003	1.2540	0.3309	5.9000e-003	0.3368		1,152.732 9	1,152.732 9	0.0320	0.0287	1,162.075 4
Total	**0.6339**	**3.0899**	**5.3368**	**0.0230**	**1.6151**	**0.0222**	**1.6372**	**0.4367**	**0.0210**	**0.4577**		**2,399.476 6**	**2,399.476 6**	**0.0628**	**0.2114**	**2,464.050 4**

3.6 Building Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4716	13.4438	16.1668	0.0270		0.6133	0.6133		0.5769	0.5769		2,555.698 9	2,555.698 9	0.6044		2,570.807 7
Total	**1.4716**	**13.4438**	**16.1668**	**0.0270**		**0.6133**	**0.6133**		**0.5769**	**0.5769**		**2,555.698 9**	**2,555.698 9**	**0.6044**		**2,570.807 7**

3.6 Building Construction - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0781	2.7685	0.8517	0.0114	0.3675	0.0155	0.3830	0.1058	0.0149	0.1206		1,222.999 6	1,222.999 6	0.0300	0.1797	1,277.296 5
Worker	0.5157	0.2363	4.1308	0.0110	1.2476	6.0900e-003	1.2536	0.3309	5.6100e-003	0.3365		1,114.795 1	1,114.795 1	0.0289	0.0267	1,123.464 5
Total	**0.5937**	**3.0047**	**4.9825**	**0.0224**	**1.6150**	**0.0216**	**1.6367**	**0.4367**	**0.0205**	**0.4572**		**2,337.794 7**	**2,337.794 7**	**0.0589**	**0.2064**	**2,400.761 0**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4716	13.4438	16.1668	0.0270		0.6133	0.6133		0.5769	0.5769	0.0000	2,555.698 9	2,555.698 9	0.6044		2,570.807 7
Total	**1.4716**	**13.4438**	**16.1668**	**0.0270**		**0.6133**	**0.6133**		**0.5769**	**0.5769**	**0.0000**	**2,555.698 9**	**2,555.698 9**	**0.6044**		**2,570.807 7**

3.6 Building Construction - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0781	2.7685	0.8517	0.0114	0.3675	0.0155	0.3830	0.1058	0.0149	0.1206		1,222.999 6	1,222.999 6	0.0300	0.1797	1,277.296 5
Worker	0.5157	0.2363	4.1308	0.0110	1.2476	6.0900e-003	1.2536	0.3309	5.6100e-003	0.3365		1,114.795 1	1,114.795 1	0.0289	0.0267	1,123.464 5
Total	**0.5937**	**3.0047**	**4.9825**	**0.0224**	**1.6150**	**0.0216**	**1.6367**	**0.4367**	**0.0205**	**0.4572**		**2,337.794 7**	**2,337.794 7**	**0.0589**	**0.2064**	**2,400.761 0**

3.6 Building Construction - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.3674	12.4697	16.0847	0.0270		0.5276	0.5276		0.4963	0.4963		2,556.474 4	2,556.474 4	0.6010		2,571.498 1
Total	**1.3674**	**12.4697**	**16.0847**	**0.0270**		**0.5276**	**0.5276**		**0.4963**	**0.4963**		**2,556.474 4**	**2,556.474 4**	**0.6010**		**2,571.498 1**

3.6 Building Construction - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0753	2.7121	0.8317	0.0112	0.3674	0.0152	0.3827	0.1058	0.0146	0.1203		1,198.2002	1,198.2002	0.0293	0.1764	1,251.4952
Worker	0.4838	0.2120	3.8481	0.0107	1.2476	5.8100e-003	1.2534	0.3309	5.3500e-003	0.3363		1,076.8811	1,076.8811	0.0262	0.0249	1,084.9668
Total	**0.5591**	**2.9241**	**4.6798**	**0.0218**	**1.6150**	**0.0210**	**1.6360**	**0.4367**	**0.0199**	**0.4566**		**2,275.0813**	**2,275.0813**	**0.0555**	**0.2013**	**2,336.4620**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.3674	12.4697	16.0847	0.0270		0.5276	0.5276		0.4963	0.4963	0.0000	2,556.4744	2,556.4744	0.6010		2,571.4981
Total	**1.3674**	**12.4697**	**16.0847**	**0.0270**		**0.5276**	**0.5276**		**0.4963**	**0.4963**	**0.0000**	**2,556.4744**	**2,556.4744**	**0.6010**		**2,571.4981**

3.6 Building Construction - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0753	2.7121	0.8317	0.0112	0.3674	0.0152	0.3827	0.1058	0.0146	0.1203		1,198.2002	1,198.2002	0.0293	0.1764	1,251.4952
Worker	0.4838	0.2120	3.8481	0.0107	1.2476	5.8100e-003	1.2534	0.3309	5.3500e-003	0.3363		1,076.8811	1,076.8811	0.0262	0.0249	1,084.9668
Total	**0.5591**	**2.9241**	**4.6798**	**0.0218**	**1.6150**	**0.0210**	**1.6360**	**0.4367**	**0.0199**	**0.4566**		**2,275.0813**	**2,275.0813**	**0.0555**	**0.2013**	**2,336.4620**

3.7 Architecural Coating - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	19.8556					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1808	1.2188	1.8101	2.9700e-003		0.0609	0.0609		0.0609	0.0609		281.4481	281.4481	0.0159		281.8443
Total	**20.0364**	**1.2188**	**1.8101**	**2.9700e-003**		**0.0609**	**0.0609**		**0.0609**	**0.0609**		**281.4481**	**281.4481**	**0.0159**		**281.8443**

3.7 Architecural Coating - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.1038	0.0475	0.8312	2.2200e-003	0.2510	1.2300e-003	0.2523	0.0666	1.1300e-003	0.0677		224.3185	224.3185	5.8200e-003	5.3700e-003	226.0630
Total	**0.1038**	**0.0475**	**0.8312**	**2.2200e-003**	**0.2510**	**1.2300e-003**	**0.2523**	**0.0666**	**1.1300e-003**	**0.0677**		**224.3185**	**224.3185**	**5.8200e-003**	**5.3700e-003**	**226.0630**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	19.8556					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1808	1.2188	1.8101	2.9700e-003		0.0609	0.0609		0.0609	0.0609	0.0000	281.4481	281.4481	0.0159		281.8443
Total	**20.0364**	**1.2188**	**1.8101**	**2.9700e-003**		**0.0609**	**0.0609**		**0.0609**	**0.0609**	**0.0000**	**281.4481**	**281.4481**	**0.0159**		**281.8443**

3.7 Architecural Coating - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.1038	0.0475	0.8312	2.2200e-003	0.2510	1.2300e-003	0.2523	0.0666	1.1300e-003	0.0677		224.3185	224.3185	5.8200e-003	5.3700e-003	226.0630
Total	**0.1038**	**0.0475**	**0.8312**	**2.2200e-003**	**0.2510**	**1.2300e-003**	**0.2523**	**0.0666**	**1.1300e-003**	**0.0677**		**224.3185**	**224.3185**	**5.8200e-003**	**5.3700e-003**	**226.0630**

3.7 Architecural Coating - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	19.8556					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1709	1.1455	1.8091	2.9700e-003		0.0515	0.0515		0.0515	0.0515		281.4481	281.4481	0.0154		281.8319
Total	**20.0265**	**1.1455**	**1.8091**	**2.9700e-003**		**0.0515**	**0.0515**		**0.0515**	**0.0515**		**281.4481**	**281.4481**	**0.0154**		**281.8319**

3.7 Architecural Coating - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0974	0.0427	0.7743	2.1400e-003	0.2510	1.1700e-003	0.2522	0.0666	1.0800e-003	0.0677		216.6895	216.6895	5.2700e-003	5.0200e-003	218.3165
Total	**0.0974**	**0.0427**	**0.7743**	**2.1400e-003**	**0.2510**	**1.1700e-003**	**0.2522**	**0.0666**	**1.0800e-003**	**0.0677**		**216.6895**	**216.6895**	**5.2700e-003**	**5.0200e-003**	**218.3165**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	19.8556					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1709	1.1455	1.8091	2.9700e-003		0.0515	0.0515		0.0515	0.0515	0.0000	281.4481	281.4481	0.0154		281.8319
Total	**20.0265**	**1.1455**	**1.8091**	**2.9700e-003**		**0.0515**	**0.0515**		**0.0515**	**0.0515**	**0.0000**	**281.4481**	**281.4481**	**0.0154**		**281.8319**

3.7 Architecural Coating - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0974	0.0427	0.7743	2.1400e-003	0.2510	1.1700e-003	0.2522	0.0666	1.0800e-003	0.0677		216.6895	216.6895	5.2700e-003	5.0200e-003	218.3165
Total	**0.0974**	**0.0427**	**0.7743**	**2.1400e-003**	**0.2510**	**1.1700e-003**	**0.2522**	**0.0666**	**1.0800e-003**	**0.0677**		**216.6895**	**216.6895**	**5.2700e-003**	**5.0200e-003**	**218.3165**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	15.6247	10.2938	82.4280	0.1447	14.7968	0.1152	14.9120	3.9441	0.1074	4.0515		14,763.17 28	14,763.17 28	1.2316	0.8387	15,043.89 18
Unmitigated	15.6247	10.2938	82.4280	0.1447	14.7968	0.1152	14.9120	3.9441	0.1074	4.0515		14,763.17 28	14,763.17 28	1.2316	0.8387	15,043.89 18

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Automobile Care Center	0.00	0.00	0.00		
Convenience Market with Gas Pumps	771.04	771.04	771.04	1,494,507	1,494,507
Fast Food Restaurant with Drive Thru	4,910.91	4,910.91	4910.91	3,392,427	3,392,427
Parking Lot	0.00	0.00	0.00		
Single Family Housing	831.06	831.06	831.06	2,132,591	2,132,591
Total	6,513.01	6,513.01	6,513.01	7,019,524	7,019,524

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Automobile Care Center	10.00	5.00	6.50	33.00	48.00	19.00	21	51	28
Convenience Market with Gas	10.00	5.00	6.50	0.80	80.20	19.00	100	0	0
Fast Food Restaurant with Drive	10.00	5.00	6.50	2.20	78.80	19.00	29	21	50
Parking Lot	10.00	5.00	6.50	0.00	0.00	0.00	0	0	0
Single Family Housing	10.00	5.00	6.50	46.50	12.50	41.00	86	11	3

4.4 Fleet Mix

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Automobile Care Center	0.550065	0.056538	0.183073	0.126916	0.023794	0.005777	0.013314	0.009484	0.000878	0.000597	0.025554	0.000937	0.003071
Convenience Market with Gas Pumps	0.550065	0.056538	0.183073	0.126916	0.023794	0.005777	0.013314	0.009484	0.000878	0.000597	0.025554	0.000937	0.003071
Fast Food Restaurant with Drive Thru	0.550065	0.056538	0.183073	0.126916	0.023794	0.005777	0.013314	0.009484	0.000878	0.000597	0.025554	0.000937	0.003071
Parking Lot	0.550065	0.056538	0.183073	0.126916	0.023794	0.005777	0.013314	0.009484	0.000878	0.000597	0.025554	0.000937	0.003071
Single Family Housing	0.550065	0.056538	0.183073	0.126916	0.023794	0.005777	0.013314	0.009484	0.000878	0.000597	0.025554	0.000937	0.003071

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Kilowatt Hours of Renewable Electricity Generated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0799	0.7261	0.6099	4.3600e-003		0.0552	0.0552		0.0552	0.0552		871.2703	871.2703	0.0167	0.0160	876.4478
NaturalGas Unmitigated	0.0799	0.7261	0.6099	4.3600e-003		0.0552	0.0552		0.0552	0.0552		871.2703	871.2703	0.0167	0.0160	876.4478

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Automobile Care Center	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Convenience Market with Gas Pumps	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Fast Food Restaurant with Drive Thru	7405.8	0.0799	0.7261	0.6099	4.3600e-003		0.0552	0.0552		0.0552	0.0552		871.2703	871.2703	0.0167	0.0160	876.4478
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0799**	**0.7261**	**0.6099**	**4.3600e-003**		**0.0552**	**0.0552**		**0.0552**	**0.0552**		**871.2703**	**871.2703**	**0.0167**	**0.0160**	**876.4478**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Automobile Care Center	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Convenience Market with Gas Pumps	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Fast Food Restaurant with Drive Thru	7.4058	0.0799	0.7261	0.6099	4.3600e-003		0.0552	0.0552		0.0552	0.0552		871.2703	871.2703	0.0167	0.0160	876.4478
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0799**	**0.7261**	**0.6099**	**4.3600e-003**		**0.0552**	**0.0552**		**0.0552**	**0.0552**		**871.2703**	**871.2703**	**0.0167**	**0.0160**	**876.4478**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	5.0593	0.0772	6.7102	3.6000e-004		0.0372	0.0372		0.0372	0.0372	0.0000	12.1056	12.1056	0.0117	0.0000	12.3984
Unmitigated	5.0593	0.0772	6.7102	3.6000e-004		0.0372	0.0372		0.0372	0.0372	0.0000	12.1056	12.1056	0.0117	0.0000	12.3984

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.6528					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	4.2029					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.2036	0.0772	6.7102	3.6000e-004		0.0372	0.0372		0.0372	0.0372		12.1056	12.1056	0.0117		12.3984
Total	**5.0593**	**0.0772**	**6.7102**	**3.6000e-004**		**0.0372**	**0.0372**		**0.0372**	**0.0372**	**0.0000**	**12.1056**	**12.1056**	**0.0117**	**0.0000**	**12.3984**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.6528					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	4.2029					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.2036	0.0772	6.7102	3.6000e-004		0.0372	0.0372		0.0372	0.0372		12.1056	12.1056	0.0117		12.3984
Total	**5.0593**	**0.0772**	**6.7102**	**3.6000e-004**		**0.0372**	**0.0372**		**0.0372**	**0.0372**	**0.0000**	**12.1056**	**12.1056**	**0.0117**	**0.0000**	**12.3984**

7.0 Water Detail

7.1 Mitigation Measures Water

Apply Water Conservation Strategy

8.0 Waste Detail

8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Appendix B

Title 24 Solar Requirement Calculations

Winding Ranch Residential Solar Panel Requirements

Factors for Climate Zone 12	
A	0.613
B	1.4
CF	20%

	DU	Total SF	Garage SF	Conditioned Space	kW	kWhr/year
Total	81.0	162,000.0	32,400.0	129,600.0	192.8	337,864.1

Notes:
1. Calculations based on 2019 Title 24 Residential Compliance Manual for new residential buildings with 3 or fewer residential floors.
2. Factors are for eastrern Sacramenot County where A is the climate zone 12 adjustment factor, B is the climate zone 12 dwelling unit factor, and CF is the capacity factor which accounts for climate, daylight hours, roof pitch and orientation, and transmission loss.
3. Garage area based on typical 400 SF 2-car garage.
4. Solar power output requirement is calculated by 2019 Title 24 Residential Compliance Manual Equation 7-1:

kW = (CFA X A) / 1000 + (DU X B).

5. Annual solar energy generated is calculated by:

kWhr/year = Power Output (kW) x 24 hours/day x 365 days/year x CF.

Appendix C

Gasoline Service Station Assessment Tool

The following section contains content that was obtained from a third party and may not achieve the same level of Americans with Disabilities Act (ADA) and Section 508 accessibility as other parts of this document.

2022 CARB & CAPCOA Gasoline Service Station Industrywide Risk Assessment Look-up Tool
Version 1.0 - February 18, 2022

Required Value	User Defined Input	Instructions
Annual Throughput (gallons/year)	**3000000**	Enter your gas station's annual throughput in gallons of gasoline dispensed per year.
Hourly Dispensing Throughput (gallons/hour)	**1000**	The tool will calculate the maximum hourly vehicle fueling throughput based on annual throughput as defined by Table 10 of the 2020 Gasoline Service Station Industrywide Risk Assessment Technical Guidance Document (Technical Guidance). If a different value is desired please enter it into cell L4.
Hourly Loading Throughput (gallons/hour)	**8880**	The tool will calculate the maximum hourly loading throughput based on annual throughput as defined by Table 10 of the Technical Guidance. If a different value is desired please enter it into cell L5.
Meteorological Data	**Fresno**	Select appropriate meteorological data. Met sets provided include 2 rural (Redding and Lancaster) and 4 urban (Fresno, Ontario, San Diego, and San Jose) locations. Use whichever best correlates to your location. If you would like to use site-specific meteorological data please refer to the Variable Met Tool.
Distance to Nearest Resident (meters)	**385**	Enter the distance to the nearest residential receptor in meters as measured from the edge of the station canopy. Please note that the value must be between 10 and 1000 meters. The distance you input will round down to the nearest receptor distance used in the Technical Guidance (e.g., 19m will return value at 10m distance).
Distance to Nearest Business (meters)	**200**	Enter the distance to the nearest worker receptor in meters as measured from the edge of the station canopy. Please note that the value must be between 10 and 1000 meters. The distance you input will round down to the nearest receptor distance used in the Technical Guidance (e.g., 19m will return value at 10m distance).
Distance to Acute Receptor (meters)	**200**	Enter the distance where acute impacts are expected in meters as measured from the edge of the station canopy. This can be the distance to the property boundary, nearest resident, nearest worker, or any other user defined location. Please note that the value must be between 10 and 1000 meters. The distance you input will round down to the nearest receptor distance used in the Technical Guidance (e.g., 19m will return value at 10m distance).
Control Scenario	**EVR Phase I & EVR Phase II**	Select the appropriate control scenario for your gas station. Please refer to technical Guidance for an explanation of the different control scenarios. Almost all gas stations in California are equipped with EVR Phase I and EVR Phase II controls.
Include Building Downwash Adjustments	**no**	Building downwash may over estimate risk results. High results should be investigated further through site-specific health risk assessment.

Risk Value	Results
Max Residential Cancer Risk (chances/million)	**0.16**
Max Worker Cancer Risk (chances/million)	**0.03**
Chronic HI	**0.00**
Acute HI	**0.02**

Appendix B Energy Calculations

Winding Ranch
Energy Calculations

Operational Energy Consumption

Estimated Annual Operational Energy Demand

Area Energy Demand by Land Use (CalEEMod output data, as modeled by HELIX in 2023) - Represents usage prior to any proposed Mitigation Measures

Land Use	Electricity Demand (kWh/year)	Natrual Gas Demand (kBTU/year)	Diesel Demand (kBTU/year)	Electricity Demand Area+Water (kWh/year)
Parking Lot	256,099	0	-	256,589
Fast Food Restaurant with Drive Thru	400,713	1,257,596	-	411,433
Single Family Housing	407,859	3,185,822	-	442,907
Automobile Care Center	745,400	0	-	751,988
Convenience Market with Gas Pumps	222,128	104,636	-	223,788
Strip Mall	40,121	76338	-	42,746
Fast Food Restaurant w/o Drive Thru	185,210	581,262	-	189,800
Total	**2,257,530**	**5,205,654**	**-**	**2,319,252**
Total Residential Energy Usage	**407,859**	**3,185,822**	**-**	**442,907**
Total Non-Residential Energy Usage	**1,849,671**	**2,019,832**	**-**	**1,876,344**

Water Energy Demand by Land Use (CalEEMod output data, as modeled by HELIX in 2023)

Land Use	Electricity Intensity: Supply, Treat and Distribute (kWh/Mgal)	Electricity Intensity: Wastewater Treatment (kWh/Mgal)	Indoor Water Usage (gal/year)	Outdoor Water Usage (gal/year)	Indoor Water Electricity Usage (kWh)	Outdoor Water Electricity Usage (kWh)	Total Water Electricity Usage (kWh)
Parking Lot	1,612	1,519	0	304,187	*0*	*490*	490
Fast Food Restaurant with Drive Thru	1,612	1,519	3,171,927	489,311	*9,931*	*789*	10,720
Single Family Housing	1,612	1,519	2,855,979	16,194,986	*8,942*	*26,106*	35,048
Automobile Care Center	1,612	1,519	2,104,000	0	*6,588*	*0*	6,588
Convenience Market with Gas Pumps	1,612	1,519	385,177	281,701	*1,206*	*454*	1,660
Strip Mall	1,612	1,519	642,209	381,002	*2,011*	*614*	2,625
Fast Food Restaurant w/o Drive Thru	1,612	1,519	1,466,068	0	*4,590*	*0*	4,590
Total	**--**	**--**	**10,625,360**	**17,651,187**	**33,268**	**28,454**	**61,722**

Electricity Intensity Factors are CalEEMod defaults.

Construction Energy Consumption

Total Construction Scenario

Phase	Source	MT CO_2e [a]	Fuel Type	Emission Factor (lb CO_2/gallon) [b]	Gallons
Demolition	Offroad Equip	37.2	Diesel	22.45	3,653
	Worker	1.7	Gas	17.86	210
	Vendor	0.0	Diesel	22.45	-
	Hauling	27.2	Diesel	22.45	2,671
Site Preparation	Offroad Equip	27.1	Diesel	22.45	2,661
	Worker	1.0	Gas	17.86	120
	Vendor	0.0	Diesel	22.45	-
	Hauling	14.0	Diesel	22.45	1,375
Grading	Offroad Equip	116.0	Diesel	22.45	11,391
	Worker	3.8	Gas	17.86	472
	Vendor	0.0	Diesel	22.45	-
	Hauling	0.0	Diesel	22.45	-
Building Construction	Offroad Equip	327.1	Diesel	22.45	32,122
	Worker	57.9	Gas	17.86	7,152
	Vendor	56.5	Diesel	22.45	5,549
	Hauling	0.0	Diesel	22.45	-
Paving	Offroad Equip	13.8	Diesel	22.45	1,355
	Worker	1.5	Gas	17.86	180
	Vendor	0.0	Diesel	22.45	-
	Hauling	24.4	Diesel	22.45	2,396
Architectural Coatings	Offroad Equip	8.0	Diesel	22.45	782
	Worker	5.1	Gas	17.86	623
	Vendor	0.0	Diesel	22.45	-
	Hauling	0.0	Diesel	22.45	-
			Total Demand	**Diesel**	**63,956**
				Gasoline	**8,757**
			Average Annual Demands	**Diesel**	**2,132**
				Gasoline	**292**

Note: Total Potential Construction emissions are amortized over 30 years, typical for mixed use developments.
Sources:
[a] Modeled by HELIX in 2023. Conservatively used CO2e, as the CalEEMod report did not list CO2 emissions.
[b] U.S. Energy Information Administration released September 7, 2023 (https://www.eia.gov/environment/emissions/co2_vol_mass.php)

Winding Ranch
Operational Transportation Energy Consumption

Source: EMFAC2021 (v1.0.2) Emissions Inventory
Region Type: County

Region: Sacramento
Calendar Year: 2026

Season: Annual

Vehicle Classification: EMFAC202x Categories
Units: miles/year for CVMT and EVMT, trips/year for Trips, kWh/year for Energy Consumption, tons/year for Emissions, 1000 gallons/year for Fuel Consumption

Land Use Type	VMT/Year
Parking Lot	0
Fast Food Restaurant with Drive Thru	9,839,424
Single Family Housing	3,738,723
Automobile Care Center	0
Convenience Market with Gas Pumps	3,948,404
Strip Mall	1,479,058
Fast Food Restaurant w/o Drive Thru	1,592,851

20,598,460	**Project Annual VMT:**
56,434	**Project Daily VMT:**

Region	Calendar Year	Vehicle Category	Model Year	Speed	Fuel	Population	Total VMT	CVMT	EVMT	Trips	Energy Consumpt	Fuel Consump	Kwh/mile	% VMT	Project Daily VMT	Project Annual VMT	Project Annual Fuel Consumption (gallons)	Project Annual Electricity
Sacramento	2026	LDA	Aggregate	Aggregate	Gasoline	490520.664	6234445422	6234445422	0	782351747.8	0	207197.984		47.58%	26850.2019	9800323.70	325707.77	0
Sacramento	2026	LDA	Aggregate	Aggregate	Diesel	1430.745301	13089361.44	13089361.44	0	2045151.482	0	299.052268		0.10%	56.3726	20576.00	470.0993972	0
Sacramento	2026	LDA	Aggregate	Aggregate	Electricity	28982.42278	478966295.1	0	478966295.1	49762469.44	184920521.2	0	0.386082534	3.66%	2062.7884	752917.77	0	290688.4003
Sacramento	2026	LDA	Aggregate	Aggregate	Plug-in Hybrid	14977.6109	227230053.6	108295041.5	118935012.1	21490550.11	35921918.49	3862.16319	0.302029805	1.73%	978.6232	357197.46	6071.181458	107884.2796
Sacramento	2026	LDT1	Aggregate	Aggregate	Gasoline	47430.07468	520680772.2	520680772.2	0	71669110.9	0	20815.3526		3.97%	2242.4423	818491.42	32720.98471	0
Sacramento	2026	LDT1	Aggregate	Aggregate	Diesel	16.20559695	49725.24075	49725.24075	0	15583.03673	0	2.08582404		0.00%	0.2142	78.17	3.278840278	0
Sacramento	2026	LDT1	Aggregate	Aggregate	Electricity	175.1803744	2544250.957	0	2544250.957	286723.8724	982290.8578	0	0.386082534	0.02%	10.9575	3999.47	0	1544.125856
Sacramento	2026	LDT1	Aggregate	Aggregate	Plug-in Hybrid	92.6274366	1563988.29	669007.1992	894981.0904	132906.0143	270310.964	23.9482194	0.302029805	0.01%	6.7357	2458.53	37.64573858	742.5503243
Sacramento	2026	LDT2	Aggregate	Aggregate	Gasoline	241263.535	3126402083	3126402083	0	387624078	0	127258.97		23.86%	13464.6342	4914591.49	200046.5184	0
Sacramento	2026	LDT2	Aggregate	Aggregate	Diesel	773.0221254	10644280.32	10644280.32	0	1271222.363	0	314.823424		0.08%	45.8423	16732.43	494.8910855	0
Sacramento	2026	LDT2	Aggregate	Aggregate	Electricity	1942.902522	23835457.02	0	23835457.02	3410671.273	9202453.658	0	0.386082534	0.18%	102.6534	37468.48	0	14465.92577
Sacramento	2026	LDT2	Aggregate	Aggregate	Plug-in Hybrid	2236.214513	35887405.98	16162099.57	19725306.41	3208621.214	5957630.443	580.562095	0.302029805	0.27%	154.5581	56413.71	912.6227081	17038.62179
Sacramento	2026	LHD1	Aggregate	Aggregate	Gasoline	20553.00978	242176204	242176204	0	100130415.5	0	24883.9003		1.85%	1042.9925	380692.27	39116.59523	0
Sacramento	2026	LHD1	Aggregate	Aggregate	Diesel	13789.3624	160881442.2	160881442.2	0	56719076.04	0	10025.1312		1.23%	692.8763	252899.83	15759.14526	0
Sacramento	2026	LHD1	Aggregate	Aggregate	Electricity	243.7058975	5327426.283	0	5327426.283	1115348.202	3468228.143	0	0.651013821	0.04%	22.9439	8374.52	0	5451.92975
Sacramento	2026	LHD2	Aggregate	Aggregate	Gasoline	2842.835824	33410585.37	33410585.37	0	13849763.87	0	3820.38729		0.25%	143.8911	52520.24	6005.511251	0
Sacramento	2026	LHD2	Aggregate	Aggregate	Diesel	5354.107557	65644509.14	65644509.14	0	22022775.6	0	4914.05672		0.50%	282.7145	103190.80	7724.720204	0
Sacramento	2026	LHD2	Aggregate	Aggregate	Electricity	62.04140345	1291813.37	0	1291813.37	269121.2288	827320.7575	0	0.640433655	0.01%	5.5635	2030.68	0	1300.518439
Sacramento	2026	MDV	Aggregate	Aggregate	Gasoline	152420.7174	1840906007	1840906007	0	240249773.3	0	91935.9646		14.05%	7928.3232	2893837.95	144520.0257	0
Sacramento	2026	MDV	Aggregate	Aggregate	Diesel	2517.863077	31607974.52	31607974.52	0	4031417.91	0	1264.01382		0.24%	136.1277	49686.60	1986.984207	0
Sacramento	2026	MDV	Aggregate	Aggregate	Electricity	2074.444415	25426040.76	0	25426040.76	3640734.271	9816550.261	0	0.386082534	0.19%	109.5036	39968.82	0	15431.26352
Sacramento	2026	MDV	Aggregate	Aggregate	Plug-in Hybrid	1385.855033	21635123.19	9863155.681	11771967.51	1988487.165	3555485.049	358.488178	0.302029805	0.17%	93.1771	34009.63	563.5305065	10271.92329
							13103646221											497,556,884

Category	Amount	Units
Diesel (heat content)	5.8	MMBtu/barrel
Motor Gasoline	5.25	MMBtu/barrel
Gallons per Barrel	42	gallons/barrel
		MMBtu/KWh

Source: The Climate Registry. 2021. 2021 Climate Registry Default Emission Factors: Table 2.1
(https://www.theclimateregistry.org/wp-content/uploads/2021/05/2021-Default-Emission-Factor-Document.pdf)

Project Mobile Energy		
Gallons/year, Diesel	**26,439**	**Diesel**
Gallons/year, Gasoline	748,117	Gasoline
KWh/year, Electricity	328,882	Electricity
Gallons/year, Gasoline, Plug-in Hybrid	7,585	Plug-in Hybrid
KWh/year, Electricity, Plug-in Hybrid	135,937	Plug-in Hybrid
KWh/year, EV and Hybrid	**464,820**	**EV + Hybrid**
Gallons/year, Gasoline + Hybrid	**755,702**	**Gasoline + Hybrid**
Gallons/year, Natural Gas	-	Natural Gas

Appendix C Biological Resources Assessment

Winding Ranch Project

Biological Resources Assessment

July 2022 | 00949.00004.001

Prepared for:

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TABLE OF CONTENTS

TABLE OF CONTENTS (cont.)

LIST OF APPENDICES

LIST OF FIGURES

ACRONYMS AND ABBREVIATIONS

2012 Staff Report	CDFW Staff Report on Burrowing Owl Mitigation
BRA	Biological Resources Assessment
CDFW	California Department of Fish and Wildlife
CESA	California Endangered Species Act
CEQA	California Environmental Quality Act
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CSA	California Special Animals
CWA	Clean Water Act
DBH	diameter at breast height
FESA	Federal Endangered Species Act
FS	Forest Service
HCP	Habitat Conservation Plan
HELIX	HELIX Environmental Planning, Inc.
IPaC	Information for Planning and Consultation
ISA	International Society of Arboriculture
MBTA	Migratory Bird Treaty Act
MSL	mean sea level
NCCP	Natural Community Conservation Plan
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NPPA	Native Plant Protection Act
NRCS	Natural Resource Conservation Service
OHWM	ordinary high water mark
PER	Planning and Environmental Review
RWQCB	Regional Water Quality Control Board
SAA	Streambed Alteration Agreement
SSC	Species of Special Concern
SWRCB	State Water Resources Control Board
TPZ	tree protection zone

ACRONYMS AND ABBREVIATIONS (cont.)

USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

EXECUTIVE SUMMARY

This report presents the updated biological assessment conducted on June 1, 2022 by HELIX Environmental Planning, Inc. (HELIX) biologists In response to the expansion of the Winding Ranch Project, located within the unincorporated community of Carmichael in Sacramento County, California. For the purposes of this report, the Winding Ranch Project will hereafter be referred to as Project. The Project is bounded by two major roads on the north and west, Winding Way and Manzanita Avenue, respectively, and by residential development on the east and south.

The purpose of this document is to describe baseline conditions on the parcel and to summarize the general biological resources occurring or potentially occurring on the site, to assess the suitability of the site to support special-status species and sensitive habitat types, and to provide recommendations for regulatory permitting or further analysis that may be required prior to development activities occurring on the site.

The 24.80-acre parcel (Study Area) is comprised of ruderal herbaceous habitat that has been historically altered, including canals and ditches to convey water, developed and disturbed areas including a parking and gravel lot, and mixed oak woodland. The Study Area contains 20.033 acres of ruderal herbaceous habitat, 3.407 acres of developed/disturbed areas, 1.164 acres of mixed oak woodland, 0.165 acre of seasonal wetland ditches with intermittent surface flow and an ordinary highwater mark, and 0.035 acre of ditches and canals. Surrounding land uses include a defunct bowling alley, high-density apartment buildings, and single-family homes.

Known or potential biological constraints in the Study Area include:

- Potential habitat for special-status plants: Sanford's arrowhead (*Sagittaria sanfordii*), Ahart's dwarf rush (*Juncus leiospermus* var. *ahartii*), and stinkbells (*Fritillaria agrestis*);
- Potential roosting and foraging habitat for special-status bats including pallid bat (*Antrozous pallidus*);
- Potential foraging habitat for tricolored blackbird (*Agelaius tricolor*);
- Potential habitat for western burrowing owl (*Athene cunicularia*);
- Potential nesting habitat for Swainson's hawk (*Buteo swainsoni*);
- Potential foraging and/or nesting habitat for special-status birds including Cooper's hawk (*Accipiter cooperi*), merlin (*Falco columbarius*), purple martin (*Progne subis*), song sparrow ("Modesto" population) (*Melospiza melodia*), and white-tailed kite (*Elanus leucurus*);
- Potential habitat for special-status invertebrates including andrenid bee (*Andrena subapasta*) and Crotch bumble bee (*Bombus crotchii*);
- Potential habitat for other migratory birds and other birds of prey protected by the Migratory Bird Treaty Act (MBTA) and California Fish and Game Codes; and
- Sensitive habitats including jurisdictional aquatic resources and oak woodland habitat.

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1.0 INTRODUCTION

This report summarizes the findings of a Biological Resources Assessment (BRA) completed by HELIX for the 24.80-acre Winding Ranch Project Study Area located within the unincorporated community of Carmichael in Sacramento County, California. This document addresses the onsite physical features, plant communities present, and the common plant and wildlife species occurring or potentially occurring in the Study Area. Furthermore, the suitability of habitats in the Study Area to support special-status species and sensitive habitats is analyzed, and recommendations are provided for any regulatory permitting or further analysis required prior to development activities occurring on the site.

1.1 PROJECT DESCRIPTION

The project proponent is proposing development of a new retail and multi-family residential development that will necessitate mass grading of the site and the fill of all on-site aquatic resources to accommodate a commercial/retail center with the required parking, infrastructure, and other local requirements for this type of development.

2.0 REGULATORY FRAMEWORK

Federal, State, and local environmental laws, regulations, and policies relevant to the California Environmental Quality Act (CEQA) review process are summarized below. Applicable CEQA significance criteria are also addressed in this section.

2.1 FEDERAL REGULATIONS

2.1.1 Federal Endangered Species Act

The U.S. Congress passed the Federal Endangered Species Act (FESA) in 1973 to protect species that are endangered or threatened with extinction. FESA is intended to operate in conjunction with the National Environmental Policy Act (NEPA) to help protect the ecosystems upon which endangered and threatened species depend.

FESA prohibits the “take” of endangered or threatened wildlife species. “Take” is defined to include harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting wildlife species or any attempt to engage in such conduct (FESA Section 3 [(3) (19)]). Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns (50 CFR §17.3). Harass is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns (50 CFR §17.3). Actions that result in take can result in civil or criminal penalties.

In the context of the proposed Project, FESA consultation with the U.S. Fish and Wildlife Service (USFWS) and/or the National Marine Fisheries Service (NMFS) would be initiated if development resulted in the potential for take of a threatened or endangered species or if issuance of a Section 404 permit or other federal agency action could result in take of an endangered species or adversely modify critical habitat of such a species.

2.1.2 Migratory Bird Treaty Act

Raptors, migratory birds, and other avian species are protected by a number of State and federal laws. The federal Migratory Bird Treaty Act (MBTA) prohibits the killing, possessing, or trading of migratory birds except in accordance with regulations prescribed by the Secretary of Interior.

2.1.3 The Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (Eagle Act) prohibits the taking or possession of and commerce in bald and golden eagles with limited exceptions. Under the Eagle Act, it is a violation to "*take, possess, sell, purchase, barter, offer to sell, transport, export or import, at any time or in any manner, any bald eagle commonly known as the American eagle, or golden eagle, alive or dead, or any part, nest, or egg, thereof.*" Take is defined to include pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, and disturb. Disturb is further defined in 50 CFR Part 22.3 as "*to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.*"

2.2 STATE JURISDICTION

2.2.1 California Endangered Species Act

The State of California enacted the California Endangered Species Act (CESA) in 1984. CESA is similar to FESA but pertains to State-listed endangered and threatened species. CESA requires state agencies to consult with the California Department of Fish and Wildlife (CDFW), when preparing CEQA documents. The purpose is to ensure that State lead agency actions do not jeopardize the continued existence of a listed species or result in the destruction, or adverse modification of habitat essential to the continued existence of those species, if there are reasonable and prudent alternatives available (Fish and Game Code §2080). CESA directs agencies to consult with CDFW on projects or actions that could affect listed species. It also directs CDFW to determine whether jeopardy would occur and allows CDFW to identify "reasonable and prudent alternatives" to the project consistent with conserving the species. CESA allows CDFW to authorize exceptions to the State's prohibition against take of a listed species if the "take" of a listed species is incidental to carrying out an otherwise lawful project that has been approved under CEQA (Fish & Game Code § 2081).

As with FESA, for covered projects that may impact state-listed species under CESA that are also covered species under the PCCP, direct consultation with CDFW for state-listed take authorization is not required as long as the covered project complies with PCCP requirements. For projects that may result in take of state-listed species that are not PCCP covered species, CESA directs agencies to consult with CDFW on projects or actions that could affect listed species, directs CDFW to determine whether jeopardy would occur and allows CDFW to identify "reasonable and prudent alternatives" to the project consistent with conserving the species. CESA allows CDFW to authorize exceptions to the State's prohibition against take of a listed species if the "take" of a listed species is incidental to carrying out an otherwise lawful project that has been approved under CEQA (Fish & Game Code § 2081).

2.2.2 California Department of Fish and Game Codes

A number of species have been designated as "Fully Protected" species under Sections 5515, 5050, 3511, and 4700 of the Fish and Game Code (FGC) but are not listed as endangered (Section 2062) or threatened (Section 2067) species under CESA. Except for take related to scientific research, all take of fully protected species is prohibited. The California Fish and Game Code defines take as "*hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill.*" Additionally, Sections 3503, 3503.5, and 3513 of the California Fish and Game Code prohibits the killing of birds or the destruction of bird nests.

2.2.3 Native Plant Protection Act

The Native Plant Protection Act (NPPA), enacted in 1977, allows the Fish and Game Commission to designate plants as rare or endangered. The NPPA prohibits take of endangered or rare native plants, with some exceptions for agricultural and nursery operations and emergencies. Vegetation removal from canals, roads, and other sites, changes in land use, and certain other situations require proper advance notification to CDFW.

2.3 JURISDICTIONAL WATER

2.3.1 Federal Jurisdiction

Unless considered an exempt activity under Section 404(f) of the Federal Clean Water Act, any person, firm, or agency planning to alter or work in "waters of the U.S.," including the discharge of dredged or fill material, must first obtain authorization from the USACE under Section 404 of the Clean Water Act (CWA; 33 USC 1344). Permits, licenses, variances, or similar authorization may also be required by other federal, state, and local statutes. Section 10 of the Rivers and Harbors Act prohibits the obstruction or alteration of navigable waters of the U.S. without a permit from USACE (33 USC 403). Activities exempted under Section 404(f) are not exempted within navigable waters under Section 10.

"Waters of the U.S." are defined as: "All waters that are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters that are subject to the ebb and flow of the tide; all interstate waters including interstate wetlands; all other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes or natural ponds, the use, degradation, or destruction of which could affect interstate commerce; impoundments of these waters; tributaries of these waters; the territorial sea; or wetlands adjacent to these waters (33 Code of Federal Regulations [CFR] Part 328)."

Within non-tidal waters that meet the definition cited above and, in the absence of adjacent wetlands, the indicator used by the USACE to determine the lateral extent of its jurisdiction is the ordinary high water mark (OHWM) – the line on the shore established by fluctuations of water and indicated by a clear, natural line impressed on the bank, shelving, changes in soil character, destruction of terrestrial vegetation, and/or the presence of litter and debris.

Wetlands are defined under the CFR Part 328.3 as those areas that are inundated or saturated by surface or ground water at a frequency and duration to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

The USACE has determined that not all features which meet the wetland definition are, in fact, considered to be waters of the U.S. Normally, features not considered as waters of the U.S. include (a) non-tidal drainage and irrigation ditches excavated on dry land; (b) artificially irrigated areas which would revert to upland if the irrigation ceased; (c) artificial lakes or ponds created by excavating and/or diking dry land to collect and retain water and which are used exclusively for such purposes as stock watering, irrigation, settling basins, or rice growing, (d) artificial reflecting or swimming pools or other small ornamental bodies of water created by excavating and/or diking dry land to retain water for primarily aesthetic reasons, and (e) waterfilled depressions created in dry land incidental to construction activity and pits excavated in dry land for the purpose of obtaining fill, sand, or gravel unless and until the construction or excavation operation is abandoned and the resulting body of water meets the definition of waters of the United States (see 33 CFR 328.3(a)). Other features may be excluded based on Supreme Court decisions (e.g., SWANCC and Rapanos) or by regulation.

Federal and state regulations pertaining to waters of the U.S., including wetlands, are discussed below.

The Clean Water Act (33 United States Code (USC) 1251-1376) provides guidance for the restoration and maintenance of the chemical, physical, and biological integrity of the nation's waters.

Section 401 requires that an applicant for a federal license or permit that allows activities resulting in a discharge to waters of the U.S. obtain a state certification that the discharge complies with other provisions of CWA. The Regional Water Quality Control Board (RWQCB) administers the certification program in California and may require State Water Quality Certification before other permits are issued.

Section 402 establishes a permitting system for the discharge of any pollutant (except dredged or fill material) into waters of the U.S.

Section 404 establishes a permit program administered by USACE that regulates the discharge of dredged or fill material into waters of the U.S. (including wetlands). Implementing regulations by USACE are found at 33 CFR Parts 320-332. The Section 404 (b)(1) Guidelines were developed by the USEPA in conjunction with USACE (40 CFR Part 230), allowing the discharge of dredged or fill material for non-water dependent uses into special aquatic sites only if there were no practicable alternative that would have less adverse impacts.

2.3.2 State Jurisdiction

Any action requiring a CWA Section 404 permit, or a Rivers and Harbors Act Section 10 permit, must also obtain a CWA Section 401 Water Quality Certification. The State of California Water Quality Certification (WQC) Program was formally initiated by the State Water Resources Control Board (SWRCB) in 1990 under the requirements stipulated by Section 401 of the Federal CWA. Although the CWA is a Federal law, Section 401 of the CWA recognizes that states have the primary authority and responsibility for setting water quality standards. In California, under Section 401, the State and Regional Water Boards are the authorities that certify that issuance of a federal license or permit does not violate California's water quality standards (i.e., that they do not violate Porter-Cologne and the Water Code). The WQC Program currently issues the WQC for discharges requiring USACE permits for fill and dredge discharges within Waters of the United States, and now also implements the State's wetland protection and hydromodification regulation program under the Porter Cologne Water Quality Control Act.

On May 28, 2020, the SWRCB implemented the State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State (Procedures) for inclusion in the forthcoming Water

Quality Control Plan for Inland Surface Waters and Enclosed Bays and Estuaries and Ocean Waters of California (SWRCB 2019). The Procedures consist of four major elements:

I. A wetland definition;
II. A framework for determining if a feature that meets the wetland definition is a water of the state;
III. Wetland delineation procedures; and
IV. Procedures for the submittal, review, and approval of applications for Water Quality Certifications and Waste Discharge Requirements for dredge or fill activities.

Under the Procedures and the State Water Code (Water Code §13050(e)), "Waters of the State" are defined as "any surface water or groundwater, including saline waters, within the boundaries of the state." "Waters of the State" includes all "Waters of the U.S."

More specifically, a wetland is defined as: "*An area is wetland if, under normal circumstances, (1) the area has continuous or recurrent saturation of the upper substrate caused by groundwater, or shallow surface water, or both; (2) the duration of such saturation is sufficient to cause anaerobic conditions in the upper substrate; and (3) the area's vegetation is dominated by hydrophytes or the area lacks vegetation*." The wetland definition encompasses the full range of wetland types commonly recognized in California, including some features not protected under federal law, and reflects current scientific understanding of the formation and functioning of wetlands (SWRCB 2019).

Unless excluded by the Procedures, any activity that could result in discharge of dredged or fill material to Waters of the State, which includes Waters of the U.S. and non-federal Waters of the State, requires filing of an application under the Procedures.

2.3.2.1 California Department of Fish and Wildlife

CDFW is a trustee agency that has jurisdiction under Section 1600 et seq. of the California Fish and Game Code. Under Sections 1602 and 1603, a private party must notify CDFW if a proposed project will "substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake designated by the department, or use any material from the streambeds…except when the department has been notified pursuant to Section 1601." Additionally, CDFW asserts jurisdiction over native riparian habitat adjacent to aquatic features, including native trees over four inches in diameter at breast height (DBH). If an existing fish or wildlife resource may be substantially adversely affected by the activity, CDFW may propose reasonable measures that will allow protection of those resources. If these measures are agreeable to the parties involved, they may enter into an agreement with CDFW identifying the approved activities and associated mitigation measures. Generally, CDFW recommends applying for a Streambed Alteration Agreement (SAA) for any work done within the lateral limit of water flow or the edge of riparian vegetation, whichever is greater.

2.4 CEQA SIGNIFICANCE

Section 15064.7 of the State CEQA Guidelines encourages local agencies to develop and publish the thresholds that the agency uses in determining the significance of environmental effects caused by projects under its review. However, agencies may also rely upon the guidance provided by the expanded Initial Study Checklist included in Appendix G of the State CEQA Guidelines. Appendix G provides examples of impacts that would normally be considered significant. Based on these examples, impacts to biological resources would normally be considered significant if the project would:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFW or USFWS;
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the CDFW or USFWS;
- Have a substantial adverse effect on State or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species, or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; and
- Conflict with the provisions of an adopted Habitat Conservation Plan (HCP), Natural Community Conservation Plan (NCCP), or other approved local, regional, or state habitat conservation plan.

An evaluation of whether or not an impact on biological resources would be substantial must consider both the resource itself and how that resource fits into a regional or local context. Substantial impacts would be those that would diminish or result in the loss of an important biological resource, or those that would obviously conflict with local, State, or federal resource conservation plans, goals, or regulations. Impacts are sometimes locally important but not significant according to CEQA. The reason for this is that although the impacts would result in an adverse alteration of existing conditions, they would not substantially diminish, or result in the permanent loss of, an important resource on a population-wide or region-wide basis.

The PCCP has conducted an analysis under CEQA of the impacts to covered species that will result from implementation of the PCCP and determined that covered projects that comply with PCCP requirements and mitigation measures will have a less than significant impact on PCCP covered species.

2.4.1 California Native Plant Society

The California Native Plant Society (CNPS) maintains a rank of plant species native to California that have low population numbers, limited distribution, or are otherwise threatened with extinction. This information is published in the *Inventory of Rare and Endangered Vascular Plants of California*. Potential impacts to populations of CNPS-ranked plants receive consideration under CEQA review. The following identifies the definitions of the CNPS Rare Plant Ranking System:

Rank 1A: Plants presumed Extinct in California and either rare or extinct elsewhere

Rank 1B: Plants Rare, Threatened, or Endangered in California and elsewhere

Rank 2A: Plants presumed extirpated in California but common elsewhere

Rank 2B: Plants Rare, Threatened, or Endangered in California, but more common elsewhere

Rank 3: Plants about which we need more information – A Review List

Rank 4: Plants of limited distribution – A Watch List

All plants appearing on CNPS Rank 1 or 2 are considered to meet CEQA Guidelines Section 15380 criteria. While only some of the plants ranked 3 and 4 meet the definitions of threatened or endangered species, the CNPS recommends that all Rank 3 and Rank 4 plants be evaluated for consideration under CEQA. Furthermore, the CNPS Rare Plant Rankings include levels of threat for each species. These threat ranks include the following:

0.1 - Seriously threatened in California (over 80% of occurrences threatened/high degree and immediacy of threat);

0.2 - Moderately threatened in California (20 to 80% occurrences threatened/moderate degree and immediacy of threat); and

0.3 - Not very threatened in California (less than 20% of occurrences threatened/low degree and immediacy of threat or no current threats known).

Threat ranks do not designate a change of environmental protections, so that each species (i.e., CRPR 1B.1, CRPR 1B.2, CRPR 1B.3, etc.), be fully considered during preparation of environmental documents under CEQA.

2.4.2 California Department of Fish and Wildlife Species of Concern

Additional fish, amphibian, reptile, bird, and mammal species may receive consideration by CDFW and lead agencies during the CEQA process, in addition to species that are formally listed under FESA and CESA or listed as fully protected. These species are included on the *Special Animals List*, which is maintained by CDFW. This list tracks species in California whose numbers, reproductive success, or habitat may be in decline. In addition to "Species of Special Concern" (SSC), the *Special Animals List* includes species that are tracked in the California Natural Diversity Database (CNDDB) but warrant no legal protection. These species are identified as "California Special Animals" (CSA).

2.5 SACRAMENTO COUNTY POLICIES AND REGULATIONS

In addition to federal and state regulations, the *County of Sacramento General Plan* (General Plan) (County of Sacramento 2017) includes goals and policies regarding biological resources including, Vegetation and Wildlife, Aquatic Resources, and Terrestrial Resources. Complete descriptions of applicable sections of these goals and policies are provided in Appendix A.

2.5.1 Sacramento County Tree Preservation and Protection Policies

Sacramento County regulates removal and impacts of protected trees under the Tree Preservation Ordinance (Tree Ordinance), Chapter 19.12 of the County Code. Under the Ordinance, all native oak trees, defined as valley oak (*Quercus lobata*), interior live oak (*Quercus wislizeni*), blue oak (*Quercus douglasii*), or oracle oak (*Quercus morehus*), with at least one trunk of six inches or more in diameter at breast height or an aggregate diameter of ten inches or more for multi-trunk trees, are protected. The Ordinance also gives special consideration to Landmark Trees, which are prominent or stately trees of any species that are in good health and structural condition, and Heritage Trees, which are any native oak with a trunk diameter of 19 inches or larger.

In addition, as part of the environmental review process, the Sacramento County Community Development Department, Planning and Environmental Review considers both the removal of certain native and non-native trees and the encroachment of construction activities into the protected zones of these trees. Native trees are defined as native oaks, Northern California black walnut (*Juglans hindsii*), California sycamore (*Platanus racemosa*), Oregon ash (*Fraxinus latifolia*), Goodding's black willow (*Salix gooddingii*), California box elder (*Acer negundo* var*. californicum*), California buckeye (*Aesculus californica*), and white alder (*Alnus rhombifolia*) with a trunk diameter of four inches or greater.

The *Sacramento County General Plan* establishes a goal of protecting both oaks and other non-oak native species. Policy CO-139 provides that non-oak native trees which cannot be protected through preservation should be replaced with in-kind species in accordance with established tree planting specifications, the combined diameter of which shall equal the combined diameter of the trees removed. For impacts to non-native trees, Policy CO-145 requires that removal of non-native tree canopy shall be mitigated by creating equivalent canopy on-site (Sacramento County 2018a).

2.5.2 Swainson's Hawk Impact Mitigation Program

During the environmental review process, the Sacramento County Office of Planning and Environmental Review (PER) determines if the project will impact Swainson's Hawk foraging habitat. Impacts to foraging habitat may result from (1) parcel size reduction of lands designated as agricultural; (2) zoning changes from agriculturally-designated lands to urban land use or entitlements for non-agricultural uses; (3) public projects; or (4) development on large undeveloped commercial and industrial lands. If an impact to foraging habitat is determined, then mitigation under The Sacramento County Swainson's Hawk Mitigation Program designates the following mitigation options based on the total impacted acreage (Sacramento County 2018b).

<u>Projects with impacts to less than 40 acres</u>

- Have the option to pay an impact fee or provide title or easement to suitable Swainson's Hawk mitigation lands on a per-acre basis.
- The total impact fee is currently $12,925 per acre of impact. Of that fee, $10,550 is for land/easement acquisition and $2,375 is for establishing an endowment to cover operations, monitoring, and management of land purchased by the County.
- All projects pay a $500 one-time administrative fee.

<u>Projects with impacts of 40 acres and greater</u>

- Must provide title or easement to suitable Swainson's Hawk mitigation lands on a per-acre basis.
- An endowment fee is due; however, this fee is variable based on parcel-specific data. A set fee of $2,375 per acre impacted is required for projects using the fee option and a variable fee, no greater than $3,500 per acre impacted, is required for projects delivering title or easement (actual fee calculated based on parcel-specific data).

- All projects pay a $500 one-time administrative fee.

PER assumes that parcels zoned as AG-40 (Agriculture) or larger are considered to have 100 percent habitat value and the value decreases as the minimum parcel size drops. Properties zoned AR-5 and smaller, parcels zoned as RD-1 thru 40, and commercial and industrial zonings retain no foraging habitat value. Parcels within the Study Area are zoned SC (Shopping Center), LC (Light commercial), and RD-40 (Multiple Family Residential) (Sacramento County 2016). Therefore, no mitigation for loss of Swainson's hawk foraging is required for the project under the County's Swainson's Hawk Impact Mitigation Program.

3.0 METHODS

Available information pertaining to the natural resources of the region was reviewed and the references reviewed for this assessment are listed in the References section. The following site-specific published information was reviewed for this BRA:

- California Department of Fish and Wildlife (CDFW). 2022. California Natural Diversity Database (CNDDB); For: *Carmichael, Citrus Heights, Pleasant Grove, Roseville, Rocklin, Rio Linda, Folsom, Sacramento East,* and *Buffalo Cree*k U.S. Geological Survey (USGS) 7.5-minute series quadrangles, Sacramento, CA. Accessed [June 10, 2022];

- The California Native Plant Society (CNPS). 2022 Inventory of Rare and Endangered Plants (CNPS): For: *Carmichael, Citrus Heights, Pleasant Grove, Roseville, Rocklin, Rio Linda, Folsom, Sacramento East,* and *Buffalo Creek* U.S. Geological Survey (USGS) 7.5-minute series quadrangles, Sacramento, CA. Accessed [June 10, 2022];

- USDA, NRCS. 2022. *Web Soil Survey*. Available at: http://websoilsurvey.sc.egov.usda.gov. Accessed [June 10, 2022];

- U.S. Fish and Wildlife Service (USFWS). 2022. *Information for Planning and Consultation* (IPaC) *Winding Ranch, Sacramento County, California.* Accessed [June 10, 2022]; and

- USGS. 2022 *Carmichael, California*. 7.5-minute series topographic quadrangle. United States Department of Interior.

Prior to conducting the field survey, existing information was reviewed concerning known habitats and special-status species that may occur in the Study Area. The results of the records search and five-mile radius CNDDB query for the Study Area are summarized in Appendix B. The field surveys were conducted on November 20, 2019, by HELIX biologists Marisa Brilts and Charlotte Marks, and on June 1, and 8, 2022 by HELIX biologists Marias Brilts and Greg Davis in response to the expansion of the Project footprint. The Study Area was systematically surveyed on foot to ensure total search coverage, with special attention given to portions of the Study Area with the potential to support special-status species and sensitive habitats. Binoculars were used to further extend site coverage and identify species observed. All plant and animal species observed were recorded (Appendix C), and all biological communities previously mapped in the Study Area were verified using a handheld Trimble GeoXT GPS unit with sub-meter accuracy or Collector app. on an Android phone.

Following the field survey, the potential for each species identified in the records search to occur within the Study Area was determined based on the site survey, soils, habitats present within the survey area, and species-specific information, as shown in Appendix B.

4.0 RESULTS

4.1 SITE LOCATION AND DESCRIPTION

The approximate 24.80-acre Study Area is in Sacramento County and located approximately 1.75 miles southeast of Interstate 80 in the unincorporated community of Carmichael. The Study Area is located in a developed suburban area. It is bound by Winding Way to the north and Manzanita Avenue to the west, both high-traffic streets, to the east by Rampart Drive, Mary Lynn Lane, and high-density apartment complexes, and on the south by Jan Drive and the now defunct Crestview Lanes Bowling Alley (Figure 1). An aerial of the Study Area is provided in Figure 2 (*Aerial Map*).

4.2 PHYSICAL FEATURES

4.2.1 Topography and Drainage

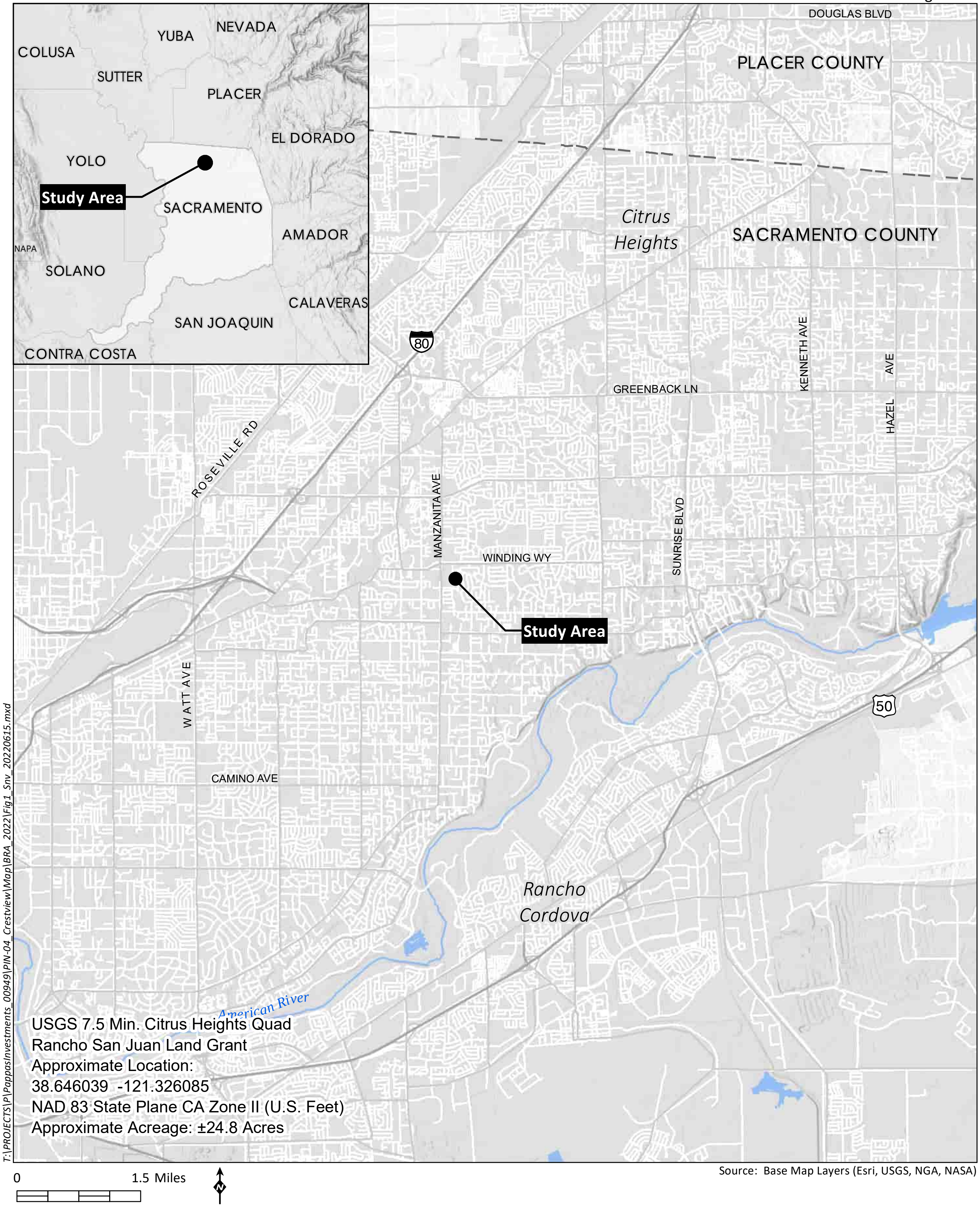
The general topography of the Study Area is level to gently rolling, with elevations that range from approximately 110 to 140 feet (35 to 42 meters) above mean sea level (MSL). It is evident that the Study Area has been disturbed in the past. Signs of previous disturbance include excavated ditches intended to promote surface drainage, a gravel lot, and leveled areas suggestive of past grading.

The Study Area is located in the Lower American Watershed Hydrologic Unit Code (HUC) 8-18020111. The Study Area receives drainage flows primarily from a large culvert under Jan Drive. The drainage runs approximately 300 feet through the undeveloped half of the site before entering another large culvert under the Crestview Lanes parking lot. A small drainage ditch was excavated along the northern boundary of the Study Area, directing runoff into the drainage, and along the north boundary of the Crestview Lanes parking lot directing water into a storm drain inlet. Drainage from the parking lot and building is directed into a storm drain system, which, presumably, joins the subsurface culvert. The culvert opens into a drainage to the north and re-enters a culvert under Winding Way. The hydrologic regime on the site consists of seasonal storm water runoff and precipitation, primarily between November and March. Annual average precipitation is less than 20 inches.

4.2.2 Soils

The Natural Resources Conservation Service has mapped two urban soil types within the Study Area (Figure 3): Urban Land and Urban Land-Xerarents-Fiddyment Complex, 0-8 percent slopes. The general characteristics and properties associated with these soil types are described below (USDA, NRCS 1980 and 2022).

(227) Urban Land: The urban land map unit includes developed areas, the majority of which are covered by impervious surfaces such as buildings, roads, and parking lots. The underlying soils have typically been altered in the development process.



Source: Base Map Layers (Esri, USGS, NGA, NASA)

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Vicinity Map

Figure 1

Source: Aerial (DigitalGlobe 3/4/2021)

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Aerial Map

Figure 2

Source: NRCS, 2022; Aerial (DigitalGlobe 3/4/2021)

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HELIX Environmental Planning

Soils Map

Figure 3

(229) Urban Land-Xerarents-Fiddyment Complex, 0-8 percent slopes: This soil type is found in fill areas and on hills. Typically, the well-drained Xerarent or Fiddyment soils are moderately deep fill over a cemented siltstone or claypan impervious surface. These soils have typically been altered by construction and support primarily ornamental plants, oaks, grasses and forbs.

4.3 BIOLOGICAL COMMUNITIES

Three biological communities, ruderal herbaceous, developed/disturbed, and mixed oak woodland occur within the Study Area (Figure 4). These communities are described in more detail below. Seasonal wetland ditches with intermittent surface flow and an ordinary high-water mark and ditches occur within these habitats. A comprehensive list of all plant species observed within the Study Area is provided in Appendix C. Representative site photographs are included in Appendix D.

4.3.1 Ruderal Herbaceous

Ruderal herbaceous habitat is characterized by plant species that are among the first to colonize disturbed areas (either naturally disturbed as by fire or artificially disturbed as by construction, grading, etc.). Abandoned agricultural fields, construction sites, vacant lots, and road shoulders are just a few of the settings that can create favorable conditions for ruderal plant species. Ruderal habitat is typically associated with invasive and noxious weeds. Approximately 20.033 acres of ruderal herbaceous habitat occur within the Study Area (Figure 4).

The dominant plants within the Study Area and within this community type include ripgut brome (*Bromus diandrus*), wild oat (*Avena fatua*), chicory (*Cichorium intybus*), and vetch (*Vicia* sp.). Yellow star-thistle (*Centaurea solstitialis*), medusa head (*Elymus caput-medusae*), stinkwort (*Dittrichia graveolens*), Italian thistle (*Carduus pycnocephalus*), and common groundsel (*Senecio vulgaris*) are present as well.

4.3.2 Developed/Disturbed

Developed/disturbed habitat differs from ruderal habitat by generally having little to no vegetation and containing built structures or maintained surfaces. Vegetation that does occur within this community type is often ornamental, rather than composed of invasive or noxious weeds such as in ruderal habitat. Approximately 3.407 acres of developed/disturbed habitat occur within the Study Area (Figure 4).

Plant species that do occur in the Study Area within this community type are similar to the dominant species previously described in the ruderal herbaceous habitat. However, in large part, this biological community is devoid of vegetation and largely consists of a paved parking lot associated with the adjacent abandoned bowling alley along Manzanita Avenue, dirt foot paths parallel to the seasonal wetland ditch in the north, and along oaks in the south. Cottonwoods (*Populus fremontii*), willows (*Salix* sp.) and palms (*Washingtonia robusta*) are present within this community primarily located in tree wells within the paved parking lot.

4.3.3 Mixed Oak Woodland

A total of 1.164 acres of mixed oak woodland occur within the Study Area (Figure 4). The Study Area was surveyed by an International Society Arboriculture (ISA) certified arborist (WE-0510A) on December 17 and 18, 2019 (Sierra Nevada Arborists 2020). A total of 108 trees consisting of 1 almond (*Prunus dulcis*), 9 blue oaks (*Quercus douglasii)*, 1 black walnut (*Juglans nigra*), 1 California fan palm (*Washingtonia filifera*), 3 Chinese pistache (*Pistacia chinensis*), 2 Chinese zelkovas (*Ulmus parvifolia*), 28 cork oaks (*Quercus suber*), 1 deodar cedar (*Cedrus deodara*), 4 Fremont cottonwoods (*Populus fremontii*), 1 fruitless mulberry (*Morus alba*), 2 gum trees (*Eucalyptus sp*.), 1 Modesto ash (*Fraxinus velutina*), 3 pecans (*Carya illinoinensis*), 1 sweetgum (*Eucalyptus cladocalyx*), and 50 valley oaks were inventoried on the project site during these surveys.

4.4 SPECIAL-STATUS SPECIES

Special-status species are plant and wildlife species that have been afforded special recognition by federal, State, or local resource agencies or organizations. Listed and special-status species are of relatively limited distribution and may require specialized habitat conditions. Special-status species are defined as meeting one or more of the following criteria:

- Listed or proposed for listing under CESA or FESA;
- Protected under other regulations (e.g., Migratory Bird Treaty Act);
- Included on the CDFW Special Animals List;
- Identified as Rare Plants Rank 1 to 4 by CNPS; or
- Receive consideration during environmental review under CEQA.

Special-status species considered for this analysis are based on queries of the CNDDB, the USFWS, and CNPS ranked species (online versions) for the *Citrus Heights* USGS quadrangle and eight surrounding quadrangles. Appendix B includes the common name and scientific name for each species, regulatory status (federal, State, local, CNPS), habitat descriptions, and potential for occurrence within the Study Area. The following set of criteria has been used to determine each species' potential for occurrence within the Study Area:

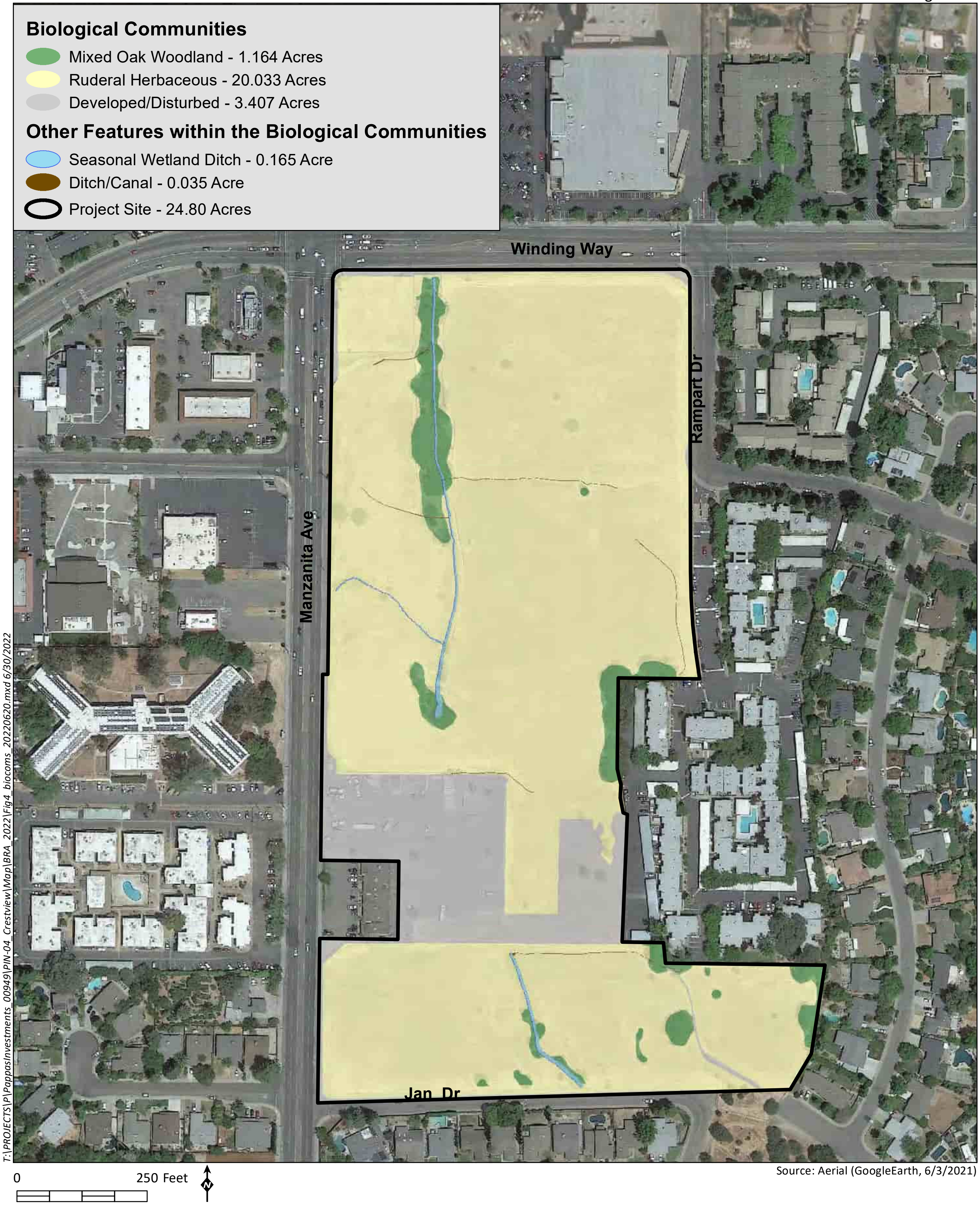
- **Will Not Occur:** Species is either sessile (i.e., plants) or so limited to a particular habitat that it cannot disperse on its own and/or habitat suitable for its establishment and survival does not occur on the project site.

- **Not Expected:** Species moves freely and might disperse through or across the project site, but suitable habitat for residence or breeding does not occur on the project site, potential for an individual of the species to disperse through or forage in the site cannot be excluded with 100% certainty.

- **Presumed Absent:** Habitat suitable for residence and breeding occurs on the project site; however, focused surveys conducted for the current project were negative.

- **May Occur:** Species was not observed on the site and breeding habitat is not present but the species has the potential to utilize the site for dispersal, High: Habitat suitable for residence and breeding occurs on the project site and the species has been recorded recently on or near the project site, but was not observed during surveys for the current project.

- **Present:** The species was observed during biological surveys for the current project and is assumed to occupy the project site or utilize the project site during some portion of its life cycle.



Source: Aerial (GoogleEarth, 6/3/2021)

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HELIX Environmental Planning

Biological Communities

Figure 4

4.4.1 Listed and Special-Status Plants

According to the records search, 15 listed and special-status plants have the potential to occur onsite or in the vicinity of the Study Area (CDFW 2022). Based on field observations, published information, and literature review, however, three special-status plant species have the potential to occur within the Study Area. Sanford's arrowhead has a high potential of occurrence, and Ahart's dwarf rush, and stinkbells have some potential to occur within the Study Area.

4.4.1.1 Special-Status Plants with Potential for Occurrence

Sanford's Arrowhead – CNPS 1B

Sanford's arrowhead is ranked as a CNPS 1B (Plants Rare or Endangered in California and elsewhere) species. It is a perennial rhizomatous herb found in marshes and swamps in assorted shallow freshwater areas from 0 to 1,076 feet (0 to 650 meters) above MSL. The identification period for this species is from May through October. There are four documented CNDDB records of this species occurring within five miles of the Study Area (CDFW 2022).

The seasonal wetland ditches provide potential habitat for this species. Although this species was not observed during the 2019 biological survey, the survey was not floristic in nature, and it was not conducted during the typical identification period for this species. The follow-up survey, conducted on June 1, 2022, was conducted on additional onsite areas not looked at previously, was floristic in nature, and was conducted during the typical identification period for this species. Although the species was not observed in 2022 within the additional onsite areas, based on suitable habitat for this species being present within the Study Area and documented occurrences in the vicinity, this species has a *high* potential to occur within the Study Area.

Ahart's Dwarf Rush

Ahart's dwarf rush is ranked as a CNPS 1B species. It is an annual herb found in mesic areas within valley and foothill grassland from 98 to 751 feet (30 to 229 meters) above MSL. The identification period for this species is from April through August. There are no documented CNDDB records of this species occurring within five miles of the Site (CDFW 2022).

The ruderal herbaceous habitat within the Study Area provides marginal habitat for this species... Although this species was not observed during the 2019 biological survey, the survey was not floristic in nature, and it was not conducted during the typical identification period for this species. The follow-up survey, conducted on June 1, 2022, was conducted on additional onsite areas not looked at previously, was floristic in nature, and was conducted during the typical identification period for this species. Although the species was not observed in 2022 within the additional onsite areas, based on the marginal habitat documented in 2019 within the Study Area and the lack of documented occurrences in the vicinity, there is a *low* potential for this species to occur within the ruderal herbaceous habitat.

Stinkbells

Stinkbells are ranked as a CNPS 4.2 (limited distribution) species. It is a perennial bulbiferous herb found in clay soils and sometimes serpentinite, chaparral, cismontane woodland, pinyon and juniper woodland, and valley and foothill grassland from 30 to 5,100 feet (10 to 1,555 meters). The identification period for this species is from March through June. There is one documented CNDDB record of this species within five miles of the Study Area (CDFW 2022). However, the degree of disturbance within the Study Area and soil types present make it unlikely that the site will support this species. Given the marginal habitat within the Study Area, there is a *low* potential for this species to occur

4.4.2 Listed and Special-Status Wildlife

According to the records search, 38 listed and special-status wildlife species have the potential to occur onsite or in the vicinity of the Study Area (CDFW 2022). Based on field observations, published information, and literature review, eleven special-status wildlife species have the potential to occur within the Study Area: Cooper's hawk, purple martin, white-tailed kite, andrenid bee, Crotch bumble bee, Swainson's hawk, tricolored blackbird, burrowing owl, merlin, song sparrow (Modesto population), and pallid bat. These species are discussed in more detail below. In addition to these special-status wildlife species, nesting birds and raptors protected under federal, State, and local laws/policies also have potential to occur within the Study Area.

4.4.2.1 Special-Status Wildlife Potential for Occurrence

Purple Martin

The purple martin is a California Species of Special Concern. It is an uncommon, local summer resident that occurs in a variety of woodland communities. Purple martins can be seen in the Central Valley during spring and fall migration and as an uncommon and local summer breeder. Nests in wide variety of open and partly open habitats that are often near water or around towns. Nests in tree cavities, abandoned woodpecker holes, crevices in rocks, and sometimes in bird houses or gourds put up by humans. Summer (breeding). There is one record in the CNDDB for this species within five miles of the Study Area (CDFW 2022). The Study Area provides potential nesting and foraging habitat for this species. Therefore, this species has a *high* potential to occur within the Study Area.

White-Tailed Kite

White-tailed kite is a California Fully Protected species. It is a year-long resident in coastal and valley lowlands in California. White-tailed kites breed from February to October, with the breeding season peaking from May to August (Zeiner et al. 1990). They inhabit savanna, open woodlands, marshes, desert grassland, partially cleared lands and cultivated fields. This species nests in trees, often near a marsh in a savanna, open woodland, partially cleared lands, or cultivated fields. Foraging occurs within ungrazed or lightly grazed fields and pastures.

There are nine CNDDB record for this species within five miles of the Study Area (CDFW 2022). The trees within the Study Area provide suitable nesting habitat for this species. The ruderal herbaceous habitat within the Study Area provides suitable foraging habitat. Therefore, this species has a *high* potential to occur within the Study Area.

Nesting Birds

In addition to the purple martin and white-tailed kite discussed above, the nests of most birds are protected under the MBTA and California Fish and Game Codes. Additionally, the USFWS and CDFW have identified several avian species of conservation concerns such as Cooper's hawk, merlin, and song sparrow that do not have specific statutory protection that may occur within habitats such as those found within the Study Area. The trees within the mixed oak woodland in the Study Area provide potential nesting habitat for a variety of avian species protected by the MBTA and Fish and Game Codes and ruderal herbaceous habitat in thin the Study Area provides suitable nesting and foraging habitat for nesting birds protected by federal and state laws.

Andrenid Bee

The andrenid bee is on the California Special Animals List as designated by CDFW. This species is found in grassland habitats within El Dorado, Placer, Sacramento, and San Joaquin counties. Andrenid bees are ground nesters, and will typically stay underground from summer, fall and winter and emerge in spring to forage on blooming flowers. They are the earliest bee species to emerge in the spring and will often pollinate willows, maples, violets and other early blooming wildflowers (USDA FS 2011).

There is one documented CNDDB record for this species within five miles of the Study Area (CDFW 2022). The ruderal herbaceous habitat within the Study Area provides suitable habitat for the species. Given the known occurrences in the vicinity of the Study Area and suitable habitat present within the Study Area, this species has a *high* potential to occur within the Study Area.

Swainson's Hawk

Swainson's hawk is a long-distance migrant with nesting grounds in western North America. The Swainson's hawk population that nests in the Central Valley winters primarily in Mexico, while the population that nests in the interior portions of North America winters in South America (Bradbury et al. in prep.). Swainson's hawks arrive in the Central Valley between March and early April to establish breeding territories. Breeding occurs from late March to late August, peaking in late May through July (Zeiner et al. 1990). In the Central Valley, Swainson's hawks' nest in isolated trees, small groves, or large woodlands next to open grasslands or agricultural fields. This species typically nests near riparian areas; however, it has been known to nest in urban areas as well. Nest locations are usually in close proximity to suitable foraging habitats, which include fallow fields, annual grasslands, irrigated pastures, alfalfa and other hay crops, and low-growing row crops. Swainson's hawks leave their breeding grounds to return to their wintering grounds in late August or early September (Bloom and Van De Water 1994). There is one CNDDB record of this species within five miles of the Study Area (CDFW 2022). There are several suitable nesting trees for this species within and adjacent to the Study Area. However, the area surrounding the Study Area is highly developed thereby significantly limiting or negating foraging opportunities for this species. Therefore, this species has a *low* potential to occur within the Study Area.

Tricolored Blackbird

Tricolored blackbird was listed as a state-threatened species on March 18, 2019. Tricolored blackbird is a colonial species that breeds in freshwater marshes of cattail (*Typha* sp.), bulrush (*Schoenoplectus* sp. and *Isolepis* sp.), sedge (*Carex* sp.), and non-native vegetation including Himalayan blackberry (*Rubus armeniacus*). Nests occur in large colonies of up to thousands of individuals (Nature Serve 2019). Nesting locations typically must be large enough to support a minimum colony of approximately fifty pairs (Zeiner et al. 1990). This species forages in grasslands and agricultural fields with low-growing vegetation (Shuford and Garbaldi 2008).

There are three CNDDB records for this species within five miles of the Study Area (CDFW 2022). While the ruderal herbaceous habitat within the Study Area provides marginally suitable foraging habitat for this species, no suitable nesting habitat for this species exists. Therefore, this species has a *low* potential to occur within the Study Area and is not expected to nest in the Study Area.

Burrowing Owl

Burrowing owl is a California Species of Special Concern. This species is a small ground-dwelling owl that occurs in western North America from Canada to Mexico and east to Texas and Louisiana. Although in certain areas of their range, burrowing owls are migratory, these owls are predominantly non-migratory in California. Burrowing owls generally inhabit gently sloping areas, characterized by low, sparse vegetation (Poulin et al. 2011). The breeding season for burrowing owls is typically from February 1 to August 31 (Haug et al. 1993; Thomsen 1971). Burrowing owls nest in burrows in the ground, often in old ground squirrel burrows. Burrowing owls are also known to use artificial burrows including pipes, culverts, and nest boxes.

There is one CNDDB record for this species within five miles of the Study Area (CDFW 2022). The small mammal burrows and ruderal herbaceous habitat within the Study Area provide marginally suitable burrowing and foraging habitat for this species. This species was not observed within the Study Area during the biological survey. Therefore, this species has a *low* potential to occur within the Study Area.

Pallid Bat

Pallid bat, designated as a Species of Special Concern by CDFW. The Western Bat Working Group (WBWG) has classified the pallid bat in California as “imperiled or are at high risk of imperilment” (WBWG 2022). The pallid bat is a sizeable buff-colored bat, with large ears and broad wings (Orr 1954). The pallid bat occurs throughout the southwestern U.S., south into Mexico, and along the Pacific states of California, Oregon, and Washington (Hermanson and O’Shea 1983). This species is found in a variety of habitats, including grasslands and oak woodlands. This species typically roosts in rock crevices, caves, tree hollows, or various human-made structures such as attics, barns, and bridges (Orr 1954). Pallid bats are primarily insectivores and feed by gleaning prey items from the ground or off vegetation (Bell 1982). The dormancy period ends in late March or early April. Pallid bats are gregarious in the spring and summer months, forming colonies of approximately 30-100 individuals. Females typically give birth in May and June to twins (mean of 1.8 young per female). Colony size decreases during the fall, and by October, the bats move to winter locations (Orr 1954).

The Study Area provides suitable roosting habitat for this species within the existing trees onsite. Although some potential roost sites are present, the current level of adjacent human disturbance including roads, buildings, and may limit the likelihood of roosting occurring within the Study Area. No signs of roosting (guano, stains, noise) were observed during the field survey. Therefore, pallid bat has a *low* potential to occur within the Study Area.

Crotch’s Bumblebee

The Crotch’s bumblebee is on the California Special Animals List as designated by CDFW. Crotch’s bumblebee inhabits grasslands and shrublands and requires a hotter and drier environment than other bumblebee species. It is characterized as a short-tongued species and therefore prefers certain plant species as a food source including milkweeds, dusty maidens, lupines, medics, phacelias, sages, clarkias, poppies, and wild buckwheats. The Crotch’s bumblebees are social insects that live in annual colonies composed of a queen, workers, and reproductives. Nests are often located underground in abandoned rodent nests, or above ground in tufts of grass, old bird nests, rock piles, or cavities in dead trees. Only mated queens overwinter and conduct all the foraging and care for the colony in early spring until the first workers emerge and assist with these duties. This species was not observed within the Study Area during the biological survey. Therefore, this species has a *low* potential to occur within the Study Area.

4.5 SENSITIVE HABITATS

Sensitive habitats include those that are of special concern to resource agencies or those that are protected under CEQA. Riparian areas are regulated under Section 1600 of the California Fish and Game Code, wetlands and other waters of the U.S. are regulated under Sections 401 and 404 of the Clean Water Act and potentially Sections 1600-1602 of the California Fish and Game Code, and protected trees are regulated under the Tree Ordinance for Sacramento County.

4.5.1 Potential Jurisdictional Waters of the U.S. and State

Seasonal wetland ditches are present within the Study Area and these features have been formally delineated. The USACE issued a preliminary jurisdictional determination on June 2, 2011 concurring with 0.16 acre of seasonal marsh present within the 14-acre Crestview Shopping Center site. This 14-acre site corresponds with the northernmost 14 acres of the Winding Ranch site. On August 11, 2011, the USACE issued a NWP 39 authorization, pending 401 Water Quality Certification, for the proposed fill of 0.164 acre of seasonal marsh within the 14-acre Crestview Site (SPK-2011-00364). The August 11, 2011 NWP 39 Authorization was not implemented and the authorization expired March 18, 2012. The NWP 39 Authorization was re-verified on March 23, 2012 but was never implemented. On July 8, 2015, the USACE issued a preliminary jurisdictional determination concurring with 0.164 acre of seasonal wetland ditch mapped within an expanded 23.24-acre Study Area which includes the majority of the current Study Area. In response to the recent expansion of the Project footprint, HELIX assessed an additional 0.5-acre parcel (Sacramento County APN 245-0011-018) for aquatic resources, as well as expanded areas from the previous 23.24-acre Study Area boundary to encompass the current 24.80-acre Study Area contains 0.165 acre of seasonal wetland ditches with intermittent surface flow and an ordinary high water mark, and 0.035 acre of ditches and canals. In addition to delineating aquatic resources on the 0.5-acre parcel, Pappas Investments (Client) requested that an updated aquatic resources map be prepared to update the 2015 delineation that was conducted by ECORP Consulting, Inc. (ECORP), which was issued a preliminary jurisdictional determination by the USACE in June 2015 (SPK-2011-00364).

4.5.2 Protected Trees

Several oak trees occur within the Study Area. A formal arborist survey was not conducted during the November 20, 2019 biological survey. However, the Study Area was surveyed by an ISA Certified Arborist (WE- 0510A) on December 17 and 18, 2019 (Sierra Nevada Arborists 2020). A total of 108 trees measuring 4 inches in diameter and larger at breast height and/or overhanging the Study Area were inventoried during the December 2020 survey. The 111-tress inventoried consist of 1 almond, 9 blue oaks, 1 California black walnut, 1 California fan palm, 3 Chinese Pistache, 2 Chines zelkova, 28 cork oak, 1 deodar cedar, 4 Fremont cottonwoods, 1 fruitless mulberry, 2 gum tress, 1 Modesto ash, 3 norther California walnuts, 3 pecan, 1 sweetgum, and 50 valley oaks. Of these 61 trees consisting of 1 almond, 8 blue oaks, 2 Chines zelkova, 6 cork oak, 1 deodar cedar, 2 gum, 1 Modesto ash, 1 Norther California walnut, 1 sweetgum, and 38 valley oak trees are county protected species.

Section 2.5, Sacramento County evaluates any impacts to protected trees under the Tree Preservation and Protection Ordinance. The project will result in impacts to or removal of protected trees, the County will likely require an updated formal tree survey to inventory protected trees onsite, evaluate impacts to the protected trees as a result of the proposed project, and evaluate applicable mitigation.

4.5.3 Wildlife Corridors

Wildlife corridors link areas of suitable wildlife habitat that are otherwise separated by rugged terrain, changes in vegetation, or human disturbance. The fragmentation of open space areas by development creates isolated "islands" of wildlife habitat. Fragmentation can also occur when a portion of one or more habitats is converted into another habitat; for instance, when woodland or scrub habitat is altered or converted into grasslands after a disturbance such as fire, mudslide, or grading activities. Wildlife corridors mitigate the effects of this fragmentation by: (1) allowing animals to move between remaining habitats, thereby permitting depleted populations to be replenished and promoting genetic exchange; (2) providing escape routes from fire, predators, and human disturbances, thus reducing the risk of catastrophic events (such as fire or disease) on population or local species extinction; and (3) serving as travel routes for individual animals as they move within their home ranges in search of food, water, mates, and other needs.

Although some wildlife species may utilize portions of the Study Area for foraging, breeding, or other functions, the Study Area itself does not link two significant natural areas and it is not considered a wildlife migration corridor.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The 24.80-acre Study Area is comprised of approximately 20.033 acres of ruderal herbaceous habitat, 3.407 acres developed/disturbed areas, and 1.164 acres of mixed oak woodland. Approximately 0.165 acre of seasonal wetland ditches and approximately 0.035 acre of ditch/canals occur within the ruderal herbaceous habitat. Sensitive resources that will be impacted by the development of the proposed project include wetland ditches and protected trees (Figure 5).

No special-status plants or special-status wildlife were observed within the Study Area during the November 20, 2019 biological survey or during the follow-up survey conducted on June 1, 2022 on additional areas not looked at previously; however, special-status plant and wildlife species may occur within the Study Area. Recommendations, including avoidance and minimization measures to limit or avoid impacts to special-status plant and wildlife species that may occur within the Study Area, are included in Section 5.1.

Known or potential biological constraints in the Study Area include:

- Potential habitat for special-status plants: Sanford's arrowhead, Ahart’s dwarf rush, and stinkbells;
- Potential roosting and foraging habitat for special-status bats including pallid bat;
- Potential foraging habitat for tricolored blackbird;
- Potential habitat for western burrowing owl;
- Potential nesting habitat for Swainson’s hawk;

IMPACTS TO BIOLOGICAL COMMUNITIES

Classification	Impacted Acreage*	Avoided Acreage*	Total Acreage*
Ruderal Herbaceous	20.033	-	20.033
Mixed Oak Woodland	1.164	-	1.164
Developed/Disturbed	3.407	-	3.407
Other Features within the Biological Communities			
Seasonal Wetland Ditch	0.165	-	0.165
Ditch/Canal	0.035	-	0.035
TOTAL:	**24.80**	**0.00**	**24.80**

*Acreages calculated at 3 significant digits and subsequently rounded.

Source: Aerial (GoogleEarth, 6/3/2021)

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HELIX Environmental Planning

Impacts to Biological Communities

Figure 5

- Potential foraging and/or nesting habitat for special-status birds including Cooper's hawk, merlin, purple martin, song sparrow ("Modesto" population), and white-tailed kite;
- Potential habitat for special-status invertebrates including andrenid bee and Crotch bumble bee;
- Potential habitat for other migratory birds and other birds of prey protected by the MBTA and California Fish and Game Codes; and
- Sensitive habitats including jurisdictional aquatic resources and oak woodland habitat.

5.1 RECOMMENDATIONS

5.1.1 Special-Status Plant Species

As discussed previously, the seasonal wetland ditches provide potentially suitable habitat for special-status plant species including Ahart's dwarf rush and Sanford's arrowhead and the ruderal herbaceous habitat provides potential habitat for stinkbells that are known to occur in the vicinity of the Study Area.

Since a focused plant survey was not conducted during the site visits, prior to the initiation of construction, a qualified botanist should conduct one botanical survey in May within the Study Area which will overlap with the typical identification period of all three potentially occurring special-status plant species. It should be noted that weather conditions during any given survey year may require surveys to be conducted earlier or later in the typical blooming period in order to conduct the survey during the appropriate weather conditions. This timing may result in the need to conduct more than one round of plant surveys to adequately survey for all potentially occurring special-status plant species. The results of these surveys should be documented in a letter report to Sacramento County. If no special-status plants are observed during the botanical survey, no additional measures for special-status plants are recommended.

If any of the non-listed special-status plants are identified within areas of potential construction disturbance, the plants and/or the seedbank should be transplanted to suitable habitat within the Study Area outside of the project footprint or offsite if suitable habitat is not available within the Study Area. A qualified biologist should prepare an avoidance and mitigation plan detailing protection and avoidance measures, transplanting procedures, success criteria, and long-term monitoring protocols. In addition, a pre-construction worker awareness training should be conducted alerting workers to the presence of and protections for special-status plants in the vicinity of the work area.

5.1.2 Andrenid Bee and Crotch's Bumblebee

Andrenid bee and Crotch's bumblebee have the potential to occur within the ruderal herbaceous habitat and mixed oak woodland communities within the Study Area. The vegetation within these communities provides nesting, breeding, and foraging habitat for andrenid bee and Crotch's bumblebee. Vegetation clearing and ground-disturbing activities within these vegetation communities could impact these species during construction if present. However, since andrenid bee and Crotch's bumblebee establishes new nests annually, the potential loss of individual nests is not expected to have a significant impact on this species. Therefore, no species-specific mitigation measures are recommended for this species.

However, measures can be taken to restore, create, or preserve bee habitats to include suitable forage, nesting, and overwintering sites. These include restricting pesticide use on or near suitable habitat, particularly while treated plants are in flower and promote landscaping that increase pollinator friendly plants.

Pallid Bat Pallid bat has the potential to occur within the Study Area. The ruderal herbaceous habitat and mixed oak woodland communities within the Study Area provide suitable roosting habitat for these bat species.

A qualified biologist should conduct a pre-construction survey for special-status bat species within 14 days prior to development or ground disturbing activities including grading, vegetation clearing, tree removal, or construction. If no bats are observed, a letter report should be prepared to document the survey and provided to project proponent, and no additional measures are recommended. If development does not commence within 14 days of the pre-construction survey, or halts for more than seven days, an additional survey is required prior to resuming or starting work.

If special-status bats are present and roosting in the Study Area or the surrounding 100 feet of the Study Area, the qualified biologist should establish an appropriate no disturbance buffer around the roost site prior to the commencement of ground disturbing activities or development. No trees should be removed until the biologist has determined that a roost site is no longer active, and no bats are present. If avoidance is not feasible, then the CDFW should be consulted for additional avoidance measures and additional mitigation measures, such as installation of bat boxes or alternate roost structures.

A qualified biologist should conduct an environmental awareness training for all construction personnel prior to the initiation of work.

5.1.3 Swainson's Hawk

Swainson's hawk has a *low* potential to occur within the Study Area. The Study Area provides suitable nesting habitat within the isolated trees on site, and there are 3 known nesting occurrences within 5 miles of the Study Area. However, the extent of development surrounding the Study Area reduces the likelihood that this species would nest within the Study Area. No Swainson's hawks were observed during the site survey, however, most of the Study Area was surveyed when this species is not expected to be present within the Sacramento Valley. Vegetation clearing and ground disturbance during construction activities would destroy potential nesting habitat for this species if present during construction.

- As outlined in Section 2.5.2, based on current zoning of the Study Area and the extent of surrounding development, the Study Area is not expected to provide foraging habitat value for Swainson's hawks and mitigation for impacts to foraging habitat would not be required by Sacramento County. However, there is some limited potential for Swainson's hawks to nest within the Study Area due to suitable nest trees occurring within the Study Area. Therefore, a pre-construction nesting survey for this species should be conducted as outlined in Section 5.1.6.

In addition, a pre-construction worker awareness training session should be conducted prior to the start of construction alerting workers to the potential presence of nesting birds, including Swainson's hawk, during construction.

5.1.4 Tricolored Blackbird

The Study Area is currently within five miles of three known occurrences of this species (CDFW 2022). While the ruderal herbaceous habitat within the Study Area provides marginally suitable foraging habitat for this species, the Study Area provides no suitable nesting habitat. Therefore, the proposed project is not expected to impact suitable nesting habitat for tricolored blackbird. Impacts to tricolored blackbird foraging habitat is not regulated under CESA. Therefore, the project is not expected to result in take of tricolored blackbird as defined by CESA and an incidental take permit would not be required. No additional measures are suggested for this species.

5.1.5 Burrowing Owl

Although burrowing owls were not observed during the biological assessment, the Study Area contains ruderal herbaceous habitat and some small mammal burrows that are potentially suitable habitat for burrowing owl. It is recommended that a take avoidance survey for burrowing owls be conducted no more than 14 days prior to the initiation of construction as prescribed by CDFW guidelines (CDFW 2012). The Study Area should be surveyed by a qualified biologist to determine or rule out the presence of burrowing owl onsite. This survey may be conducted in conjunction with a nesting bird survey if construction were to be initiated within the nesting season.

If burrowing owls are observed on or within 500 feet of proposed development activities that will result in ground disturbance, then an impact assessment should be prepared and submitted to the CDFW, in accordance with the 2012 Staff Report. If it is determined that project activities may result in impacts to occupied western burrowing owl habitat, then the project proponent should consult with CDFW and develop a detailed mitigation plan establishing avoidance and mitigation measures based on the requirements set forth in Appendix A of the 2012 Staff Report (CDFW 2012).

5.1.6 Migratory Birds

Several special-status species of migratory birds have the potential to nest in the Study Area including Cooper's hawk, white-tailed kite, purple martin, and Swainson's hawk. Active nests are protected by the California Fish and Game Code Section 3503.5 and the MBTA. Ground-disturbing activities including vegetation clearing and tree removal could impact nesting birds if these activities occur during the nesting season (generally February 1 to August 31). All vegetation clearing including removal of trees and shrubs should be completed between September 1 and January 31, if feasible.

If construction activities within the Study Area begin during the nesting season, a qualified biologist should conduct a pre-construction survey of the project footprint, where accessible, for active nests. Additionally, the surrounding 500 feet should be surveyed for active raptor nests where accessible. The pre-construction survey should be conducted within 14 days prior to commencement of ground-disturbing activities. If the pre-construction survey shows that there is no evidence of active nests, a letter report should be prepared to document the survey, and no additional measures are recommended. If construction does not commence within 14 days of the pre-construction survey, or halts for more than 14 days, an additional survey is required prior to starting work.

If nests are found and considered to be active, the project biologist should establish buffer zones to prohibit construction activities and minimize nest disturbance until the young have successfully fledged or the biologist determines that the nest is no longer active. The designated buffer size will depend on the species in question, surrounding existing disturbances, and specific site characteristics, but may range from 50 feet for some songbirds to 250 to 500 feet for most raptors. If active nests are found within any trees slated for removal, then an appropriate buffer should be established around the trees and the trees should not be removed until a biologist determines that the nestlings have successfully fledged or the nest is confirmed to no longer be active. In addition, the pre-construction worker awareness training should include information on the location of active nests and protections in place for the active avian nests.

If construction activities begin during the non-breeding season (September 1 through January 31), a survey is not required, and no further studies are necessary.

5.1.7 Aquatic Resources

A total of approximately 0.165 acre of seasonal wetland ditches with intermittent surface flow and an ordinary highwater mark, and 0.035 acre of ditches and canals were mapped within the Study Area. As currently designed, the proposed project would result in impacts (i.e., discharge of dredged or fill material) to features that were previously determined to be waters of the U.S. and waters of the State, and a Section 404 Clean Water Act Permit would be required by the Corps and a Section 401 Water Quality Certification would be required by the RWQCB prior to the issuance of a grading permit. Any waters of the U.S. or jurisdictional wetlands that would be lost or impacted would need to be replaced or rehabilitated on a "no-net-loss" basis in accordance with the Corps mitigation guidelines. Habitat restoration, rehabilitation, and/or replacement should be at a location and by methods agreeable to the Corps and RWQCB.

5.1.8 Oak Trees

As previously discussed, protected oak trees and oak woodland exist within the Study Area. The proposed project will result in removal or significant impacts to protected oak trees.

The following measures should be adopted for protected trees slated for removal within the project footprint:

- A tree removal permit shall be obtained;
- It shall be the responsibility of the person trenching, grading or filling within a tree dripline or cutting, destroying or removing any tree under this chapter to have the tree permit or a copy of the conditions of approval imposed by the approving body at the tree removal site; and
- The permit, or the conditions of approval granted by the approving body, shall entitle the applicant to remove only the tree or trees approved for removal. (SCC 480 § 1, 1981.)

The following tree protection measures should be adopted for protected trees slated for preservation onsite adjacent to the project footprint:

- Tree Protection Fencing, consisting of four-foot tall, brightly colored, high-visibility plastic fencing, shall be placed around the perimeter of the tree protection zone (TPZ) (dripline radius + one foot) on the project side of existing oak trees;

- Tree protection fencing shall not be moved without prior authorization from the Project Arborist or the City of Sacramento;
- No parking, portable toilets, dumping or storage of any construction materials, grading, excavation, trenching, or other infringement by workers or domesticated animals is allowed in the TPZ;
- No signs, ropes, cables, or any other item shall be attached to a protected tree, unless recommended by an ISA-Certified Arborist;
- Underground utilities should be avoided in the TPZ; and
- Cut or fill within the dripline of existing native oak trees should be avoided.

5.2 SUMMARY OF AVOIDANCE AND MINIMIZATION MEASURES

- Conduct a special-status plant survey;
- Conduct one pre-construction survey for burrowing owl, nesting birds, and pallid bat, (as applicable) within 14 days prior to the start of construction within the limits of the Study Area;
- Obtain necessary permits for fill of the seasonal wetland ditches (Section 404 Clean Water Act permit and Section 401 Water Quality Certification);
- Conduct worker awareness training to discuss biological constraints during project construction including wetland avoidance (if applicable) potential for special-status plants (if applicable), and nesting birds (if applicable);
- Obtain a tree permit to perform construction activities within the canopy of protected trees on site that will result in significant impacts to protected trees or to remove protected trees;
- Conduct clearing and tree and shrub removal operations between September 1 and January 31 to avoid potential impacts to nesting birds, including Swainson’s hawk if feasible; and
- Implement tree protection measures for protected trees onsite to be avoided.

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Appendix A

Applicable Sections of the Sacramento County General Plan

Habitat Protection and Management

GOAL: Preserve and manage natural habitats and their ecological functions throughout Sacramento County.

Habitat Mitigation

Objective: Mitigate and restore for natural habitat and special-status species loss.

Policies:

CO-58: Endure no-net loss of wetlands, riparian woodlands, and oak woodlands.
CO-59: Ensure mitigation occurs for any loss of or modification to the following types of acreage and habitat function (vernal pools, wetlands, riparian, native vegetative habitat, and special-status species).
CO-60: Mitigation should be directed to lands identified on the Open Space Vision Diagram and associated component maps.
CO-61: Mitigation should be consistent with Sacramento County-adopted habitat conservation plans.
CO-62: Permanently protect land required as mitigation.

Habitat Protection and Project Review

Objective: Review development plans and projects to ensure a balance between essential growth needs and the protection and preservation of natural habitat and special-status species.

Policies:

CO-70: Community Plans, Specific Plans, Master Plans and development projects shall:

- include the location, extent, proximity and diversity of existing natural habitats and special status species in order to determine potential impacts, necessary mitigation and opportunities for preservation and restoration.
- be reviewed for the potential to identify nondevelopment areas and establish preserves, mitigation banks and restore natural habitats, including those for special status species, considering effects on vernal pools, groundwater, flooding, and proposed fill or removal of wetland habitat.
- be reviewed for applicability of protection zones identified in this Element, including the Floodplain Protection Zone, Stream Corridor Ordinance, Cosumnes River Protection Combining Zone and the Laguna Creek Combining Zone.

CO-71: Development design shall help protect natural resources by:

- Minimizing total built development in the floodplain, while designing areas of less frequent use that can support inundation to be permitted in the floodplain.
- Ensuring development adjacent to stream corridors and vernal pools provide, where physically reasonable, a public street paralleling at least one side of the corridor with vertical curbs, gutters, foot path, street lighting, and post and cable barriers to prevent vehicular entry.
- Projects adjacent to rivers and streams shall integrate amenities, such as trail connectivity, which will serve as benefits to the community and ecological function.
- Siting of wetlands near residential and commercial areas should consider appropriate measures to minimize potential for mosquito habitation.

- Development adjacent to steam corridors and vernal pools shall be designed in such a manner as to prevent unauthorized vehicular entry into protected areas.

CO-72: If land within river and stream watersheds in existing agricultural areas is developed for non-agricultural purposes, the County should actively pursue easement dedication for recreation trails within such development as a condition of approval.
CO-73: Secure easement or fee title to open space lands within stream corridors as a condition of development approval.
CO-74: Evaluate feasible on-site alternatives early on in the planning process and prior to the environmental review process that reduce impacts on wetland and riparian habitat and provide effective on-site preservation in terms of minimum management requirements, effective size, and evaluation criteria.

Special-Status Species and Their Respective Habitats

GOAL: Preserve, enhance and restore special status species habitat in Sacramento County to aid in the recovery of these species.

Protection of Special-Status Species Habitat

Objective: Protect and maintain habitat for special-status species.

Policies:

CO-75: Maintain viable populations of special status species through the protection of habitat in preserves and linked with natural wildlife corridors.
CO-76: Habitat conservation plans shall be adopted by the County to provide a comprehensive strategy to protect and aid in the recovery of special status species.
CO-77: Development of open space acquisition programs within natural areas shall consider whether the area is occupied by special status species.
CO-78: Plans for urban development and flood control shall incorporate habitat corridors linking habitat sites for special status species.

Rivers and Streams

GOAL: Preserve, protect, and enhance natural open space functions of riparian, stream and river corridors.

Riparian Habitat

Objective: Manage riparian corridors to protect natural, recreational, economic, agricultural and cultural resources as well as water quality, supply and conveyance.

Policies:

CO-87: Encourage private landowners to protect, enhance and restore riparian habitat.
CO-88: Where removal of riparian habitat is necessary for channel maintenance, it will be planned and mitigated so as to minimize unavoidable impacts upon biological resources.
CO-89: Protect, enhance and maintain riparian habitat in Sacramento County.
CO-90: Increase riparian woodland, valley oak riparian woodland and riparian scrub habitat along select waterways within Sacramento County.

CO-91: Discourage introductions of invasive non-native aquatic plants and animals.
CO-92: Enhance and protect shaded riverine aquatic habitat along rivers and streams.

Limitation of Fill in Floodplains

Objective: Maintain the natural character of the 100-year floodplain by limiting fill and excavation.

Policies:

CO-93: Discourage fill in the 100-year floodplain (reference CO-117).
CO-94: Development within the 100-year floodplain and designated floodway of Sacramento streams, sloughs, creeks or rivers shall be:

- Consistent with policies to protect wetlands and riparian areas; and
- Limited to land uses that can support seasonal inundation.

CO-95: Development within the 100-year floodplain should occur in concert with the development of the Floodplain Protection Zone.

Bank Stabilization

Objective: Maintain levee protection, riparian vegetation, function and topographic diversity by stream channel and bank stabilization projects; and stabilize riverbanks to protect levees, water conveyance and riparian functions.

Policies:

CO-96: Reduce dependence on traditional levee protection methods where those methods conflict with habitat preservation efforts and where alternate methods exist which are compatible with preservation efforts and offer an acceptable level of bank stabilization.
CO-97: Work with appropriate regulatory agencies to reduce bank and levee erosion by minimizing erosive wake activity generated by recreational and commercial boating.
CO-98: Coordinate with federal, state and local agencies overseeing levee and bank stabilization to investigate and, whenever possible, utilize biotechnical or nonstructural alternatives to other conventional stabilization methods.
CO-99: Encourage habitat restoration and recreational opportunities as an integral part of bank and levee stabilization efforts.
CO-100: Encourage construction of structures for flood control and stormwater quality purposes using currently approved scientific methods to prevent erosion and stabilize the banks.
CO-101: Stabilize the banks of rivers and streams in a manner that increases flood protection and increases riparian habitat functions.

Protection of Rivers

Objective: Conserve and protect the Sacramento, Cosumnes, Mokelumne and American Rivers to preserve natural habitat and recreational opportunities.

Policies:

CO-102: Coordinate with federal, state and local agencies overseeing levee and bank stabilization to investigate and, whenever possible, utilize biotechnical or nonstructural alternatives to other conventional stabilization methods.

CO-103: Protect the Cosumnes River Corridor by promoting the preservation of agriculture, natural habitat and limited recreational uses adjacent to the river channel, and when feasible by acquiring appropriate lands or easements adjacent to the river.
CO-104: Promote the preservation of the Mokelumne River.

Channel Modifications

Objective: Protect and restore natural stream functions.

Policies:

CO-105: Channel modification projects shall be considered for approval by the Board of Supervisors only after conducting a noticed public hearing examining the full range of alternatives, relative costs and benefits, and environmental, economic, and social benefits.
CO-105a: Encourage flood management designs that respect the natural topography and vegetation of waterways while retaining flow and functional integrity. (Added 2016)
CO-106: Realigned or modified channels should retain topographic diversity including maintaining meandering characteristics, varied berm width, naturalized side slope, and varied channel bottom elevation.
CO-107: Maintain and protect natural function of channels in developed, newly developing, and rural areas.
CO-108: Channel lowering should occur after consideration of alternatives and only when it is necessary to accommodate the gravity drainage of storm runoff and/or accommodate floodflows under existing bridge structures.
CO-109: Channel modifications should not prevent minimum water flows necessary to protect and enhance fish habitats, native riparian vegetation, water quality, or ground water recharge.
CO-110: Improvements in watercourses will be designed for low maintenance. Appropriate Manning's "n" 13 values will be used in design of the watercourses to reflect future vegetative growth (including mitigation plantings) associated with the low maintenance concept.
CO-111: Channel modifications shall retain wetland and riparian vegetation whenever possible or otherwise recreate the natural channel consistent with the historical ecological integrity of the stream or river.
CO-112: The use of concrete and impervious materials is discouraged where it is inconsistent with the existing adjacent watercourse and overall ecological function of the stream.
CO-113: Encourage revegetation of native plant species appropriate to natural substrate conditions and avoid introduction of nonindigenous species.

Land Use Adjacent to Rivers and Streams

Objective: Land uses within and development adjacent to stream corridors are to be consistent with natural values.

Policies:

CO-114: Protect stream corridors to enhance water quality, provide public amenities, maintain flood control objectives, preserve and enhance habitat, and offer recreational and educational opportunities.
CO-115: Provide setbacks along stream corridors and stream channels to protect riparian habitat functions

- A functional setback of at least 100 feet and measured from the outside edge of the stream bank should be retained on each side of a stream corridor that prohibits development or agricultural activity. This buffer is necessary to protect riparian functions by allowing for the filtering of sediment, pesticides, phosphorus and nitrogen, organic matter and other contaminates that are known to degrade water quality. This buffer also provides for the protection of vegetation along the stream bank which provides bank stability, erosion control and flood attenuation.

- A transitional setback of at least 50 feet in width beyond the functional buffer should be retained along all stream corridors. This buffer is necessary to protect hydrogeomorphic functions that regulate water temperature, regulate microclimate, maintain channel complexity and retain hydrologic flow regimes. This buffer also provides corridors to facilitate the movement of wildlife.
- An extended setback of at least 50 feet in width beyond the transitional setback should be retained along all stream corridors. This setback will allow for recreational uses such as bike, pedestrian and/or equestrian trails and will allow for the placement of infrastructure such as water and sewer lines.
- Stormwater discharge ponds or other features used for improving stormwater quality may be located within the extended or transitional setback area. However, in order to protect stream habitat and floodplain value, the width of the setback shall not be based upon the width of the pollutant discharge pond. The ponds shall be landscaped and maintained with vegetation native to the surrounding area. Detention ponds or other features implementing pollutant discharge requirements, other than approved regional stormwater quality practices that are designed and operated to complement the corridor functionally and aesthetically, are prohibited.
- Setback averaging within individual development projects or as otherwise specified in a County-adopted master plan will be permitted except when riparian woodland will be lost. The minimum width of setbacks cannot fall below 50 feet.
- Master drainage plans may provide for other standards that meet the intent of this policy.

CO-116: Encourage filter strips using appropriate native vegetation and substrate along riparian streambanks adjacent to irrigated croplands.

CO-117: Public roads, parking, and associated fill slopes shall be located outside of the stream corridor, except at stream crossings and for purposes of extending or setting back levees. The construction of public roads and parking should utilize structural materials to facilitate permeability. Crossings shall be minimized and be aesthetically compatible with naturalistic values of the stream channel.

CO-118: Development adjacent to waterways should protect the water conveyance of the system, while preserving and enhancing the riparian habitat and its function.

CO-119: Preserve and enhance Laguna Creek Parkway by:

- Supporting efforts by the Upper Laguna Creek Collaborative planning process to develop an Upper Laguna Creek Master Plan and associated environmental permits to guide future development and conservation along Laguna Creek upstream of Bond Road;
- Preserving, enhancing and restoring water quality and the ecological functions and values of Laguna Creek and the natural hydrologic and geomorphic characteristics of the creek, upstream of Bond Road; and
- Managing development of the watershed of Upper Laguna Creek (upstream of Waterman Road) consistent with the Upper Laguna Creek Master Plan.

Terrestrial Resources

GOAL: Sacramento County vegetative habitats preserved, protected, and enhanced.

Native Vegetation Protection, Restoration and Enhancement

Objective: Tree and native vegetation management practices to promote regeneration in designated resource conservation areas.

Policies:

CO-131: Fuel wood production cut for sale shall occur only on a sustainable yield basis.
CO-132: Protect native vegetative habitats from improper grazing regimes on public lands and inform private land operators of how they may minimize impacts to these habitats.
CO-133: Prohibit native vegetative habitat mitigation and/or other public plantings onto incompatible substrates i.e., tree planting in vernal pool hardpan.
CO-134: Maintain and establish a diversity of native vegetative species in Sacramento County.
CO-135: Protect the ecological integrity of California Prairie habitat.
CO-136: Prohibit the loss of mitigated resource areas.
CO-137: Mitigate for the loss of native trees for road expansion and development consistent with General Plan policies and/or the County Tree Preservation Ordinance.

Landmark and Heritage Tree Protection

Objective: Heritage and landmark tree resources preserved and protected for their historic, economic, and environmental functions.

Policies:

CO-138: Protect and preserve non-oak native trees along riparian areas if used by Swainson's Hawk, as well as landmark and native oak trees measuring a minimum of 6 inches in diameter or 10 inches aggregate for multi-trunk trees at 4.5 feet above ground.
CO-139: Native trees other than oaks, which cannot be protected through development, shall be replaced with in-kind species in accordance with established tree planting specifications, the combined diameter of which shall equal the combined diameter of the trees removed.
CO-140: For projects involving native oak woodlands, oak savannah or mixed riparian areas, ensure mitigation through either of the following methods:

- An adopted habitat conservation plan.
- Ensure no net loss of canopy area through a combination of the following: (1) preserving the main, central portions of consolidated and isolated groves constituting the existing canopy and (2) provide an area on-site to mitigate any canopy lost. Native oak mitigation area must be a contiguous area on-site which is equal to the size of canopy area lost and shall be adjacent to existing oak canopy to ensure opportunities for regeneration.
- Removal of native oaks shall be compensated with native oak species with a minimum of a one to one dbh replacement.
- A provision for a comparable on-site area for the propagation of oak trees may substitute for replacement tree planting requirements at the discretion of the County Tree Coordinator when removal of a mature oak tree is necessary.

- If the project site is not capable of supporting all the required replacement trees, a sum equivalent to the replacement cost of the number of trees that cannot be accommodated may be paid to the County's Tree Preservation Fund or another appropriate tree preservation fund.
- If on-site mitigation is not possible given site limitation, off-site mitigation may be considered. Such a mitigation area must meet all of the following criteria to preserve, enhance, and maintain a natural woodland habitat in perpetuity, preferably by transfer of title to an appropriate public entity. Protected woodland habitat could be used as a suitable site for replacement tree plantings required by ordinances or other mitigations.
  - Equal or greater in area to the total area that is included within a radius of 30 feet of the dripline of all trees to be removed;
  - Adjacent to protected stream corridor or other preserved natural areas;
  - Supports a significant number of native broadleaf trees; and
  - Offers good potential for continued regeneration of an integrated woodland community.

CO-141: In 15 years the native oak canopy within on-site mitigation areas shall be 50 percent canopy coverage for valley oak and 30 percent canopy coverage for blue oak and other native oaks.

Urban Forest Management

Objective: A coordinated, funded Urban Tree Management Plan and program sufficient to achieve a doubling of the County's tree canopy by 2050 and promote trees as economic and environmental resources for the use, education, and enjoyment of current and future generations.

Policies:

CO-142: Provide funds for education, programs, and materials emphasizing the value and importance of trees.

CO-143: Work cooperatively with local utilities to assure that new trees are planted in locations that will maximize energy conservation and air quality benefits.

CO-144: Support a regional approach consistent with the provisions of Greenprint for the protection, replacement, and mitigation of trees.

CO-145: Removal of non-native tree canopy for development shall be mitigated by creation of new tree canopy equivalent to the acreage of non-native tree canopy removed. New tree canopy acreage shall be calculated using the 15-year shade cover values for tree species.

CO-146: If new tree canopy cannot be created onsite to mitigate for the non-native tree canopy removed for new development, project proponents (including public agencies) shall contribute to the Greenprint funding in an amount proportional to the tree canopy of the specific project.

New Urban Trees

Objective: One million new trees planted within the urban area between now and 2030.

Policies:

CO-147: Increase the number of trees planted within residential lots and within new and existing parking lots.

CO-148: Support private foundations with local funds for their tree planting efforts.

CO-149: Trees planted within new or existing parking lots should utilize pervious cement and structured soils in a radius from the base of the tree necessary to maximize water infiltration sufficient to sustain the tree at full growth.

Appendix B

Special-Status Species to Occur in the Study Area

Scientific Name/ Common Name[1]	Status[2]	Habitat, Ecology and Life History	Potential to Occur[3]
Plants			
Balsamorhiza macrolepis big-scale balsamroot	1B.2	Perennial herb found in chaparral, cismontane woodland, valley and foothill grasslands, and sometimes in serpentinite soils. Blooming period: March – June.	**Not expected:** This species may occur in the Study Area within grassy areas; however, because serpentine soilare absent from the Study Area, it is not expected to occur.
Brodiaea rosea ssp. *Vallicola* valley brodiaea	4.2	Perennial bulbiferous herb found in old alluvial terraces on silty, sandy, or gravelly loam soils within swales of valley and foothill grassland and vernal pools. Blooming period: April – May (June).	**Will Not Occur**: The Study Area does not contain suitable habitat to support this species.
Chloropyron molle ssp. hispidum hispid salty bird's-beak	1B.1	Annual hemiparasite herb found on alkaline soil in meadows and seeps, playas, valley and foothill grasslands, from 1-155 meters. Blooming period: June – September.	**Will Not Occur**: The Study Area does not contain suitable habitat (i.e., alkaline soils) to support this species
Clarkia biloba ssp. brandegeeae Brandegee's clarkia	4.2	Annual herb often found on roadcuts within chaparral, cismontane woodland, and lower montane coniferous forest from 75 to 915 meters. Known from approximately 89 occurrences in Butte, El Dorado, Nevada, Placer, Sacramento, Sierra, and Yuba counties. Blooming period: May – July.	**Will Not Occur**: The Study Area does not contain suitable habitat to support this species.
Downingia pusilla dwarf downingia	2B.2	An annual herb found in mesic areas within valley and foothill grassland and vernal pool habitats from 1 to 445 meters. Blooming period: March – May.	**Will Not Occur**: The Study Area does not contain suitable habitat (i.e., vernal pools) to support this species.
Fritillaria agrestis stinkbells	4.2	Perennial bulbiferous herb found in clay soils, sometimes in serpentinite, chaparral, cismontane woodland, pinyon and juniper woodland, and valley and foothill grassland from 10 to 1,555 meters. Blooming period: March – June.	**May Occur**: The Study Area provides marginally suitable habitat for this species. Past disturbance within the herbaceous habitat, makes it unlikely that the site will support this species. There is one CNDDB record for this species within five miles of the Study Area (CDFW 2022).

Scientific Name/ Common Name[1]	Status[2]	Habitat, Ecology and Life History	Potential to Occur[3]
Gratiola heterosepala Boggs Lake hedge-hyssop	SE, 1B.2	Annual herb found on clay soils in vernal pools and swamps, occasionally along the lake margins, from 10 to 2,375 meters. Blooming period: April – August	**Will Not Occur**: The Study Area does not contain suitable habitat (i.e., vernal pools or swamps) to support this species.
Hesperevax caulescens hogwallow starfish	4.2	Annual herb found in moist valley and foothill grasslands with clay soils as well as shallow vernal pools from 0 to 505 meters. Blooming period: March – June.	**Will Not Occur**: The Study Area does not contain suitable habitat (i.e., vernal pools) to support this species.
Juncus leiospermus var. ahartii Ahart's dwarf rush	1B.2	Annual herb found in mesic areas in valley and foothill grasslands from 30 to 229 meters. Blooming period: March – May.	**May Occur**: The Study Area provides marginal habitat for this species within the seasonal wetland ditches located within the Study Area
Juncus leiospermus var. leiospermus Red Bluff dwarf rush	1B.1	Annual herb in vernally moist chaparral, cismontane woodlands, meadows and seeps, valley and foothill grasslands, and vernal pools from 35-1,250 meters. Blooming period: March – June.	**Will Not Occur**: The Study Area does not contain suitable to support this species
Legenere limosa legenere	1B.1	Annual herb found in vernal pools from 1 to 880 meters. Blooming period: April – June.	**Will Not Occur**: The Study Area does not contain suitable habitat (i.e., vernal pools) to support this species.
Navarretia myersii ssp. myersii pincushion navarretia	1B.1	Annual herb often found in acidic soils within vernal pools from 20 to 330 meters. Blooming period: April – May.	**Will Not Occur**: The Study Area does not contain suitable habitat (i.e., vernal pools) to support this species
Orcuttia tenuis slender Orcutt grass	FT, SE, 1B.1	Annual herb often on gravely soils in vernal pools from 35 to 1,760 meters. Blooming period: May -September (October).	**Will Not Occur**: The Study Area does not contain suitable habitat (i.e., vernal pools) to support this species.
Orcuttia viscida Sacramento Orcutt grass	FE, SE, 1B.1	Annual herb found in deep vernal pools from 20 to 100 meters. Blooming period: April – July (September).	**Will Not Occur**: The Study Area does not contain suitable habitat (i.e., vernal pools) to support this species.
Sagittaria sanfordii Sanford's arrowhead	1B.1	Perennial rhizomatous herb found in assorted shallow freshwater wetlands, marshes, and swamps from 0 to 650 meters. Blooming period: May – October.	**High**: The seasonal wetland ditches within the Study Area provide suitable habitat for this species. There are four CNDDB records for this species within five miles of the Study Area (CDFW 2022).

Scientific Name/ Common Name[1]	Status[2]	Habitat, Ecology and Life History	Potential to Occur[3]
Animals			
Invertebrates			
Andrena subapasta An andrenid bee	CSA	Found in grassland habitats within El Dorado, Placer, Sacramento, and San Joaquin counties. Ground nesters that will be underground from summer, fall and winter and emerge in early spring to forage and pollinate early bloomers, such as willows, maples, violets and other early blooming wildflowers. Spring through fall.	**High:** The Study Area provides suitable habitat for this species within the ruderal habitat. There is one CNDDB record for this species within five miles of the Study Area (CDFW 2020).
Bombus crotchii Crotch bumble bee	CE	Typically observed in coastal California east towards the Sierra-Cascade Crest; less common in western Nevada. Select food plant genera: Antirrhinum, Phacelia, Clarkia, Dendromecon, Eschscholzia, Eriogonum. Flight period: (Queen): March-May, Flight period: (Worker) April – August, Flight period: (Male):April – September.	**May Occur**: The vegetation within the upland habitat within the Study Area provides marginal habitat for this species.
Branchinecta lynchi vernal pool fairy shrimp	FT	Inhabits vernal pools, swales, and ephemeral freshwater habitat. Known from Alameda, Butte, Calaveras, Colusa, Contra Costa, El Dorado, Fresno, Glenn, Kings, Madera, Merced, Monterey, Napa, Placer, Riverside, Sacramento, San Benito, San Joaquin, San Luis Obispo, Santa Barbara, Shasta, Solano, Stanislaus, Sutter, Tehama, Tulare, Tuolumne, Ventura, Yolo, and Yuba counties. USFWS protocol-level wet-season sampling and/or dry season cyst identification.	**Will Not Occur**: The Study Area does not contain suitable habitat (i.e., vernal pools) to support this species. There are four CNDDB records for this species within five miles of the Study Area (CDFW 2022).
Branchinecta mesovallensis midvalley fairy shrimp	CSA	Vernal pools in the Central Valley in Sacramento, Solano, Merced, Madera, San Joaquin, Fresno, and Contra Costa counties. USFWS protocol-level wet-season sampling and/or dry season cyst identification.	**Will Not Occur**: Although the Study Area contains seasonal ditches, the site does not support suitable habitat (i.e., vernal pools) to support this species.

Scientific Name/ Common Name[1]	Status[2]	Habitat, Ecology and Life History	Potential to Occur[3]
Danaus plexippus monarch butterfly	FC	In winter, western monarchs aggregate in clusters at forested groves scattered along 620 miles of the Pacific coast from Mendocino County to Baja California, Mexico. Small aggregations have also been reported in Inyo and Kern counties. In February and March, the surviving monarchs breed at the overwintering site before dispersing. Adult females lay eggs singly on milkweed species (primarily *Asclepias* spp., but occasionally on other closely related species as well, including *Gomphocarpus* spp. and *Calotropis* spp.) which are critical for successful development of the caterpillar into an adult butterfly.	
Desmocerus californicus dimorphus valley elderberry longhorn beetle	FT	Associated with elderberry shrubs (Sambucus sp.) often within riparian habitats. Presence can be indicated by bore-holes in stems of elderberries. March – June (Adults) Year – round (Larvae).	**Will Not Occur**: Elderberry shrubs are absent from the Study Area. There are six CNDDB records for this species within five miles of the Study Area (CDFW 2022).
Dumontia oregonensis hairy water flea	CSA	Small aquatic crustacean that is found in shallow ephemeral vernal pools, native wet prairies, seasonally wet meadows, managed agricultural fields and desert pools that fill with water in early-winter and dry out by late-winter. Seasonally wet habitats are typically underlain with poorly drained soils, shallow soils above bedrock, or exposed bedrock and are fed mainly by direct precipitation or shallow groundwater inflows, generally with no surface inflow channels. Typically found in habitats that have greater than 60 percent vegetation; associated species in California, include tall flatsedge (Cyperus eragrostis), common spikerush (Eleocharis macrostachya), and western mannagrass (Glyceria	**Will Not Occur**: The Study Area does not contain suitable habitat (i.e., vernal pools) to support this species

Scientific Name/ Common Name[1]	Status[2]	Habitat, Ecology and Life History	Potential to Occur[3]
		occidentalis) Found in Sacramento and Solano counties in California and into southern Oregon. Wet-season.	
Gonidea angulata western ridged mussel	CSA	Freshwater mussel species of northwestern North America. Occurs in California, Oregon, Washington, Idaho, Nevada, and British Columbia. An individual is expected to live up to about 30 years and reach a size of about five inches long. Like other native northwestern freshwater mussels, it has a parasitic life stage specific to only certain fish species.	**Will Not Occur:** The Study Area does not contain adequate water sources for the species nor the specific species of fish that act as hosts in its parasitic life stage.
Hydrochara rickseckeri Ricksecker's water scavenger beetle	CSA	Found year-round. An endemic aquatic beetle known to occur in vernal pools that are inundated in winter and spring and dry during the summer months. Ideal habitat includes, neutral to slightly alkaline, clear, low dissolved salts, dominated with vernal pool plant species, and complex of vernal pool crustacean species. Known to occur in the Central Valley below 300 meters in elevation.	**Will Not Occur**: The Study Area does not contain suitable habitat (i.e., vernal pools) to support this species.
Lepidurus packardi vernal pool tadpole shrimp	FE	Inhabits vernal pools, swales, and ephemeral freshwater habitat. Known from Alameda, Butte, Colusa, Contra Costa, Fresno, Glenn, Kings, Merced, Placer, Fresno, San Joaquin, Shasta, Solano, Stanislaus, Sutter, Tehama, Tulare, Yolo, and Yuba counties. USFWS protocol-level wet-season sampling and/or dry season cyst identification.	**Will Not Occur**: Although the Study Area contains seasonal wetland ditches, due to the urbanization surrounding the site and the lack of vernal pools within the Study Area, the Study Area does not provide suitable habitat for this species. There is one CNDDB record for this species within five miles of the Study Area (CDFW 2022).

Scientific Name/ Common Name[1]	Status[2]	Habitat, Ecology and Life History	Potential to Occur[3]
Linderiella occidentalis California linderiella	CSA	Found in most landforms, geologic formations and soil types supporting vernal pools in California. They are typically found in deeper vernal pools throughout elevations ranging from 10 to 1,159 meters. USFWS protocol-level wet-season sampling and/or dry season cyst identification.	**Will Not Occur**: Although the Study Area contains seasonal wetland ditches, the site does not support suitable habitat (i.e., vernal pools) to support this species. There are three documented occurrences within five miles of the Study Area (CDFW 2022).
Fishes			
Oncorhynchus mykiss irideus pop. 11 steelhead - Central Valley DPS	FT	Found year-round in the ocean, rivers, creeks, and large inland lakes. This distinct population only occurs in the Sacramento and San Joaquin Rivers and their tributaries.	**Will Not Occur**: The Study Area does not contain suitable habitat to support this species. There is one CNDDB record for this species within five miles of the Study Area (CDFW 2020).
Hypomesus transpacificus Delta smelt	FT	Found year-round in open waters of bays, tidal rivers, channels, and sloughs.	**Will Not Occur**: The Study Area does not contain suitable habitat to support this species.
Amphibians			
Ambystoma californiense California tiger salamander	FT	Breeds in vernal pools and seasonal ponds in grasslands and oak savannas. Adults spend summer in small mammal burrows. Drift fence studies during fall and winter for upland habitats. November – February (adults) March 15 – May 15 (larvae).	**Will Not Occur**: The Study Area does not contain suitable aquatic habitat for this species. The site does contain mammal burrows, but the Study Area is not within the known range of the species.
Spea hammondii western spadefoot	SSC	Found in a variety of upland habitats, including lowlands, foothills, grasslands, open chaparral, and pine-oak woodlands. Habitat preferences include shortgrass plains, and sandy or gravelly soils for burrowing (e.g., alkali flats, washes, alluvial fans). Hibernates/aestivates for most of the year underground. During the breeding season are found in temporary rain pools, and slow-moving streams (e.g., areas flooded by intermittent streams). Breeding:	**Will Not Occur**: The Study Area does not provide suitable breeding habitat for this species, there is no permanent water source nor pools within the seasonal wetland ditch. Additionally, the Study Area is surrounded by urban development, making access to the site difficult and restricted to underground culverts. Additionally, no suitable burrows

Scientific Name/ Common Name[1]	Status[2]	Habitat, Ecology and Life History	Potential to Occur[3]
		January – May.	were observed during the 2019 biological survey.
Reptiles			
Emys marmorata western pond turtle	SSC	Found year round in or within 100 meters of permanent water in a wide variety of habitats up to 1450 meters. Nests in sandy banks and soil at least four inches deep.	**Will Not Occur**: Although the Study Area provides suitable upland habitat, there is no permanent water source in or adjacent to the Study Area. Additionally, the Study Area is surrounded by urban development, making access to the site difficult and restricted to underground culverts There are three CNDDB records for this species within five miles of the Study Area (CDFW 2022).
Thamnophis gigas giant garter snake	FT, ST	Found in agricultural wetlands and other wetlands such as irrigation and drainage canals, low gradient streams, marshes, ponds, sloughs, small lakes, and their associated uplands in Sacramento, Sutter, Butte, Colusa, and Glenn counties. Active outside of dormancy period November-mid March.	**Will Not Occur**: The Study Area does not provide suitable habitat for this species and the Study Area is outside of the current known range of the species.
Birds			
Accipiter cooperii Cooper's hawk	WL	Found year-round. Found in cismontane woodland, riparian forest, riparian woodland, and upper montane coniferous forest	**High:** The Study Area provides suitable nesting habitat for this species within the mixed oak woodland.
Agelaius tricolor tricolored blackbird	ST, SSC	Found year-round. Nests in colonies near fresh water, usually within emergent wetland habitat with tall, dense cattails, tule, willow, blackberry, wild rose, and other marshy vegetation. Forages in open grassland, wetland, and agricultural habitats.	**May Occur**: No suitable nesting habitat exists within the Study Area. Marginally suitable foraging habitat exists for this species within the ruderal herbaceous habitat. There are three CNDDB records for this species within five miles of the Study Area (CDFW 2022).

Scientific Name/ Common Name[1]	Status[2]	Habitat, Ecology and Life History	Potential to Occur[3]
Ammodramus savannarum grasshopper sparrow	SSC	Frequents dense, dry, or well drained grassland, especially native grassland. Nests at base of overhanging clump of grass. This species is known from Los Angeles, Mendocino, Orange, Placer, Sacramento, San Diego, San Luis Obispo, Solano, and Yuba counties, in California. Found April -July.	**Will Not Occur**: The Study Area does not provide suitable habitat for this species.
Aquila chrysaetos golden eagle	FP	Found year-round in open and semi-open areas in the mountains up to 12,000 feet in elevation. They are also found in canyon lands, rimrock, terrain, and riverside cliffs and bluffs. Nest are built on cliffs and steep escarpments in grassland, in trees, chaparral, shrubland, forests and man-made structures within vegetated areas.	**Will Not Occur**: The Study Area does not provide suitable habitat for this species.
Ardea alba great egret	CSA	Found year-round. Found in marshes, swampy woods, tidal estuaries, lagoons, mangroves, streams, lakes, ponds, fields and meadows. Nests primarily in tall trees, or in woods or thickets near water.	**Will Not Occur**: The Study Area does not provide suitable habitat for this species. No known or potential rookery habitat exists within the Study Area. There is one CNDDB record for this species/rookery site within five miles of the Study Area (CDFW 2022).
Ardea herodias great blue heron	CSA	Found year-round. Inhabits both freshwater and saltwater habitats and forages in grassland and agricultural field. Breeding colonies are located within 2 to 4 miles of feeding areas, often in isolated swamps or on islands, and near lakes and ponds bordered by forests.	**Will Not Occur**: The Study Area does not provide suitable habitat for this species. No known or potential rookery habitat exists within the Study Area. There are two CNDDB records for this species/rookery site within five miles of the Study Area (CDFW 2022).

Scientific Name/ Common Name[1]	Status[2]	Habitat, Ecology and Life History	Potential to Occur[3]
Athene cunicularia burrowing owl	SSC	Found year round. Nests in burrows in the ground, often in old ground squirrel burrows or badger, within open dry grassland and desert habitat. The burrows are found in dry, level, open terrain, including prairie, plains, desert, and grassland with low height vegetation for foraging and available perches, such as fences, utility poles, posts, or raised rodent mounds.	**May Occur:** Although there is a nearby occurrence, the ruderal herbaceous habitat that exists within the Study Area is marginal, the vegetation is relatively tall, and the Study Area has been historically disturbed. Additionally, only a few suitable small mammal burrows were observed during the 2019 biological survey. There is one CNDDB record for this species within five miles of the Study Area (CDFW 2022).
Buteo regalis ferruginous hawk	WL	Frequents open habitats including grasslands, sagebrush flats, desert scrub, low foothills surrounding valleys and fringes of pinyon-juniper habitats. Preys on rodents and other vertebrates. Winter (non-breeding).	**Will Not Occur**: The Study Area does not provide suitable habitat for this species.
Buteo swainsoni Swainson's hawk	ST	Nest peripherally in valley riparian systems, lone trees or groves of trees in agricultural fields. Valley oak, Fremont cottonwood, walnut, and large willow trees, ranging in height from 41 to 82 feet, are the most commonly used nest trees in the Central Valley. Breeding: March – October.	**May Occur:** The Study Area provides suitable nesting habitat within the isolated trees on site, few rodent burrows were observed during the November 2019 survey therefore this species is unlikely to utilize the Study Area as foraging habitat. The extent of development surrounding the Study Area reduces the potential for this species to occur. There is one CNDDB record for this species within five miles of the Study Area (CDFW 2022).

Scientific Name/ Common Name[1]	Status[2]	Habitat, Ecology and Life History	Potential to Occur[3]
Coccyzus americanus occidentalis western yellow-billed cuckoo	FT, SE	Found in woodlands, thickets, orchards, and streamside groves. Breeds mostly in dense deciduous stands, including forest edges, tall thickets, dense second growth, overgrown orchards, scrubby oak woods. Often found in willow groves around marshes. In the west, mostly in streamside trees, including cottonwood-willow groves in arid country. Late Spring – Early Fall.	**Will Not Occur**: The Study Area does not contain suitable habitat to support this species. Trees within the Study Area are not in dense groves.
Elanus leucurus white-tailed kite	FP Breeding	Found year-round. Inhabit savanna, open woodlands, marshes, desert grassland, partially cleared lands and cultivated fields. Nests in trees, often near a marsh in savanna, open woodland, partially cleared lands, and cultivated fields. Foraging occurs within ungrazed or lightly-grazed fields and pastures.	**High**: The Study Area provides suitable nesting habitat for this species within the existing trees in the woodland community and suitable foraging habitat within the ruderal herbaceous habitat. There are nine CNDDB occurrence for this species within five miles of the Study Area (CDFW 2022).
Falco columbarius merlin	WL	Non-breeding habitats include a wide variety, such as marshes, deserts, sea coasts, near coastal lakes and lagoons, open woodlands, fields, etc. During winter, may roost in conifer trees. Winter (non-breeding).	**May Occur**: The Study Area provides foraging habitat for this species within the ruderal herbaceous habitat and mixed oak woodland. This species would only be expected to occur in the region during the winter months.
Laterallus jamaicensis coturniculus California black rail	ST, FP	Found year-round. Saltwater, brackish, and freshwater marshes. Does not occur in wetland areas with annual fluctuations in water level and need a permanent water source of at least 1 inch in depth.	**Will Not Occur**: The Study Area does not provide suitable habitat (i.e., permanent water source) for this species.
Melospiza melodia pop. 1 song sparrow ("Modesto" population)	SSC	Found year-round. Found in thickets, brush, marshes, roadsides, gardens. Habitat varies over its wide range. In most areas, found in brushy fields, streamsides, shrubby marsh edges, woodland edges, hedgerows, well-vegetated gardens. Some coastal populations	**May Occur**: The Study Area provides marginally suitable nesting and foraging habitat for this species

Scientific Name/ Common Name[1]	Status[2]	Habitat, Ecology and Life History	Potential to Occur[3]
		live in salt marshes. Nests in dense streamside brush in southwestern deserts, and in any kind of dense low cover on Aleutian Islands, Alaska.	
Nannopterum auritum double-crested cormorant	WL	Found year-round. Found in a wide variety of aquatic habitats including coasts, bays, lakes, rivers, mangrove swamps, reservoirs and inland ponds. Nesting occurs in trees near or over water, on sea cliffs or on the ground on islands.	**Will Not Occur**: The Study Area does not provide suitable habitat (i.e., open water) for this species.
Pandion haliaetus osprey	WL	Rivers, lakes, coast. Found near water, either fresh or salt, where large numbers of fish are present. May be most common around major coastal estuaries and salt marshes, but also regular around large lakes, reservoirs, rivers. Migrating Ospreys are sometimes seen far from water, even over the desert. Breeding: Spring.	**Will Not Occur**: The Study Area does not contain suitable habitats (i.e., open water) to support this species.
Progne subis purple martin	SSC	Nests in wide variety of open and partly open habitats that are often near water or around towns. Nests in tree cavities, abandoned woodpecker holes, crevices in rocks, and sometimes in bird houses or gourds put up by humans. Summer (breeding).	**High:** The Study Area provides suitable nesting and foraging habitat for this species within the mixed oak woodland and ruderal herbaceous habitat There is one CNDDB occurrence documented within five miles of the Study Area (CDFW 2022).
Riparia riparia bank swallow	ST Nesting	Colonial breeder found in open and partly open situations, frequently near flowing water. Nests on steep sand, dirt, or gravel banks, in burrows dug near the top of the bank, along the edge of inland water, or along the coast, or in gravel pits or road embankments.	**Will Not Occur**: The Study Area does not contain suitable habitats to support this species. There are three CNDDB occurrences documented within five miles of the Study Area (CDFW 2022).
Mammals			
Antrozous pallidus pallid bat	SSC	Found year-round. Found in grasslands, shrublands, woodlands, and forests from sea level up through mixed conifer forest habitats.	**May Occur**: The Study Area provides suitable roosting habitat for this species within the mixed oak woodland. However, the Study Area

Scientific Name/ Common Name[1]	Status[2]	Habitat, Ecology and Life History	Potential to Occur[3]
		Roosts in colonies usually in rock crevices, caves, mines, hollow trees, and buildings.	is fragmented by development on all sides.
Lasionycteris noctivagans silver-haired bat	SSC	This species occurs primarily in coniferous forested habitats which are adjacent to lakes, ponds, or streams, including areas altered by human disturbance.	**Will Not Occur**: The Study Area does not contain suitable habitats (i.e., conifers or lakes, ponds) to support this species.
Taxidea taxus American badger	SSC	Found year-round. Found in a variety of grassland, shrublands, and open woodlands throughout California. Prefers open areas, and may frequent brushlands, with minimal ground cover. Occurs from below sea level to 3,600 meters. Primarily nocturnal, but can be active at any time of day. Strong affinity to a home area (2 to 725 ha), especially in winter. Suitable burrowing habitat, to make dens and forage for prey, requires friable soils. The majority of their food is obtained by excavating burrows of fossorial rodents (ground squirrels, pocket gophers, kangaroo rats, prairie-dogs, and mice), but will also eat scorpions, insects, snakes, lizards, and birds.	**Will Not Occur**: Although the Study Area contains suitable habitat for this species, the site is fragmented on all sides by development. Therefore, it is highly unlikely that this species could utilize the small and fragmented habitat within the Study Area.

1 Sensitive species reported in CNDDB or CNPS on the "Carmichael, Citrus Heights, Pleasant Grove, Roseville, Rocklin, Rio Linda, Folsom, Sacramento East, and Buffalo Creek" USGS quads, or in USFWS lists for the project site.

2 Status is as follows: Federal (ESA) listing/State (CESA) listing/other CDFW status or CRPR. F = Federal; S = State of California; E = Endangered; T = Threatened; C = Candidate; FP=Fully Protected; SSC=Species of Special Concern; WL=Watch List.

3 Status in the Project site is assessed as follows. **Will Not Occur**: Species is either sessile (i.e., plants) or so limited to a particular habitat that it cannot disperse on its own and/or habitat suitable for its establishment and survival does not occur on the project site; **Not Expected**: Species moves freely and might disperse through or across the project site, but suitable habitat for residence or breeding does not occur on the project site, potential for an individual of the species to disperse through or forage in the site cannot be excluded with 100% certainty; **Presumed Absent:** Habitat suitable for residence and breeding occurs on the project site; however, focused surveys conducted for the current project were negative; **May Occur**: Species was not observed on the site and breeding habitat is not present but the species has the potential to utilize the site for dispersal, **High**: Habitat suitable for residence and breeding occurs on the project site and the species has been recorded recently on or near the project site, but was not observed during surveys for the current project; **Present**: The species was observed during biological surveys for the current project and is assumed to occupy the project site or utilize the project site during some portion of its life cycle.

CRPR = California Rare Plant Rank: 1B – rare, threatened, or endangered in California and elsewhere; 2B – rare, threatened, or endangered in California but more common elsewhere. Extension codes: .1 – seriously endangered; .2 – moderately endangered.

Appendix C

Plant and Wildlife Species Observed in the Study Area

Family	Scientific Name	Common Name	Native (N), Non-Native (NN), or Invasive (I) Habitat
Dicots			
Alismataceae	*Alisma triviale*	northern water plantain	N
Amaranthaceae	*Amaranthus albus*	tumbleweed	NN
Anacardiaceae	*Pistacia chinensis*	Chinese pistache	I
Araliaceae	*Hedera helix*	English ivy	I
Asteraceae	*Centaurea solstitialis*	yellow star thistle	I
Asteraceae	*Cichorium intybus*	chicory	NN
Asteraceae	*Dittrichia graveolens*	stinkwort	I
Asteraceae	*Grindelia camporum*	common gumplant	N
Asteraceae	*Leontodon saxatilis*	hawkbit	NN
Asteraceae	*Sonchus oleraceus*	common sow thistle	I
Brassicaceae	*Raphanus sativus*	cultivated radish	I
Convolvulaceae	*Convolvulus arvensis*	field bindweed	NN
Euphorbaceae	*Croton setiger*	turkey-mullein	N
Fabaceae	*Cytisus scoparius*	scotch broom	I
Fabaceae	*Vicia* sp.	vetch	I
Fagaceae	*Quercus suber*	cork oak	NN
Fagaceae	*Quercus wislizeni*	interior live oak	N
Fragaceae	*Quercus douglasii*	blue oak blue oak	N
Fragaceae	*Quercus lobata*	valley oak	N
Geraniaceae	*Erodium botrys*	big heron bill	NN
Geraniaceae	*Erodium* sp.	geranium	NN
Juglandaceae	*Juglans nigraJuglans sp.*	black walnut	NN
Juglandaceae	*Juglans hindsii*	Northern California black walnut	N
Juglandaceae	*Carya illinoinensis*	pecan	NN
Malvaceae	*Malva parviflora*	cheeseweed mallow	NN
Moraceae	*Morus alba*	Mulberry	NN
Myrtaceae	*Eucalyptus cladocalyxEucalyptus sp.*	sweetgumeucalyptus	NN
Oleaceae	*Fraxinus* sp. *Fraxinus velutina*	Modesto ash	N--
Onagraceae	*Epilobium brachycarpum*	annual fireweed	N
Papaveraceae	*Eschscholzia californica*	California poppy	N
Polygonaceae	*Rumex crispus*	curly dock	I
Polygonaceae	*Rumex palustris*	rumex palustris	NN
Polygonaceae	*Persicaria sp.*	smartweed	--
Rosaceae	*Prunus dulcis*	domestic almond	NN
Salicaceae	*Populus fremontii*	Fremont cottonwood	N
Salicaceae	*Salix* sp.	willow	N
Ulmaceae	*Ulmus parvifolia*	Chinese elm	NN
Verbenaceae	*Phyla nodiflora*	turkey tangle frogfruit	N
Monocots			
Arecaeae	*Washingtonia filifera*	California fan palm	N
Juncaceae	*Juncus sp.*	rush	N
Poaceae	*Avena fatua*	wild oat	I
Poaceae	*Bromus diandrus*	ripgut brome	I
Poaceae	*Cynodon dactylon*	Bermuda grass	I
Poaceae	*Phalaris aquatica*	bulbous canarygrass	I
Poaceae	*Briza minor*	little quaking grass	NN
Poaceae	*Agrostis stolonifera*	creeping bentgrass	I
Poaceae	*Cortaderia jubata*	pampas grass	I
Poaceae	*Hordeum murinum*	foxtail barley	I
Poaceae	*Bromus hordeaceus*	soft brome	I

Family	Scientific Name	Common Name	Native (N), Non-Native (NN), or Invasive (I) Habitat
Poaceae	*Sorghum halepense*	Johnsongrass	I
Poaceae	*Polypogon maritimus*	Mediterranean beard grass	I
Typhaceae	*Typha sp.*	cattails	--

Order	Family	Scientific Name	Common Name
Birds			
Passeriformes	Corvidae	*Corvus brachyrhynchos*	American crow
Passeriformes	Corvidae	*Aphelocoma californica*	California scrub-jay
Passeriformes	Fringillidae	*Haemorhous mexicanus*	House finch
Columbiformes	Columbidae	*Zenaida macroura*	Mourning dove
Passeriformes	Mimidae	*Mimus polyglottos*	Northern mockingbird
Mammals			
Lagomorphs	Leporidae	*Lepus californicus*	Black-tailed jackrabbit
Reptiles			
Squamata	Phrynosomatidae	*Sceloporus occidentalis*	Western fence lizard

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Appendix D

Representative Site Photos

Photo 1. Seasonal wetland ditch looking south towards Jan Drive. Photo taken November 20, 2019.

Photo 2. Seasonal wetland ditch looking north from Jan Drive. Photo taken November 20, 2019.

Photo 3. Example of ruderal herbaceous habitat within the southeast portion of the Study Area. Photo taken November 20, 2019.

Photo 4. Heritage oaks within the eastern portion of the Study Area. Photo taken November 20, 2019.

Representative Site Photos

Photo 5. Parking lot located along Manzanita Avenue within the Study Area. Photo taken November 20, 2019.

Photo 6. Ditch that transects the Study Area in an east to west direction towards the northern portion of the Study Area.

Photo 7. Photo taken of the seasonal wetland ditch midway down, looking south. Photo taken November 20, 2019.

Photo 8. Mixed oak woodlands along the seasonal wetland ditch looking south from Winding Way. Photo taken November 20, 2019.

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Photo 9. The photo was taken facing west located within the northwest corner of the Study Area. Photo was taken June 1, 2022.

Photo 10. Photo of Turkey tangle located within the northwest corner of the Study Area. Photo was taken June 1, 2022.

Photo 11. Example of ruderal herbaceous habitat within the northwest corner of the Study Area. Photo was taken June 1, 2022.

Photo 12. View facing north from the northwest corner of the Study Area. Photo was taken June 1, 2022.

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Appendix D Arborist Report

ARBORIST REPORT
AND
TREE INVENTORY SUMMARY

CRESTVIEW PROJECT SITE
Manzanita and Winding Way, Carmichael
County of Sacramento, California

Prepared for:

Thad Johnson
Pappas Investments
2020 L Street, 5th Floor
Sacramento, California 95811

Prepared by:

Edwin E. Stirtz
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January 2, 2020

TABLE OF CONTENTS

COPYRIGHT STATEMENT

QUALIFICATION STATEMENT

Sierra Nevada Arborists is a fully insured, Roseville, California-based arboriculture consulting firm founded in January of 1998 by its Principal, Edwin E. Stirtz. Mr. Stirtz is an ISA Certified Arborist and is ISA Tree Risk Assessment Qualified. He is a member of the American Society of Consulting Arborists and International Society of Arboriculture.

Mr. Stirtz possesses in excess of 40 years of experience in arboriculture, forestry, and horticulture, both maintenance and construction, and has spent the last 29 years as a consultant focusing on preservation and compliance with environmental regulations in the Sacramento and surrounding regions.

INTRODUCTION

Sierra Nevada Arborists is pleased to present this Arborist Report and Tree Inventory Summary for the trees located within the Crestview property at Manzanita and Winding Way, Carmichael, located in the County of Sacramento, California. This Arborist Report and Tree Inventory Summary memorializes tree data obtained by Edwin E. Stirtz, ISA Certified Arborist WE-0510A, at the time of field reconnaissance and inventory efforts on December 17 and 18, 2019.

LOCATION AND SITE

The site is located in an established area surrounded by commercial and residential uses and is currently both undeveloped and with some improvements. The majority of the vegetation is overhanging from adjacent backyards or growing along the drainage swale running through the site.

SCOPE OF INVENTORY EFFORT

The County of Sacramento Tree Preservation Ordinance (Sacramento County Code Title 19, Chapter 19.12) regulates both the removal of protected trees and the encroachment of construction activities within their driplines. The Ordinance defines a “tree” as “any living native oak tree having at least one trunk of 6 inches or more in diameter measured 4½ feet above the ground, or a multi-trunked native oak tree having an aggregate diameter of 10 inches or more, measured 4½ feet above the ground.” In addition, all native oak and specified non-oak native trees which measure 4 inches in diameter and larger (or 10-inch aggregate diameter for multi-trunk native oak and Northern California Black Walnut trees) and other non-native trees with trunk diameters of 19 inches and larger are afforded various levels of protection through the County’s environmental review policy. These separate requirements are not based solely on the Sacramento County Tree Preservation Ordinance. Tree inventories and arborist reports submitted to the County of Sacramento Office of Planning and Environmental Review (OPER) are used, among other things, to evaluate project impacts and create appropriate mitigation pursuant to the Sacramento County General Plan policies and CEQA. To that end, on January 25, 2008, OPER promulgated a separate set of criteria to be utilized when preparing tree inventories and arborist reports for a proposed development site. All trees 4" DSH+ were included in this inventory.

At the request of Pappas Investments, on December 17 and 18, 2019, Edwin E. Stirtz of Sierra Nevada Arborists visited the property located on Skyland Court in the County of Sacramento, California. The purpose of this field reconnaissance effort was to identify and inventory the trees within and/or overhanging the proposed project site which measured four inches in diameter and larger measured at breast height (“DBH”), specifically including the identification of any native oaks, California Sycamore, Northern California Black Walnut, Oregon Ash, Goodding's Black Willow, California Box Elder, White Alder and California Buckeye as requested by OPER in their Arborist Report Requirements dated January 25, 2008.

METHODOLOGY

During field reconnaissance and inventory efforts, Edwin E. Stirtz of Sierra Nevada Arborists conducted a visual review from ground level of the trees within the Crestview Project Site. The trees which met the defined criteria were identified in the field by affixing round tags with blue flagging to the tree trunks, except for Trees 29980, 29981, 29982, 24890 and 24894, which did not have flagging. The tree numbers utilized in this report and accompanying Tree Inventory Summary correspond to the tree tag which is affixed to the tree in the field, and those tree numbers or grouping of numbers have been digitized on the enclosed Tree Inventory Field Exhibit for future reference.

At the time of field identification and inventory efforts, specific data was gathered for each tagged tree including the tree's species, diameter measured at breast height ("DBH"), and dripline radius ("DLR"). In addition, for the trees which met the criteria of the OPER Requirements and/or County of Sacramento Tree Preservation Ordinance an assessment was made of the tree's root crown/collar, trunk, limbs, and foliage. Utilizing this data, the trees' overall structural condition and vigor were separately assessed ranging from "excellent"[1] to "poor" based upon the observed characteristics noted within the tree and the Arborist's best professional judgment. Ratings are subjective and are dependent upon both the structure and vigor of the tree. The vigor rating considers factors such as the size, color and density of the foliage; the amount of deadwood within the canopy; bud viability; evidence of wound closure; and the presence or evidence of stress, disease, nutrient deficiency and insect infestation. The structural rating reflects the root crown/collar, trunk and branch configurations; canopy balance; the presence of included bark, weak crotches and other structural defects and decay and the potential for structural failure. Finally, notable characteristics were documented and recommendations on a tree-by-tree basis were made which logically followed the observed characteristics noted within the trees at the time of the field inventory effort. The recommendations are based on the assumption that the tree would be introduced into a developed environment and may require maintenance and/or may not be suitable for retention within a post-development setting.

[1] It is rare that a tree qualifies in an "excellent" category, and it should be noted that there were no trees observed within the project area which fell within the criteria of an "excellent" or "good" rating. A complete description of the terms and ratings utilized in this report and accompany inventory summary are found on pages 10-11.

SUMMARY OF INVENTORY EFFORT

Field reconnaissance and inventory efforts found 111 trees measuring 4 inches in diameter and larger measured at breast height within and/or overhanging the proposed project area. Composition of the 111 inventoried trees includes the following species and accompanying aggregate diameter inches:

TOTAL SPECIES DIVERSIFICATION			
Almond	=	1 tree	(30 aggregate diameter inches)
Blue Oak	=	9 trees	(153 aggregate diameter inches)
California Black Walnut	=	1 tree	(15 aggregate diameter inches)
California Fan Palm	=	1 tree	(14 aggregate diameter inches)
Chinese Pistache	=	3 trees	(34 aggregate diameter inches)
Chinese Zelkova	=	2 trees	(71 aggregate diameter inches)
Cork Oak	=	28 trees	(354 aggregate diameter inches)
Deodar Cedar	=	1 tree	(25 aggregate diameter inches)
Fremont Cottonwood	=	4 trees	(51 aggregate diameter inches)
Fruitless Mulberry	=	1 tree	(16 aggregate diameter inches)
Gum	=	2 trees	(74 aggregate diameter inches)
Modesto Ash	=	1 tree	(19 aggregate diameter inches)
No. California Walnut	=	3 trees	(41 aggregate diameter inches)
Pecan	=	3 trees	(38 aggregate diameter inches)
Sweetgum	=	1 tree	(23 aggregate diameter inches)
Valley Oak	=	50 trees	(829 aggregate diameter inches)
TOTAL	**=**	**111 trees**	**(1,787 aggregate diameter inches)**

COUNTY PROTECTED SPECIES			
Almond	=	1 tree	(30 aggregate diameter inches)
Blue Oak	=	8 trees	(147 aggregate diameter inches)
Chinese Zelkova	=	2 trees	(71 aggregate diameter inches)
Cork Oak	=	6 trees	(129 aggregate diameter inches)
Deodar Cedar	=	1 tree	(25 aggregate diameter inches)
Gum	=	2 trees	(74 aggregate diameter inches)
Modesto Ash	=	1 tree	(19 aggregate diameter inches)
No. California Walnut	=	1 tree	(23 aggregate diameter inches)
Sweetgum	=	1 tree	(23 aggregate diameter inches)
Valley Oak	=	38 trees	(751 aggregate diameter inches)
TOTAL	**=**	**61 trees**	**(1,292 aggregate diameter inches)**

CONDITIONAL RATINGS (1-6, where 6 is remove)
1 = None
2 = None
3 = 59 trees
4 = 2 trees
5 = None
6 = None
TOTAL = 61 trees

SUITABILITY FOR PRESERVATION (P/M/G)
Poor to Good = 1 tree
Poor = 1 tree
Moderate = 57 trees
Moderate to Good = 1 tree
Good = 1 tree
TOTAL = 61 trees

SINGLE-STEMMED OAK SPECIES <6" DBH (Data Provided for Mapping Accuracy)			
Valley Oak	=	4 trees	(20 aggregate diameter inches)
TOTAL	**=**	**4 trees**	**(20 aggregate diameter inches)**

MULTI-STEMMED OAK SPECIES <10" DBH (Data Provided for Mapping Accuracy)			
Blue Oak	=	1 tree	(6 aggregate diameter inches)
Valley Oak	=	8 trees	(58 aggregate diameter inches)
TOTAL	**=**	**9 trees**	**(64 aggregate diameter inches)**

NON-NATIVE SPECIES <19" DBH (Data Provided for Mapping Accuracy)			
California Black Walnut	=	1 tree	(15 aggregate diameter inches)
California Fan Palm	=	1 tree	(14 aggregate diameter inches)
Chinese Pistache	=	3 trees	(34 aggregate diameter inches)
Cork Oak	=	22 trees	(225 aggregate diameter inches)
Fremont Cottonwood	=	4 trees	(51 aggregate diameter inches)
Fruitless Mulberry	=	1 tree	(16 aggregate diameter inches)
No. California Walnut	=	2 trees	(18 aggregate diameter inches)
Pecan	=	3 trees	(38 aggregate diameter inches)
TOTAL	**=**	**37 trees**	**(411 aggregate diameter inches)**

Recommended Removals

At this time, no trees have been recommended for removal from the proposed project area due to the nature and extent of defects, compromised health, and/or structural instability noted at the time of field inventory efforts.

It should also be noted that some of the trees within the proposed project area are trees which may be undesirable on residential lots, or are trees which will require periodic/seasonal monitoring to assess the trees' ongoing structural integrity. At this early stage of the project Sierra Nevada Arborists has not recommended the removal of these trees since development plans, including proposed home sites and building footprints, have not yet been finalized and the precise location of these trees in proximity to planned improvement activities is not known. At this time, it is recommended that these trees be monitored and thoroughly inspected by a qualified ISA Certified Arborist on at least an annual basis to keep abreast of the trees' changing condition(s) and to assess the trees' ongoing structural integrity and potential for hazard in a developed environment.

CONSTRUCTION IMPACT ASSESSMENT

This Arborist Report and Tree Inventory Summary is intended to provide to Pappas Investments, the County of Sacramento, and other members of the development team a detailed *pre-development review* of the species, size, and current structure and vigor of the trees within and/or overhanging the proposed project area. It is not an exhaustive review of the impacts which will be sustained from project implementation. At this early stage of the project specific root system and canopy impacts on a tree-by-tree basis cannot be definitively assessed until the site development, grading, and other improvement plans have been refined and finalized and data from the accompanying inventory summary (i.e., tree numbers, dripline radius, and root protection zones) is properly depicted on the plans.

Since trees are living organisms whose condition may change at any time a complete assessment of construction impacts and specific recommendations to help mitigate for the adverse impacts which may be sustained by the trees from contemplated construction activities cannot be made until the development plans have been refined and finalized. Once final plans have been developed for the site a qualified ISA Certified Arborist with special expertise and demonstrated experience with construction projects in and among native and non-native trees should review those plans and provide a more detailed assessment of impacts, including identification of trees which may require removal to facilitate contemplated site development activities. This review will be particularly important if structures and/or pedestrian activities will fall within or near the fall zone of a tree which has been noted as exhibiting structural defects, questionable long-term longevity and/or a conditional rating which is less than "fair", and for trees which measure 16 inches and greater in diameter which will be retained within close proximity to development as trees of this size may pose a more significant hazard if a sudden limb shed and/or catastrophic failure should occur. In addition, the review should include an assessment of root system and canopy impacts which will be sustained by the trees which will be retained within the proposed development area, along with specific recommendations on a tree-by-tree basis to help reduce adverse impacts of construction on the retained trees. In the meantime, this report provides some pre-development recommendations which logically follow the observed characteristics noted in the trees at the time of the field inventory efforts, as well as General Protection Measures which should be utilized as a guideline for the protection of trees which may be retained within the development area. These recommendations will require modification and/or augmentation as development plans are refined and finalized.

GENERAL COMMENTS AND ARBORISTS' DISCLAIMER

The County of Sacramento regulates both the removal of "protected trees" and the encroachment of construction activities within their driplines. Therefore, a tree permit and/or additional development authorization should be obtained from the County of Sacramento prior to the removal of any trees within the proposed project area. All terms and conditions of the tree permit and/or other Conditions of Approval are the sole and exclusive responsibility of the project applicant. It should be noted that prior to final inspection written verification from an ISA Certified Arborist may be required certifying the approved removal activities and/or implementation of other Conditions of Approval outlined for the retained trees on the site. ***Sierra Nevada Arborists will not provide written Certification of Compliance unless we have been provided with a copy of the approved site development plans, applicable permits and/or Conditions of Approval, and are on site to monitor and observe regulated activities during the course of construction.*** Therefore, it will be necessary for the project applicant to notify Sierra Nevada Arborists well in advance (at least 72 hours prior notice) of any regulated activities which are scheduled to occur on site so that those activities can be properly monitored and documented for compliance certification.

Please bear in mind that implementation of the recommendations provided within this report will help to reduce adverse impacts of construction on the retained trees; however, implementation of any recommendations should not be viewed as a guarantee or warranty against the trees' ultimate demise and/or failure in the future. Arborists are tree specialists who use their education, knowledge, training and experience to examine trees, recommend measures to enhance the beauty and health of the trees and ***attempt to reduce the risk of living near trees***. Arborists cannot detect every condition that could possibly lead to the structural failure of a tree. There are some inherent risks with trees that cannot be predicted with any degree of certainty, even by a skilled and experienced arborist. Entities who chose to develop sites with trees are accepting a certain level of risk from unpredictable tree related hazards such as toppling in storms, limbs falling and fires that may damage property at some time in the future. Since trees are living organisms their structure and vigor constantly change over time, and they are not immune to changes in site conditions or seasonal variations in the weather. Further, conditions are often hidden within the tree and/or below ground. Arborists and other tree care professionals cannot guarantee that a tree will be healthy and/or safe under all circumstances or for a specific period of time. Likewise, remedial treatments cannot be guaranteed. Trees can be managed but they cannot be controlled. To develop land and live near trees is to accept some degree of risk and the only way to eliminate all risk associated with trees would be to eliminate all of the trees. ***An entity who develops land and introduces activities with trees in the vicinity should be aware of and inform end users of this Arborists' Disclaimer, and be further advised that the developer and future users assume the risk that a tree could at any time suffer a branch and/or limb failure, blow over in a storm and/or fail for no apparent reason which may cause bodily injury or property damage***. Sierra Nevada Arborists cannot predict acts of nature including, without limitation, storms of sufficient strength which can even take down a tree with a structurally sound and vigorous appearance.

Finally, the trees preserved within and/or overhanging the proposed project area will experience a physical environment different from the pre-development environment. As a result, tree health and structural stability should be regularly monitored. Occasional pruning, fertilization, mulch, pest management, replanting and/or irrigation may be required. In addition, ***provisions for monitoring both tree health and structural stability following construction must be made a priority***. As trees age, the likelihood of failure of branches or entire trees increases. Therefore, ***the future management plan must include an annual inspection*** by a qualified ISA Certified Arborist to keep abreast of the trees' changing condition(s) and to assess the trees' ongoing structural integrity and potential for hazard in a developed environment.

Thank you for allowing Sierra Nevada Arborists to assist you with this review. Please feel free to give me a call if you have any questions or require additional information and/or clarification.

Sincerely,

Edwin E. Stirtz

Edwin E. Stirtz
International Society of Arboriculture
Certified Arborist WE-0510A
ISA Tree Risk Assessment Qualified
Member, American Society of Consulting Arborists

ASSUMPTIONS AND LIMITING CONDITIONS

1. Any legal description provided to the consultant is assumed to be correct. Any titles and ownership to any property are assumed to be good and marketable. No responsibility is assumed for matters legal in character. Any and all property is appraised or evaluated as though free and clear, under responsible ownership and competent management.

2. It is assumed that any property is not in violation of any applicable codes, ordinances, statutes, or other governmental regulations.

3. Care has been taken to obtain all information from reliable sources. All data has been verified insofar as possible; however, the consultant can neither guarantee nor be responsible for the accuracy of information provided by others.

4. The consultant shall not be required to give a deposition and/or attend court by reason of this report unless subsequent contractual arrangements are made for in advance, including payment of an additional fee for such services according to our standard fee schedule, adjusted yearly, and terms of the subsequent contract of engagement.

5. Loss or alteration of any part of this report invalidates the entire report. Ownership of any documents produced passes to the Client only when all fees have been paid.

6. Possession of this report or a copy thereof does not imply right of publication or use for any purpose by any other than the person to whom it is addressed, without the prior expressed written or verbal consent of the consultant.

7. Neither all nor any part of the contents of this report, nor copy thereof, shall be conveyed by anyone, including the client, to the public through advertising, public relations, news, sales, or other media, without the prior expressed written or verbal consent of the consultant, particularly as to value conclusions, identity of the consultant, or any reference to any professional society or institute or to any initialed designation conferred upon the consultant as stated in his qualifications.

8. This report and any values expressed herein represent the opinion of the consultant and the consultant’s fee is in no way contingent upon the reporting of a specified value, a stipulated result, the occurrence of a subsequent event, nor upon any finding to be reported.

9. Sketches, diagrams, graphs, drawings and photographs within this report are intended as visual aids and are not necessarily to scale and should not be construed as engineering or architectural reports or surveys. The reproduction of information generated by other consultants is for coordination and ease of

reference. Inclusion of such information does not constitute a representation by the consultant as to the sufficiency or accuracy of the information.

10. Unless expressed otherwise: 1) information contained in this report covers only those items that were examined and reflects the condition of those items at the time of inspection; and 2) the inspection is limited to visual examination of accessible items without laboratory analysis, dissection, excavation, probing or coring, unless otherwise stated.

11. There is no warranty or guarantee, expressed or implied, that problems or deficiencies of the plants or property in question may not arise in the future.

12. This report is based on the observations and opinions of Edwin E. Stirtz, and does not provide guarantees regarding the future performance, health, vigor, structural stability or safety of the plants described herein. Neither this author nor Sierra Nevada Arborists has assumed any responsibility for liability associated with the trees on or adjacent to this project site, their future demise and/or any damage which may result therefrom.

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13. The information contained within this report is true to the best of the author's knowledge and experience as of the date it was prepared; however, certain conditions may exist which only a comprehensive, scientific, investigation might reveal which should be performed by other consulting professionals.

14. The legal description, dimensions, and areas herein are assumed to be correct. No responsibility is assumed for matters that are legal in nature.

15. Any changes to an established tree's environment can cause its decline, death and/or structural failure.

DEFINITIONS

Tree Number:	Corresponds to aluminum tag attached to the tree.
Species Identification:	Scientific and common species name.
Diameter ("DBH"):	This is the trunk diameter measured at breast height (industry standard 4.5 feet above ground level).
Dripline radius ("DLR"):	A radius equal to the horizontal distance from the trunk of the tree to the end of the farthest most branch tip prior to any cutting. When depicted on a map, the dripline will appear as an irregularly shaped circle that follows the contour of the tree's branches as seen from overhead.
Protected Zone:	A circle equal to the largest radius of a protected tree's dripline plus 1 foot.
Root Crown:	Assessment of the root crown/collar area located at the base of the trunk of the tree at soil level.
Trunk:	Assessment of the tree's main trunk from ground level generally to the point of the primary crotch structure.
Limbs:	Assessment of both smaller and larger branching, generally from primary crotch structure to branch tips.
Foliage:	Tree's leaves.
Overall Condition:	Describes overall condition of the tree in terms of structure and vigor.
Recommendation:	Pre-development recommendations based upon observed characteristics noted at the time of the field inventory effort.
Obscured:	Occasionally some portion of the tree may be obscured from visual inspection due to the presence of dense vegetation which, during the course of inspection for the arborist report, prevented a complete evaluation of the tree. In these cases, if the tree is to be retained on site the vegetation should be removed to allow for a complete assessment of the tree prior to making final decisions regarding the suitability for retention.

TREE CONDITION RATING CRITERIA

RATING TERM	ROOT CROWN	TRUNK	LIMBS	FOLIAGE	STRUCTURE	VIGOR
Good	No apparent injuries, decay, cavities or evidence of hollowing; no anchoring roots exposed; no indications of infestation or disease	No apparent injuries, decay, cavities or evidence of hollowing; no codominant attachments or multiple trunk attachments are observed; no indications of infestation or disease	No apparent injuries, decay, cavities or evidence of hollowing; below average amount of dead limbs or twigs; no major limb failures or included bark; callus growth is vigorous	Leaf size, color and density are typical for the species; buds are normal in size, viable, abundant and uniform throughout the canopy; annual seasonal growth increments are average or above average; no insect or disease infestations/ infections evident	No apparent structural defects; no weak crotches; no excessively weighted branches and no significant cavities or decay	Tree appears healthy and has little or no significant deadwood; foliage is normal and healthy
Fair	Small to moderate injuries, decay, cavities or hollowing may be evident but are not currently affecting the overall structure; some evidence of infestation or disease may be present but is not currently affecting the tree's structure	Small to moderate injuries, decay, cavities or hollowing may be evident; codominant branching or multiple trunk attachments or minor bark inclusion may be observed; some infestation or disease may be present but not currently affecting the tree's structure	Small to moderate injuries, decay or cavities may be present; average or above average dead limbs or twigs may be present; some limb failures or bark inclusion observed; callus growth is average	Leaf size, color and density are typical or slightly below typical for the species; buds are normal or slightly sparse with potentially varied viability, abundance and distribution throughout the canopy; annual seasonal growth increments are average or slightly below average; minor insect or disease infestation/infection may be present	Minor structural problems such as weak crotches, minor wounds and/or cavities or moderate amount of excessive weight; non-critical structural defects which can be mitigated through pruning, cabling or bracing	Tree appears stressed or partially damaged; minimal vegetative growth since previous season; moderate amount of deadwood, abnormal foliage and minor lesions or cambium dieback
Poor	Moderate to severe injuries, decay, cavities or hollowing may be evident and are affecting the overall structure; presence of infestation or disease may be significant and affecting the tree's structure	Moderate to severe injuries, decay, cavities or hollowing may be evident and are affecting the tree's structure; presence of infestation or disease may be significant and affecting the tree's structure	Severe injuries, decay or cavities may be present; major deadwood, twig dieback, limb failures or bark inclusion observed; callus growth is below average	Leaf size, color and density are obviously abnormal; buds are obviously abnormal or absent; annual seasonal growth is well below average for the species; insect or disease problems may be severe	Obvious major structural problems which cannot be corrected with mitigation; potential for major limb, trunk or root system failure is high; significant decay or dieback may be present	Tree health is declining; no new vegetative growth; large amounts of deadwood; foliage is severely abnormal

The ratings "good to fair" and "fair to poor" are used to describe trees that fall between the described major categories and have elements of both

GENERAL PROTECTION GUIDELINES FOR TREES PLANNED FOR PRESERVATION

Great care must be exercised when work is conducted upon or around protected trees. The purpose of these General Protection Measures is to provide guidelines to protect the health of the affected protected trees. These guidelines apply to all encroachments into the protected zone of a protected tree, and may be incorporated into tree permits and/or other Conditions of Approval as deemed appropriate by the applicable governing body.

- A circle with a radius measurement from the trunk of the tree to the tip of its longest limb, plus one foot, shall constitute the critical root zone protection area of each protected tree. Limbs must not be cut back in order to change the dripline. The area beneath the dripline is a critical portion of the root zone and defines the minimum protected area of each protected tree. Removing limbs that make up the dripline does not change the protected area.

- Any protected trees on site which require pruning shall be pruned by an ISA Certified Arborist prior to the start of construction work. All pruning shall be in accordance with the American National Standards Institute (ANSI) A300 pruning standards, ANSI Standard 2133.1-2000 regarding safety practices, and the International Society of Arboriculture (ISA) “Tree Pruning Guidelines” and Best Management Practices.

- Prior to initiating construction, temporary protective fencing shall be installed at least one foot outside the root protection zone of the protected trees in order to avoid damage to the tree canopies and root systems. Fencing shall be installed in accordance with the approved fencing plan prior to the commencement of any grading operations or such other time as determined by the review body. The developer shall contact the Project Arborist and the Planning Department for an inspection of the fencing prior to commencing construction activities on site.

- Signs shall be installed on the protective fence in four (4) equidistant locations around each individual protected tree. The size of each sign must be a minimum of two (2) feet by two (2) feet and must contain the following language:

  WARNING: THIS FENCE SHALL NOT BE REMOVED OR RELOCATED WITHOUT WRITTEN AUTHORIZATION FROM THE COUNTY OF SACRAMENTO

  Once approval has been obtained by the County of Sacramento Municipal Services Agency protective fencing shall remain in place throughout the entire construction period and shall not be removed, relocated, taken down or otherwise modified in whole or in part without prior written authorization from the Agency, or as deemed necessary by the Project Arborist to facilitate approved activities within the root protection zone.

- Any removal of paving or structures (i.e. demolition) that occurs within the dripline of a protected tree shall be done under the direct supervision of the Project Arborist. To the maximum extent feasible, demolition work within the dripline protection area of the protected tree shall be performed by hand. If the Project Arborist determines that it is not feasible to perform some portion(s) of this work by hand, then the smallest/lightest weight equipment that will adequately perform the demolition work shall be used.

- No signs, ropes, cables (except those which may be installed by an ISA Certified Arborist to provide limb support) or any other items shall be attached to the protected trees. Small metallic numbering tags for the purpose of identification in preparing tree reports and inventories shall be allowed.

- No vehicles, construction equipment, mobile homes/office, supplies, materials or facilities shall be driven, parked, stockpiled or located within the driplines of protected trees.

- Drainage patterns on the site shall not be modified so that water collects, stands or is diverted across the dripline of any protected tree.

- No trenching shall be allowed within the driplines of protected trees, except as specifically approved by the Planning Department as set forth in the project's Conditions of Approval and/or approved tree permit. If it is absolutely necessary to install underground utilities within the dripline of a protected tree the utility line within the protected zone shall be "bored and jacked" or performed utilizing hand tools to avoid root injury under the direct supervision of the Project Arborist.

- Grading within the protected zone of a protected tree shall be minimized. Cuts within the protected zone shall be maintained at less than 20% of the critical root zone area. Grade cuts shall be monitored by the Project Arborist. Any damaged roots encountered shall be root pruned and properly treated as deemed necessary by the Project Arborist.

- Minor roots less than one (1) inch in diameter encountered during approved excavation and/or grading activities may be cut, but damaged roots shall be traced back and cleanly cut behind any split, cracked or damaged area as deemed necessary by the Project Arborist.

- Major roots greater than one (1) inch in diameter encountered during approved excavation and/or grading activities may not be cut without approval of the Project Arborist. Depending upon the type of improvement being proposed, bridging techniques or a new site design may need to be employed to protect the roots and the tree.

- Cut faces, which will be exposed for more than 2-3 days, shall be covered with dense burlap fabric and watered to maintain soil moisture at least on a daily basis (or possibly more frequently during summer months). If any native ground surface fabric within the protected zone must be removed for any reason, it shall be replaced within forty-eight (48) hours.

- If fills exceed 1 foot in depth up to 20% of the critical root zone area, aeration systems may serve to mitigate the presence of the fill materials as determined by the Project Arborist.

- When fill materials are deemed necessary on two or three sides of a tree it is critical to provide for drainage away from the critical root zone area of the tree (particularly when considering heavy winter rainfalls). Overland releases and subterranean drains dug outside the critical root zone area and tied directly to the main storm drain system are two options.

- In cases where a permit has been approved for construction of a retaining wall(s) within the protected zone of a protected tree the applicant will be required to provide for immediate protection of exposed roots from moisture loss during the time prior to completion of the wall. The retaining wall within the protected zone of the protected tree shall be constructed within seventy-two (72) hours after completion of grading within the root protection zone.

- The construction of impervious surfaces within the dripline of a protected tree shall be minimized. When necessary, a piped aeration system shall be installed under the direct supervision of the Project Arborist.

- Preservation devices such as aeration systems, tree wells, drains, special paving and cabling systems must be installed in conformance with approved plans and certified by the Project Arborist.

- No sprinkler or irrigation system shall be installed in such a manner that sprays water or requires trenching within the dripline of a protected tree. An above ground drip irrigation system is recommended. An independent low-flow drip irrigation system may be used for establishing drought-tolerant plants within the protected zone of a protected tree. Irrigation shall be gradually reduced and discontinued after a two (2) year period.

- All portions of permanent fencing that will encroach into the protected zone of a protected tree shall be constructed using posts set no closer than ten (10) feet on center. Posts shall be spaced in such a manner as to maximize the separation between the tree trunks and the posts in order to reduce impacts to the tree(s).

- Landscaping beneath native oak trees may include non-plant materials such as bark mulch, wood chips, boulders, etc. Planting live material under protected native oak trees is generally discouraged, and is not recommended within six (6) feet of the trunk of a native oak tree with a diameter a breast height (DBH) of eighteen (18) inches or less, or within ten (10) feet of the trunk of a native oak tree with a DBH of more than eighteen (18) inches. The only plant species which shall be planted within the dripline of native oak trees are those which are tolerant of the natural, semi-arid environs of the tree(s).

PAPPAS DEVELOPMENT
Crestview Project Site
Manzanita and Winding Way, Carmichael
County of Sacramento, California
TREE INVENTORY SUMMARY

TREE #	COMMON NAME	SPECIES	MULTI-STEMS (inches)	TOTAL DBH (inches)	DLR (feet)	CONDITIONAL ASSESSMENT						Rating (1-6)	Preser-vation (P/M/G)	Protected County Tree	NOTABLE CHARACTERISTICS	MAINTENANCE RECOMMENDATIONS
						RT CR	TRUNK	LIMBS	FOLIAGE	STRUCTURE	VIGOR					
2488	Valley Oak	*(Quercus lobata)*		5	5	Single-Stemmed Oak Species <6" DBH; Data Provided for Mapping Accuracy									Measured at 3' above grade.	
2489	Blue Oak	*(Quercus douglasii)*	2,2,3,4	11	5	Fair	Fair	Fair	Dormant	Fair	Fair	3	M	11		None at this time.
2490	Valley Oak	*(Quercus lobata)*	2,3,4,4	13	9	Fair	Fair	Fair	Dormant	Fair	Fair	3	M	13		None at this time.
2491	Valley Oak	*(Quercus lobata)*	2,3,3, 3,3,3,4	21	15	Obscured	Fair	Fair	Dormant	Poor to fair	Fair	3	M	21	Root crown obscured by leaves.	None at this time.
24877	Blue Oak	*(Quercus douglasii)*	3,3,4	10	7	Fair	Fair	Fair	Dormant	Fair	Fair	3	M	10		
24878	Blue Oak	*(Quercus douglasii)*	2,2,2,2,2,3	13	6	Fair	Fair	Fair	Dormant	Fair	Fair	3	M	13		None at this time.
24879	Chinese Pistache	*(Pistacia chinensis)*	2,2,2,3,3	12	14	Non-Native Species <19" DBH; Data Provided for Mapping Accuracy										
24880	Blue Oak	*(Quercus douglasii)*	2,3,3,3,3	14	9	Fair	Fair	Fair	Dormant	Fair	Fair	3	M	14		None at this time.
24881	Chinese Pistache	*(Pistacia chinensis)*	1,2,2,2,2,2	11	8	Non-Native Species <19" DBH; Data Provided for Mapping Accuracy										
24882	Valley Oak	*(Quercus lobata)*		5	12	Single-Stemmed Oak Species <6" DBH; Data Provided for Mapping Accuracy										
24883	Valley Oak	*(Quercus lobata)*		5	7	Single-Stemmed Oak Species <6" DBH; Data Provided for Mapping Accuracy										
24884	Valley Oak	*(Quercus lobata)*	3,3,3,4,4,4	21	12	Fair	Fair	Fair	Dormant	Fair	Fair	3	M	21		None at this time.
24885	Valley Oak	*(Quercus lobata)*	16,36	52	36	Fair	Fair	Fair	Dormant	Poor to fair	Fair	4	M	52	Primary branching at 3' above grade. Weakly attached codominant stems with included bark. Branches again at 6' above grade, south side, with decay in the crotch. Bulge/reaction growth on the south side 3' above grade just below the crotch. Slightly above average amount of deadwood.	***Perform aerial inspection and provide further recommendations.***
24886	Valley Oak	*(Quercus lobata)*	3,3,6	12	8	Fair	Fair	Fair	Dormant	Fair	Fair	3	M	12		None at this time.
24887	Modesto Ash	*(Fraxinus velutina)*		19	21	Fair	Fair	Fair	Dormant	Fair	Fair	3	M-G	19	Branches at 9' above grade.	None at this time.
24888	Valley Oak	*(Quercus lobata)*		29	33	Fair	Fair	Fair	Dormant	Poor to fair	Fair	3	M	29	Branches at 8' above grade. Weakly attached codominant stems with included bark. Out of balance/bending southeast. Slightly above average amount of deadwood.	None at this time.
24889	Valley Oak	*(Quercus lobata)*	2,3	5	5	Multi-Stemmed Oak Species <10" DBH; Data Provided for Mapping Accuracy										
24890	Deodar Cedar	*(Cedrus deodara)*		25	29	Obscured	Fair	Fair	Fair	Fair	Fair	3	G	25	Located offsite about 10' north of the north property boundary and overhanging to site about 15'. DBH/DLR estimated. Root crown obscured by ivy. Tag on fence.	None at this time.
24891	Valley Oak	*(Quercus lobata)*	2,4	6	6	Multi-Stemmed Oak Species <10" DBH; Data Provided for Mapping Accuracy										

TREE #	COMMON NAME	SPECIES	MULTI-STEMS (inches)	TOTAL DBH (inches)	DLR (feet)	CONDITIONAL ASSESSMENT						Rating (1-6)	Preser-vation (P/M/G)	Protected County Tree	NOTABLE CHARACTERISTICS	MAINTENANCE RECOMMENDATIONS
						RT CR	TRUNK	LIMBS	FOLIAGE	STRUCTURE	VIGOR					
24892	Valley Oak	*(Quercus lobata)*	3,3,3,3	12	7	Fair	Fair	Fair	Dormant	Fair	Fair	3	M	12		None at this time.
24893	Valley Oak	*(Quercus lobata)*	3,3,3	9	11	Multi-Stemmed Oak Species <10" DBH; Data Provided for Mapping Accuracy										
24894	Blue Oak	*(Quercus douglasii)*		38	38	Fair	Fair	Fair	Dormant	Fair	Fair	3	M	38	Located offsite north of the property line and overhanging the parcel 36'. Only the south side of the tree is visible. DBH estimated. Primary branching at 10' above grade. Weakly attached codominant stems. Pruned on the north side for building clearance. Multiple pruning wounds throughout the tree, some to 12', partially callused with no decay. Tag on fence.	***Perform aerial inspection and provide further recommendations.***
24895	Blue Oak	*(Quercus douglasii)*	17,20	37	39	Obscured	Obscured	Poor to fair	Dormant	Poor to fair	Poor to fair	4	M	37	Root crown and trunk obscured by heavy ivy. DBH/DLR estimated.	***Remove ivy and reinspect the tree.***
24896	Sweetgum	*(Liquidambar styraciflua)*		23	25	Fair	Fair	Fair	Dormant	Poor to fair	Fair	3	P-G	23	Located offsite appx. 9' east of the east property line fence and overhanging the parcel appx. 12'. Only the west side is visible. DBH/DLR estimated. Abundant water sprouting throughout. Topped about 15' above grade on the central leader with resprouting.	None at this time.
24897	Valley Oak	*(Quercus lobata)*		5	6	Single-Stemmed Oak Species <6" DBH; Data Provided for Mapping Accuracy										
24898	Blue Oak	*(Quercus douglasii)*		11	14	Fair	Fair	Fair	Dormant	Fair	Fair	3	M	11		None at this time.
24899	Valley Oak	*(Quercus lobata)*		7	9	Fair	Fair	Fair	Dormant	Fair	Fair	3	M	7		None at this time.
29916	Cork Oak	*(Quercus suber)*	3,3,4	10	11	Non-Native Species <19" DBH; Data Provided for Mapping Accuracy										
29917	Cork Oak	*(Quercus suber)*	10,11	21	23	Fair	Fair	Fair	Dormant	Fair	Fair	3	M	21		None at this time.
29918	Cork Oak	*(Quercus suber)*	9,11	20	26	Fair	Fair	Fair	Dormant	Fair	Fair	3	M	20	**AKA Tree 5286**	None at this time.
29919	Cork Oak	*(Quercus suber)*		13	17	Non-Native Species <19" DBH; Data Provided for Mapping Accuracy									Measured at 3' above grade.	
29920	Cork Oak	*(Quercus suber)*	2,2,2,3	9	12	Non-Native Species <19" DBH; Data Provided for Mapping Accuracy										
29921	Valley Oak	*(Quercus lobata)*	2,2,2,3	9	11	Multi-Stemmed Oak Species <10" DBH; Data Provided for Mapping Accuracy										

TREE INVENTORY SUMMARY

TREE #	COMMON NAME	SPECIES	MULTI-STEMS (inches)	TOTAL DBH (inches)	DLR (feet)	CONDITIONAL ASSESSMENT						Rating (1-6)	Preser-vation (P/M/G)	Protected County Tree	NOTABLE CHARACTERISTICS	MAINTENANCE RECOMMENDATIONS
						RT CR	TRUNK	LIMBS	FOLIAGE	STRUCTURE	VIGOR					
29922	Cork Oak	*(Quercus suber)*		19	19	Fair	Fair	Fair	Fair	Poor to fair	Fair	3	M	19	**AKA Tree 5284** Measured at 2' above grade. Branches at 4' above grade. Weakly attached codominant stems.	None at this time.
29923	Valley Oak	*(Quercus lobata)*	3,10,10	23	22	Fair	Fair	Fair	Dormant	Poor to fair	Fair	3	M	23	Branches at 2' above grade. Weakly attached codominant stems.	None at this time.
29924	Valley Oak	*(Quercus lobata)*		14	17	Fair	Fair	Fair	Dormant	Fair	Fair	3	M	14	Measured at 3' above grade.	None at this time.
29925	No. California Walnut	*(Juglans hindsii)*	3,3,3	9	11	Non-Native Species <19" DBH; Data Provided for Mapping Accuracy										
29926	No. California Walnut	*(Juglans hindsii)*	7,8,8	23	21	Poor	Fair	Fair	Dormant	Poor	Fair	3	P	23	All 3 stems are resprouts from an old Walnut tree.	None at this time.
29927	Cork Oak	*(Quercus suber)*		17	22	Non-Native Species <19" DBH; Data Provided for Mapping Accuracy									**AKA Tree 5281**	
29928	Cork Oak	*(Quercus suber)*	10,11	21	26	Fair	Fair	Fair	Fair	Poor	Fair	3	M	21	Branches at grade. Weakly attached codominant stems. Leaning/out of balance to the east.	None at this time.
29929	Cork Oak	*(Quercus suber)*		4		Non-Native Species <19" DBH; Data Provided for Mapping Accuracy										
29930	Cork Oak	*(Quercus suber)*		12	15	Non-Native Species <19" DBH; Data Provided for Mapping Accuracy										
29931	Cork Oak	*(Quercus suber)*		5		Non-Native Species <19" DBH; Data Provided for Mapping Accuracy										
29932	Cork Oak	*(Quercus suber)*		5		Non-Native Species <19" DBH; Data Provided for Mapping Accuracy										
29933	Cork Oak	*(Quercus suber)*	6,6	12	13	Non-Native Species <19" DBH; Data Provided for Mapping Accuracy										
29934	Cork Oak	*(Quercus suber)*		8	11	Non-Native Species <19" DBH; Data Provided for Mapping Accuracy										
29935	Valley Oak	*(Quercus lobata)*		17	23	Fair	Fair	Fair	Dormant	Fair	Fair	3	M	17	Measured at 2' above grade.	None at this time.
29936	Cork Oak	*(Quercus suber)*		17	21	Non-Native Species <19" DBH; Data Provided for Mapping Accuracy										
29937	Valley Oak	*(Quercus lobata)*	2,2,2,2	8	10	Multi-Stemmed Oak Species <10" DBH; Data Provided for Mapping Accuracy										
29938	Valley Oak	*(Quercus lobata)*	2,2,3,4	11	15	Fair	Fair	Fair	Dormant	Fair	Fair	3	M	11		None at this time.
29939	Valley Oak	*(Quercus lobata)*	2,2,3,4,5	16	21	Fair	Fair	Fair	Dormant	Fair	Fair	3	M	16		None at this time.
29940	Valley Oak	*(Quercus lobata)*		24	26	Fair	Poor to fair	Fair	Dormant	Poor to fair	Fair	3	M	24	Large 10"wide mechanical wound, southwest side, from 1'-4' above grade. Vandalism on the lower half of the tree. Primary branching 9' above grade. Weakly attached codominant stems. Callused pruning wounds, southeast side, 8' and 9' above grade with no decay.	None at this time.
29941	Valley Oak	*(Quercus lobata)*	1,2,3,4	10	13	Fair	Fair	Fair	Dormant	Fair	Fair	3	M	10		None at this time.
29942	Cork Oak	*(Quercus suber)*	2,3	5	9	Non-Native Species <19" DBH; Data Provided for Mapping Accuracy										

PAPPAS DEVELOPMENT
Crestview Project Site
Manzanita and Winding Way, Carmichael
County of Sacramento, California
TREE INVENTORY SUMMARY

TREE #	COMMON NAME	SPECIES	MULTI-STEMS (inches)	TOTAL DBH (inches)	DLR (feet)	CONDITIONAL ASSESSMENT						Rating (1-6)	Preser-vation (P/M/G)	Protected County Tree	NOTABLE CHARACTERISTICS	MAINTENANCE RECOMMENDATIONS
						RT CR	TRUNK	LIMBS	FOLIAGE	STRUCTURE	VIGOR					
29943	Blue Oak	*(Quercus douglasii)*	2,2,2	6	7	Multi-Stemmed Oak Species <10" DBH; Data Provided for Mapping Accuracy										
29944	Pecan	*(Carya illinoinensis)*	3,3,3,4,4	17	15	Non-Native Species <19" DBH; Data Provided for Mapping Accuracy										
29945	Valley Oak	*(Quercus lobata)*	2,3,3,4,4	16	19	Fair	Fair	Fair	Dormant	Fair	Fair	3	M	16		None at this time.
29946	Pecan	*(Carya illinoinensis)*	2,3,3,3	11	16	Non-Native Species <19" DBH; Data Provided for Mapping Accuracy										
29947	Pecan	*(Carya illinoinensis)*	2,2,3,3	10	16	Non-Native Species <19" DBH; Data Provided for Mapping Accuracy										
29948	Cork Oak	*(Quercus suber)*	3,3,3,4	13	19	Non-Native Species <19" DBH; Data Provided for Mapping Accuracy										
29949	Chinese Zelkova	*(Zelkova sinica)*	3,3,3,3, 3,3,3,4, 4,4,4,4	41	24	Obscured	Fair	Fair	Dormant	Poor	Fair	3	M	41	Root crown obscured by leaves and debris. Branches at grade. Resprout from a large tree.	None at this time.
29950	Valley Oak	*(Quercus lobata)*		8	12	Fair	Fair	Fair	Dormant	Fair	Fair	3	M	8		None at this time.
29951	Valley Oak	*(Quercus lobata)*	8,9	17	22	Fair	Fair	Fair	Dormant	Fair	Fair	3	M	17		None at this time.
29952	Almond	*(Prunus dulcis)*	2,2,2,2,3,3,3 ,4,4,5	30	24	Obscured	Fair	Fair	Dormant	Poor	Fair	3	M	30	Root crown obscured by leaves. Branches at grade.	None at this time.
29953	Chinese Zelkova	*(Zelkova sinica)*	2,3,4, 4,7,10	30	19	Obscured	Fair	Fair	Dormant	Poor to fair	Fair	3	M	30	Root crown obscured by grass and leaves. Branches at grade.	None at this time.
29954	California Fan Palm	*(Washingtonia filifera)*		14	6	Non-Native Species <19" DBH; Data Provided for Mapping Accuracy									DBH estimated.	
29955	Cork Oak	*(Quercus suber)*		10	15	Non-Native Species <19" DBH; Data Provided for Mapping Accuracy										
29956	Cork Oak	*(Quercus suber)*		17	22	Non-Native Species <19" DBH; Data Provided for Mapping Accuracy										
29957	Cork Oak	*(Quercus suber)*		9	12	Non-Native Species <19" DBH; Data Provided for Mapping Accuracy										
29958	Cork Oak	*(Quercus suber)*		9	19	Non-Native Species <19" DBH; Data Provided for Mapping Accuracy										
29959	Valley Oak	*(Quercus lobata)*		11	23	Fair	Fair	Fair	Dormant	Fair	Fair	3	M	11		None at this time.
29960	Valley Oak	*(Quercus lobata)*	3,5	8	14	Multi-Stemmed Oak Species <10" DBH; Data Provided for Mapping Accuracy										
29961	Valley Oak	*(Quercus lobata)*		6	14	Fair	Fair	Fair	Dormant	Fair	Fair	3	M	6		None at this time.
29962	Cork Oak	*(Quercus suber)*		6	11	Non-Native Species <19" DBH; Data Provided for Mapping Accuracy										
29963	Valley Oak	*(Quercus lobata)*	10,11	21	26	Fair	Fair	Fair	Dormant	Poor to fair	Fair	3	M	21	Branches at grade. Out of balance south.	None at this time.
29964	Valley Oak	*(Quercus lobata)*		24	28	Fair	Fair	Fair	Dormant	Fair	Fair	3	M	24	**AKA Tree 5297** Primary branching at 7' above grade. Weakly attached codominant stems.	None at this time.
29965	Valley Oak	*(Quercus lobata)*	9,10,16	35	33	Fair	Fair	Fair	Dormant	Poor to fair	Fair	3	M	35	Branches at 4' above grade. Out of balance southwest. Suppressed by adjacent tree. Slightly above average amount of deadwood.	None at this time.

PAPPAS DEVELOPMENT
Crestview Project Site
Manzanita and Winding Way, Carmichael
County of Sacramento, California
TREE INVENTORY SUMMARY

TREE #	COMMON NAME	SPECIES	MULTI-STEMS (inches)	TOTAL DBH (inches)	DLR (feet)	CONDITIONAL ASSESSMENT						Rating (1-6)	Preser-vation (P/M/G)	Protected County Tree	NOTABLE CHARACTERISTICS	MAINTENANCE RECOMMENDATIONS
						RT CR	TRUNK	LIMBS	FOLIAGE	STRUCTURE	VIGOR					
29966	Valley Oak	*(Quercus lobata)*		28	29	Fair	Fair	Fair	Dormant	Fair	Fair	3	M	28	Primary branching at 6' above grade. Weakly attached codominant stems.	None at this time.
29967	Blue Oak	*(Quercus douglasii)*	6,7	13	15	Fair	Fair	Fair	Dormant	Fair	Fair	3	M	13		None at this time.
29968	Valley Oak	*(Quercus lobata)*	2,2,3	7	11	Multi-Stemmed Oak Species <10" DBH; Data Provided for Mapping Accuracy										
29969	No. California Walnut	*(Juglans hindsii)*	2,3,4	9	13	Non-Native Species <19" DBH; Data Provided for Mapping Accuracy										
29970	Cork Oak	*(Quercus suber)*		10	15	Non-Native Species <19" DBH; Data Provided for Mapping Accuracy										
29971	Valley Oak	*(Quercus lobata)*	9,9	18	21	Fair	Fair	Fair	Dormant	Fair	Fair	3	M	18		None at this time.
29972	Valley Oak	*(Quercus lobata)*	1,1,1,2, 3,3,3	14	11	Fair	Fair	Fair	Dormant	Fair	Fair	3	M	14		None at this time.
29973	Cork Oak	*(Quercus suber)*		9	24	Non-Native Species <19" DBH; Data Provided for Mapping Accuracy									**AKA Tree 5292**	
29974	Cork Oak	*(Quercus suber)*		20	17	Fair	Fair	Fair	Fair	Fair	Fair	3	M	20	**AKA Tree 5290** Slightly above average amount of deadwood.	None at this time.
29975	Cork Oak	*(Quercus suber)*	8,9	17	15	Non-Native Species <19" DBH; Data Provided for Mapping Accuracy									**AKA Tree 5289**	
29976	Cork Oak	*(Quercus suber)*		28	27	Fair	Poor to fair	Fair	Fair	Fair	Fair	3	M	28	**AKA Tree 5288** Old mechanical wounds, west side, 2' above grade with minor decay. Partially callused pruning wounds, west side, at 8' and 9' above grade with minor decay. Stems on east side pruned about 1' from the trunk with minor decay.	None at this time.
29977	Cork Oak	*(Quercus suber)*		8	17	Non-Native Species <19" DBH; Data Provided for Mapping Accuracy										
29978	Valley Oak	*(Quercus lobata)*	2,4	6	9	Multi-Stemmed Oak Species <10" DBH; Data Provided for Mapping Accuracy										
29979	California Black Walnut	*(Juglans californica)*	4,5,6	15	10	Non-Native Species <19" DBH; Data Provided for Mapping Accuracy										
29980	Gum	*(Eucalyptus)*		36	33	Obscured	Fair	Fair	Fair	Fair	Fair	3	M	36	Located 1' south of the south property line and overhanging the parcel about 25'. Root crown obscured by fence. DBH/DLR estimated.	None at this time.

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TREE INVENTORY SUMMARY

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						RT CR	TRUNK	LIMBS	FOLIAGE	STRUCTURE	VIGOR					
29981	Gum	*(Eucalyptus)*		38	45	Obscured	Obscured (lower trunk) Fair (upper trunk)	Fair	Fair	Fair	Fair	3	M	38	Located offsite and overhanging the parcel 37' in the north direction. DBH/DLR estimated. Pruned for building clearance. Out of balance/leaning northwest.	None at this time.
29982	Fruitless Mulberry	*(Morus alba)*		16	24	Non-Native Species <19" DBH; Data Provided for Mapping Accuracy									Located offsite and overhanging the parcel 20'. DBH/DLR estimated. Tag on fence.	
29983	Valley Oak	*(Quercus lobata)*		24	25	Fair	Fair	Fair	Dormant	Fair	Fair	3	M	24	Primary branching 12' above grade. Weakly attached codominant stems. Partially callused pruning wound 11' above grade with minor decay.	None at this time.
29984	Valley Oak	*(Quercus lobata)*	13,23	36	31	Fair	Fair	Fair	Dormant	Poor to fair	Fair	3	M	36	Branches at 2' above grade. Out of balance west. Slightly above average amount of deadwood.	None at this time.
29985	Valley Oak	*(Quercus lobata)*		11	31	Fair	Fair	Fair	Dormant	Poor to fair	Fair	3	M	11	DLR estimated due to growing off the parcel to the northeast.	None at this time.
29986	Valley Oak	*(Quercus lobata)*		17	36	Fair	Fair	Fair	Dormant	Poor to fair	Fair	3	M	17		None at this time.
29987	Valley Oak	*(Quercus lobata)*		17	36	Fair	Fair	Fair	Dormant	Fair	Fair	3	M	17	DLR estimated. Out of balance south.	None at this time.
29988	Valley Oak	*(Quercus lobata)*		25	29	Fair	Fair	Fair	Dormant	Fair	Fair	3	M	25	Slightly above average amount of deadwood.	None at this time.
29989	Valley Oak	*(Quercus lobata)*		25	26	Fair	Fair	Fair	Dormant	Fair	Fair	3	M	25	**AKA Tree 5268** Branches at 11' above grade.	None at this time.
29990	Valley Oak	*(Quercus lobata)*	17,23	40	26	Fair	Fair	Fair	Dormant	Poor to fair	Fair	3	M	40	**AKA Tree 5267** Branches at 2' above grade. Weakly attached codominant stems. Slightly above average amount of deadwood.	None at this time.
29991	Fremont Cottonwood	*(Populus fremontii)*	2,2,2,3,3	12	7	Non-Native Species <19" DBH; Data Provided for Mapping Accuracy										
29992	Fremont Cottonwood	*(Populus fremontii)*	1,1,1,2,2,2,2	11	6	Non-Native Species <19" DBH; Data Provided for Mapping Accuracy										
29993	Fremont Cottonwood	*(Populus fremontii)*	2,2,2,4,6	16	10	Non-Native Species <19" DBH; Data Provided for Mapping Accuracy										

PAPPAS DEVELOPMENT
Crestview Project Site
Manzanita and Winding Way, Carmichael
County of Sacramento, California
TREE INVENTORY SUMMARY

TREE #	COMMON NAME	SPECIES	MULTI-STEMS (inches)	TOTAL DBH (inches)	DLR (feet)	CONDITIONAL ASSESSMENT						Rating (1-6)	Preser-vation (P/M/G)	Protected County Tree	NOTABLE CHARACTERISTICS	MAINTENANCE RECOMMENDATIONS
						RT CR	TRUNK	LIMBS	FOLIAGE	STRUCTURE	VIGOR					
29994	Fremont Cottonwood	*(Populus fremontii)*	3,4,5	12	7	Non-Native Species <19" DBH; Data Provided for Mapping Accuracy										
29995	Valley Oak	*(Quercus lobata)*	4,4,5,6,7	26	12	Fair	Fair	Fair	Dormant	Poor to fair	Fair	3	M	26	Branches at grade. Above average amount of deadwood.	None at this time.
29996	Valley Oak	*(Quercus lobata)*	5,5,6	16	16	Fair	Fair	Fair	Dormant	Fair	Fair	3	M	16	Measured at 2' above grade.	None at this time.
29997	Valley Oak	*(Quercus lobata)*	3,4,4,4,5	20	12	Fair	Fair	Fair	Dormant	Poor to fair	Fair	3	M	20	Branches at grade. Abundant wasp galls throughout. Slightly above average amount of deadwood.	None at this time.
29998	Valley Oak	*(Quercus lobata)*	2,3,3,3,3	14	11	Fair	Fair	Fair	Dormant	Fair	Fair	3	M	14		None at this time.
29999	Chinese Pistache	*(Pistacia chinensis)*	2,3,3,3	11	4	Non-Native Species <19" DBH; Data Provided for Mapping Accuracy										

TOTAL INVENTORIED TREES = 111 trees (1,787 aggregate diameter inches)
TOTAL RECOMMENDED REMOVALS = None
Total County Protected Trees = 61 trees (1,292 aggregate diameter inches)
Rating (1-6, where 6 is remove) = 1=0 trees; 2=0 trees; 3=59 trees; 4=2 trees; 5=0 trees; 6=0 trees
Suitability for Preservation (Poor/Moderate/Good): P-G=1 tree; P=1 tree; M=57 trees; M-G=1 tree; G=1 tree
Single-Stemmed Oak Species <6" DBH = 4 trees (20 aggregate diameter inches)
Multi-Stemmed Oak Species <10" DBH = 9 trees (64 aggregate diameter inches)
Non-Native Species <19" DBH = 37 trees (411 aggregate diameter inches)

Pappas Investments: Manzanita Ave, Carmichael, CA Project Site
APN's 245-0011, -012, -020, -021
Tree Inventory Field Exhibit
Tag numbers truncated on exhibit
900 series=299xx in field
800 series=248xx in field
2400 series=24xx in field
Prepared by Sierra Nevada Arborists
December 24, 2019
revised May 8, 2020
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Appendix E Aquatic Resources Delineation

HELIX Environmental Planning, Inc.
1677 Eureka Road, Suite 100
Roseville, CA 95661
916.435.1202 tel
619.462.0552 fax
www.**helixepi**.com

July 18, 2022 Project 00949.00004.001

Thad Johnson
Pappas Investments
2020 L Street, 5th Floor
Sacramento, CA 95811

Subject: Aquatic Resources Delineation and Preliminary Jurisdictional Determination Addendum for the Holesapple (Crestview) Property Project (also known as Winding Ranch) in Carmichael, California

Dear Mr. Johnson:

This letter, and associated attachments, addresses an addendum to the *Delineation of Waters of the United States for the Crestview Property* that was prepared by ECORP Consulting, Inc. (ECORP) in May 2015. For the purposes of this letter, the Holesapple (Crestview) Property Project (also known as Winding Ranch) will hereafter be referred to as Project.

The project site is located in Sacramento County approximately 1.75 miles southeast of Interstate 80 in the unincorporated community of Carmichael. The project site is located in a developed suburban area. It is bound by Winding Way to the north and Manzanita Avenue to the west, both high-traffic streets, to the east by Rampart Drive, Mary Lynn Lane, and high-density apartment complexes, and on the south by Jan Drive. The site is located on the U.S. Geological Survey (USGS) *Citrus Heights*, California 7.5-minute topographic quadrangles (Latitude -121.326085 North, Longitude 38.646039 West, NAD 83) (Figure 1, *Vicinity Map*).

BACKGROUND

In response to the expansion of the Project footprint, HELIX Environmental Planning, Inc. (HELIX) was contracted to assess a 0.5-acre parcel (Sacramento County APN 24-50011-018) for aquatic resources, as well as areas expanded from a previous Study Area boundary. In addition to delineating aquatic resources on the 0.5-acre parcel, Pappas Investments (Client) requested that an updated aquatic resources map be prepared to update the 2015 delineation that was conducted by ECORP, which was issued a Preliminary Jurisdictional Determination by the U.S. Army Corps of Engineers (USACE) in June 2015 (SPK-2011-00364).

METHODS

Prior to conducting the field survey, HELIX staff reviewed the *Delineation of Waters of the United States for the Crestview Property* prepared by ECORP (Attachment A) in May 2015, as well as aerial imagery, USFWS National Wetland Inventory data, and Natural Resources Conservation Service (NRCS) web soil survey data. Potential wetland areas identified in the preliminary desktop assessment of the site were investigated in the field by HELIX biologist Greg Davis on June 8, 2022, and HELIX Professional Wetland Scientist (PWS #2354) Patrick Britton on June 29, 2022, to determine the presence/absence of wetlands in accordance with the *Corps of Engineers Wetlands Delineation Manual*, the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Version 2.0), and the USACE *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States*.

RESULTS

No aquatic resources were observed within the 0.5-acre parcel during the survey conducted on June 8, 2022. Wetland Ditch (WD)-1 was expanded from 0.047-acre to 0.048-acre in the southern portion of the new Study Area boundary during the survey conducted on June 29, 2022. The aquatic resources delineation map from ECORP has been modified to include the 0.5-acre parcel, as well as other expansion areas (see HELIX's Aquatic Resources Delineation Map in Attachment B).

Data points characterizing upland sites within the 0.5-acre parcel were taken and recorded on data forms that are included in Attachment C of this letter.

CONCLUSION

This letter will be included as a supporting attachment to the regulatory permit submittals regarding the findings within the expansion areas of the Project footprint. Additional supporting information is included in the Aquatic Resources Delineation Report from ECORP in Attachment A of this letter, as well as in the updated Aquatic Resources Delineation Map in Attachment B.

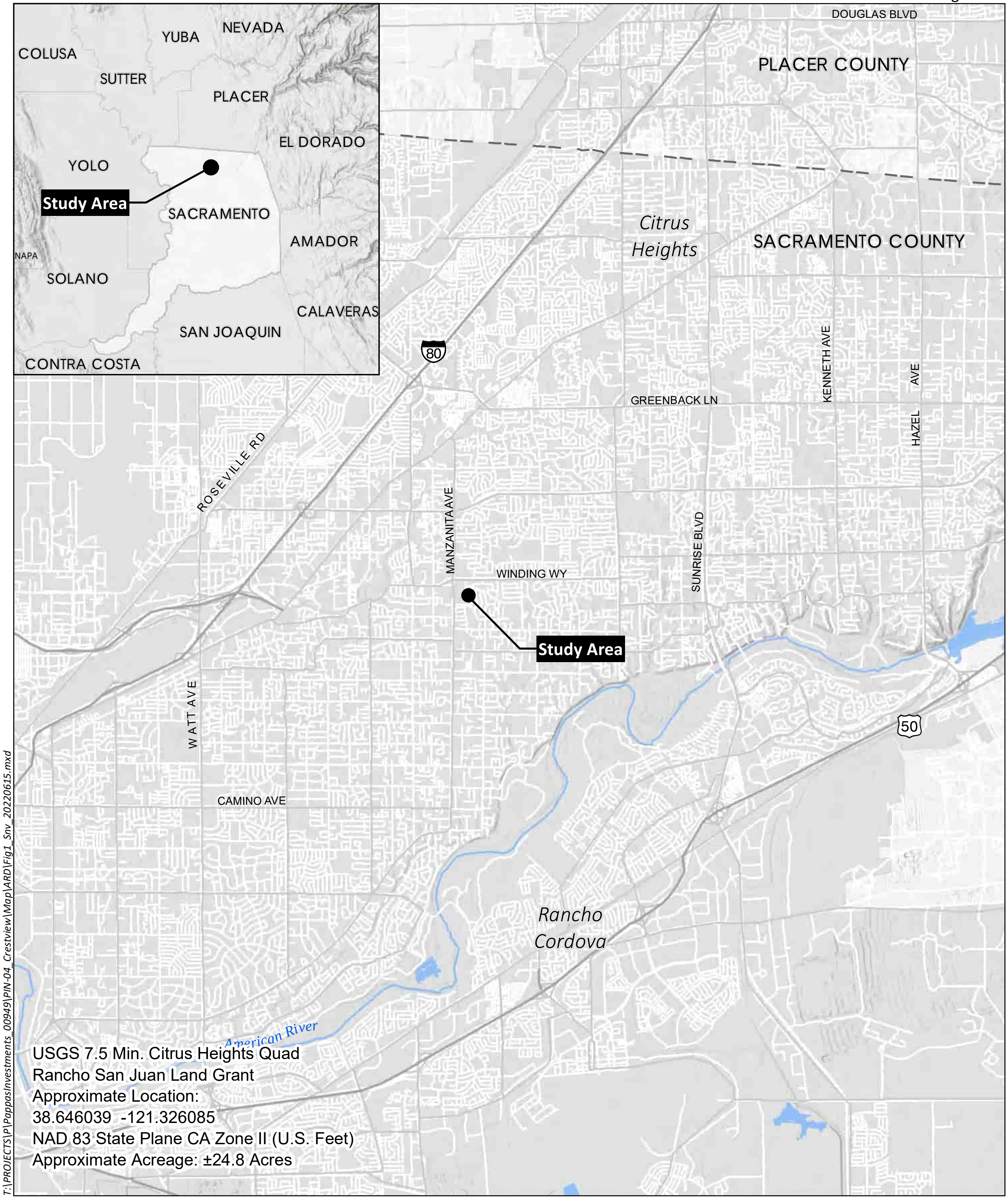
If you have any questions regarding the enclosed findings, please contact me at (916) 435-1202 or email GregD@helixepi.com.

Sincerely,

Greg Davis
Biologist

Attachments:

Figure 1: Vicinity Map
Attachment A: ECORP *Delineation of Waters of the United States for the Crestview Property*
Attachment B: Aquatic Resources Delineation Map, June 5, 2022
Attachment C: HELIX Supplemental Aquatic Resources Delineation Data Forms



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0 1.5 Miles

N

Source: Base Map Layers (Esri, USGS, NGA, NASA)

HELIX
Environmental Planning

Vicinity Map

Figure 1

Attachment A

ECORP *Delineation of Waters of the United States for the Crestview Property*

Delineation of Waters of the United States For the Crestview Property

Sacramento County, California

Prepared For:

Wells Fargo Bank, N.A. and Heather Holesapple, as Co-Trustees

For the Richard Holesapple Revocable Trust

May 8, 2015

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ATTACHMENTS

1.0 INTRODUCTION

On behalf of Wells Fargo Bank, N.A. and Heather Holesapple, as Co-Trustees for the Richard Holesapple Revocable Trust, ECORP Consulting, Inc. (ECORP) conducted a delineation of Waters of the United States (U.S.) for the ±23.25-acre Crestview Property (Property), south of Winding Way, East of Fair Oaks Boulevard, and north of Lincoln Avenue in Carmichael, Sacramento County, California (Figure 1. *Project Location and Vicinity*). The Property corresponds to an unsectioned portion of the San Juan Land Grant of the "Citrus Heights, California" 7.5-minute quadrangle (U.S. Department of Interior, U.S. Geological Survey [USGS] 1992). The approximate center of the Property is located at 38° 38' 48.29" North and 121° 19' 38.84" West within the Lower American Watershed (HUC #18020111, USGS 1978).

The Property was previously authorized to permanently fill 0.16 acre of Waters of the U.S. under a Nationwide Permit Number 39 (Commercial and Institutional Developments) SPK-2011-00364; however, since the permit expired in 2012 a new delineation of Waters of the U.S. was conducted. This report describes potential Waters of the U.S., including wetlands, identified within the Property that may be regulated by the U.S. Army Corps of Engineers (USACE) pursuant to Section 404 of the Clean Water Act (CWA) and the Central Valley Regional Water Quality Control Board (RWQCB), pursuant to Section 401 of the CWA. The information presented in this report provides data required by the USACE Sacramento District's Minimum Standards for Acceptance of Preliminary Wetland Delineations and in accordance with the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0) (USACE 2001, USACE 2008). The potential Waters of the U.S. boundaries depicted in this report represent a calculated estimation of the jurisdictional area within the site and are subject to modification following the USACE verification process.

2.0 REGULATORY SETTING

2.1 Waters of the United States

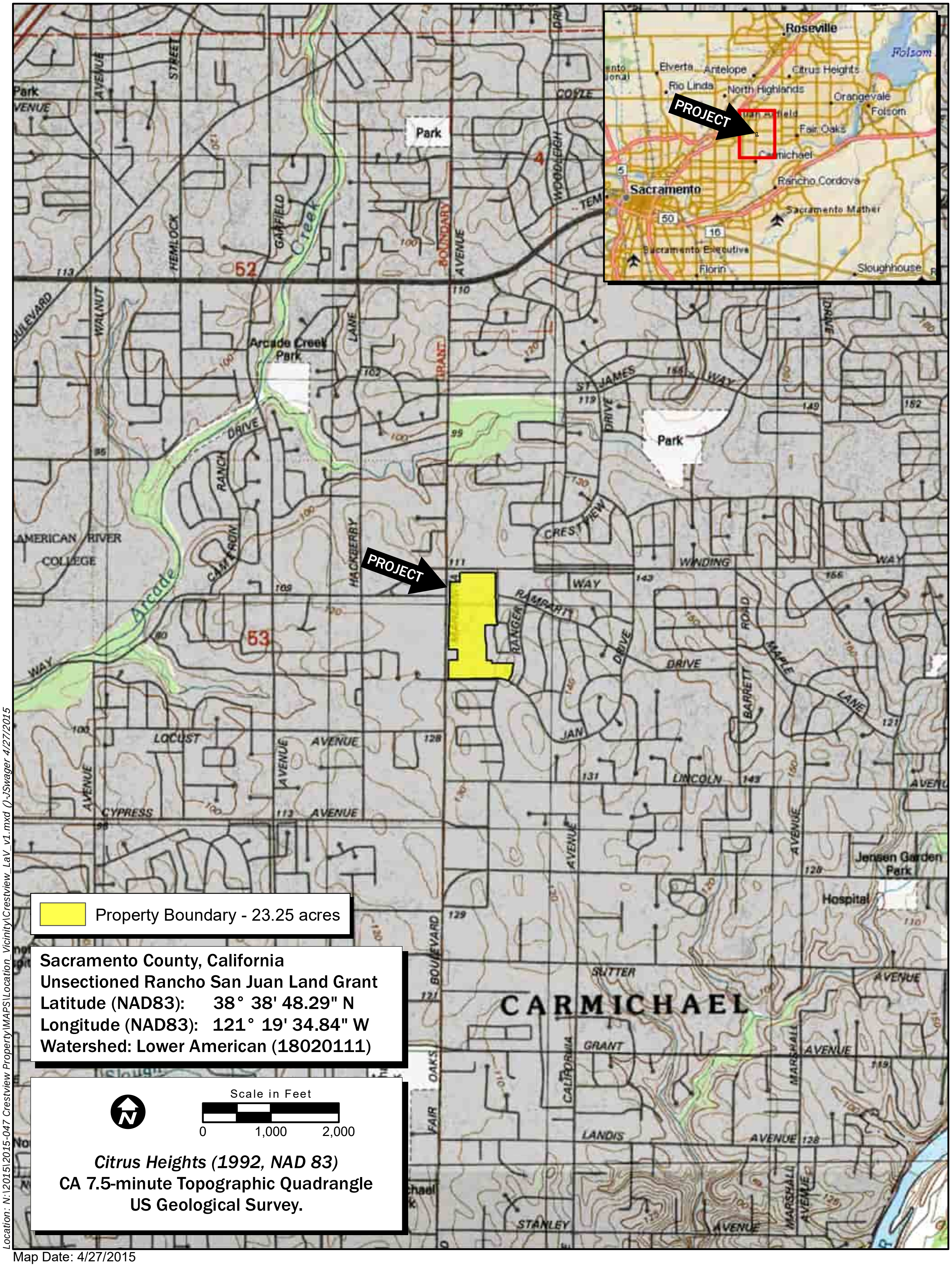
This report describes potential Waters of the U.S., including wetlands that may be regulated by the USACE under Section 404 of the CWA.

2.1.1 Wetlands

Wetlands are "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" [33 CFR 328.3(b), 51 FR 41250, November 13, 1986]. Wetlands can be perennial or intermittent and isolated or adjacent to other Waters.

2.1.2 Other Waters

Other Waters are non-tidal, perennial, and intermittent watercourses and tributaries to such watercourses [33 CFR 328.3(a), 51 FR 41250, November 13, 1986]. The limit of USACE jurisdiction for non-tidal watercourses (without adjacent wetlands) is defined in 33 CFR 328.4(c)(1) as the "ordinary high water mark".



Location: N:\2015\2015-047 Crestview Property\MAPS\Location_Vicinity\Crestview_LaV_v1.mxd ()-JSwager 4/27/2015

Map Date: 4/27/2015
Service Layer Credits: Copyright:© 2014 DeLorme

Figure 1. Project Location and Vicinity

2015-047 Crestview Property

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

The ordinary high water mark (OHWM) is defined as the "line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas" [33 CFR 328.3(e), 51 FR 41250, November 13, 1986]. The bank-to-bank extent of the channel that contains the water flow during a normal rainfall year generally serves as a good first approximation of the lateral limit of USACE jurisdiction. The upstream limits of other waters are defined as the point where the OHWM is no longer perceptible.

2.2 Federal Clean Water Act

The USACE regulates discharge of dredged or fill material into Waters of the U.S. under Section 404 of the CWA. "Discharges of fill material" is defined as the addition of fill material into Waters of the U.S., including, but not limited to the following: placement of fill that is necessary for the construction of any structure, or impoundment requiring rock, sand, dirt, or other material for its construction; site-development fills for recreational, industrial, commercial, residential, and other uses; causeways or road fills; and fill for intake and outfall pipes, and subaqueous utility lines [33 C.F.R. §328.2(f)]. In addition, Section 401 of the CWA (33 U.S.C. 1341) requires any applicant for a federal license or permit to conduct any activity that may result in a discharge of a pollutant into Waters of the U.S. to obtain a certification that the discharge will comply with the applicable effluent limitations and water quality standards.

Substantial impacts to wetlands, i.e., over 0.5 acre of impact, may require an individual permit from the USACE. Projects that only minimally affect wetlands, i.e., less than 0.5 acre of impact, may meet the conditions of one of the existing USACE Nationwide Permits. A Water Quality Certification or waiver pursuant to Section 401 of the CWA is required for Section 404 permit actions and is issued by the RWQCB.

2.3 Jurisdictional Assessment

Pursuant to the U.S. Environmental Protection Agency (USEPA) and USACE memorandum regarding CWA jurisdiction, issued following the United States Supreme Court's decision in the consolidated cases Rapanos v. United States and Carabell v. United States (herein referred to as Rapanos), the agencies will assert jurisdiction over the following Waters: "traditionally navigable" Waters (TNWs), all wetlands adjacent to TNWs, non-navigable tributaries of TNWs that are "relatively permanent" (RPW) (i.e., tributaries that typically flow year-round or have continuous flow at least seasonally), and wetlands that directly abut such tributaries (USEPA and USACE 2007).

Waters requiring a significant nexus determination by the USACE and USEPA to establish jurisdiction include non-navigable tributaries that are not relatively permanent, wetlands adjacent to non-navigable tributaries that are not relatively permanent, and wetlands adjacent to but do not directly abut a relatively permanent non-navigable tributary (USEPA and USACE 2007). The jurisdictional determination is a fact-based evaluation to establish whether a Water has a significant nexus with a TNW. The significant nexus analysis assesses the flow characteristics and functions of the non-navigable tributary itself and the functions performed by all wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of downstream TNWs (USEPA and USACE 2007).

2.4 Porter-Cologne Water Quality Act

The RWQCB implements water quality regulations under the federal CWA and the Porter-Cologne Water Quality Act. These regulations require compliance with the National Pollutant Discharge Elimination System (NPDES), including compliance with the California Storm Water NPDES General Construction Permit for discharges of storm water runoff associated with construction activities. General Construction Permits for projects that disturb one or more acres of land require development and implementation of a Storm Water Pollution Prevention Plan. Under the Porter-Cologne Water Quality Act, the RWQCB regulates actions that would involve "discharging waste, or proposing to discharge waste, with any region that could affect the water of the state" (Water Code 13260[a]).

3.0 METHODS

This jurisdictional delineation of potential Waters of the U.S. was conducted in accordance with the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Arid West Region Supplement) (USACE 2008). The boundaries of potential Waters of the U.S. were delineated through aerial photograph interpretation and standard field methods (i.e., paired data set analyses) and all wetland data were recorded on Arid West Region – Wetland Determination Data Forms, provided in Attachment A. A color aerial photograph (1"=75' scale, USGS 2011) was used to assist with mapping and ground-truthing, provided as Attachment B. The extent of the potential Waters of the U.S., including wetlands, within the Property was recorded in the field using a post-processing capable global positioning system (GPS) unit with sub-meter accuracy (Trimble GeoXT). In addition, the USACE's Six County Aquatic Resources Inventory (SCARI) was queried for previously-mapped features on-site. Munsell Soil Color Charts (Kollmorgen Instruments Co. 1990) and the Soil Survey of Sacramento County, California (NRCS 2015) were used to aid in identifying hydric soils in the field. The Jepson Manual, Second Edition (Baldwin, et al., editors. 2012) was used for plant nomenclature and identification.

A field survey was conducted on 20 April 2015 by ECORP biologists Krissy Walker and Emily Mecke. Ms. Walker and Ms. Mecke systematically surveyed the entire ±23.25-acre Property to determine the location and extent of potential Waters of the U.S. including wetlands within the Property. Paired locations were sampled to evaluate whether or not the vegetation, hydrology, and soils supported a determination of wetland or non-wetland status. At each sampling point pair, one point was located such that it was within the estimated wetland area, and the other point was situated outside the limits of the estimated wetland area.

3.1 Routine Determinations for Wetlands

The following three criteria must be met to be determined a wetland:

- A majority of dominant vegetation species are wetland associated species
- Hydrologic conditions exist that result in periods of flooding, ponding, or saturation during the growing season
- Hydric soils are present

3.1.1 Vegetation

Hydrophytic vegetation is defined as the sum total of macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanent or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present (Environmental Laboratory 1987). The definition of wetlands includes the phrase "a prevalence of vegetation typically adapted for life in saturated soil conditions." Prevalent vegetation is characterized by the dominant plant species comprising the plant community (Environmental Laboratory 1987). The dominance test is the basic hydrophytic vegetation indicator and was applied at each sampling point location. The "50/20 rule" was used to select the dominant plant species from each stratum of the community. The rule states that for each stratum in the plant community, dominant species are the most abundant plant species (when ranked in descending order of coverage and cumulatively totaled) that immediately exceed 50 percent of the total coverage for the stratum, plus any additional species that individually comprise 20 percent or more of the total cover in the stratum (HQUSACE 1992, USACE 2008).

Dominant plant species observed at each sampling point were then classified according to their indicator status (probability of occurrence in wetlands) (Table 1), North American Digital Flora: National Wetland Plant List (Lichvar et al. 2014). The site was considered to be dominated by hydrophytic vegetation if the majority (greater than 50 percent) of the dominant vegetation on a site are classified as obligate (OBL), facultative wetland (FACW), or facultative (FAC).

Table 1. Classification of Wetland-Associated Plant Species[1]

Plant Species Classification	Abbreviation	Probability of Occurring in Wetland
Obligate	OBL	Almost always occur in wetlands
Facultative Wetland	FACW	Usually occur in wetlands, but may occur in non-wetlands
Facultative	FAC	Occur in wetlands and non-wetlands
Facultative Upland	FACU	Usually occur in non-wetlands, but may occur in wetlands
Upland	UPL	Almost never occur in wetlands
Plants That Are Not Listed (assumed upland species)	N/L	Does not occur in wetlands in any region.

[1]Source: Lichvar et al. 2014

In instances where indicators of hydric soil and wetland hydrology were present but the plant community failed the dominance test, the vegetation was re-evaluated using the prevalence index. The prevalence index is a weighted-average wetland indicator status of all plant species in the sampling plot, where each indicator status category is given a numeric code (OBL=1, FACW=2, FAC=3, FACU=4, and UPL=5) and weighting is by abundance (percent cover). If the plant community failed the prevalence index, the presence/absence of plant morphological adaptations to prolonged inundation or saturation in the root zone was evaluated.

3.1.2 Soils

A hydric soil is defined as a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (NRCS 2003). Indicators that a hydric soil is present include, but are not limited to, histosols, histic epipedon, hydrogen sulfide, depleted below dark surface, sandy redox, loamy gleyed matrix, depleted matrix, redox dark surface, redox depressions, and vernal pools.

A soil pit was excavated to the depth needed to document an indicator, to confirm the absence of indicators or until refusal at each sampling point. The soil was then examined for hydric soil indicators. Soil colors were determined while the soil was moist using the *Munsell Soil Color Charts* (Kollmorgen Instruments Co. 1990).

3.1.3 Hydrology

By definition, wetlands are seasonally or perennially inundated or saturated at or near (within 12 inches of) the soil surface. Primary indicators of wetland hydrology include, but are not limited to: visual observation of saturated soils, visual observation of inundation, surface soil cracks, inundation visible on aerial imagery, water-stained leaves, oxidized rhizospheres along living roots, aquatic invertebrates, water marks (secondary indicator in riverine environments), drift lines (secondary indicator in riverine environments), and sediment deposits (secondary indicator in riverine environments). The occurrence of one primary indicator is sufficient to conclude that wetland hydrology is present. If no primary indicators are observed, two or more secondary indicators are required to conclude wetland hydrology is present. Secondary indicators include but are not limited to: drainage patterns, crayfish burrows, FAC-neutral test, and shallow aquitard. The occurrence of at least one primary indicator or two secondary indicators is required to confirm the presence of wetland hydrology.

4.0 RESULTS

4.1 Existing Site Conditions

The Property is comprised of level to gently rolling terrain and is located in the Sacramento Valley subregion of the California Floristic Province (Baldwin, et al., editors. 2012). This area is characterized by a Mediterranean climate, which is comprised of hot and dry summer months and cool and wet winter months. The Property is situated at an elevation range of approximately 115 feet to 140 feet above mean sea level. The Property does not appear to have been disked or grazed in several years.

During the 2014-2015 wet season (October 1, 2014 through March 31, 2015) 9.31 inches of precipitation was recorded in Sacramento prior to the field survey (Accuweather.com 2015). The average annual rainfall for Sacramento County is 18.15 inches (Western Regional Climate Center 2015). Precipitation recorded for the water year (October 1, 2014 through March 31, 2015) was 64 percent for the American River Basin and 85 percent for the Sacramento Valley Floor as compared to the historic average (CDEC 2015). The most recent significant storm event prior to the delineation occurred between February 6 and February 9, 2015 with a total of 2.29 inches of rain over the course of 3 days. Small amounts of precipitation have been recorded in March and April between this event and the date that the field work was conducted (Accuweather.com 2015).

The majority of the Property is composed non-native annual grassland. Plant species observed in the non-native annual grassland include oat (*Avena* sp.), ripgut brome (*Bromus diandrus*), cut-leaved geranium (*Geranium dissectum*), prickly lettuce (*Lactuca serriola*), foxtail barely (*hordeum murinum*), and winter vetch (*Vicia villosa*). Potential wetlands are located in the northwestern and south central portion of the Property. These aquatic features are described in detail in Section 4.2 - Potential Waters of the U.S.

4.1.1 Six County Aquatic Resources Inventory

No features mapped by USACE's SCARI occur on-site. The closest mapped feature is approximately ½ mile north of the Property (USACE, Sacramento District 2010).

4.1.2 Soils

According to the Web Soil Survey (NRCS 2015), two soil units, or types, have been mapped within the Property (Table 2 and Figure 2. *Natural Resources Conservation Service Soil Types*). These include: (227) Urban Land; and (229) Urban land – Xerarents-Fiddyment complex, 0 to 8 percent slopes. Both of these soil units are not considered hydric (NRCS 2006).

Table 2. Natural Resources Conservation Service Soil Types

Soil Unit	Hydric	Hydric Components (NRCS 2006)
227- Urban Land	No	N/A
229 – Xerarents-Fiddyment complex, 0 to 9 percent slopes	No	N/A

4.2 Potential Waters of the U.S.

A total of 0.164 acre of seasonal wetland swale was mapped on the Property (Figure 3. *Jurisdictional Delineation*). The Arid West wetland determination data forms are included as Attachment A, an aerial photograph of the site is included in Attachment B, and a list of plant species observed on-site is included in Attachment C. A discussion of the wetlands is presented below.

4.2.1 Wetlands

Seasonal Wetland Swale

Seasonal wetland swales are linear wetland features that do not exhibit an OHWM. These are typically inundated for short periods during and generally only immediately after rain events, but usually maintain soil saturation for longer periods into the growing season.

<u>Vegetation</u>

The dominant plant species found within the seasonal wetland swale included swamp smartweed (*Persicaria hydropiperiodes*) (see Attachment A). Other plants found within the seasonal wetland swale included common cattail (*Typha latifolia*), cut-leaf geranium (*Geranium dissectum*), goose grass (*Galium aparine*), harding grass (*Phalaris aquatic*), soft brome (Bromus hodeaceus), wild grape (*Vitis californica*), wild radish (*Raphanus raphanistrum*), common fig (*Ficus carica*), valley oak (*Quercus lobata*), and cork oak (*Quercus suber*). Hydrophytic vegetation was determined to be present in both of the sampling points (01 and 03) within seasonal wetland swales due to the passage of the dominance test.

Location: N:\2015\2015-047 Crestview Property\MAPS\Soils_and_Geology\Soils\Crestview_Soils_v1.mxd (JDS)-JSwager 4/22/2015

Map Date: 4/22/2015
Photo Source: USGS 2013

Figure 2. Natural Resources Conservation Service Soil Types

2015-047 Crestview Property

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Figure 3.
Jurisdictional Delineation [2]

Map Features

Property Boundary [1]

Culvert

Three Criteria Sampling Point

Wetlands - 0.164 acres [2]

Seasonal Wetland Swale - 0.164 acres

[1] Boundary Source: Sacramento County GIS Parcels. Boundary is approximate.

[2] Subject to U.S. Army Corps of Engineers verification
This exhibit depicts information and data produced in strict accord with the wetland delineation methods described in the 1987 Corps of Engineers Wetland Delineation Manual and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region and conforms to Sacramento District specifications. However, feature boundaries have not been legally surveyed and may be subject to minor adjustments if more accurate locations are required. The summary values for each feature have been rounded to the nearest round number or 1/100 decimal. Summation of these values in the table may not equal the total reported.

Three Criteria Sampling Points

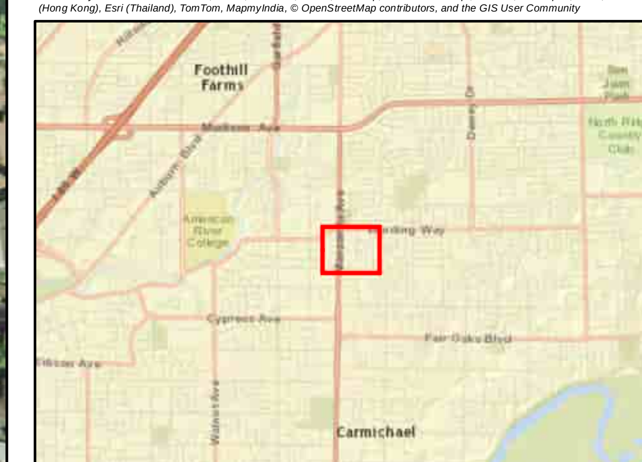
Waters of the U.S.

Sample Point	Latitude/Longitude
01	38.646739/-121.326907
03	38.645148/-121.326329

Upland

Sample Point	Latitude/Longitude
02N	38.646744/-121.326847
04N	38.645125/-121.326376

Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



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Location: N:\2015\2015-047 Crestview Property\MAPS\Wetland_Mapping\Wetland_Delineation\v1\Crestview_WDv1_20150422_11x17.mxd (JDS) JSwager 4/22/2015

2015-047 Crestview Property

Scale in Feet
0 200

Photo Date: USGS 2011
Delineators: K. Walker, E. Mecke
Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet

Map Date: 4/22/2015

Soils

The soil matrix color from the surface to a depth of 4 inches within sampling point 01 was 10YR 2/1 (without redox features). The soil matrix color from a depth of 4 inches to a depth 16 inches was 10YR 3/3 with 15% redox concentrations located in pore linings colored 7.5YR 4/6. Soils within sampling point 01 were not determined to be hydric based on hydric soil indicators; however, because there is so much urban runoff (e.g., asphalt) these soil are problematic and assumed hydric because there is an obvious seasonal wetland swale in this location. The soil matrix color from the surface to a depth of 6 inches in the upland area (02N) adjacent to sampling point 01 was 10YR3/6 (without redox features); refusal was encountered at greater than 6 inches in depth (Attachment A). Soils within this upland sampling point (02N) were determined not to be hydric.

The soil matrix color from the surface to a depth of 16 inches within sampling point 03 was 7.5YR 2.5/2 (without redox features). Soils within sampling point 03 were not determined to be hydric; however, as stated above because there is so much urban runoff (e.g., asphalt, sedimentation) these soil are problematic and assumed hydric because there is an obvious seasonal wetland swale in this location. The soil matrix color from the surface to a depth of 6 inches in the upland area (04N) adjacent to sampling point 03 was 7.5YR 2.5/2 (without redox features) (Attachment A). Soils within the upland sampling point were determined not to be hydric.

Hydrology

Wetland hydrology indicators observed within the seasonal wetland swale included Saturation (A3), sediment deposits (B2, nonriverine), drift deposits (B3, nonriverine), and oxidized rhizospheres along living roots (C3) (Attachment A). Wetland hydrology indicators were not found in the upland areas adjacent to the seasonal wetland swales.

5.0 JURISDICTIONAL ASSESSMENT

The potential wetlands and upland areas on-site drain to the northwest to culverts on the western and northern boundaries of the Property. These culverts flow into Arcade Creek via a storm drain system. Therefore, potential wetlands on-site would likely be considered tributary to Arcade Creek, a perennial creek that flows from east to west to the southwest of the Property. Because Arcade Creek flows for three or more months of the year, it would likely be considered relatively permanent water (RPW). Arcade Creek is a tributary to the American River via Steelhead Creek. The USACE Sacramento District has identified the American River as a navigable water.

As a RPW tributary to a Navigable Water, Arcade Creek would be subject to USACE jurisdiction, along with Waters of the U.S. that abut Arcade Creek. Therefore, the potential Waters of the U.S. on the Property would likely be jurisdictional pursuant to the USEPA and USACE memorandum regarding CWA jurisdiction following the Rapanos decision (USEPA and USACE 2007).

6.0 CONCLUSION

A total of 0.164 acre of potential Waters of the U.S. has been mapped on-site. This acreage represents a calculated estimation of the jurisdictional area within the Property and is subject to modification following the USACE verification process. Fill within jurisdictional features would require permitting pursuant to Section 404 and 401 of the federal CWA.

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LIST OF ATTACHMENTS

ATTACHMENT A

Wetland Determination Data Forms - Arid West Region

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Crestview City/County: Carmichael Sampling Date: 4/20/15

Applicant/Owner: See report State: CA Sampling Point: 1

Investigator(s): K. Walker, E. Mecke Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Drainage Local relief (concave, convex, none): Concave Slope (%): 1-2

Subregion (LRR): C Lat: 38.646739 Long: -121.326907 Datum: NAD83

Soil Map Unit Name: 229 - Urban land - xerarents - Fiddyment complex 0 to 8 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil X, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___
Hydric Soil Present?	Yes ___	No X
Wetland Hydrology Present?	Yes X	No ___

Is the Sampled Area within a Wetland? Yes X No ___

Remarks:

seasonal wetland swale.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 4x4)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ___)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: ___)			
1. Persicaria hydropiperoides	80%	Y	OBL
2. Geranium dissectum	5%	N	UPL
3. Galium aparine	10%	N	FACU
4. Phalaris aquatica	2%	N	FACU
5.			
6.			
7.			
8.			
= Total Cover	97		
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 5% % Cover of Biotic Crust ___

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	80	x 1 = 80
FACW species		x 2 =
FAC species		x 3 =
FACU species	12	x 4 = 48
UPL species	5	x 5 = 25
Column Totals:	97 (A)	153 (B)

Prevalence Index = B/A = 1.58

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

X Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ___

Remarks:

Hydrophytic vegetation is present.

SOIL

Sampling Point: 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 2/1	100					sandy clay loam	
4-16	10YR 3/3	85	7.5YR 4/6	15	C	PL	sandy clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- __ Histosol (A1)
- __ Histic Epipedon (A2)
- __ Black Histic (A3)
- __ Hydrogen Sulfide (A4)
- __ Stratified Layers (A5) (**LRR C**)
- __ 1 cm Muck (A9) (**LRR D**)
- __ Depleted Below Dark Surface (A11)
- __ Thick Dark Surface (A12)
- __ Sandy Mucky Mineral (S1)
- __ Sandy Gleyed Matrix (S4)
- __ Sandy Redox (S5)
- __ Stripped Matrix (S6)
- __ Loamy Mucky Mineral (F1)
- __ Loamy Gleyed Matrix (F2)
- __ Depleted Matrix (F3)
- __ Redox Dark Surface (F6)
- __ Depleted Dark Surface (F7)
- __ Redox Depressions (F8)
- __ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- __ 1 cm Muck (A9) (**LRR C**)
- __ 2 cm Muck (A10) (**LRR B**)
- __ Reduced Vertic (F18)
- __ Red Parent Material (TF2)
- __ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ________

Depth (inches): ________

Hydric Soil Present? Yes ____ No X

Remarks:

soil was not determined to be hydric based on hydric soil indicators; however, because there is so much urban runoff these soils are problematic and assumed hydric b/c there is an obvious sws in this location.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- __ Surface Water (A1)
- __ High Water Table (A2)
- ✓ Saturation (A3)
- __ Water Marks (B1) (**Nonriverine**)
- __ Sediment Deposits (B2) (**Nonriverine**)
- ✓ Drift Deposits (B3) (**Nonriverine**)
- __ Surface Soil Cracks (B6)
- __ Inundation Visible on Aerial Imagery (B7)
- __ Water-Stained Leaves (B9)
- __ Salt Crust (B11)
- __ Biotic Crust (B12)
- __ Aquatic Invertebrates (B13)
- __ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- __ Presence of Reduced Iron (C4)
- __ Recent Iron Reduction in Tilled Soils (C6)
- __ Thin Muck Surface (C7)
- __ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- __ Water Marks (B1) (**Riverine**)
- __ Sediment Deposits (B2) (**Riverine**)
- __ Drift Deposits (B3) (**Riverine**)
- __ Drainage Patterns (B10)
- __ Dry-Season Water Table (C2)
- __ Crayfish Burrows (C8)
- __ Saturation Visible on Aerial Imagery (C9)
- __ Shallow Aquitard (D3)
- __ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No ✓	Depth (inches): ____
Water Table Present?	Yes ____	No ✓	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ✓	No ____	Depth (inches): 2

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

wetland hydrology is present.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Crestview City/County: Carmichael Sampling Date: 4/20/15

Applicant/Owner: see report State: CA Sampling Point: 2N

Investigator(s): K. Walker, E. Mecke Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Drainage Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): C Lat: 38.646744 Long: -121.326847 Datum: NAD83

Soil Map Unit Name: 229 - Urban land - Xerarents - Fiddyment complex, 0 to 8 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___	No X
Hydric Soil Present?	Yes ___	No X
Wetland Hydrology Present?	Yes ___	No X

Is the Sampled Area within a Wetland? Yes ___ No X

Remarks:

Upland adjacent to seasonal wetland swale (data point 01).

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ___)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ___)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 4x4)			
1. Bromus hordeaceus	1	N	FACU
2. Avena sp.	20	N	UPL
3. Rumex crispus	2	N	FAC
4. Hordeum murinum	5	N	FACU
5. Bromus diandrus	3	N	UPL
6. Vicia villosa	3	N	UPL
7. Medicago polymorpha	3	N	FACU
8. Phalaris aquatica	65	Y	FACU
= Total Cover	102		
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ___

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species	2	x 3 = 6
FACU species	74	x 4 = 296
UPL species	26	x 5 = 130
Column Totals:	102 (A)	432 (B)

Prevalence Index = B/A = 4.24

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No X

Remarks:

Hydrophytic vegetation is not present.

SOIL

Sampling Point: 2N

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR3/6	100					silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ___ No X

Remarks:

Refusal, hydric soil is not present

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ___ Depth (inches): ______

Water Table Present? Yes ___ No ___ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ___ No ___ Depth (inches): ______

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

wetland hydrology is not present.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Crestview City/County: Carmichael Sampling Date: 4/20/15

Applicant/Owner: see report State: CA Sampling Point: 3

Investigator(s): K. Walker, E. Mecke Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Drainage Local relief (concave, convex, none): concave Slope (%): 1-2

Subregion (LRR): C Lat: 38.645148 Long: -121.324329 Datum: NAD 83

Soil Map Unit Name: 229- Urbanland - Xeraremts - Fiddyment complex 0 to 8 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil X, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	Is the Sampled Area within a Wetland? Yes X No ___
Hydric Soil Present?	Yes ___ No X	
Wetland Hydrology Present?	Yes X No ___	

Remarks:

seasonal wetland swale.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ___)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ___)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 4x4)			
1. Persicaria hydropiperoidies	25	Y	OBL
2. Typha latifolia	10	N	OBL
3. Unk. grass	60	Y	FAC
4.			
5.			
6.			
7.			
8.			
= Total Cover	95		
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 8 % Cover of Biotic Crust ___

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	35	x 1 = 35
FACW species		x 2 =
FAC species	60	x 3 = 180
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	95 (A)	215 (B)

Prevalence Index = B/A = 2.26

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

X Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ___

Remarks:

Grass unidentifiable but assumed to be a FAC species based on the hydrology and associated identifiable species.

SOIL

Sampling Point: 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-16	7.5YR 2.5/2	100					Sandy clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ___ No X

Remarks:
Soils not determined to be hydric based on hydric soil indicators; however, because there is so much urban runoff these soils are problematic and assumed hydric b/c there is an obvious SWS in this location.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ✓ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No ✓	Depth (inches): ___
Water Table Present?	Yes ✓	No ___	Depth (inches): 3
Saturation Present? (includes capillary fringe)	Yes ✓	No ___	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Wetland hydrology present.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Crestview City/County: Carmichael Sampling Date: 4/20/15

Applicant/Owner: see report State: CA Sampling Point: 4N

Investigator(s): K. Walker, E Meeke Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Drainage Local relief (concave, convex, none): Flat Slope (%): 0

Subregion (LRR): C Lat: 38.645125 Long: -121.326376 Datum: NAD83

Soil Map Unit Name: 229- Urban land - xerarents - Fiddyment complex 0 to 8 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____ No X	Is the Sampled Area within a Wetland? Yes ____ No X
Hydric Soil Present?	Yes ____ No X	
Wetland Hydrology Present?	Yes ____ No X	

Remarks:

upland adjacent to seasonal wetland swale (data point 03)

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: ____)			
1. Bromus diandrus	30	Y	UPL
2. Bromus hordeaceus	10	N	FACU
3. Avena sp.	40	Y	UPL
4. Convolvulus arvensis	2	N	UPL
5. Geranium dissectum	10	N	UPL
6. Erodium botrys	5	N	FACU
7. Lactuca serriola	15	N	FACU
8. Galium aparine	2	N	FACU
= Total Cover	114		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	32	x 1 =	32
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species	82	x 5 =	410
Column Totals:	114 (A)		442 (B)

Prevalence Index = B/A = 3.8

Hydrophytic Vegetation Indicators:

- ___ Dominance Test is >50%
- ___ Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks:

Hydrophytic vegetation is not present.

SOIL

Sampling Point: 4N

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-6	7.5YR 2.5/2	100					Silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ______ No X

Remarks:

Refusal, hydric soils are not present.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ______ No ______ Depth (inches): ______

Water Table Present? Yes ______ No ______ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ______ No ______ Depth (inches): ______

Wetland Hydrology Present? Yes ______ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Wetland hydrology is not present.

ATTACHMENT B

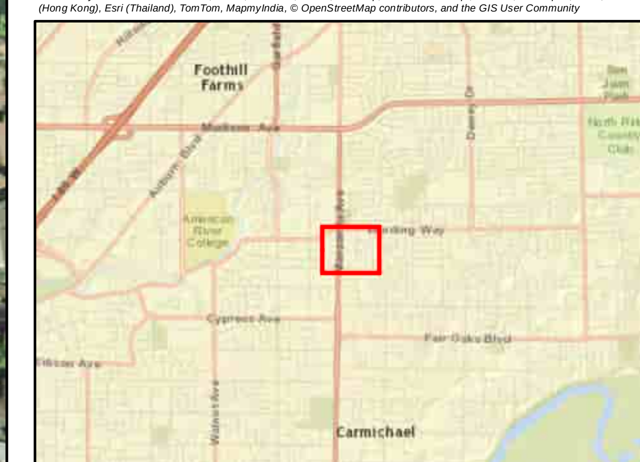
Aerial Photograph of the Property

Attachment B
Aerial Photo

Map Features

Property Boundary [1]

Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Location: N:\2015\2015-047 Crestview Property\MAPS\Wetland_Mapping\Wetland_Delineation\v1\Crestview_WDv1_20150422_11x17_Aerial.mxd (JDS)-JSwager 4/22/2015

2015-047 Crestview Property

Scale in Feet
0 200

Photo Date: USGS 2011
[1] Sacramento County GIS Parcels. Boundary is approximate.
Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet

Map Date: 4/22/2015

ATTACHMENT C

Plant Species Observed On-Site

Plants Observed On-Site, April 20, 2015

Scientific Name	Common Name
ASTERACEAE	**SUNFLOWER FAMILY**
*Cichorium intybus**	Chicory
*Lactuca serriola**	Prickly lettuce
CONVOLVULACEAE	**MORNING-GLORY FAMILY**
*Convolvulus arvensis**	Morning glory
CYPERACEAE	**SEDGE FAMILY**
Carex sp.	Sedge
FABACEAE	**LEGUME FAMILY**
*Vicia villosa**	Winter vetch
*Medicago polymorpha**	Bur clover
FAGACEAE	**OAK FAMILY**
Quercus lobata	Valley oak
Quercus douglasii	Blue oak
*Quercus suber**	Cork oak
GERANIACEAE	**GERANIUM FAMILY**
*Geranium dissectum**	Cut-leaved geranium
*Erodium botrys**	Filaree
JUGLANDACEAE	**WALNUT FAMILY**
Juglans sp.*	Walnut
MORACEAE	**MULBERRY FAMILY**
Morus sp.	Mulberry
POACEAE	**GRASS FAMILY**
Avena sp.*	Oat
*Bromus Diandrus**	Ripgut brome
*Bromus hordeaceus**	Soft brome
*Hordeum murinum**	Barley
*Phalaris aquatica**	Harding grass
POLYGONACEAE	**BUCKWHEAT FAMILY**
Persicaria hydropiperoides	Swamp smartweed
*Rumex crispus**	Curly dock

Plants Observed On-Site, April 20, 2015 Continued.

Scientific Name	Common Name
TYPHACEAE	**CATTAIL FAMILY**
Typha latifolia	Broad-leaf cattail
RUBIACEAE	**MADDER FAMILY**
Galium aparine	Goose grass
VITACEAE	**GRAPE FAMILY**
Vitis californica	California wild grape

ATTACHMENT D

Wetland Delineation Shape Files

(to be included with USACE submittal only)

Attachment B

Aquatic Resources Delineation Map,
June 5, 2022

AQUATIC RESOURCES INDIVIDUAL FEATURE

Seasonal Wetland Ditch			
Label	Acres	Latitude	Longitude
WD-1	0.117	38.647592	-121.326914
WD-2	0.048	38.644983	-121.326226
Subtotal	**0.165**		

NOTES
- The boundaries and jurisdictional status of all waters shown on this map are preliminary and subject to verification by the U.S. Army Corps of Engineers.
- Delineation conducted by Foothills and Associates on 3/15/11 and 4/19/11 by KDW.
- Delineation conducted by ECORP on 6/30/2015. updated by G. Davis on 6/9/2022 and P. Britton on 6/29/2022.
- Aquatic resources were mapped by HELIX using a Juniper Geode GNSS submeter GPS unit.
- This delineation utilizes the USACE 1987 three-parameter methodology and Arid West Supplement to delineate jurisdictional waters of the U.S.
- The Hydrologic Unit Code for this site is 18020111.
- Topographic contour interval is 1 foot.
- Coordinate System: State Plane Zone II.
- Projection: Lambert Conic Conformable.
- Datum: North American Datum 1983.

Document Path: T:\PROJECTS\P\PappasInvestments_00949\PIN-04_Crestview\Map\ARD\AttB_ARD_20220615.mxd

HELIX Environmental Planning

USACE REGULATORY FILE #: SPK-2011-00364
VERIFIED BY: TBD
DATE OF VERIFICATION: TBD

REVISIONS

DATE	DESCRIPTION	BY

0 150 300
Feet
1 inch = 150 feet
N

Drawn By: JCD

AQUATIC RESOURCES DELINEATION MAP

Winding Ranch Project

City of Carmichael, Sacramento County, California

July 5, 2022

Attachment B

Attachment C

HELIX Supplemental Aquatic Resources Delineation Data Forms

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Holesapple/Crestview/Winding Ranch Project City/County: Carmichael/Sacramento Sampling Date: 6/9/2022

Applicant/Owner: Pappas Investments State: CA Sampling Point: 1

Investigator(s): Greg Davis Section, Township, Range: Unsectioned Rancho San Juan Land Grant

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): concave Slope (%): 2

Subregion (LRR): C Lat: 38.648876 Long: -121.327143 Datum: NAD83

Soil Map Unit Name: 227 - Urban Land NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No ✓
Hydric Soil Present?	Yes ____	No ✓
Wetland Hydrology Present?	Yes ____	No ✓

Is the Sampled Area within a Wetland? Yes ____ No ✓

Remarks:

Site is located in a small, upland swale.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 25' x 25')	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 10' x 10')			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 10' x 10')			
1. Avena barbata	70	Y	NI
2. Bromus diandrus	30	Y	NI
3.			
4.			
5.			
6.			
7.			
8.			
= Total Cover	100		
Woody Vine Stratum (Plot size: 10' x 10')			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ____ % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ Dominance Test is >50%
- ___ Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks:

Hydrophytic vegetation was not present at this site.

SOIL

Sampling Point: 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 3/2	100	-	-	-	-	L	gravelly
2-12	10YR 3/3	100	-	-	-	-	L	gravelly

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? **Yes** ___ **No** ✓

Remarks:

Hydric soils were not observed at this site.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ______

Water Table Present? Yes ___ No ✓ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ______

Wetland Hydrology Present? **Yes** ___ **No** ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology indicators were observed at this site.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Holesapple/Crestview/Winding Ranch Project City/County: Carmichael/Sacramento Sampling Date: 6/9/2022

Applicant/Owner: Pappas Investments State: CA Sampling Point: 2

Investigator(s): Greg Davis Section, Township, Range: Unsectioned Rancho San Juan Land Grant

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): None Slope (%): 0

Subregion (LRR): C Lat: 38.648943 Long: -121.327144 Datum: NAD83

Soil Map Unit Name: 227 - Urban Land NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No ✓
Hydric Soil Present?	Yes ____	No ✓
Wetland Hydrology Present?	Yes ____	No ✓

Is the Sampled Area within a Wetland? Yes ____ No ✓

Remarks:

Site is located adjacent to Winding Way at the downslope end of a small swale.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 25' x 25')			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 10' x 10')			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 10' x 10')			
1. Avena barbata	50	Y	NI
2. Phyla nodiflora	40	Y	FACW
3. Cichorium intybus	5		FACU
4. Convolvulus arvensis	5		NI
5.			
6.			
7.			
8.			
= Total Cover	100		
Woody Vine Stratum (Plot size: 10' x 10')			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ________ % Cover of Biotic Crust ________

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	40	x 2 = 80
FAC species	0	x 3 = 0
FACU species	5	x 4 = 20
UPL species	50	x 5 = 250
Column Totals:	100 (A)	350 (B)

Prevalence Index = B/A = 3.5

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks:

Hydrophytic vegetation was not present at this site.

SOIL

Sampling Point: 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/2	100	-	-	-	-	L	very gravelly
6-	REFUSAL							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Gravel/rock

Depth (inches): 6

Hydric Soil Present? Yes ______ No ✓

Remarks:

Hydric soils were not observed at this site.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): ____________

Water Table Present? Yes ______ No ✓ Depth (inches): ____________

Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): ____________

Wetland Hydrology Present? Yes ______ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology indicators were observed at this site.

Appendix F Preliminary Stormwater Quality Report

Preliminary Stormwater Quality Report

For:

Winding Ranch Commercial

Carmichael, CA

Project Address:
SEC Winding Way & Manzanita Ave
Carmichael, CA

Prepared by:
RSC Engineering, Inc.
1420 Rocky Ridge Dr., Suite 150
Roseville CA, 95661

Date:
December 1st, 2021

RSC Engineering, Inc.
Consulting Engineers

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Table of Contents

Appendices:

Appendix A – Low Impact Development (LID) Credit Spreadsheets

Appendix B – Preliminary Stormwater Quality Exhibit

Appendix C – Preliminary Impervious Area Exhibit

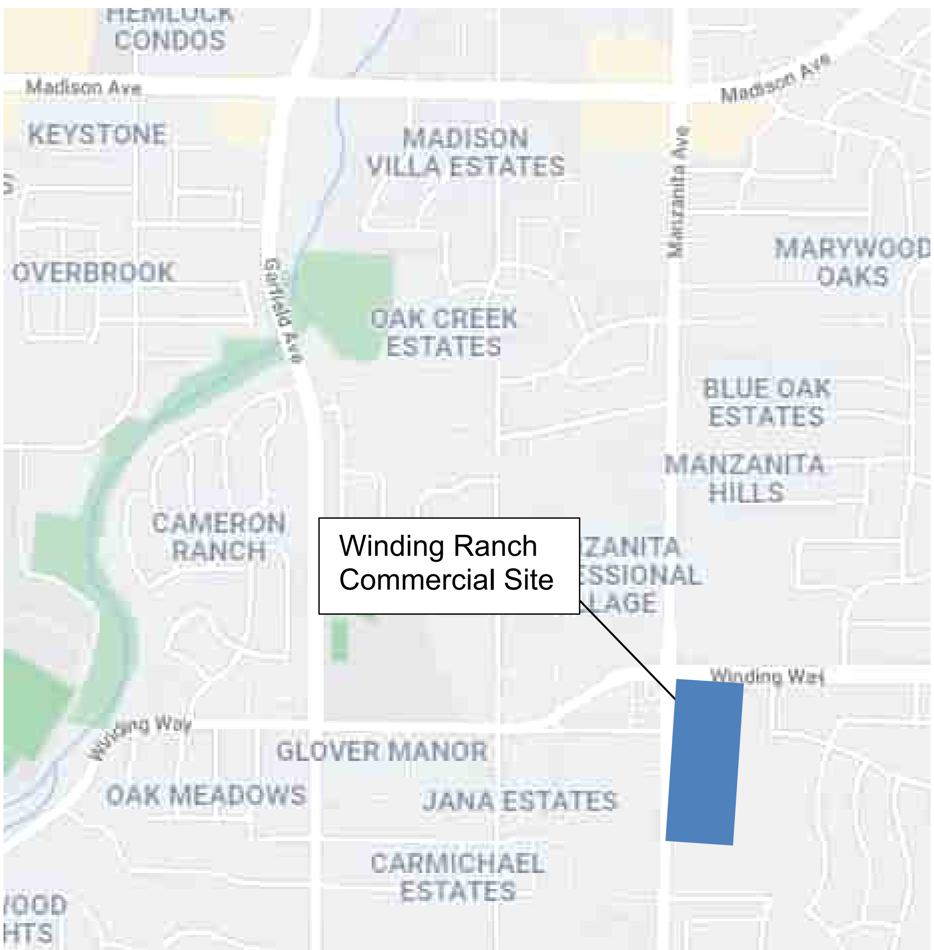
Appendix D – Contech Stormfilter Manufactures Drawings

Appendix E – Hydromodification Applicability Map

Introduction:

The approximately 6.8-acre Winding Ranch Commercial site is located South of Winding Way and East of Manzanita Ave. The existing site is an undeveloped plot. The proposed project consists of 6 buildings, 1 C-Store with fueling pumps and a carwash and 5 small commercial buildings with drive throughs. Existing site will be rough graded then graded, and asphalt parking lots and concrete walkways will be constructed to accommodate the new buildings. Stormwater planter facilities, disconnected roof drains, and Contech stormfilter units will be implemented across the site to achieve the stormwater treatment as required by the Stormwater Quality Design Manual for the Sacramento Region (SQDM). Each lot was treated as its own site thus LID is met per each site. See Appendix B for information on BMP locations.

Exhibit 1 - Vicinity Map:



Objective:

Develop sizing for stormwater planter facilities, dispersal trenches and Contech Units to satisfy the Stormwater quality and LID requirements of the SQDM.

Stormwater Treatment:

The proposed development at the project site consists of approximately 4.76 acres of new impervious cover. Where feasible, stormwater planter facilities and dispersal trenches will be placed to treat the runoff from each specific drainage shed. Where stormwater planters are not feasible due to space constraints topography, a Contech stormfilter units will be used to treat the runoff from that area.

The proposed stormwater planter facilities are sized with a 12” ponding depth, 18” of 0.5 porosity plant media, and 9” of 0.4 porosity gravel per the minimum requirements of the Stormwater Quality Design Manual. The stormwater planter facilities will have a ditch box inlet with a window elevation 12” above the finish grade for overflow and drainage control. The sizing of the storm water planters is shown in a table on the stormwater quality exhibit (Appendix B).

The project proposes to use a Contech Stormfilters units. The calculations are summarized in a table on the stormwater quality exhibit B2 (Appendix B). Manufactures info sheet for the unit is included in Appendix E.

LID Calculations:

Completed LID Spreadsheets for each lot are included in Appendix A1-A6. A spreadsheet was completed for the project to show compliance with the required LID point system. Step 1 of the spreadsheet was completed to show the amount of LID points that the developed site earns by the amount of landscaping and pervious area within the project site. As shown for each lot in Table 1. Refer to the pervious cover exhibit in Appendix C for the pervious area calculation.

Step 2 of the spreadsheet was completed to show the amount of LID points that the developed site earns by the amount of disconnected roof drains used on the project. This is only applicable to Lot 1. This provides 9 LID points.

Step 3 of the LID spread sheet was provided to show the amount of LID points that the project will earn from constructing treatment control facilities. For this calculation, the total bioretention area, subdrain elevation and ponding depth is used, the location of the stormwater planter facilities can be found in exhibit in Appendix B.

Table 1.

Lot Number	Precent Impervious	Resultant LID Points	Biortenetion Area Provided (s.f.)	Resultant LID Points	Total LID Points
1	77%	23	1655	69.1	100.9
2	70%	30	725	70.9	100.9
3	71%	29	800	84.3	112.9
4	67%	33	705	76.6	109.6
5	68%	32	745	83.6	115.9
6	70%	30	895	82.8	112.3

By adding the results of the 3 sections of the spreadsheets as discussed above, it was calculated that each lot is over 100 LID points as shown in Table 1. Therefore, each lot complies with the requirements of the SQDM.

Hydromodification

The Winding Ranch Commercial site is exempt from hydromodification due to its location according to the Hydromodification Management Plan Applicability Map (Appendix E) from the City of Sacramento.

Conclusions:

The Winding Ranch Commercial project will meet the water quality parameters and LID Points required by the Stormwater Quality Design Manual for the Sacramento Region by using stormwater planters, Contech Stormfilter units, and disconnected roof drains in strategic locations across the site. Completed LID worksheet demonstrates the required LID stormwater treatment points are met.

Appendix A1

Appendix D-2: Commercial Sites: Low Impact Development (LID) Credits and Treatment BMP Sizing Calculations

Name of Drainage Shed: Manzanita (Lot 1)

Location of project: Sacramento

Fill in Blue Highlighted boxes

Step 1 - Open Space and Pervious Area Credits

Is your project within the drainage area of a common drainage plan that includes open space? If not, skip to 1 b.

1 a. Common Drainage Plan Area	0	acres	A_{CDP}
Common Drainage Plan Open Space (Off-project)	0	acres	A_{OS}
a. Natural storage reservoirs and drainage corridors	0	acres	
b. Buffer zones for natural water bodies	0	acres	
c. Natural areas including existing trees, other vegetation, and soil	0	acres	
d. Common landscape area/park	0	acres	
e. Regional Flood Control/Drainage basins	0	acres	

see area example below

1 b. Project Drainage Shed Area (Total)	2.12	acres	A
Project-Specific Open Space (In-project, communal)**	0.48	acres	A_{PSOS}
a. Natural storage reservoirs and drainage corridors		acres	
b. Buffer zones for natural water bodies	0.00	acres	
c. Natural areas including existing trees, other vegetation, and soil	0.00	acres	
d. Landscape area/park	0.48	acres	
e. Flood Control/Drainage basins	0.00	acres	

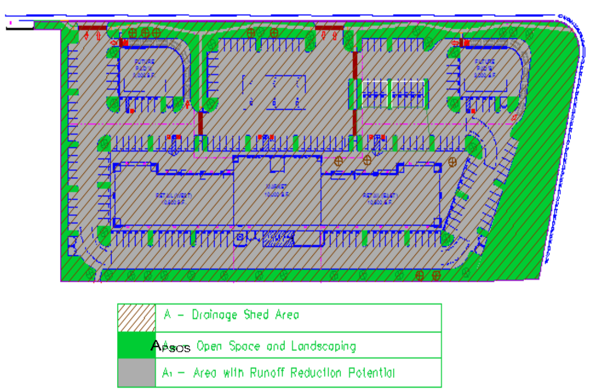
see area example below

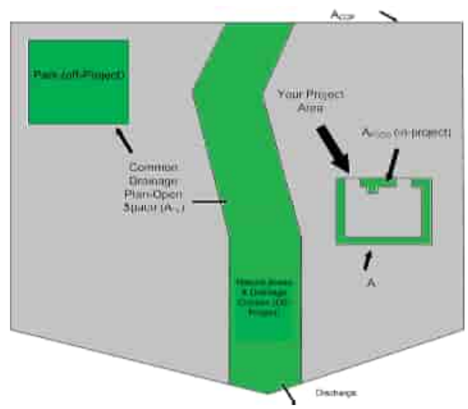
** Doesn't include impervious areas within individual lots and surrounding individual units. That is accounted for below using Form D-1a in Step 2.

Area with Runoff Reduction Potential	$A - A_{PSOS} =$	1.64	acres	A_T
Assumed Initial Impervious Fraction	$A_T / A =$	0.77		I

Open Space & Pervious Area LID Credit (Step 1)

$(A_{OS}/A_{CDP}+A_{PSOS}/A)x100 =$ 23 pts





Step 2 - Runoff Reduction Credits

Runoff Reduction Treatments	Impervious Area Managed			Efficiency Factor		Effective Area Managed (A_C)	
Porous Pavement:							
Option 1: Porous Pavement (see Fact Sheet, excludes porous pavement used in Option 2)	0	acres	x		=	0.000	acres
Option 2: Disconnected Pavement (see Fact Sheet, excludes porous pavement used in Option 1)	use Form D-2a for credits					0.00	acres
Landscaping used to Disconnect Pavement (see Fact Sheet)	0.0000	acres			=	0.00	acres
Disconnected Roof Drains (see Fact Sheet and/or Table D-2b for summary of requirements)	0.15	acres			=	0.15	acres
Ecoroof (see Fact Sheet)	0	acres			=	0.00	acres
Interceptor Trees (see Fact Sheet)	use Form D-2b for credits					0.00	acres
Total Effective Area Managed by Runoff Reduction Measures				A_C		0.15	acres
Runoff Reduction Credit (Step 2)				$(A_C / A_T)*100 =$		9	pts

Table D-2a

Porous Pavement Type	Efficiency Multiplier
Cobblestone Block Pavement	0.40
Pervious Concrete/Asphalt	0.60
Modular Block Pavement &	0.75
Reinforced Grass Pavement	1.00

Table D-2b

Maximum roof size	Minimum travel distance
≤ 3,500 sq ft	21 ft
≤ 5,000 sq ft	24 ft
≤ 7,500 sq ft	28 ft
≤ 10,000 sq ft	32 ft

Form D-2a: Disconnected Pavement Worksheet

See Fact Sheet for more information regarding Disconnected Pavement credit guidelines

Effective Area Managed (A_C)

Pavement Draining to Porous Pavement

2. Enter area draining onto Porous Pavement	0.00	acres	Box K1
3. Enter area of Receiving Porous Pavement (excludes area entered in Step 2 under Porous Pavement)	0.00	acres	Box K2
4. Ratio of Areas (Box K1 / Box K2)	0.00		Box K3

5. Select multiplier using ratio from Box K3 and enter into Box K4

Ratio (Box D)	Multiplier
Ratio is ≤ 0.5	1.00
Ratio is > 0.5 and < 1.0	0.83
Ratio is > 1.0 and < 1.5	0.71
Ratio is > 1.5 and < 2.0	0.55

Box K4: 1

6. Enter Efficiency of Porous Pavement (see table below) — Box K5

Porous Pavement Type	Efficiency Multiplier
Cobblestone Block Pavement	0.40
Pervious Concrete Asphalt Pavement	0.60
Modular Block Pavement Porous Gravel Pavement	0.75
Reinforced Grass Pavement	1.00

7. Multiply Box K2 by Box K5 and enter into Box K6	0.00	acres	Box K6
8. Multiply Boxes K1,K4, and K5 and enter the result in Box K7	0.00	acres	Box K7

9. Add Box K6 to Box K7 and multiply by 60%, and enter the Result in Box K8 — 0.00 acres
This is the amount of area credit to enter into the "Disconnected Pavement" Box of Form D-2

Form D-2b: Interceptor Tree Worksheet

See Fact Sheet for more information regarding Interceptor Tree credit guidelines

New Evergreen Trees

1. Enter number of new evergreen trees that qualify as Interceptor Trees in Box L1.		trees	Box L1
2. Multiply Box L1 by 200 and enter result in Box L2	0	sq. ft.	Box L2

New Deciduous Trees

3. Enter number of new deciduous trees that qualify as Interceptor Trees in Box L3.		trees	Box L3
4. Multiply Box L3 by 100 and enter result in Box L4	0	sq. ft.	Box L4

Existing Tree Canopy

5. Enter square footage of existing tree canopy that qualifies as Existing Tree canopy in Box L5.	0	sq. ft.	Box L5
6. Multiply Box L5 by 0.5 and enter the result in Box L6	0	sq. ft.	Box L6

Total Interceptor Tree EAM Credits

Add Boxes L2, L4, and L6 and enter it into Box L7	0	sq. ft.	Box L7
Divide Box L7 by 43,560 and multiply by 20% to get effective area managed and enter result in Box L8	0.00	acres	Box L8

This is the amount of area credit to enter into the "Interceptor Trees" Box of Form D-2

Step 3 - Runoff Management Credits

Capture and Use Credits

Impervious Area Managed by Rain barrels, Cisterns, and automatically-emptied systems

(see Fact Sheet) | - | enter gallons, for simple rain barrels | 0.00 | acres

Automated-Control Capture and Use System

(see Fact Sheet, then enter impervious area managed by the system) | 0.00 | acres

Bioretention/Infiltration Credits

Impervious Area Managed by Bioretention BMPs

(see Fact Sheet)

Bioretention Area	1,655	sq ft		
Subdrain Elevation	6	inches		
Ponding Depth, inches	12	inches	0.57	acres

Impervious Area Managed by Infiltration BMPs

(see Fact Sheet)

Drawdown Time, hrs		drawdown_hrs_inf		
Soil Infiltration Rate, in/hr		soil_inf_rate		
Sizing Option 1: Capture Volume, acre-ft	0.00	capture_vol_inf	0.00	acres
Sizing Option 2: Infiltration BMP surface area, sq ft	0	soil_surface_area	0.00	acres

Basin or trencher? | | approximate BMP depth | 0.00 | ft

Impervious Area Managed by Amended Soil or Mulch Beds

(see Fact Sheet) | Mulched Infiltration Area, sq ft | | mulch_area | 0.00 | acres

Total Effective Area Managed by Capture-and-Use/Bioretention/Infiltration BMPs | 0.57 | A_{LIDc}

Runoff Management Credit (Step 3) | $A_{LIDC}/A_T*200 =$ | 69.1 | pts

Total LID Credits (Step 1+2+3) | LID compliant, check for treatment sizing in Step 4 | 100.9

Does project require hydromodification management? If yes, proceed to using SacHM.

Adjusted Area for Flow-Based, Non-LID Treatment | $A_T - A_C - A_{LIDC} =$ | 0.92 | A_{AT}

Adjusted Impervious Fraction of A for Volume-Based, Non-LID Treatment | $A_{AT} / A =$ | 0.44 | I_A

Further treatment is required, see choose flow-based or volume-based sizing in Step 4

Step 4a Treatment - Flow-Based (Rational Method)

Calculate treatment flow (cfs): Flow = Runoff Coefficient x Rainfall Intensity x Area

Look up value for i in Table D-2c (Rainfall Intensity)	0.18	i
Obtain A_{AT} from Step 3	0.92	A_{AT}
Use C = 0.95	0.95	C
Flow = 0.95 * i * A_{AT}	0.16	cfs

Table D-2c

Rainfall Intensity			
Roseville	i =	0.20	in/hr
Sacramento	i =	0.18	in/hr
Folsom	i =	0.20	in/hr

Step 4b Treatment - Volume-Based (ASCE-WEF)

Calculate water quality volume (Acre-Feet): WQV = Area x Maximized Detention Volume (P_0)

Obtain A from Step 1	2.12	A
Obtain P_0: Maximized Detention Volume from figures E-1 to E-4 in Appendix E of this manual using I_A from Step 2.	0.32	P_0
Calculate treatment volume (acre-ft): **Treatment volume = A x (P_0 / 12)**	0.06	Acre-Feet

| | hrs | Specified Draw Down time

v06232012

Appendix A2

Appendix D-2: Commercial Sites: Low Impact Development (LID) Credits and Treatment BMP Sizing Calculations

Name of Drainage Shed: Manzanita (Lot 2)

Location of project: Sacramento

Fill in Blue Highlighted boxes

Step 1 - Open Space and Pervious Area Credits

Is your project within the drainage area of a common drainage plan that includes open space? If not, skip to 1 b.

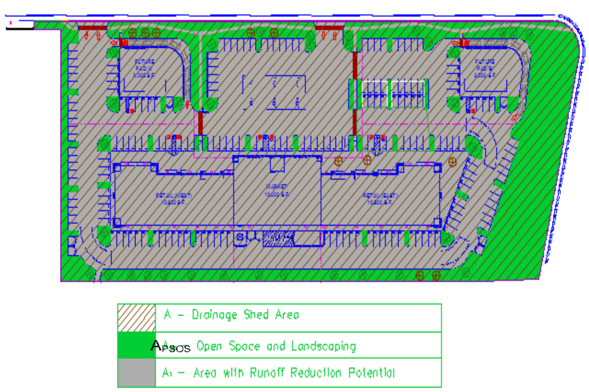
1 a. Common Drainage Plan Area	0	acres	A_{CDP}	
Common Drainage Plan Open Space (Off-project)	0	acres	A_{OS}	**see area example below**
a. Natural storage reservoirs and drainage corridors	0	acres		
b. Buffer zones for natural water bodies	0	acres		
c. Natural areas including existing trees, other vegetation, and soil	0	acres		
d. Common landscape area/park	0	acres		
e. Regional Flood Control/Drainage basins	0	acres		
1 b. Project Drainage Shed Area (Total)	1.00	acres	A	
Project-Specific Open Space (In-project, communal)**	0.30	acres	A_{PSOS}	**see area example below**
a. Natural storage reservoirs and drainage corridors		acres		
b. Buffer zones for natural water bodies	0.00	acres		
c. Natural areas including existing trees, other vegetation, and soil	0.00	acres		
d. Landscape area/park	0.30	acres		
e. Flood Control/Drainage basins	0.00	acres		

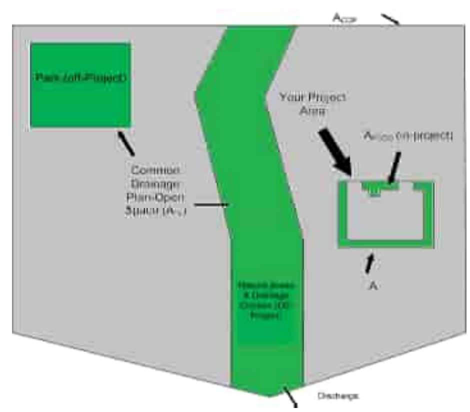
** Doesn't include impervious areas within individual lots and surrounding individual units. That is accounted for below using Form D-1a in Step 2.

Area with Runoff Reduction Potential	$A - A_{PSOS}$ =	0.70	acres	A_T
Assumed Initial Impervious Fraction	A_T / A =	0.70		I

Open Space & Pervious Area LID Credit (Step 1)

$(A_{OS}/A_{CDP}+A_{PSOS}/A)$x100 = 30 pts





Step 2 - Runoff Reduction Credits

Runoff Reduction Treatments	Impervious Area Managed			Efficiency Factor		Effective Area Managed (A_C)	
Porous Pavement:							
Option 1: Porous Pavement (see Fact Sheet, excludes porous pavement used in Option 2)	0	acres	x		=	0.000	acres
Option 2: Disconnected Pavement (see Fact Sheet, excludes porous pavement used in Option 1)	use Form D-2a for credits			→		0.00	acres
Landscaping used to Disconnect Pavement (see Fact Sheet)	0.0000	acres			=	0.00	acres
Disconnected Roof Drains (see Fact Sheet and/or Table D-2b for summary of requirements)		acres			=	0.00	acres
Ecoroof (see Fact Sheet)	0	acres			=	0.00	acres
Interceptor Trees (see Fact Sheet)	use Form D-2b for credits			→		0.00	acres
Total Effective Area Managed by Runoff Reduction Measures				A_C		0.00	acres
Runoff Reduction Credit (Step 2)				(A_C / A_T)*100 =		0	pts

Table D-2a

Porous Pavement Type	Efficiency Multiplier
Cobblestone Block Pavement	0.40
Pervious Concrete/Asphalt	0.60
Modular Block Pavement &	0.75
Reinforced Grass Pavement	1.00

Table D-2b

Maximum roof size	Minimum travel distance
≤ 3,500 sq ft	21 ft
≤ 5,000 sq ft	24 ft
≤ 7,500 sq ft	28 ft
≤ 10,000 sq ft	32 ft

Form D-2a: Disconnected Pavement Worksheet

See Fact Sheet for more information regarding Disconnected Pavement credit guidelines

Effective Area Managed (A_C)

Pavement Draining to Porous Pavement

2. Enter area draining onto Porous Pavement	0.00	acres	Box K1
3. Enter area of Receiving Porous Pavement (excludes area entered in Step 2 under Porous Pavement)	0.00	acres	Box K2
4. Ratio of Areas (Box K1 / Box K2)	0.00		Box K3

5. Select multiplier using ratio from Box K3 and enter into Box K4

Ratio (Box D)	Multiplier
Ratio is ≤ 0.5	1.00
Ratio is > 0.5 and < 1.0	0.83
Ratio is > 1.0 and < 1.5	0.71
Ratio is > 1.5 and < 2.0	0.55

Box K4: 1

6. Enter Efficiency of Porous Pavement (see table below) — Box K5

Porous Pavement Type	Efficiency Multiplier
Cobblestone Block Pavement	0.40
Pervious Concrete Asphalt Pavement	0.60
Modular Block Pavement Porous Gravel Pavement	0.75
Reinforced Grass Pavement	1.00

7. Multiply Box K2 by Box K5 and enter into Box K6	0.00	acres	Box K6
8. Multiply Boxes K1,K4, and K5 and enter the result in Box K7	0.00	acres	Box K7

9. Add Box K6 to Box K7 and multiply by 60%, and enter the Result in Box K8 — 0.00 acres

This is the amount of area credit to enter into the "Disconnected Pavement" Box of Form D-2

Form D-2b: Interceptor Tree Worksheet

See Fact Sheet for more information regarding Interceptor Tree credit guidelines

New Evergreen Trees

1. Enter number of new evergreen trees that qualify as Interceptor Trees in Box L1.		trees	Box L1
2. Multiply Box L1 by 200 and enter result in Box L2	0	sq. ft.	Box L2

New Deciduous Trees

3. Enter number of new deciduous trees that qualify as Interceptor Trees in Box L3.		trees	Box L3
4. Multiply Box L3 by 100 and enter result in Box L4	0	sq. ft.	Box L4

Existing Tree Canopy

5. Enter square footage of existing tree canopy that qualifies as Existing Tree canopy in Box L5.	0	sq. ft.	Box L5
6. Multiply Box L5 by 0.5 and enter the result in Box L6	0	sq. ft.	Box L6

Total Interceptor Tree EAM Credits

Add Boxes L2, L4, and L6 and enter it into Box L7	0	sq. ft.	Box L7
Divide Box L7 by 43,560 and multiply by 20% to get effective area managed and enter result in Box L8	0.00	acres	Box L8

This is the amount of area credit to enter into the "Interceptor Trees" Box of Form D-2

Step 3 - Runoff Management Credits

Capture and Use Credits

Impervious Area Managed by Rain barrels, Cisterns, and automatically-emptied systems

(see Fact Sheet) | - | enter gallons, for simple rain barrels | 0.00 | acres

Automated-Control Capture and Use System

(see Fact Sheet, then enter impervious area managed by the system) | 0.00 | acres

Bioretention/Infiltration Credits

Impervious Area Managed by Bioretention BMPs

(see Fact Sheet)

Bioretention Area	725	sq ft		
Subdrain Elevation	6	inches		
Ponding Depth, inches	12	inches	0.25	acres

Impervious Area Managed by Infiltration BMPs

(see Fact Sheet)

Drawdown Time, hrs		drawdown_hrs_inf		
Soil Infiltration Rate, in/hr		soil_inf_rate		
Sizing Option 1: Capture Volume, acre-ft	0.00	capture_vol_inf	0.00	acres
Sizing Option 2: Infiltration BMP surface area, sq ft	0	soil_surface_area	0.00	acres

Basin or trench? | approximate BMP depth 0.00 ft

Impervious Area Managed by Amended Soil or Mulch Beds

(see Fact Sheet) | Mulched Infiltration Area, sq ft | mulch_area | 0.00 | acres

Total Effective Area Managed by Capture-and-Use/Bioretention/Infiltration BMPs | 0.25 | A_{LIDC}

Runoff Management Credit (Step 3) | A_{LIDC}/A_T*200 = 70.9 | pts

Total LID Credits (Step 1+2+3) LID compliant, check for treatment sizing in Step 4 100.9

Does project require hydromodification management? If yes, proceed to using SacHM.

Adjusted Area for Flow-Based, Non-LID Treatment | $A_T - A_C - A_{LIDC}$ = 0.45 | A_{AT}

Adjusted Impervious Fraction of A for Volume-Based, Non-LID Treatment | A_{AT} / A = 0.45 | I_A

Further treatment is required, see choose flow-based or volume-based sizing in Step 4

Step 4a Treatment - Flow-Based (Rational Method)

Calculate treatment flow (cfs): Flow = Runoff Coefficient x Rainfall Intensity x Area

Look up value for i in Table D-2c (Rainfall Intensity)	0.18	i
Obtain A_{AT} from Step 3	0.45	A_{AT}
Use C = 0.95	0.95	C
Flow = 0.95 * i * A_{AT}	0.08	cfs

Table D-2c

Rainfall Intensity			
Roseville	i =	0.20	in/hr
Sacramento	i =	0.18	in/hr
Folsom	i =	0.20	in/hr

Step 4b Treatment - Volume-Based (ASCE-WEF)

Calculate water quality volume (Acre-Feet): WQV = Area x Maximized Detention Volume (P_0)

Obtain A from Step 1	1.00	A
Obtain P_0: Maximized Detention Volume from figures E-1 to E-4 in Appendix E of this manual using I_A from Step 2.	0.33	P_0
Calculate treatment volume (acre-ft): **Treatment volume = A x (P_0 / 12)**	0.03	Acre-Feet

hrs Specified Draw Down time

v06232012

Appendix A3

Appendix D-2: Commercial Sites: Low Impact Development (LID) Credits and Treatment BMP Sizing Calculations

Name of Drainage Shed: Manzanita (Lot 3)

Fill in Blue Highlighted boxes

Location of project: Sacramento

Step 1 - Open Space and Pervious Area Credits

Is your project within the drainage area of a common drainage plan that includes open space? If not, skip to 1 b.

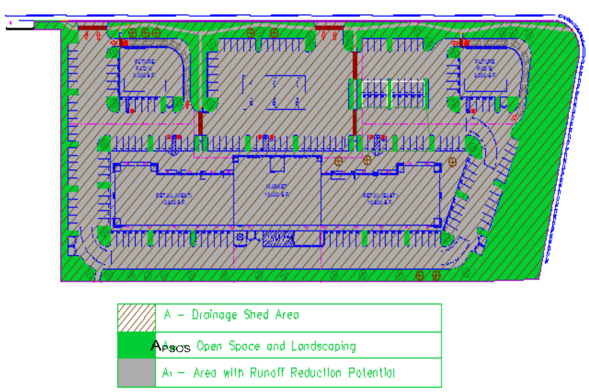
1 a. Common Drainage Plan Area		0	acres	A_{CDP}
Common Drainage Plan Open Space (Off-project)		0	acres	A_{OS}
a. Natural storage reservoirs and drainage corridors		0	acres	
b. Buffer zones for natural water bodies		0	acres	
c. Natural areas including existing trees, other vegetation, and soil		0	acres	
d. Common landscape area/park		0	acres	
e. Regional Flood Control/Drainage basins		0	acres	
1 b. Project Drainage Shed Area (Total)		0.91	acres	A
Project-Specific Open Space (In-project, communal)**		0.26	acres	A_{PSOS}
a. Natural storage reservoirs and drainage corridors			acres	
b. Buffer zones for natural water bodies		0.00	acres	
c. Natural areas including existing trees, other vegetation, and soil		0.00	acres	
d. Landscape area/park		0.26	acres	
e. Flood Control/Drainage basins		0.00	acres	

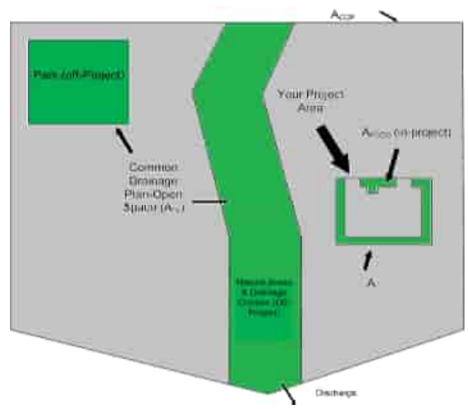
see area example below

see area example below

** Doesn't include impervious areas within individual lots and surrounding individual units. That is accounted for below using Form D-1a in Step 2.

Area with Runoff Reduction Potential	$A - A_{PSOS}$ =	0.65	acres	A_T
Assumed Initial Impervious Fraction	A_T / A =	0.71		I
Open Space & Pervious Area LID Credit (Step 1)	$(A_{OS}/A_{CDP}+A_{PSOS}/A)\times100$ =	29	pts	





Step 2 - Runoff Reduction Credits

Runoff Reduction Treatments	Impervious Area Managed			Efficiency Factor		Effective Area Managed (A_C)	
Porous Pavement:							
Option 1: Porous Pavement (see Fact Sheet, excludes porous pavement used in Option 2)	0	acres	x		=	0.000	acres
Option 2: Disconnected Pavement (see Fact Sheet, excludes porous pavement used in Option 1)	use Form D-2a for credits			→		0.00	acres
Landscaping used to Disconnect Pavement (see Fact Sheet)	0.0000	acres			=	0.00	acres
Disconnected Roof Drains (see Fact Sheet and/or Table D-2b for summary of requirements)		acres			=	0.00	acres
Ecoroof (see Fact Sheet)	0	acres			=	0.00	acres
Interceptor Trees (see Fact Sheet)	use Form D-2b for credits			→		0.00	acres
Total Effective Area Managed by Runoff Reduction Measures				A_C		0.00	acres
Runoff Reduction Credit (Step 2)				$(A_C / A_T)*100$ =		0	pts

Table D-2a

Porous Pavement Type	Efficiency Multiplier
Cobblestone Block Pavement	0.40
Pervious Concrete/Asphalt	0.60
Modular Block Pavement &	0.75
Reinforced Grass Pavement	1.00

Table D-2b

Maximum roof size	Minimum travel distance
≤ 3,500 sq ft	21 ft
≤ 5,000 sq ft	24 ft
≤ 7,500 sq ft	28 ft
≤ 10,000 sq ft	32 ft

Form D-2a: Disconnected Pavement Worksheet

See Fact Sheet for more information regarding Disconnected Pavement credit guidelines

Effective Area Managed (A_C)

Pavement Draining to Porous Pavement

2. Enter area draining onto Porous Pavement — 0.00 acres — Box K1

3. Enter area of Receiving Porous Pavement — 0.00 acres — Box K2
(excludes area entered in Step 2 under Porous Pavement)

4. Ratio of Areas (Box K1 / Box K2) — 0.00 — Box K3

5. Select multiplier using ratio from Box K3 and enter into Box K4

Ratio (Box D)	Multiplier
Ratio is ≤ 0.5	1.00
Ratio is > 0.5 and < 1.0	0.83
Ratio is > 1.0 and < 1.5	0.71
Ratio is > 1.5 and < 2.0	0.55

1 — Box K4

6. Enter Efficiency of Porous Pavement (see table below) — Box K5

Porous Pavement Type	Efficiency Multiplier
Cobblestone Block Pavement	0.40
Pervious Concrete Asphalt Pavement	0.60
Modular Block Pavement Porous Gravel Pavement	0.75
Reinforced Grass Pavement	1.00

7. Multiply Box K2 by Box K5 and enter into Box K6 — 0.00 acres — Box K6

8. Multiply Boxes K1,K4, and K5 and enter the result in Box K7 — 0.00 acres — Box K7

9. Add Box K6 to Box K7 and multiply by 60%, and enter the Result in Box K8 — 0.00 acres
This is the amount of area credit to enter into the "Disconnected Pavement" Box of Form D-2

Form D-2b: Interceptor Tree Worksheet

See Fact Sheet for more information regarding Interceptor Tree credit guidelines

New Evergreen Trees

1. Enter number of new evergreen trees that qualify as Interceptor Trees in Box L1. — trees — Box L1

2. Multiply Box L1 by 200 and enter result in Box L2 — 0 sq. ft. — Box L2

New Deciduous Trees

3. Enter number of new deciduous trees that qualify as Interceptor Trees in Box L3. — trees — Box L3

4. Multiply Box L3 by 100 and enter result in Box L4 — 0 sq. ft. — Box L4

Existing Tree Canopy

5. Enter square footage of existing tree canopy that qualifies as Existing Tree canopy in Box L5. — 0 sq. ft. — Box L5

6. Multiply Box L5 by 0.5 and enter the result in Box L6 — 0 sq. ft. — Box L6

Total Interceptor Tree EAM Credits

Add Boxes L2, L4, and L6 and enter it into Box L7 — 0 sq. ft. — Box L7

Divide Box L7 by 43,560 and multiply by 20% to get effective area managed and enter result in Box L8 — 0.00 acres — Box L8
This is the amount of area credit to enter into the "Interceptor Trees" Box of Form D-2

Step 3 - Runoff Management Credits

Capture and Use Credits

Impervious Area Managed by Rain barrels, Cisterns, and automatically-emptied systems

(see Fact Sheet) | - | enter gallons, for simple rain barrels | 0.00 | acres

Automated-Control Capture and Use System

(see Fact Sheet, then enter impervious area managed by the system) | 0.00 | acres

Bioretention/Infiltration Credits

Impervious Area Managed by Bioretention BMPs

(see Fact Sheet)

Bioretention Area	800	sq ft		
Subdrain Elevation	6	inches		
Ponding Depth, inches	12	inches	0.27	acres

Impervious Area Managed by Infiltration BMPs

(see Fact Sheet)

Drawdown Time, hrs		drawdown_hrs_inf		
Soil Infiltration Rate, in/hr		soil_inf_rate		
Sizing Option 1: Capture Volume, acre-ft	0.00	capture_vol_inf	0.00	acres
Sizing Option 2: Infiltration BMP surface area, sq ft	0	soil_surface_area	0.00	acres

Basin or trench? | approximate BMP depth 0.00 ft

Impervious Area Managed by Amended Soil or Mulch Beds

(see Fact Sheet) | Mulched Infiltration Area, sq ft | | mulch_area | 0.00 | acres

Total Effective Area Managed by Capture-and-Use/Bioretention/Infiltration BMPs | 0.27 | A_{LIDc}

Runoff Management Credit (Step 3) | $A_{LIDC}/A_T*200 =$ 84.3 | pts

Total LID Credits (Step 1+2+3) — LID compliant, check for treatment sizing in Step 4 — 112.9

Does project require hydromodification management? If yes, proceed to using SacHM.

Adjusted Area for Flow-Based, Non-LID Treatment | $A_T - A_C - A_{LIDC} =$ 0.38 | A_{AT}

Adjusted Impervious Fraction of A for Volume-Based, Non-LID Treatment | $A_{AT} / A =$ 0.41 | I_A

Further treatment is required, see choose flow-based or volume-based sizing in Step 4

Step 4a Treatment - Flow-Based (Rational Method)

Calculate treatment flow (cfs): Flow = Runoff Coefficient x Rainfall Intensity x Area

Look up value for i in Table D-2c (Rainfall Intensity)	0.18	i
Obtain A_{AT} from Step 3	0.38	A_{AT}
Use C = 0.95	0.95	C
Flow = 0.95 * i * A_{AT}	0.06	cfs

Table D-2c

Rainfall Intensity			
Roseville	i =	0.20	in/hr
Sacramento	i =	0.18	in/hr
Folsom	i =	0.20	in/hr

Step 4b Treatment - Volume-Based (ASCE-WEF)

Calculate water quality volume (Acre-Feet): WQV = Area x Maximized Detention Volume (P_0)

Obtain A from Step 1	0.91	A
Obtain P_0: Maximized Detention Volume from figures E-1 to E-4 in Appendix E of this manual using I_A from Step 2.	0.31	P_0
Calculate treatment volume (acre-ft): **Treatment volume = A x (P_0 / 12)**	0.02	Acre-Feet

hrs — Specified Draw Down time

v06232012

Appendix A4

Appendix D-2: Commercial Sites: Low Impact Development (LID) Credits and Treatment BMP Sizing Calculations

Name of Drainage Shed: Manzanita (Lot 4) — Fill in Blue Highlighted boxes

Location of project: Sacramento

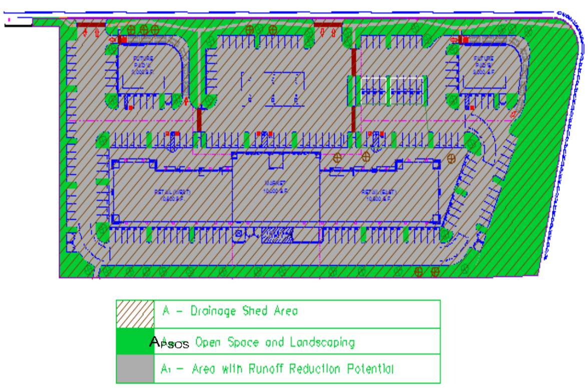
Step 1 - Open Space and Pervious Area Credits

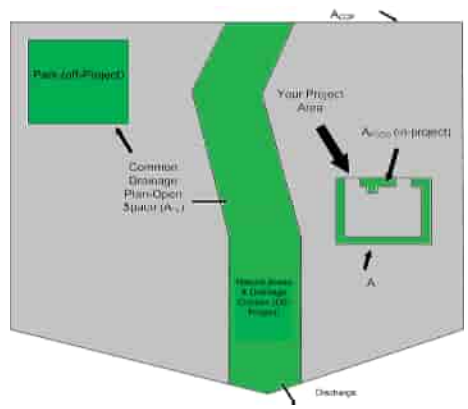
Is your project within the drainage area of a common drainage plan that includes open space? If not, skip to 1 b.

1 a. Common Drainage Plan Area	0	acres	A_{CDP}	
Common Drainage Plan Open Space (Off-project)	0	acres	A_{OS}	**see area example below**
a. Natural storage reservoirs and drainage corridors	0	acres		
b. Buffer zones for natural water bodies	0	acres		
c. Natural areas including existing trees, other vegetation, and soil	0	acres		
d. Common landscape area/park	0	acres		
e. Regional Flood Control/Drainage basins	0	acres		
1 b. Project Drainage Shed Area (Total)	0.94	acres	A	
Project-Specific Open Space (In-project, communal)**	0.31	acres	A_{PSOS}	**see area example below**
a. Natural storage reservoirs and drainage corridors		acres		
b. Buffer zones for natural water bodies	0.00	acres		
c. Natural areas including existing trees, other vegetation, and soil	0.00	acres		
d. Landscape area/park	0.31	acres		
e. Flood Control/Drainage basins	0.00	acres		

** Doesn't include impervious areas within individual lots and surrounding individual units. That is accounted for below using Form D-1a in Step 2.

Area with Runoff Reduction Potential	$A - A_{PSOS} =$	0.63	acres	A_T
Assumed Initial Impervious Fraction	$A_T / A =$	0.67		I
Open Space & Pervious Area LID Credit (Step 1)	$(A_{OS}/A_{CDP}+A_{PSOS}/A)\times100 =$	33	pts	





Step 2 - Runoff Reduction Credits

Runoff Reduction Treatments	Impervious Area Managed			Efficiency Factor		Effective Area Managed (A_C)	
Porous Pavement:							
Option 1: Porous Pavement (see Fact Sheet, excludes porous pavement used in Option 2)	0	acres	x		=	0.000	acres
Option 2: Disconnected Pavement (see Fact Sheet, excludes porous pavement used in Option 1)	use Form D-2a for credits	→				0.00	acres
Landscaping used to Disconnect Pavement (see Fact Sheet)	0.0000	acres			=	0.00	acres
Disconnected Roof Drains (see Fact Sheet and/or Table D-2b for summary of requirements)		acres			=	0.00	acres
Ecoroof (see Fact Sheet)	0	acres			=	0.00	acres
Interceptor Trees (see Fact Sheet)	use Form D-2b for credits	→				0.00	acres
Total Effective Area Managed by Runoff Reduction Measures				A_C		0.00	acres
Runoff Reduction Credit (Step 2)				$(A_C / A_T)*100 =$		0	pts

Table D-2a

Porous Pavement Type	Efficiency Multiplier
Cobblestone Block Pavement	0.40
Pervious Concrete/Asphalt	0.60
Modular Block Pavement &	0.75
Reinforced Grass Pavement	1.00

Table D-2b

Maximum roof size	Minimum travel distance
≤ 3,500 sq ft	21 ft
≤ 5,000 sq ft	24 ft
≤ 7,500 sq ft	28 ft
≤ 10,000 sq ft	32 ft

Form D-2a: Disconnected Pavement Worksheet

See Fact Sheet for more information regarding Disconnected Pavement credit guidelines

Effective Area Managed (A_C)

Pavement Draining to Porous Pavement

2. Enter area draining onto Porous Pavement — 0.00 acres — Box K1

3. Enter area of Receiving Porous Pavement — 0.00 acres — Box K2
(excludes area entered in Step 2 under Porous Pavement)

4. Ratio of Areas (Box K1 / Box K2) — 0.00 — Box K3

5. Select multiplier using ratio from Box K3 and enter into Box K4 — 1 — Box K4

Ratio (Box D)	Multiplier
Ratio is ≤ 0.5	1.00
Ratio is > 0.5 and < 1.0	0.83
Ratio is > 1.0 and < 1.5	0.71
Ratio is > 1.5 and < 2.0	0.55

6. Enter Efficiency of Porous Pavement (see table below) — Box K5

Porous Pavement Type	Efficiency Multiplier
Cobblestone Block Pavement	0.40
Pervious Concrete Asphalt Pavement	0.60
Modular Block Pavement Porous Gravel Pavement	0.75
Reinforced Grass Pavement	1.00

7. Multiply Box K2 by Box K5 and enter into Box K6 — 0.00 acres — Box K6

8. Multiply Boxes K1,K4, and K5 and enter the result in Box K7 — 0.00 acres — Box K7

9. Add Box K6 to Box K7 and multiply by 60%, and enter the Result in Box K8 — 0.00 acres
This is the amount of area credit to enter into the "Disconnected Pavement" Box of Form D-2

Form D-2b: Interceptor Tree Worksheet

See Fact Sheet for more information regarding Interceptor Tree credit guidelines

New Evergreen Trees

1. Enter number of new evergreen trees that qualify as Interceptor Trees in Box L1. — trees — Box L1

2. Multiply Box L1 by 200 and enter result in Box L2 — 0 sq. ft. — Box L2

New Deciduous Trees

3. Enter number of new deciduous trees that qualify as Interceptor Trees in Box L3. — trees — Box L3

4. Multiply Box L3 by 100 and enter result in Box L4 — 0 sq. ft. — Box L4

Existing Tree Canopy

5. Enter square footage of existing tree canopy that qualifies as Existing Tree canopy in Box L5. — 0 sq. ft. — Box L5

6. Multiply Box L5 by 0.5 and enter the result in Box L6 — 0 sq. ft. — Box L6

Total Interceptor Tree EAM Credits

Add Boxes L2, L4, and L6 and enter it into Box L7 — 0 sq. ft. — Box L7

Divide Box L7 by 43,560 and multiply by 20% to get effective area managed and enter result in Box L8 — 0.00 acres — Box L8
This is the amount of area credit to enter into the "Interceptor Trees" Box of Form D-2

Step 3 - Runoff Management Credits

Capture and Use Credits

Impervious Area Managed by Rain barrels, Cisterns, and automatically-emptied systems

(see Fact Sheet) | - | enter gallons, for simple rain barrels | 0.00 | acres

Automated-Control Capture and Use System

(see Fact Sheet, then enter impervious area managed by the system) | 0.00 | acres

Bioretention/Infiltration Credits

Impervious Area Managed by Bioretention BMPs

(see Fact Sheet)

Bioretention Area	705	sq ft		
Subdrain Elevation	6	inches		
Ponding Depth, inches	12	inches	0.24	acres

Impervious Area Managed by Infiltration BMPs

(see Fact Sheet)

Drawdown Time, hrs		drawdown_hrs_inf		
Soil Infiltration Rate, in/hr		soil_inf_rate		
Sizing Option 1: Capture Volume, acre-ft	0.00	capture_vol_inf	0.00	acres
Sizing Option 2: Infiltration BMP surface area, sq ft	0	soil_surface_area	0.00	acres

Basin or trench? | approximate BMP depth 0.00 ft

Impervious Area Managed by Amended Soil or Mulch Beds

(see Fact Sheet) | Mulched Infiltration Area, sq ft | | mulch_area | 0.00 | acres

Total Effective Area Managed by Capture-and-Use/Bioretention/Infiltration BMPs | 0.24 | A_{LIDc}

Runoff Management Credit (Step 3) | A_{LIDC}/A_T*200 = | 76.6 | pts

Total LID Credits (Step 1+2+3) LID compliant, check for treatment sizing in Step 4 109.6

Does project require hydromodification management? If yes, proceed to using SacHM.

Adjusted Area for Flow-Based, Non-LID Treatment | A_T - A_C -A_{LIDC} = | 0.39 | A_{AT}

Adjusted Impervious Fraction of A for Volume-Based, Non-LID Treatment | A_{AT} / A = | 0.41 | I_A

Further treatment is required, see choose flow-based or volume-based sizing in Step 4

Step 4a Treatment - Flow-Based (Rational Method)

Calculate treatment flow (cfs): Flow = Runoff Coefficient x Rainfall Intensity x Area

Look up value for i in Table D-2c (Rainfall Intensity)	0.18	i
Obtain A_{AT} from Step 3	0.39	A_{AT}
Use C = 0.95	0.95	C
Flow = 0.95 * i * A_{AT}	0.07	cfs

Table D-2c

Rainfall Intensity			
Roseville	i =	0.20	in/hr
Sacramento	i =	0.18	in/hr
Folsom	i =	0.20	in/hr

Step 4b Treatment - Volume-Based (ASCE-WEF)

Calculate water quality volume (Acre-Feet): WQV = Area x Maximized Detention Volume (P_0)

Obtain A from Step 1	0.94	A
Obtain P_0: Maximized Detention Volume from figures E-1 to E-4 in Appendix E of this manual using I_A from Step 2.	0.31	P_0
Calculate treatment volume (acre-ft): **Treatment volume = A x (P_0 / 12)**	0.02	Acre-Feet

hrs Specified Draw Down time

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Appendix A5

Appendix D-2: Commercial Sites: Low Impact Development (LID) Credits and Treatment BMP Sizing Calculations

Name of Drainage Shed: Manzanita (lot 5)

Location of project: Sacramento

Fill in Blue Highlighted boxes

Step 1 - Open Space and Pervious Area Credits

Is your project within the drainage area of a common drainage plan that includes open space? If not, skip to 1 b.

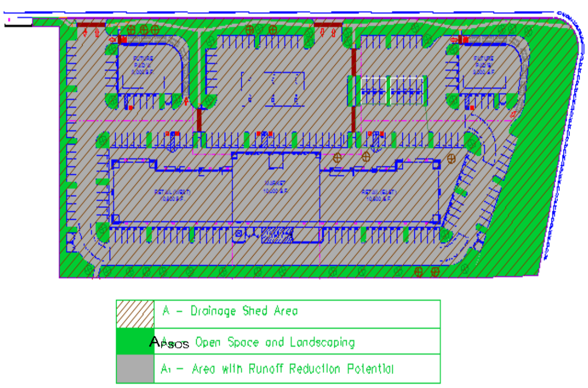
1 a. Common Drainage Plan Area		0	acres	A_{CDP}
Common Drainage Plan Open Space (Off-project)		0	acres	A_{OS}
a. Natural storage reservoirs and drainage corridors		0	acres	
b. Buffer zones for natural water bodies		0	acres	
c. Natural areas including existing trees, other vegetation, and soil		0	acres	
d. Common landscape area/park		0	acres	
e. Regional Flood Control/Drainage basins		0	acres	
1 b. Project Drainage Shed Area (Total)		0.90	acres	A
Project-Specific Open Space (In-project, communal)**		0.29	acres	A_{PSOS}
a. Natural storage reservoirs and drainage corridors			acres	
b. Buffer zones for natural water bodies		0.00	acres	
c. Natural areas including existing trees, other vegetation, and soil		0.00	acres	
d. Landscape area/park		0.29	acres	
e. Flood Control/Drainage basins		0.00	acres	

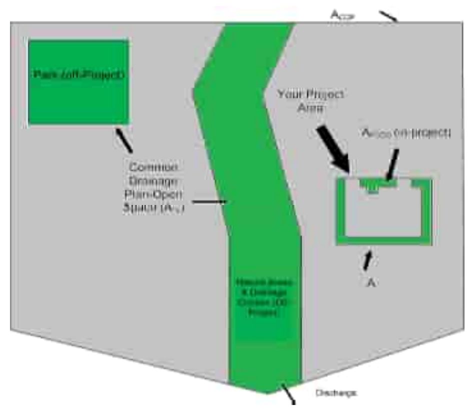
see area example below (Common Drainage Plan Open Space)

see area example below (Project-Specific Open Space)

** Doesn't include impervious areas within individual lots and surrounding individual units. That is accounted for below using Form D-1a in Step 2.

Area with Runoff Reduction Potential	$A - A_{PSOS} =$	0.61	acres	A_T
Assumed Initial Impervious Fraction	$A_T / A =$	0.68		I
Open Space & Pervious Area LID Credit (Step 1)	$(A_{OS}/A_{CDP}+A_{PSOS}/A)\times100 =$	32	pts	





Step 2 - Runoff Reduction Credits

Runoff Reduction Treatments	Impervious Area Managed			Efficiency Factor		Effective Area Managed (A_C)	
Porous Pavement:							
Option 1: Porous Pavement (see Fact Sheet, excludes porous pavement used in Option 2)	0	acres	x		=	0.000	acres
Option 2: Disconnected Pavement use Form D-2a for credits (see Fact Sheet, excludes porous pavement used in Option 1)						0.00	acres
Landscaping used to Disconnect Pavement (see Fact Sheet)	0.0000	acres			=	0.00	acres
Disconnected Roof Drains (see Fact Sheet and/or Table D-2b for summary of requirements)		acres			=	0.00	acres
Ecoroof (see Fact Sheet)	0	acres			=	0.00	acres
Interceptor Trees use Form D-2b for credits (see Fact Sheet)						0.00	acres
Total Effective Area Managed by Runoff Reduction Measures				A_C		0.00	acres
Runoff Reduction Credit (Step 2)				$(A_C / A_T)*100 =$		0	pts

Table D-2a

Porous Pavement Type	Efficiency Multiplier
Cobblestone Block Pavement	0.40
Pervious Concrete/Asphalt	0.60
Modular Block Pavement &	0.75
Reinforced Grass Pavement	1.00

Table D-2b

Maximum roof size	Minimum travel distance
≤ 3,500 sq ft	21 ft
≤ 5,000 sq ft	24 ft
≤ 7,500 sq ft	28 ft
≤ 10,000 sq ft	32 ft

Form D-2a: Disconnected Pavement Worksheet

See Fact Sheet for more information regarding Disconnected Pavement credit guidelines

Effective Area Managed (A_C)

Pavement Draining to Porous Pavement

2. Enter area draining onto Porous Pavement — 0.00 acres — Box K1

3. Enter area of Receiving Porous Pavement — 0.00 acres — Box K2
(excludes area entered in Step 2 under Porous Pavement)

4. Ratio of Areas (Box K1 / Box K2) — 0.00 — Box K3

5. Select multiplier using ratio from Box K3 and enter into Box K4

Ratio (Box D)	Multiplier
Ratio is ≤ 0.5	1.00
Ratio is > 0.5 and < 1.0	0.83
Ratio is > 1.0 and < 1.5	0.71
Ratio is > 1.5 and < 2.0	0.55

1 — Box K4

6. Enter Efficiency of Porous Pavement (see table below) — Box K5

Porous Pavement Type	Efficiency Multiplier
Cobblestone Block Pavement	0.40
Pervious Concrete Asphalt Pavement	0.60
Modular Block Pavement Porous Gravel Pavement	0.75
Reinforced Grass Pavement	1.00

7. Multiply Box K2 by Box K5 and enter into Box K6 — 0.00 acres — Box K6

8. Multiply Boxes K1,K4, and K5 and enter the result in Box K7 — 0.00 acres — Box K7

9. Add Box K6 to Box K7 and multiply by 60%, and enter the Result in Box K8 — 0.00 acres
This is the amount of area credit to enter into the "Disconnected Pavement" Box of Form D-2

Form D-2b: Interceptor Tree Worksheet

See Fact Sheet for more information regarding Interceptor Tree credit guidelines

New Evergreen Trees

1. Enter number of new evergreen trees that qualify as Interceptor Trees in Box L1. — trees — Box L1

2. Multiply Box L1 by 200 and enter result in Box L2 — 0 sq. ft. — Box L2

New Deciduous Trees

3. Enter number of new deciduous trees that qualify as Interceptor Trees in Box L3. — trees — Box L3

4. Multiply Box L3 by 100 and enter result in Box L4 — 0 sq. ft. — Box L4

Existing Tree Canopy

5. Enter square footage of existing tree canopy that qualifies as Existing Tree canopy in Box L5. — 0 sq. ft. — Box L5

6. Multiply Box L5 by 0.5 and enter the result in Box L6 — 0 sq. ft. — Box L6

Total Interceptor Tree EAM Credits

Add Boxes L2, L4, and L6 and enter it into Box L7 — 0 sq. ft. — Box L7

Divide Box L7 by 43,560 and multiply by 20% to get effective area managed and enter result in Box L8 — 0.00 acres — Box L8
This is the amount of area credit to enter into the "Interceptor Trees" Box of Form D-2

Step 3 - Runoff Management Credits

Capture and Use Credits

Impervious Area Managed by Rain barrels, Cisterns, and automatically-emptied systems

(see Fact Sheet) | - | enter gallons, for simple rain barrels | 0.00 | acres

Automated-Control Capture and Use System

(see Fact Sheet, then enter impervious area managed by the system) | 0.00 | acres

Bioretention/Infiltration Credits

Impervious Area Managed by Bioretention BMPs

(see Fact Sheet)

Bioretention Area	745	sq ft		
Subdrain Elevation	6	inches		
Ponding Depth, inches	12	inches	0.26	acres

Impervious Area Managed by Infiltration BMPs

(see Fact Sheet)

Drawdown Time, hrs		drawdown_hrs_inf		
Soil Infiltration Rate, in/hr		soil_inf_rate		
Sizing Option 1: Capture Volume, acre-ft	0.00	capture_vol_inf	0.00	acres
Sizing Option 2: Infiltration BMP surface area, sq ft	0	soil_surface_area	0.00	acres

Basin or trench? | approximate BMP depth 0.00 ft

Impervious Area Managed by Amended Soil or Mulch Beds

(see Fact Sheet) | Mulched Infiltration Area, sq ft | mulch_area | 0.00 | acres

Total Effective Area Managed by Capture-and-Use/Bioretention/Infiltration BMPs | 0.26 | A_{LIDc}

Runoff Management Credit (Step 3) | $A_{LIDC}/A_T*200 =$ 83.6 | pts

Total LID Credits (Step 1+2+3) — LID compliant, check for treatment sizing in Step 4 — 115.9

Does project require hydromodification management? If yes, proceed to using SacHM.

Adjusted Area for Flow-Based, Non-LID Treatment	$A_T - A_C - A_{LIDC} =$	0.35	A_{AT}
Adjusted Impervious Fraction of A for Volume-Based, Non-LID Treatment	$A_{AT} / A =$	0.39	I_A

Further treatment is required, see choose flow-based or volume-based sizing in Step 4

Step 4a Treatment - Flow-Based (Rational Method)

Calculate treatment flow (cfs): Flow = Runoff Coefficient x Rainfall Intensity x Area

Look up value for i in Table D-2c (Rainfall Intensity)	0.18	i
Obtain A_{AT} from Step 3	0.35	A_{AT}
Use C = 0.95	0.95	C
Flow = 0.95 * i * A_{AT}	0.06	cfs

Table D-2c

Rainfall Intensity			
Roseville	i =	0.20	in/hr
Sacramento	i =	0.18	in/hr
Folsom	i =	0.20	in/hr

Step 4b Treatment - Volume-Based (ASCE-WEF)

Calculate water quality volume (Acre-Feet): WQV = Area x Maximized Detention Volume (P_0)

Obtain A from Step 1	0.90	A
Obtain P_0: Maximized Detention Volume from figures E-1 to E-4 in Appendix E of this manual using I_A from Step 2.	0.30	P_0
Calculate treatment volume (acre-ft): **Treatment volume = A x (P_0 / 12)**	0.02	Acre-Feet

hrs Specified Draw Down time

v06232012

Appendix A6

Appendix D-2: Commercial Sites: Low Impact Development (LID) Credits and Treatment BMP Sizing Calculations

Name of Drainage Shed: Manzanita (Lot 6)

Location of project: Sacramento

Fill in Blue Highlighted boxes

Step 1 - Open Space and Pervious Area Credits

Is your project within the drainage area of a common drainage plan that includes open space? If not, skip to 1 b.

1 a. Common Drainage Plan Area	0	acres	A_{CDP}
Common Drainage Plan Open Space (Off-project)	0	acres	A_{OS}
a. Natural storage reservoirs and drainage corridors	0	acres	
b. Buffer zones for natural water bodies	0	acres	
c. Natural areas including existing trees, other vegetation, and soil	0	acres	
d. Common landscape area/park	0	acres	
e. Regional Flood Control/Drainage basins	0	acres	

see area example below

1 b. Project Drainage Shed Area (Total)	1.05	acres	A
Project-Specific Open Space (In-project, communal)**	0.31	acres	A_{PSOS}
a. Natural storage reservoirs and drainage corridors		acres	
b. Buffer zones for natural water bodies	0.00	acres	
c. Natural areas including existing trees, other vegetation, and soil	0.00	acres	
d. Landscape area/park	0.31	acres	
e. Flood Control/Drainage basins	0.00	acres	

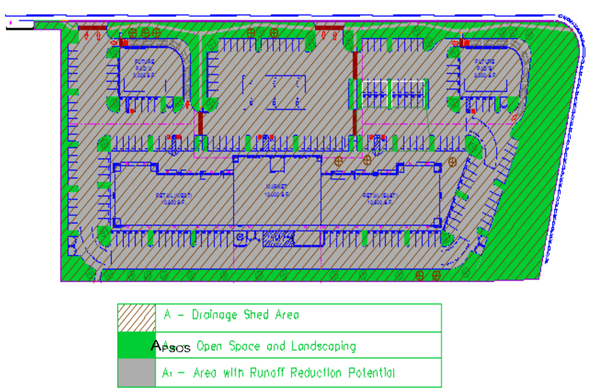
see area example below

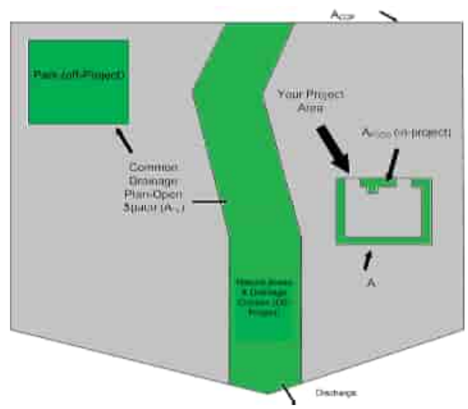
** Doesn't include impervious areas within individual lots and surrounding individual units. That is accounted for below using Form D-1a in Step 2.

Area with Runoff Reduction Potential	$A - A_{PSOS} =$	0.74	acres	A_T
Assumed Initial Impervious Fraction	$A_T / A =$	0.70		I

Open Space & Pervious Area LID Credit (Step 1)

$(A_{OS}/A_{CDP}+A_{PSOS}/A)\text{x}100 =$ 30 pts





Step 2 - Runoff Reduction Credits

Runoff Reduction Treatments	Impervious Area Managed			Efficiency Factor		Effective Area Managed (A_C)	
Porous Pavement:							
Option 1: Porous Pavement (see Fact Sheet, excludes porous pavement used in Option 2)	0	acres	x		=	0.000	acres
Option 2: Disconnected Pavement (see Fact Sheet, excludes porous pavement used in Option 1)	use Form D-2a for credits					0.00	acres
Landscaping used to Disconnect Pavement (see Fact Sheet)	0.0000	acres			=	0.00	acres
Disconnected Roof Drains (see Fact Sheet and/or Table D-2b for summary of requirements)		acres			=	0.00	acres
Ecoroof (see Fact Sheet)	0	acres			=	0.00	acres
Interceptor Trees (see Fact Sheet)	use Form D-2b for credits					0.00	acres
Total Effective Area Managed by Runoff Reduction Measures				A_C		0.00	acres

Runoff Reduction Credit (Step 2) $(A_C / A_T)\text{*}100 =$ 0 pts

Table D-2a

Porous Pavement Type	Efficiency Multiplier
Cobblestone Block Pavement	0.40
Pervious Concrete/Asphalt	0.60
Modular Block Pavement &	0.75
Reinforced Grass Pavement	1.00

Table D-2b

Maximum roof size	Minimum travel distance
≤ 3,500 sq ft	21 ft
≤ 5,000 sq ft	24 ft
≤ 7,500 sq ft	28 ft
≤ 10,000 sq ft	32 ft

Form D-2a: Disconnected Pavement Worksheet

See Fact Sheet for more information regarding Disconnected Pavement credit guidelines

Effective Area Managed (A_C)

Pavement Draining to Porous Pavement

2. Enter area draining onto Porous Pavement	0.00	acres	Box K1
3. Enter area of Receiving Porous Pavement (excludes area entered in Step 2 under Porous Pavement)	0.00	acres	Box K2
4. Ratio of Areas (Box K1 / Box K2)	0.00		Box K3

5. Select multiplier using ratio from Box K3 and enter into Box K4

Ratio (Box D)	Multiplier
Ratio is ≤ 0.5	1.00
Ratio is > 0.5 and < 1.0	0.83
Ratio is > 1.0 and < 1.5	0.71
Ratio is > 1.5 and < 2.0	0.55

Box K4: 1

6. Enter Efficiency of Porous Pavement (see table below) — Box K5

Porous Pavement Type	Efficiency Multiplier
Cobblestone Block Pavement	0.40
Pervious Concrete Asphalt Pavement	0.60
Modular Block Pavement Porous Gravel Pavement	0.75
Reinforced Grass Pavement	1.00

7. Multiply Box K2 by Box K5 and enter into Box K6	0.00	acres	Box K6
8. Multiply Boxes K1,K4, and K5 and enter the result in Box K7	0.00	acres	Box K7

9. Add Box K6 to Box K7 and multiply by 60%, and enter the Result in Box K8 — 0.00 acres
This is the amount of area credit to enter into the "Disconnected Pavement" Box of Form D-2

Form D-2b: Interceptor Tree Worksheet

See Fact Sheet for more information regarding Interceptor Tree credit guidelines

New Evergreen Trees

1. Enter number of new evergreen trees that qualify as Interceptor Trees in Box L1.		trees	Box L1
2. Multiply Box L1 by 200 and enter result in Box L2	0	sq. ft.	Box L2

New Deciduous Trees

3. Enter number of new deciduous trees that qualify as Interceptor Trees in Box L3.		trees	Box L3
4. Multiply Box L3 by 100 and enter result in Box L4	0	sq. ft.	Box L4

Existing Tree Canopy

5. Enter square footage of existing tree canopy that qualifies as Existing Tree canopy in Box L5.	0	sq. ft.	Box L5
6. Multiply Box L5 by 0.5 and enter the result in Box L6	0	sq. ft.	Box L6

Total Interceptor Tree EAM Credits

Add Boxes L2, L4, and L6 and enter it into Box L7	0	sq. ft.	Box L7
Divide Box L7 by 43,560 and multiply by 20% to get effective area managed and enter result in Box L8	0.00	acres	Box L8

This is the amount of area credit to enter into the "Interceptor Trees" Box of Form D-2

Step 3 - Runoff Management Credits

Capture and Use Credits

Impervious Area Managed by Rain barrels, Cisterns, and automatically-emptied systems

(see Fact Sheet) | - | enter gallons, for simple rain barrels | 0.00 | acres

Automated-Control Capture and Use System

(see Fact Sheet, then enter impervious area managed by the system) | 0.00 | acres

Bioretention/Infiltration Credits

Impervious Area Managed by Bioretention BMPs

(see Fact Sheet)

Bioretention Area	895	sq ft		
Subdrain Elevation	6	inches		
Ponding Depth, inches	12	inches	0.31	acres

Impervious Area Managed by Infiltration BMPs

(see Fact Sheet)

Drawdown Time, hrs		drawdown_hrs_inf		
Soil Infiltration Rate, in/hr		soil_inf_rate		
Sizing Option 1: Capture Volume, acre-ft	0.00	capture_vol_inf	0.00	acres
Sizing Option 2: Infiltration BMP surface area, sq ft	0	soil_surface_area	0.00	acres

Basin or trench? | approximate BMP depth | 0.00 | ft

Impervious Area Managed by Amended Soil or Mulch Beds

(see Fact Sheet) | Mulched Infiltration Area, sq ft | | mulch_area | 0.00 | acres

Total Effective Area Managed by Capture-and-Use/Bioretention/Infiltration BMPs | 0.31 | A_{LIDc}

Runoff Management Credit (Step 3) | A_{LIDC}/A_T*200 = | 82.8 | pts

Total LID Credits (Step 1+2+3) | LID compliant, check for treatment sizing in Step 4 | 112.3

Does project require hydromodification management? If yes, proceed to using SacHM.

Adjusted Area for Flow-Based, Non-LID Treatment | $A_T - A_C - A_{LIDC}$ = | 0.43 | A_{AT}

Adjusted Impervious Fraction of A for Volume-Based, Non-LID Treatment | A_{AT} / A = | 0.41 | I_A

Further treatment is required, see choose flow-based or volume-based sizing in Step 4

Step 4a Treatment - Flow-Based (Rational Method)

Calculate treatment flow (cfs): | Flow = Runoff Coefficient x Rainfall Intensity x Area

Look up value for i in Table D-2c (Rainfall Intensity)	0.18	i
Obtain A_{AT} from Step 3	0.43	A_{AT}
Use C = 0.95	0.95	C
Flow = 0.95 * i * A_{AT}	0.07	cfs

Table D-2c

Rainfall Intensity			
Roseville	i =	0.20	in/hr
Sacramento	i =	0.18	in/hr
Folsom	i =	0.20	in/hr

Step 4b Treatment - Volume-Based (ASCE-WEF)

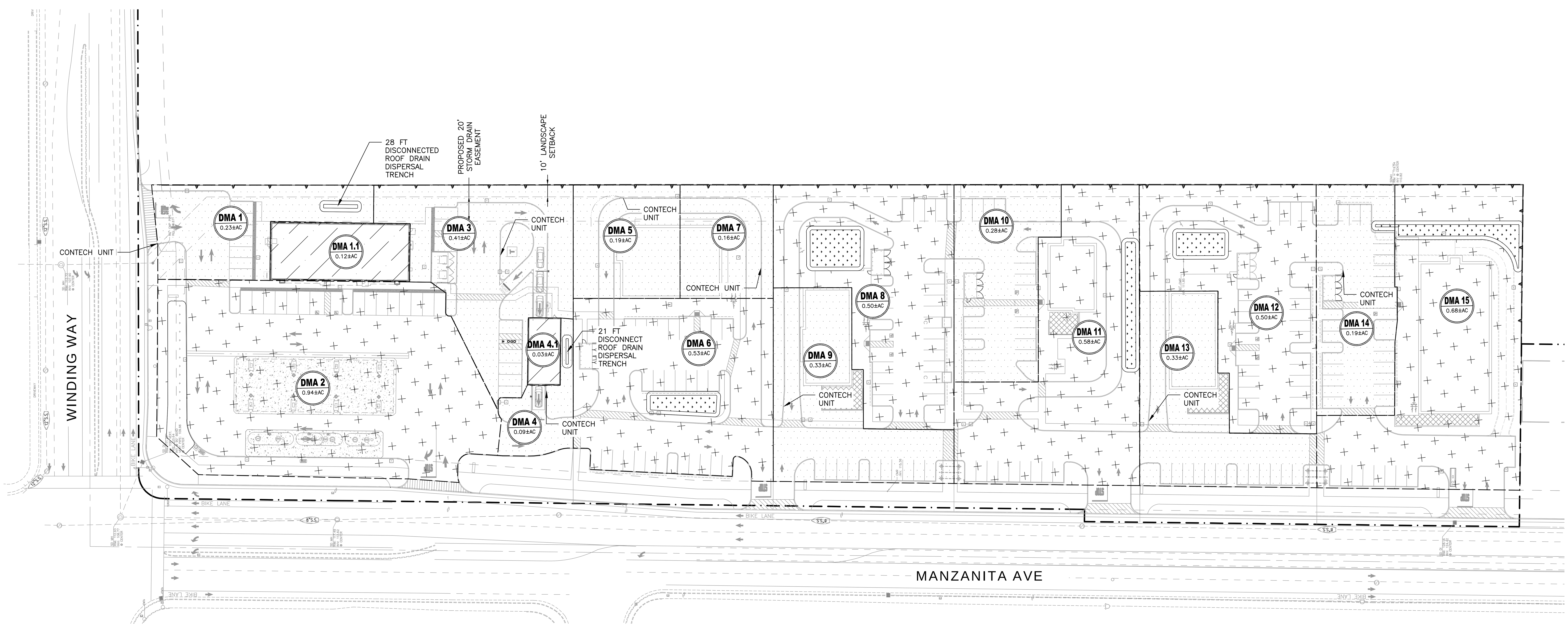
Calculate water quality volume (Acre-Feet): | WQV = Area x Maximized Detention Volume (P_0)

Obtain A from Step 1	1.05	A
Obtain P_0: Maximized Detention Volume from figures E-1 to E-4 in Appendix E of this manual using I_A from Step 2.	0.31	P_0
Calculate treatment volume (acre-ft): **Treatment volume = A x (P_0 / 12)**	0.03	Acre-Feet

| hrs | Specified Draw Down time

v06232012

Appendix B



DRAINAGE MANAGEMENT AREAS DRAINING TO STORMWATER PLANTERS							
PAD NUMBER	DMA NUMBER	TOTAL DMA AREA (SF)	% IMPERVIOUS	STORMWATER PLANTER AREA (SF)	STORMWATER PLANTER DEPTH (INCHES)	STORMWATER VOLUME PROVIDED (CF)	WATER QUALITY VOLUME REQUIRED (CF)
1	2	41,209	77	1655	12	1655	1,374
2	6	23,079	70	725	12	725	692
3	8	39,640	71	1253	12	1253	1,222
4	11	25,454	67	705	12	705	700
5	12	24,706	68	745	12	745	741
6	15	29,768	70	895	12	895	893
	TOTAL	183,856		5,978			

1. STORM WATER VOLUME REQUIRED = P_0XDMA AREA/12
WHERE: P_0=MAXIMIZED DETENTION VOLUME FOR A 12 HOUR DRAW DOWN TIME PER FIGURE E–1 IN THE SWQDM
2. % COMPLIANT=STORMWATER VOLUME PROVIDED/STORMWATER VOLUME REQUIRED

DRAINAGE MANAGEMENT AREAS DRAINING CONTECH STORMFILTER UNITS								
PAD NUMBER	DMA NUMBER	TOTAL DMA AREA (SF)	WQF REQUIRED (CFS)	WQF PER CARTRIDGE (CFS) (18" CARTRIDGE)	NUMBER OF CARTRIDGES REQUIRED	NUMBER OF CARTRIDGES PROVIDED	WQF PROVIDED (C.F.)
1	1	9,909	0.041	0.033	1.241	2	0.066
1	3	17,764	0.073	0.033	2.224	3	0.099
1	4	3,771	0.016	0.033	0.472	1	0.033
2	5	8,181	0.034	0.033	1.024	1	0.033
2	7	7,141	0.030	0.033	0.894	1	0.033
3	9	14,426	0.060	0.033	1.806	2	0.066
4	10	12,005	0.050	0.033	1.503	2	0.066
5	13	14,426	0.060	0.033	1.806	2	0.066
6	14	12,263	0.051	0.033	1.536	2	0.066
		99,886					

WQF=CiA, WHERE:
C=RUNNOF COEFFICIENT = .9
i=INTENSITY= .2 FOR SACRAMENTO COUNTY
A=AREA DMA (ACRES)

1 inch = 40 ft.

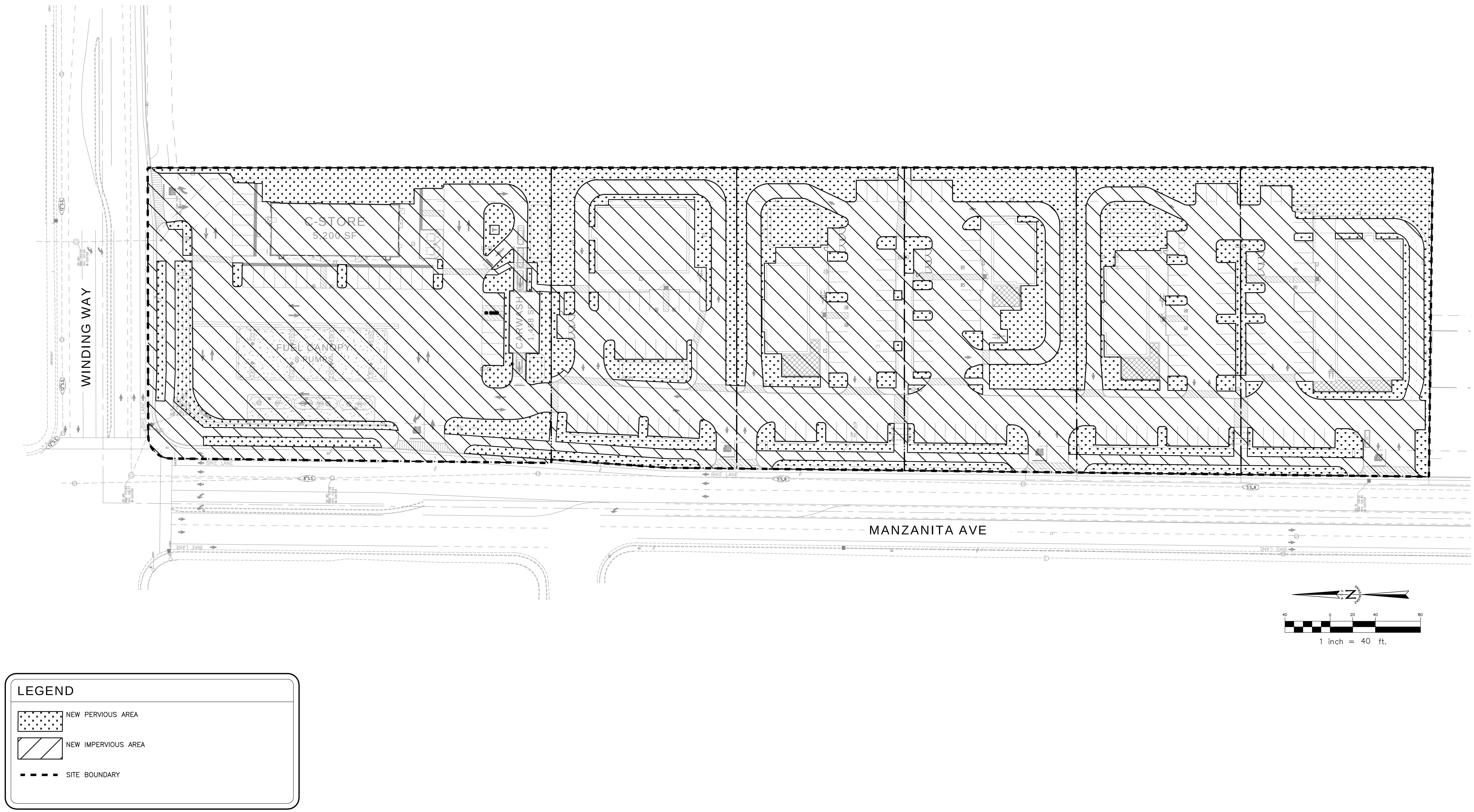
LEGEND

- DRAINAGE AREA MANAGED BY BIORETENTION
- DRAINAGE AREA MANAGED BY CONTECH STORM FILTER UNITS
- DRAINAGE AREA MANAGED BY DISPERSAL TRENCHES
- BIORETENTION AREA

WINDING RANCH
STORMWATER QUALITY AND GRADING EXHIBIT
SACRAMENTO, CA

DATE: DECEMBER 1, 2021

Appendix C



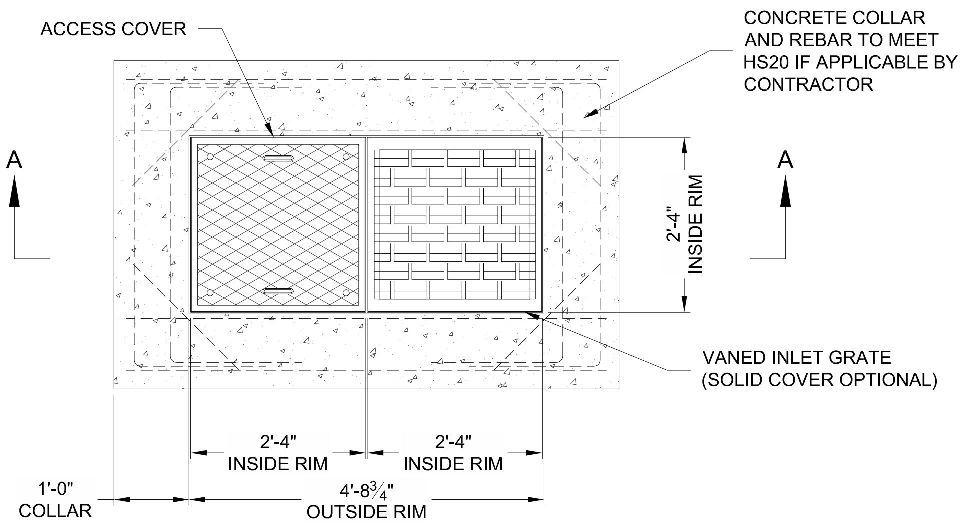
WINDING RANCH

IMPERVIOUS AREA EXHIBIT

SACRAMENTO, CA

DATE: DECEMBER 1, 2021

Appendix D



PLAN VIEW

STORMFILTER STEEL CATCHBASIN DESIGN NOTES

STORMFILTER TREATMENT CAPACITY IS A FUNCTION OF THE CARTRIDGE SELECTION AND THE NUMBER OF CARTRIDGES. 1 CARTRIDGE CATCHBASIN HAS A MAXIMUM OF ONE CARTRIDGE. SYSTEM IS SHOWN WITH A 27" CARTRIDGE, AND IS ALSO AVAILABLE WITH AN 18" CARTRIDGE. STORMFILTER CATCHBASIN CONFIGURATIONS ARE AVAILABLE WITH A DRY INLET BAY FOR VECTOR CONTROL.
PEAK HYDRAULIC CAPACITY PER TABLE BELOW. IF THE SITE CONDITIONS EXCEED PEAK HYDRAULIC CAPACITY, AN UPSTREAM BYPASS STRUCTURE IS REQUIRED.

CARTRIDGE SELECTION

CARTRIDGE HEIGHT	27"			18"			18" DEEP		
RECOMMENDED HYDRAULIC DROP (H)	3.05'			2.3'			3.3'		
SPECIFIC FLOW RATE (gpm/sf)	2 gpm/sf	1.67* gpm/sf	1 gpm/sf	2 gpm/sf	1.67* gpm/sf	1 gpm/sf	2 gpm/sf	1.67* gpm/sf	1 gpm/sf
CARTRIDGE FLOW RATE (gpm)	22.5	18.79	11.25	15	12.53	7.5	15	12.53	7.5
PEAK HYDRAULIC CAPACITY	1.0			1.0			1.8		
INLET PERMANENT POOL LEVEL (A)	1'-0"			1'-0"			2'-0"		
OVERALL STRUCTURE HEIGHT (B)	4'-9"			3'-9"			4'-9"		

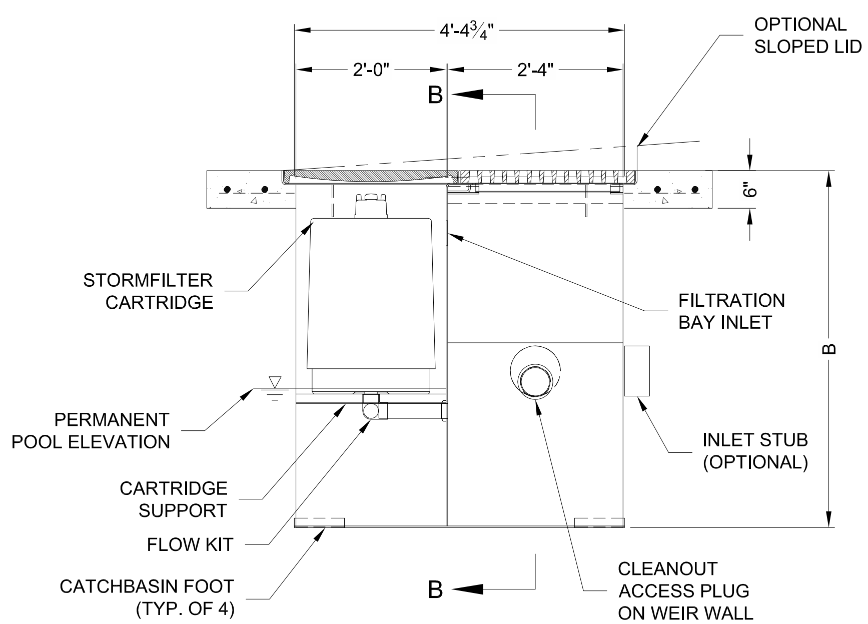
* 1.67 gpm/sf SPECIFIC FLOW RATE IS APPROVED WITH PHOSPHOSORB® (PSORB) MEDIA ONLY

GENERAL NOTES

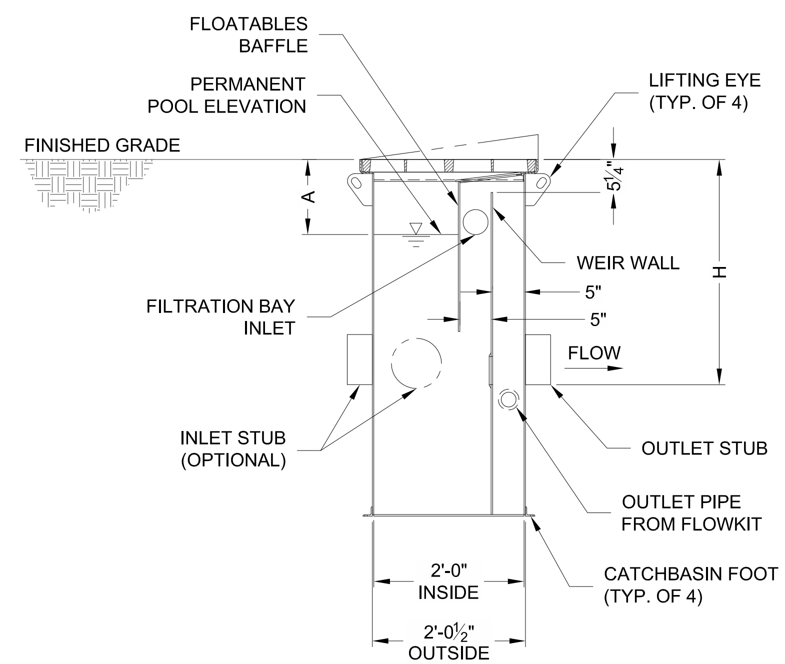
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. FOR SITE SPECIFIC DRAWINGS WITH DETAILED STORMFILTER CATCHBASIN STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.contechES.com
3. STORMFILTER CATCHBASIN WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
4. INLET SHOULD NOT BE LOWER THAN OUTLET. INLET (IF APPLICABLE) AND OUTLET PIPING TO BE SPECIFIED BY ENGINEER AND PROVIDED BY CONTRACTOR.
5. MANUFACTURER TO APPLY A SURFACE BEAD WELD IN THE SHAPE OF THE LETTER "O" ABOVE THE OUTLET PIPE STUB ON THE EXTERIOR SURFACE OF THE STEEL SFCB.
6. STORMFILTER CATCHBASIN EQUIPPED WITH 4 INCH (APPROXIMATE) LONG STUBS FOR INLET (IF APPLICABLE) AND OUTLET PIPING. STANDARD OUTLET STUB IS 8 INCHES IN DIAMETER. MAXIMUM OUTLET STUB IS 15 INCHES IN DIAMETER. CONNECTION TO COLLECTION PIPING CAN BE MADE USING FLEXIBLE COUPLING BY CONTRACTOR.
7. STEEL STRUCTURE TO BE MANUFACTURED OF 1/4 INCH STEEL PLATE. CASTINGS SHALL MEET AASHTO M306 LOAD RATING. TO MEET HS20 LOAD RATING ON STRUCTURE, A CONCRETE COLLAR IS REQUIRED. WHEN REQUIRED, CONCRETE COLLAR WITH #4 REINFORCING BARS TO BE PROVIDED BY CONTRACTOR.
8. FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF CLEANING. RADIAL MEDIA DEPTH SHALL BE 7-INCHES. FILTER MEDIA CONTACT TIME SHALL BE AT LEAST 38 SECONDS.
9. SPECIFIC FLOW RATE IS EQUAL TO THE FILTER TREATMENT CAPACITY (gpm) DIVIDED BY THE FILTER CONTACT SURFACE AREA (sq ft).

INSTALLATION NOTES

A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CATCHBASIN (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.



SECTION A-A



SECTION B-B

1-CARTRIDGE CATCHBASIN STORMFILTER DATA

STRUCTURE ID	XXX
WATER QUALITY FLOW RATE (cfs)	X.XX
PEAK FLOW RATE (<1 cfs)	X.XX
RETURN PERIOD OF PEAK FLOW (yrs)	XXX
CARTRIDGE HEIGHT (27", 18", 18" DEEP)	XX
CARTRIDGE FLOW RATE (gpm)	XX
MEDIA TYPE (PERLITE, ZPG, PSORB)	XXXXX
RIM ELEVATION	XXX.XX'

PIPE DATA:	I.E.	DIAMETER
INLET STUB	XXX.XX'	XX"
OUTLET STUB	XXX.XX'	XX"

CONFIGURATION

OUTLET / INLET / INLET   OUTLET / INLET / INLET

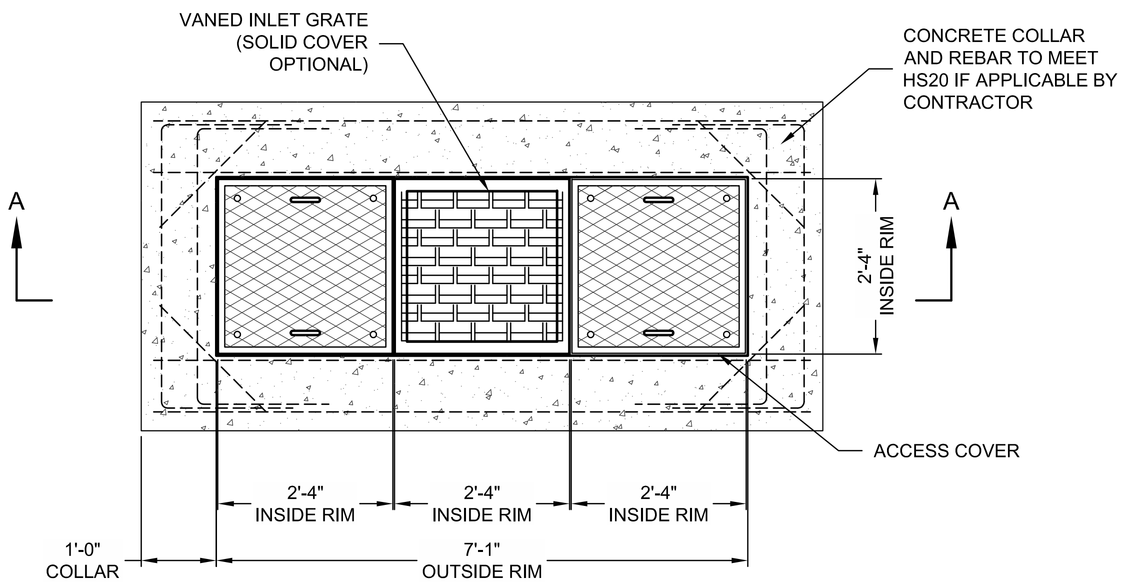
SLOPED LID	YES\NO
SOLID COVER	YES\NO

NOTES/SPECIAL REQUIREMENTS:

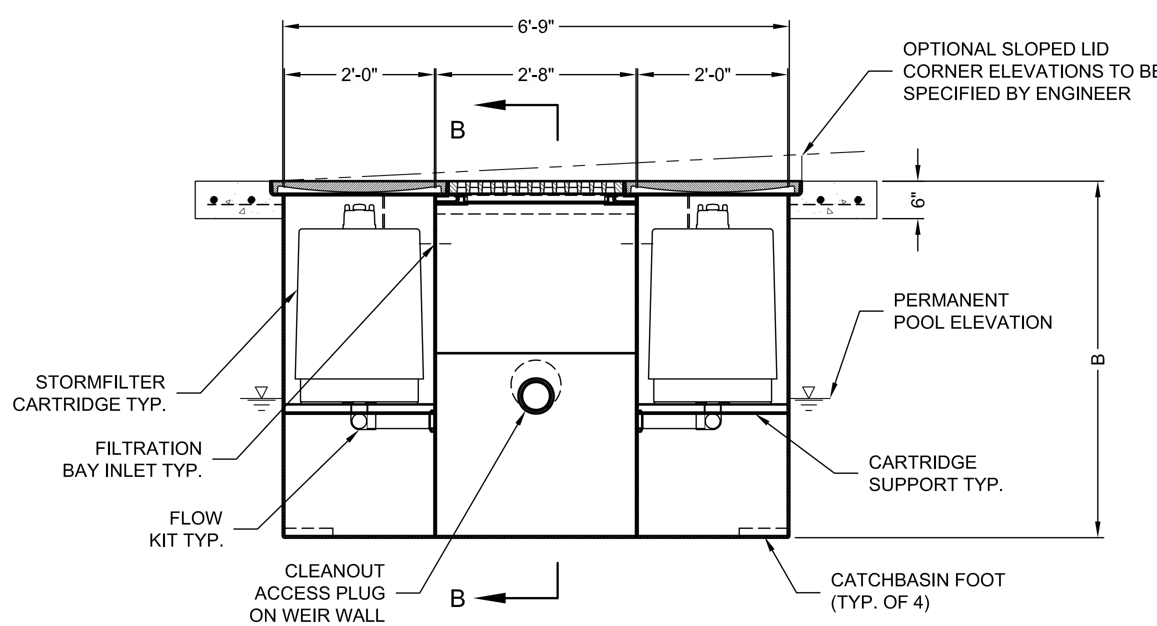
The Stormwater Management StormFilter®

CONTECH® ENGINEERED SOLUTIONS LLC
www.contechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-526-3999 513-645-7000 513-645-7993 FAX

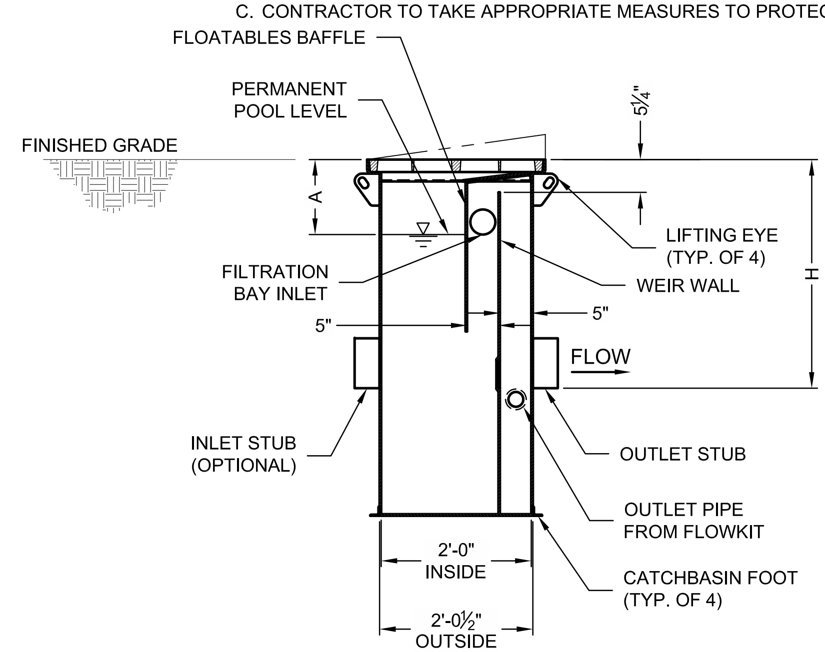
1 CARTRIDGE CATCHBASIN STORMFILTER STANDARD DETAIL



PLAN VIEW



SECTION A-A



SECTION B-B

STORMFILTER STEEL CATCHBASIN DESIGN NOTES

STORMFILTER TREATMENT CAPACITY IS A FUNCTION OF THE CARTRIDGE SELECTION AND THE NUMBER OF CARTRIDGES. 2 CARTRIDGE CATCHBASIN HAS A MAXIMUM OF TWO CARTRIDGES. SYSTEM IS SHOWN WITH A 27" CARTRIDGE, AND IS ALSO AVAILABLE WITH AN 18" CARTRIDGE. STORMFILTER CATCHBASIN CONFIGURATIONS ARE AVAILABLE WITH A DRY INLET BAY FOR VECTOR CONTROL.
PEAK HYDRAULIC CAPACITY PER TABLE BELOW. IF THE SITE CONDITIONS EXCEED PEAK HYDRAULIC CAPACITY, AN UPSTREAM BYPASS STRUCTURE IS REQUIRED.

CARTRIDGE SELECTION

CARTRIDGE HEIGHT	27"			18"			18" DEEP		
RECOMMENDED HYDRAULIC DROP (H)	3.05'			2.3'			3.3'		
SPECIFIC FLOW RATE (gpm/sf)	2 gpm/sf	1.67* gpm/sf	1 gpm/sf	2 gpm/sf	1.67* gpm/sf	1 gpm/sf	2 gpm/sf	1.67* gpm/sf	1 gpm/sf
CARTRIDGE FLOW RATE (gpm)	22.5	18.79	11.25	15	12.53	7.5	15	12.53	7.5
PEAK HYDRAULIC CAPACITY	1.0			1.0			1.8		
INLET PERMANENT POOL LEVEL (A)	1'-0"			1'-0"			2'-0"		
OVERALL STRUCTURE HEIGHT (B)	4'-9"			3'-9"			4'-9"		

* 1.67 gpm/sf SPECIFIC FLOW RATE IS APPROVED WITH PHOSPHOSORB® (PSORB) MEDIA ONLY

GENERAL NOTES
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2. FOR SITE SPECIFIC DRAWINGS WITH DETAILED STORMFILTER CATCHBASIN STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. WWW.CONTECHES.COM
3. STORMFILTER CATCHBASIN WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
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5. MANUFACTURER TO APPLY A SURFACE BEAD WELD IN THE SHAPE OF THE LETTER "O" ABOVE THE OUTLET PIPE STUB ON THE EXTERIOR SURFACE OF THE STEEL SFCB.
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9. SPECIFIC FLOW RATE IS EQUAL TO THE FILTER TREATMENT CAPACITY (gpm) DIVIDED BY THE FILTER CONTACT SURFACE AREA (sq ft).

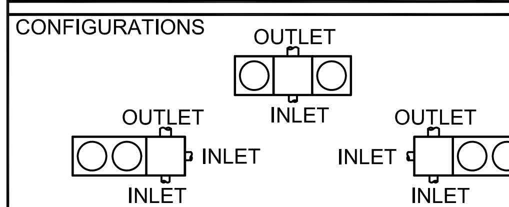
INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CATCHBASIN (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.

2-CARTRIDGE DEEP CATCHBASIN STORMFILTER DATA

STRUCTURE ID	XXX
WATER QUALITY FLOW RATE (cfs)	X.XX
PEAK FLOW RATE (<1.8 cfs)	X.XX
RETURN PERIOD OF PEAK FLOW (yrs)	XXX
CARTRIDGE FLOW RATE (gpm)	XX
MEDIA TYPE (PERLITE, ZPG, PSORB)	XXXXX
RIM ELEVATION	XXX.XX'

PIPE DATA:	I.E.	DIAMETER
INLET STUB	XXX.XX'	XX"
OUTLET STUB	XXX.XX'	XX"

CONFIGURATIONS



SLOPED LID	YES\NO
SOLID COVER	YES\NO

NOTES/SPECIAL REQUIREMENTS:

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2 CARTRIDGE CATCHBASIN
STORMFILTER
STANDARD DETAIL

STORMFILTER STEEL CATCHBASIN DESIGN NOTES

STORMFILTER TREATMENT CAPACITY IS A FUNCTION OF THE CARTRIDGE SELECTION AND THE NUMBER OF CARTRIDGES. 3 CARTRIDGE CATCHBASIN HAS A MAXIMUM OF THREE CARTRIDGES. SYSTEM IS SHOWN WITH A 27" CARTRIDGE, AND IS ALSO AVAILABLE WITH AN 18" CARTRIDGE. STORMFILTER CATCHBASIN CONFIGURATIONS ARE AVAILABLE WITH A DRY INLET BAY FOR VECTOR CONTROL.
PEAK HYDRAULIC CAPACITY PER TABLE BELOW. IF THE SITE CONDITIONS EXCEED PEAK HYDRAULIC CAPACITY, AN UPSTREAM BYPASS STRUCTURE IS REQUIRED.

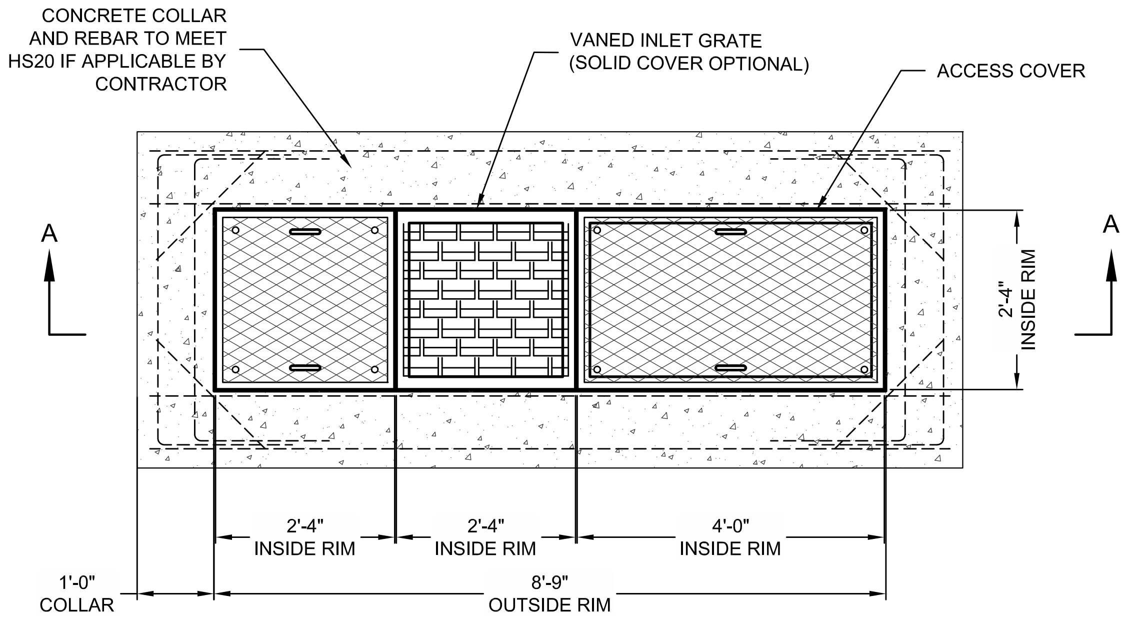
CARTRIDGE SELECTION

CARTRIDGE HEIGHT	27"			18"			18" DEEP		
RECOMMENDED HYDRAULIC DROP (H)	3.05'			2.3'			3.3'		
SPECIFIC FLOW RATE (gpm/sf)	2 gpm/sf	1.67* gpm/sf	1 gpm/sf	2 gpm/sf	1.67* gpm/sf	1 gpm/sf	2 gpm/sf	1.67* gpm/sf	1 gpm/sf
CARTRIDGE FLOW RATE (gpm)	22.5	18.79	11.25	15	12.53	7.5	15	12.53	7.5
PEAK HYDRAULIC CAPACITY	1.0			1.0			1.8		
INLET PERMANENT POOL LEVEL (A)	1'-0"			1'-0"			2'-0"		
OVERALL STRUCTURE HEIGHT (B)	4'-9"			3'-9"			4'-9"		

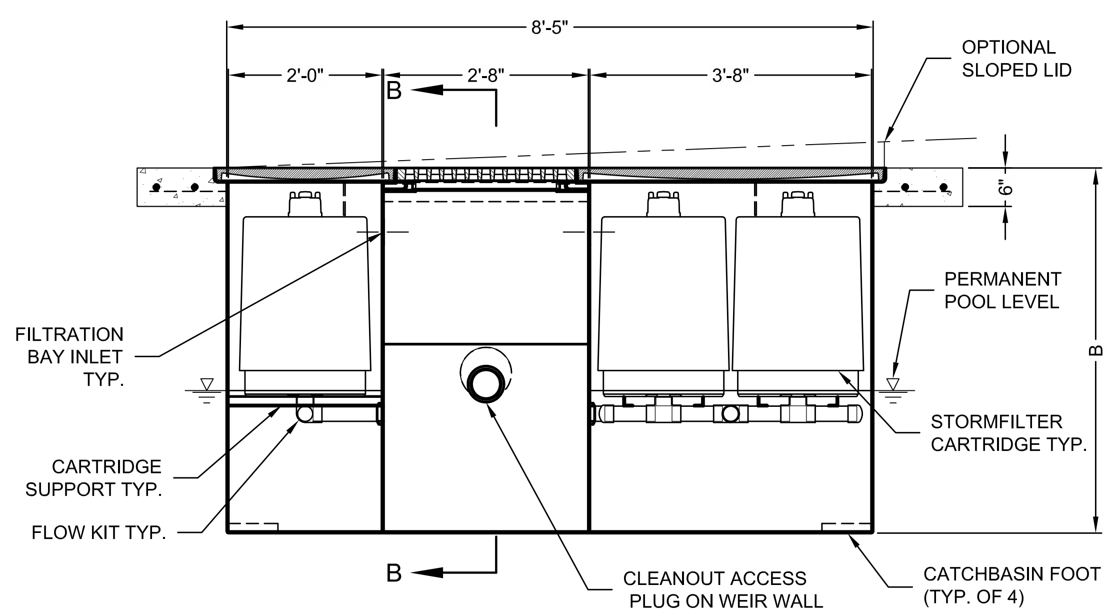
* 1.67 gpm/sf SPECIFIC FLOW RATE IS APPROVED WITH PHOSPHOSORB ® (PSORB) MEDIA ONLY

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. FOR SITE SPECIFIC DRAWINGS WITH DETAILED STORMFILTER CATCHBASIN STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ANGINEERED SOLUTIONS LLC REPRESENTATIVE. www.contechES.com
3. STORMFILTER CATCHBASIN WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
4. INLET SHOULD NOT BE LOWER THAN OUTLET. INLET (IF APPLICABLE) AND OUTLET PIPING TO BE SPECIFIED BY ENGINEER AND PROVIDED BY CONTRACTOR.
5. MANUFACTURER TO APPLY A SURFACE BEAD WELD IN THE SHAPE OF THE LETTER "O" ABOVE THE OUTLET PIPE STUB ON THE EXTERIOR SURFACE OF THE STEEL SFCB.
6. STORMFILTER CATCHBASIN EQUIPPED WITH 4 INCH (APPROXIMATE) LONG STUBS FOR INLET (IF APPLICABLE) AND OUTLET PIPING. STANDARD OUTLET STUB IS 8 INCHES IN DIAMETER. MAXIMUM OUTLET STUB IS 15 INCHES IN DIAMETER. CONNECTION TO COLLECTION PIPING CAN BE MADE USING FLEXIBLE COUPLING BY CONTRACTOR.
7. STEEL STRUCTURE TO BE MANUFACTURED OF 1/4 INCH STEEL PLATE. CASTINGS SHALL MEET AASHTO M306 LOAD RATING. TO MEET HS20 LOAD RATING ON STRUCTURE, A CONCRETE COLLAR IS REQUIRED. WHEN REQUIRED, CONCRETE COLLAR WITH #4 REINFORCING BARS TO BE PROVIDED BY CONTRACTOR.
8. FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF CLEANING. RADIAL MEDIA DEPTH SHALL BE 7-INCHES. FILTER MEDIA CONTACT TIME SHALL BE AT LEAST 38 SECONDS.
9. SPECIFIC FLOW RATE IS EQUAL TO THE FILTER TREATMENT CAPACITY (gpm) DIVIDED BY THE FILTER CONTACT SURFACE AREA (sq ft).

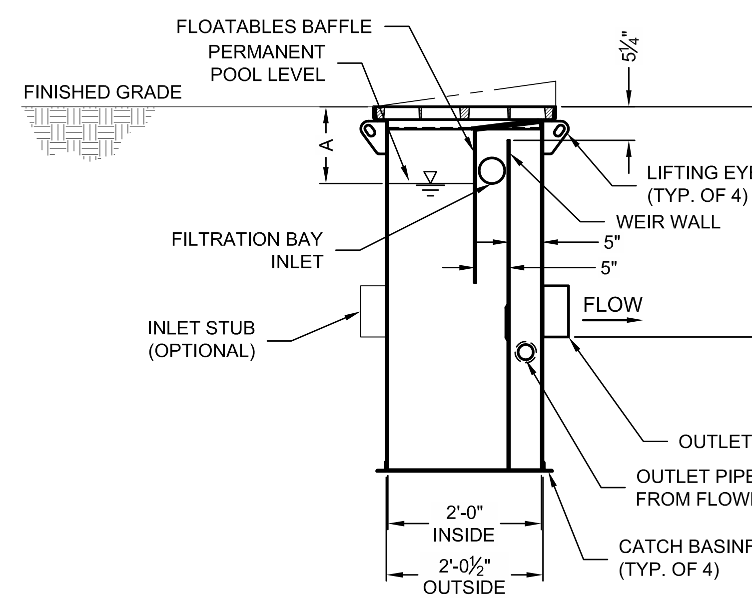
INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CATCHBASIN (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.



PLAN VIEW



SECTION A-A



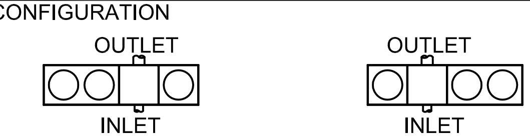
SECTION B-B

3-CARTRIDGE CATCHBASIN STORMFILTER DATA

STRUCTURE ID	XXX
WATER QUALITY FLOW RATE (cfs)	X.XX
PEAK FLOW RATE (<1 cfs)	X.XX
RETURN PERIOD OF PEAK FLOW (yrs)	XXX
CARTRIDGE FLOW RATE (gpm)	XX
MEDIA TYPE (PERLITE, ZPG, PSORB)	XXXXX
RIM ELEVATION	XXX.XX'

PIPE DATA:	I.E.	DIAMETER
INLET STUB	XXX.XX'	XX"
OUTLET STUB	XXX.XX'	XX"

CONFIGURATION



SLOPED LID	YES\NO
SOLID COVER	YES\NO

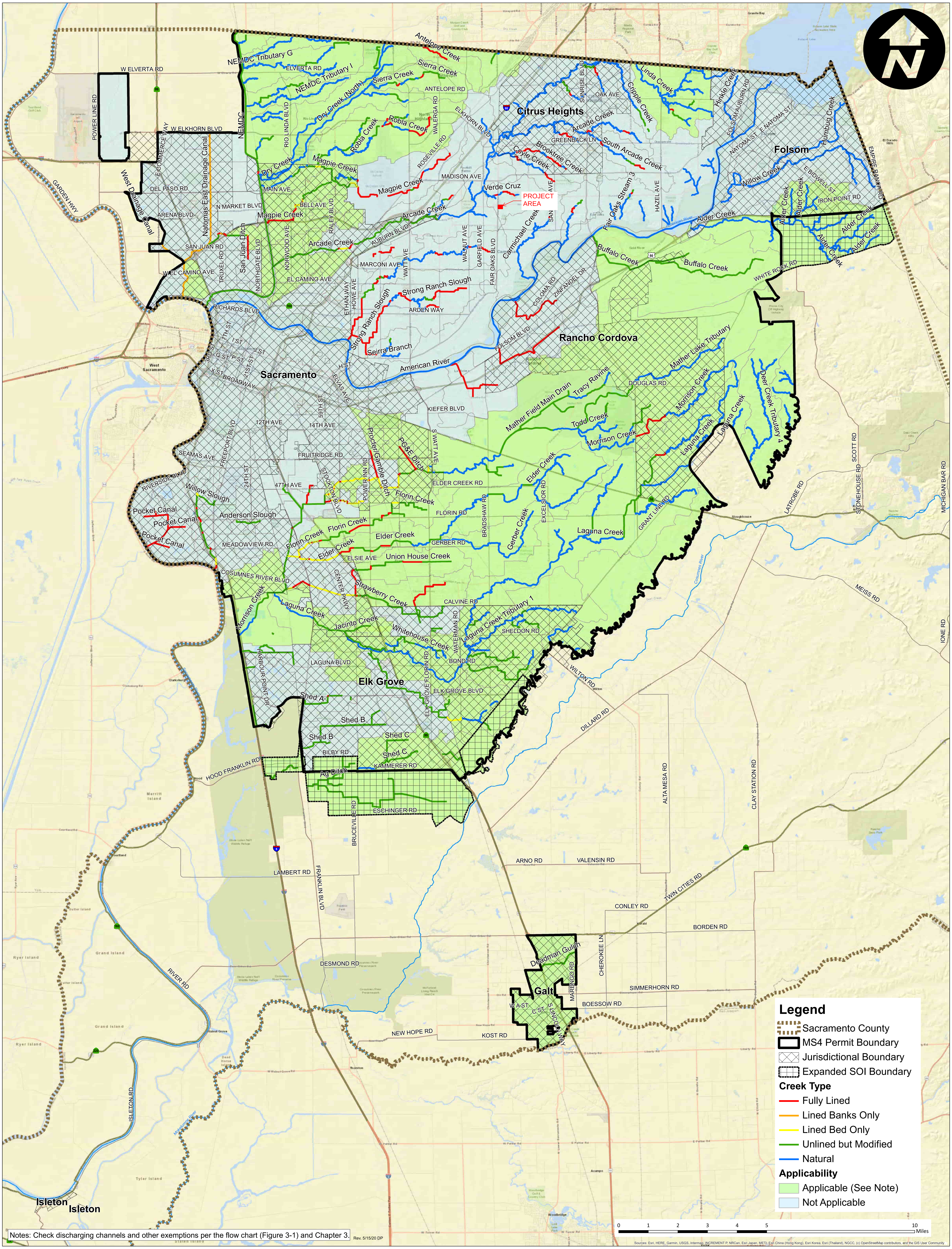
NOTES/SPECIAL REQUIREMENTS:

The Stormwater Management StormFilter®

CONTECH® ENGINEERED SOLUTIONS LLC
www.contechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-526-3999 513-645-7000 513-645-7993 FAX

3 CARTRIDGE CATCHBASIN STORMFILTER STANDARD DETAIL

Appendix E


Citrus Heights
Folsom
Rancho Cordova
Sacramento
Elk Grove
Galt
Isleton
PROJECT AREA
NEMDC Tributary G
NEMDC Tributary I
Antelope Creek
Sierra Creek
Dry Creek (North)
Robla Creek
Magpie Creek
Dry Creek
Arcade Creek
Verde Cruz
Linda Creek
Cripple Creek
Hinkle Creek
Humbug Creek
South Arcade Creek
Brooktree Creek
Coyle Creek
Carmichael Creek
Fair Oaks Stream 3
Willow Creek
Alder Creek
Buffalo Creek
Strong Ranch Slough
Seirra Branch
American River
Mather Lake Tributary
Mather Field Main Drain
Tracy Ravine
Todd Creek
Morrison Creek
Laguna Creek
Deer Creek Tributary 4
Elder Creek
Gerber Creek
Florin Creek
Procter Gamble Ditch
PG&E Ditch
Union House Creek
Strawberry Creek
Willow Slough
Anderson Slough
Pocket Canal
Jacinto Creek
Whitehouse Creek
Laguna Creek Tributary 1
Shed A
Shed B
Shed C
Ag Ditch
Deadman Gulch
Natomas East Drainage Canal
West Drainage Canal
San Juan Ditch
NEMDC
Legend
Sacramento County
MS4 Permit Boundary
Jurisdictional Boundary
Expanded SOI Boundary
Creek Type
Fully Lined
Lined Banks Only
Lined Bed Only
Unlined but Modified
Natural
Applicability
Applicable (See Note)
Not Applicable
0 1 2 3 4 5 10 Miles
Notes: Check discharging channels and other exemptions per the flow chart (Figure 3-1) and Chapter 3.
Rev. 5/15/20 DP

Appendix G Noise and Vibration Study

Environmental Noise & Vibration Assessment

Winding Ranch Project

Sacramento County, California

BAC Job # 2022-121

Prepared For:

RSC Engineering, Inc.

Attn: Tiffany Wilson
1420 Rocky Ridge Drive, Suite 150
Roseville, CA 95661

Prepared By:

Bollard Acoustical Consultants, Inc.

Dario Gotchet, Principal Consultant

November 21, 2023

BOLLARD
Acoustical Consultants

Introduction

The proposed Winding Ranch development (project) is located south of Winding Way and east of Manzanita Avenue in Sacramento County, California. The project consists of single-family and multi-family residential, and commercial (retail) uses. The commercial component consists of a total of six parcels – one parcel containing a gas station/convenience store (with car wash tunnel), and five parcels containing a retail/restaurant use (of which three will have drive-through lanes). Existing land uses in the immediate project vicinity include a mix of commercial and residential (single- and multi-family). The project area with aerial imagery is shown in Figure 1. The project site plans are presented in Figures 2 and 3.

The purposes of this assessment are to quantify the existing noise and vibration environments, identify potential noise and vibration impacts resulting from the project, identify appropriate mitigation measures, and provide a quantitative and qualitative analysis of impacts associated with the project. Specifically, impacts are identified if project-related activities would cause a substantial increase in ambient noise levels at existing sensitive land uses in the project vicinity, or if future traffic or project-generated noise or vibration levels would exceed applicable federal, state, or local (Sacramento County) standards at existing or proposed sensitive uses.

Noise and Vibration Fundamentals

Noise

Noise is often described as unwanted sound. Sound is defined as any pressure variation in air that the human ear can detect. If the pressure variations occur frequently enough (at least 20 times per second), they can be heard and are designated as sound. The number of pressure variations per second is called the frequency of sound and is expressed as cycles per second, or Hertz (Hz). Definitions of acoustical terminology are provided in Appendix A.

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 of pressure) as a point of reference, defined as 0 dB. Other sound pressures are then compared to the 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. Another useful aspect of the decibel scale is that changes in decibel levels correspond closely to human perception of relative loudness. Noise levels associated with common noise sources are provided in Figure 4.

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 filtering the frequency response of a sound level meter by means of the standardized A-weighting network. There is a strong correlation between A-weighted sound levels (expressed as dBA) and community response to noise. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment. All noise levels reported in this section are in terms of A-weighted levels.

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 noise environment. A common statistical tool to measure the ambient noise level is the average, or equivalent, sound level (L_{eq}). The L_{eq} is the foundation of the day-night average noise descriptor, DNL (or L_{dn}), and shows very good correlation with community response to noise. DNL is based on the average noise level over a 24-hour day, with a +10-decibel weighting applied to noise occurring during nighttime (10:00 PM to 7:00 AM) hours. The nighttime penalty is based on the assumption that people react to nighttime noise exposures as though they were twice as loud as daytime exposures. Because DNL represents a 24-hour average, it tends to disguise short-term variations in the noise environment.

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 noise is generally considered to be pressure waves transmitted through air, while vibration is usually associated with transmission through the ground or structures. As with noise, vibration consists of an amplitude and frequency. A person's response to vibration will depend on their individual sensitivity as well as the amplitude and frequency of the source.

Vibration can be described in terms of acceleration, velocity, or displacement. A common practice is to monitor vibration in terms of velocity in inches per second peak particle velocity (IPS, PPV) or root-mean-square (VdB, RMS). Standards pertaining to perception as well as damage to structures have been developed for vibration in terms of peak particle velocity as well as RMS velocities.

As vibrations travel outward from the source, they excite the particles of rock and soil through which they pass and cause them to oscillate. Differences in subsurface geologic conditions and distance from the source of vibration will result in different vibration levels characterized by different frequencies and intensities. In all cases, vibration amplitudes will decrease with increasing distance.

Human response to vibration is difficult to quantify. Vibration can be felt or heard well below the levels that produce any damage to structures. The duration of the event has an effect on human response, as does frequency. Generally, as the duration and vibration frequency increase, the potential for adverse human response increases.

According to the Transportation and Construction-Induced Vibration Guidance Manual (Caltrans, April 2020), operation of construction equipment and construction techniques generate ground vibration. Traffic traveling on roadways can also be a source of such vibration. At high enough amplitudes, ground vibration has the potential to damage structures and/or cause cosmetic damage. Ground vibration can also be a source of annoyance to individuals who live or work close to vibration-generating activities. However, traffic, rarely generates vibration amplitudes high enough to cause structural or cosmetic damage.

Legend

Project Area Boundary (Approximate)

Short-Term Noise & Vibration Survey Locations

N

Scale (Feet)

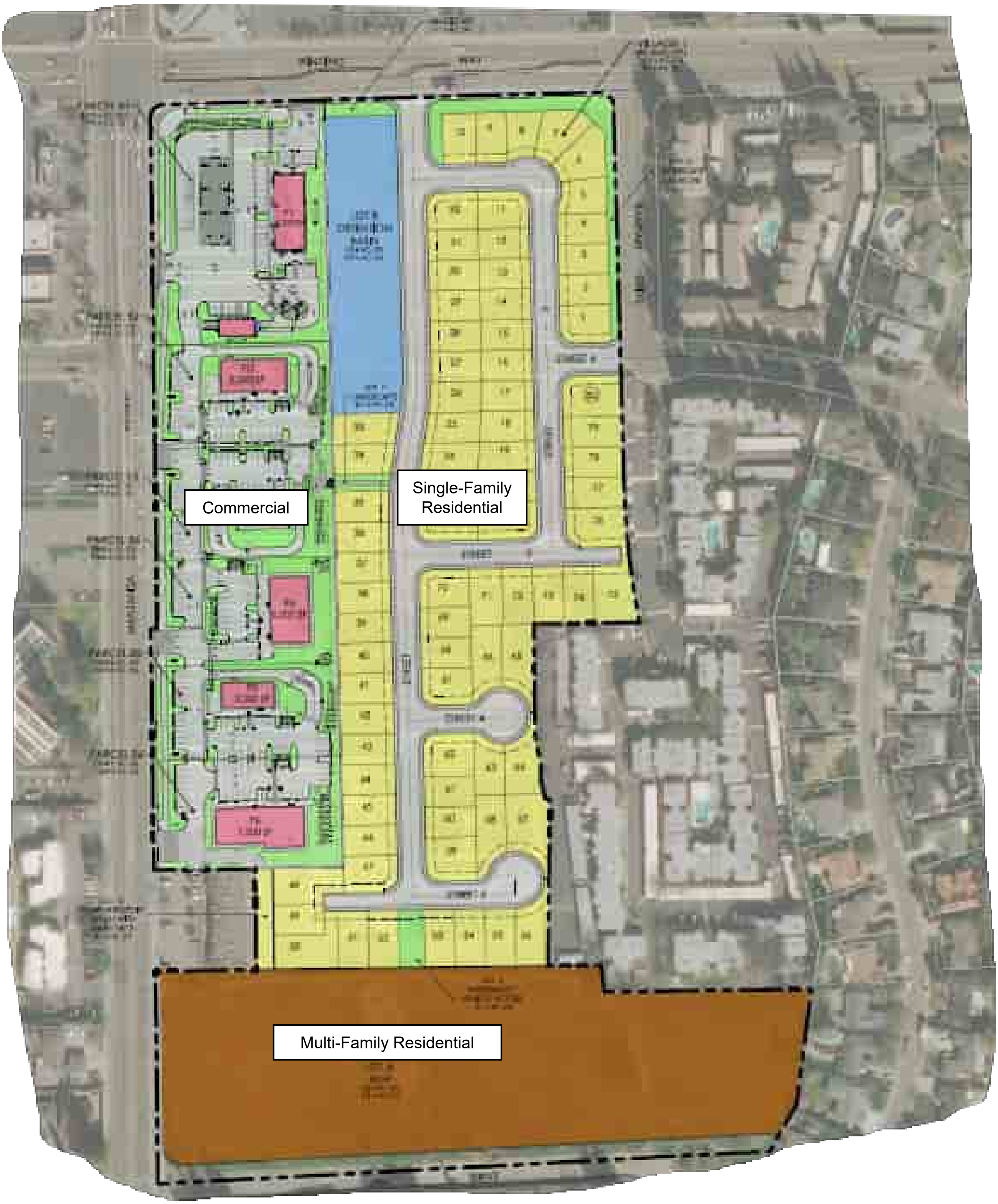
0 150 300

Winding Ranch Project
Sacramento County, California

Project Area

Figure 1

BOLLARD
Acoustical Consultants



Drawing dated January 13, 2023

Legend

Project Area Boundary

N

Scale (Feet)

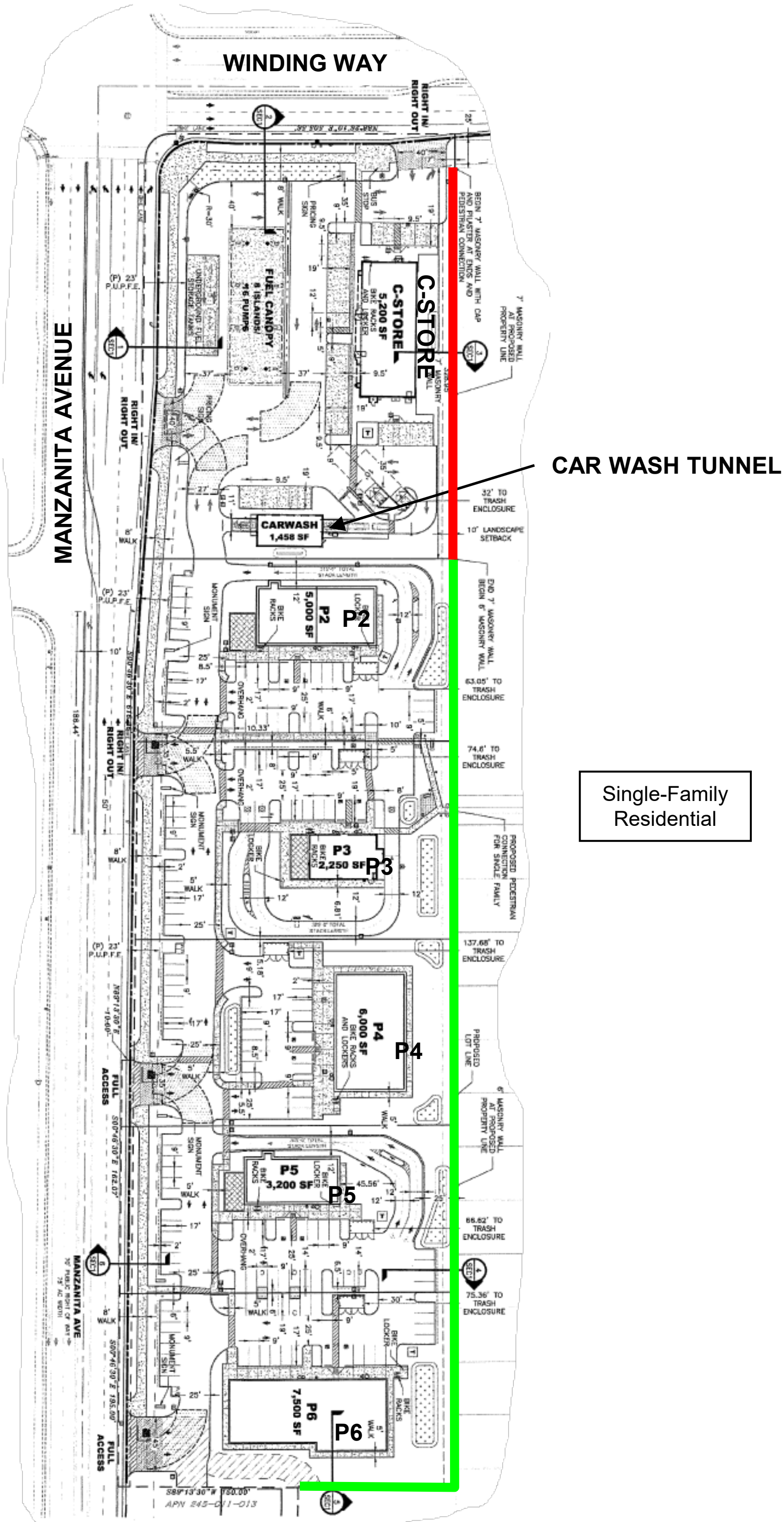
0 100 200

Winding Ranch Project
Sacramento County, California

Composite Site Plan

Figure 2

BOLLARD Acoustical Consultants



Drawing dated January 27, 2023

Legend

- Proposed 7' Masonry Wall
- Proposed 6' Masonry Wall

N

Scale (Feet)

0 75 150

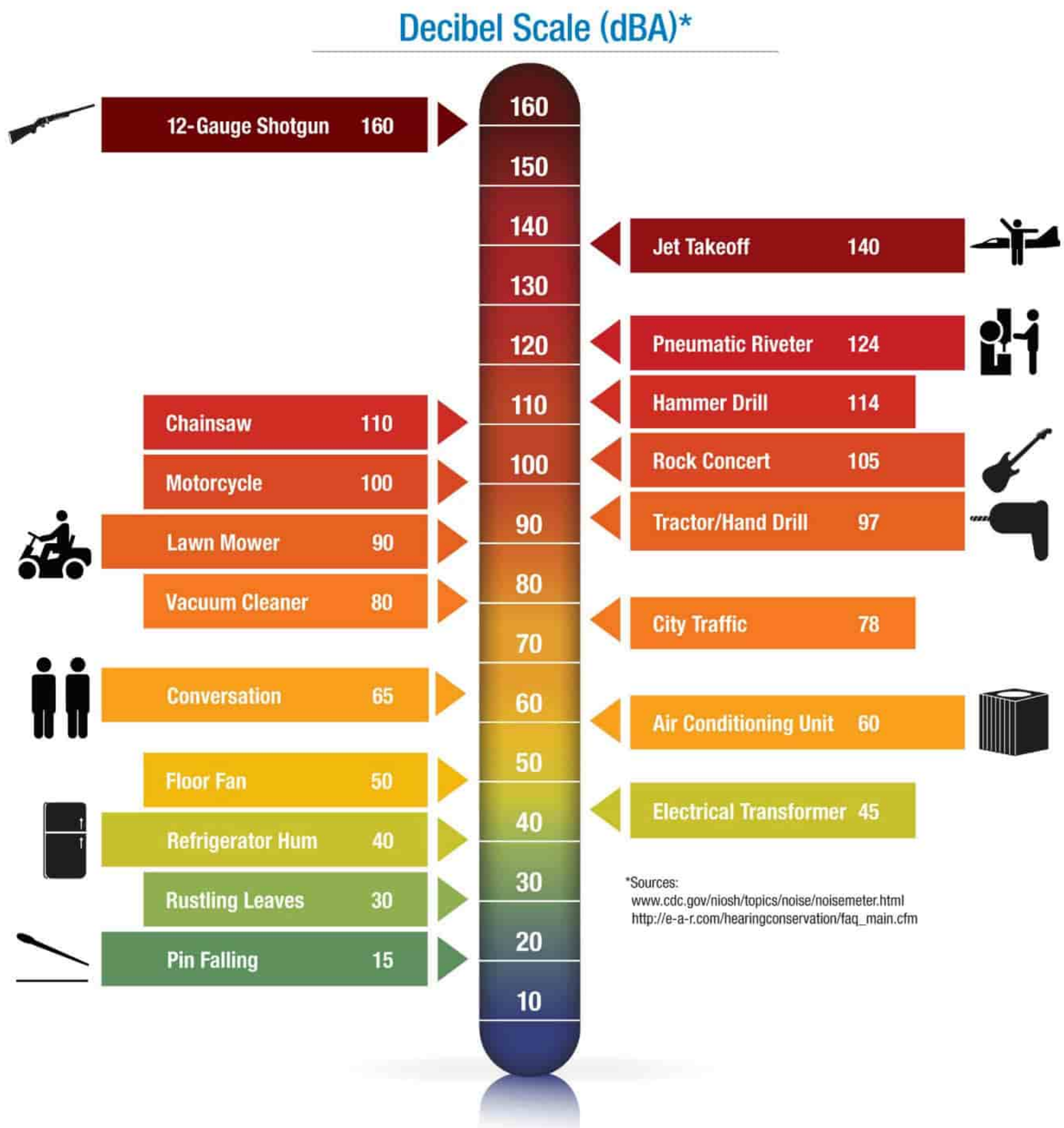
Winding Ranch Project
Sacramento County, California

Site Plan – Commercial Component

Figure 3

BOLLARD Acoustical Consultants

Figure 4
Noise Levels Associated with Common Noise Sources



Environmental Setting – Existing Ambient Noise and Vibration Environment

Land Uses in the Project Vicinity

Noise-sensitive land uses are generally defined as locations where people reside or where the presence of unwanted sound could adversely affect the primary intended use of the land. Places where people live, sleep, recreate, worship and study are generally considered to be sensitive to noise because intrusive noise can be disruptive to these activities. The nearest existing noise-sensitive land uses which would potentially be affected by the project consist of single- and multi-family residential uses. The project area and existing residential uses are shown in Figure 1.

Existing Traffic Noise Levels along Project Area Roadway Network

To predict traffic noise levels along existing roadway networks with multiple segments, modelling is commonly used rather than monitoring. The FHWA Traffic Noise Model (FHWA-RD-77-108) was used to quantify existing traffic noise levels at the existing sensitive land uses nearest to the project area roadway network. The Model was also used to quantify the distances to the 60, 65 and 70 dB DNL traffic noise contours for these roadways. The FHWA Model predicts hourly average (L_{eq}) values for free-flowing traffic conditions. Estimates of the hourly distribution of traffic for a typical 24-hour period were used to develop DNL values from L_{eq} values.

Existing traffic data in the form of AM and PM peak hour intersection turning movements were provided by the project transportation consultant (Wood Rodgers). Those data were converted to Average Daily Traffic (ADT) segment volumes by applying a factor of 5 to the sum of AM and PM peak hour conditions. Other inputs were obtained from BAC observations and noise measurement data. The existing traffic noise levels at the distances representing the nearest sensitive land uses (residential) to the project area roadways and distances from the centerlines of selected roadways to the 60 dB, 65 dB and 70 dB DNL contours are summarized in Table 1. The Table 1 data includes offsets where appropriate to account for the presence of existing intervening shielding (e.g., building screening). Appendix B contains the FHWA Model inputs for existing conditions.

Table 1
Existing Traffic Noise Levels at Nearest Receptors and Distances to DNL Contours

#	Roadway	Segment Description	DNL at Nearest Sensitive Receptor	Distance to Contour (ft)		
				70 dB DNL	65 dB DNL	60 dB DNL
1	College Oak Dr	North of Winding Way	60	20	43	93
2	College Oak Dr	South of Winding Way	61	12	26	56
3	Winding Way	West of College Oak Dr	48	2	3	7
4	Winding Way	College Oak to Manzanita Ave	63	18	39	84
5	Winding Way	Manzanita Ave to Rampart Dr	59	38	83	178
6	Winding Way	East of Rampart Dr	63	37	79	170
7	Manzanita Ave	North of Winding Way	64	38	83	178
8	Manzanita Ave	Winding Way to Windmill Way	53	40	85	184
9	Manzanita Ave	Winding Way to Lincoln Ave	66	43	92	199
10	Manzanita Ave	Lincoln Ave to Cypress Ave	59	43	94	202
11	Manzanita Ave	South of Cypress Ave	57	49	105	226
12	Windmill Way	West of Manzanita Ave	52	9	20	42
13	Lincoln Ave	West of Manzanita Ave	27	0	1	1
14	Lincoln Ave	East of Manzanita Ave	57	10	23	49
15	Cypress Ave	West of Manzanita Ave	58	16	35	76
16	Cypress Ave	East of Manzanita Ave	37	3	7	14
17	Rampart Ave	North of Winding Way	38	1	2	5
18	Rampart Ave	Winding Way to Mary Lynn Ln	36	1	2	5
19	Rampart Ave	South onto Mary Lynn Ln	35	0	1	2
20	Rampart Ave	East of Mary Lynn Ln	49	3	7	15

Source: FHWA-RD-77-108 and Wood Rodgers. Appendix B contains model inputs for existing conditions.

Existing Overall Ambient Noise Environment in Project Vicinity

The existing ambient noise environment within the project vicinity is defined primarily by noise from traffic on Winding Way and Manzanita Avenue, and by nearby commercial operations and residential activities. To generally quantify existing ambient noise environment within the project vicinity, BAC conducted short-term (20-minute) ambient noise level measurements at four (4) locations on August 9th, 2022. Specifically, several 20-minute measurement samples were taken at each monitoring site during daytime (7:00 a.m. to 7:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) hours. The locations of the noise survey sites are shown on Figure 1. Photographs of the survey locations are provided in Appendix C.

Larson Davis Laboratories (LDL) Model LxT precision integrating sound level meters were used to complete the noise level surveys. The meters were calibrated immediately before and after use with an LDL Model CA200 acoustical calibrator to ensure the accuracy of the measurements. The equipment used meets all specifications of the American National Standards Institute requirements for Type 1 sound level meters (ANSI S1.4). The results of the ambient noise surveys are summarized below in Table 2.

Table 2
Summary of Ambient Noise Survey Results – August 9th, 2022

Survey Location[1]	Time	Average Measured Noise Levels (dB)[2] L_{50}	L_{max}
Site 1: Northeast end of project area	8:53 a.m.	58	73
	4:09 p.m.	59	80
	11:55 p.m.	45	71
Site 2: East end of project area	8:00 a.m.	69	81
	5:31 p.m.	68	92
	11:26 p.m.	54	63
Site 3: South of project area across Jan Drive	8:27 a.m.	60	74
	5:03 p.m.	65	84
	10:31 p.m.	50	70
Site 4: West of project area across Manzanita Avenue	7:31 a.m.	70	79
	4:39 p.m.	69	79
	10:58 p.m.	60	80

[1] Locations of ambient noise monitoring sites are shown on Figure 1.
[2] Average measured noise levels during each 20-minute measurement sample.

Source: BAC 2022.

The BAC measurement sites were specifically selected to be representative of the ambient noise level environments at the nearest existing residential uses to the northeast (site 1), east (site 2), south (site 3), southwest and west (both site 4) of the project area. The Table 2 data indicate that measured noise levels during the monitoring period were elevated. This is believed to be attributed to nearby traffic, commercial and residential activities.

Existing Ambient Vibration Environment in Project Vicinity

During a BAC site visit on August 9th, 2022, vibration levels were below the threshold of perception within the project area. Nonetheless, to quantify existing vibration levels within the project vicinity, BAC conducted short-term (10-minute) vibration measurements at the four survey locations identified on Figure 1 on August 9th, 2022. Photographs of the survey locations are provided in Appendix C.

A Larson-Davis Laboratories Model LxT precision integrating sound level meter equipped with a vibration transducer was used to complete the measurements. The results are summarized in Table 3.

Table 3
Summary of Ambient Vibration Survey Results – August 9th, 2022

Survey Location	Time	Measured Maximum Vibration Level, PPV (in/sec)
Site 1: Northeast end of project area	4:21 p.m.	0.024
Site 2: East end of project area	5:32 p.m.	<0.001
Site 3: South of project area across Jan Drive	5:05 p.m.	<0.001
Site 4: West of project area across Manzanita Avenue	4:39 p.m.	0.015
PPV = Peak Particle Velocity (inches/second)		

Source: BAC 2022.

The Table 3 data indicate that measured maximum vibration levels within the project area ranged from less than 0.001 to 0.024 PPV in/sec.

Regulatory Setting: Criteria for Acceptable Noise and Vibration Exposure

Federal

There are no federal noise or vibration criteria which would be directly applicable to this project. However, because the Sacramento County General Plan does not currently have a policy for assessing noise impacts associated with increases in ambient noise levels from project-generated noise sources, recommendations made by the Federal Interagency Commission on Noise (FICON) are provided.

Federal Interagency Commission on Noise (FICON)

The Federal Interagency Commission on Noise (FICON) has developed a graduated scale for use in the assessment of project-related noise level increases. The criteria shown in Table 4 was developed by FICON as a means of developing thresholds for impact identification for project-related noise level increases. The FICON standards have been used extensively in recent years in the preparation of the noise sections of Environmental Impact Reports that have been certified in many California cities and counties.

The use of the FICON standards is considered conservative relative to thresholds used by other agencies in the State of California. For example, the California Department of Transportation (Caltrans) requires a project-related traffic noise level increase of 12 dB for a finding of significance, and the California Energy Commission (CEC) considers project-related noise level increases between 5 to 10 dB significant, depending on local factors. Therefore, the use of the FICON standards, which set the threshold for finding of significant noise impacts as low as 1.5 dB, provides a very conservative approach to impact assessment for this project.

Table 4
Significance of Changes in Cumulative Noise Exposure

Ambient Noise Level Without Project (DNL)	Change in Ambient Noise Level Due to Project
<60 dB	+5.0 dB or more
60 to 65 dB	+3.0 dB or more
>65 dB	+1.5 dB or more

Source: Federal Interagency Committee on Noise (FICON).

Based on the FICON research, as shown in Table 4, a 5 dB increase in noise levels due to a project is required for a finding of significant noise impact where ambient noise levels without the project are less than 60 dB DNL. Where pre-project ambient conditions are between 60 and 65 dB DNL, a 3 dB increase is applied as the standard of significance. Finally, in areas already exposed to higher noise levels, specifically pre-project noise levels in excess of 65 dB DNL, a 1.5 dB increase is considered by FICON as the threshold of significance.

State of California

California Environmental Quality Act (CEQA)

The State of California has established regulatory criteria that are applicable to this assessment. Specifically, Appendix G of the State of California Environmental Quality Act (CEQA) Guidelines are used to assess the potential significance of impacts pursuant to local General Plan policies, Municipal Code standards, or the applicable standards of other agencies. According to Appendix G of the CEQA guidelines, the project would result in a significant noise or vibration impact if the following occur:

A. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or other applicable standards of other agencies.

B. Generation of excessive groundborne vibration or groundborne noise levels.

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

It should be noted that audibility is not a test of significance according to CEQA. If this were the case, any project which added any audible amount of noise to the environment would be considered significant according to CEQA. Because every physical process creates noise, the use of audibility alone as significance criteria would be unworkable. CEQA requires a substantial increase in noise levels before noise impacts are identified, not simply an audible change.

California Department of Transportation (Caltrans)

Sacramento County does not currently have adopted standards for groundborne vibration. As a result, the vibration impact criteria developed by the California Department of Transportation (Caltrans) was applied to the project. The Caltrans guidance criteria for building structure and vibration annoyance are presented in Tables 5 and 6, respectively.

Table 5
Caltrans Guidance for Building Structure Vibration Criteria

Structure and Condition	Limiting PPV (in/sec)
Historic and some old buildings	0.5
Residential structures	0.5
New residential structures	1.0
Industrial buildings	2.0
Bridges	2.0
PPV = Peak Particle Velocity	

Source: 2020 Caltrans Transportation and Construction Vibration Guidance Manual, Table 14.

Table 6
Caltrans Guidance for Vibration Annoyance Potential Criteria

	Maximum PPV (in/sec)	
Human Response	Transient Sources	Continuous/Frequent Intermittent Sources
Severe/very disturbing	2.0	0.4 to 3.6
Strongly perceptible	0.9	0.1
Distinctly perceptible	0.24	0.035
Barely/slightly perceptible	0.035	0.012
Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent sources include pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers and vibratory compaction equipment.		
PPV = Peak Particle Velocity		

Source: 2020 Caltrans Transportation and Construction Vibration Guidance Manual, Tables 4 & 6.

Local

Sacramento County General Plan

The Noise Element of the Sacramento County General Plan contains the County's noise-related policies. The specific policies which are generally applicable to this project are reproduced below:

Traffic Noise

Policy NO-1 The noise level standards for noise-sensitive areas of new uses affected by traffic or railroad noise sources in Sacramento County are shown in Table 7.

Where the noise level standards of Table 7 are predicted to be exceeded at new uses proposed within Sacramento County which are affected by traffic or railroad noise, appropriate noise mitigation measures shall be included in the project design to reduce projected noise levels to a state of compliance with the Table 7 standards.

Non-Transportation Noise

Policy NO-5 The interior and exterior noise level standards for noise-sensitive areas of new uses affected by existing non-transportation noise sources in Sacramento County are shown in Table 8. Where the noise level standards of Table 8 are predicted to be exceeded at a proposed noise-sensitive area due to existing non-transportation noise sources, appropriate noise mitigation measures shall be included in the project design to reduce projected noise levels to a state of compliance with the Table 8 standards within sensitive areas.

Policy NO-6 Where a project would consist of or include non-transportation noise sources, the noise generation of those sources shall be mitigated so as not exceed the interior and exterior noise level standards of Table 8 at existing noise-sensitive areas in the project vicinity.

Policy NO-7 The “last use there” shall be responsible for noise mitigation. However, if a noise generating use is proposed adjacent to lands zoned for uses which may have sensitivity to noise, then the noise generating use shall be responsible for mitigating its noise generation to a state of compliance with the Table 8 standards at the property line of the generating use in anticipation of the future neighboring development.

Construction Noise

Policy NO-8 Noise associated with construction activities shall adhere to the County Code requirements. Specifically, Section 6.68.090.E addresses construction noise within the County.

Table 7
Noise Standards for New Uses Affected by Traffic and Railroad Noise

Receiving Land Use	Outdoor Areas[1] dBA (DNL/CNEL)	Interior Areas[2] dBA (DNL/CNEL)	Notes
Residential	65	45	5
Transient lodging	65	45	3, 5
Hospitals, nursing homes	65	45	3, 4, 5
Theaters & auditoriums	--	35	3
Churches, schools, libraries	65	40	3
Office buildings	65	45	3
Commercial buildings	--	50	3
Playgrounds, parks	70	--	
Industry	65	50	3

[1] Sensitive areas are defined in acoustic terminology section.
[2] Interior noise level standards applied within noise-sensitive areas of land uses, with windows and doors in the closed positions.
[3] Where there are no sensitive exterior spaces proposed for these uses, only the interior noise level standard shall apply.
[4] Hospitals are often noise-generating uses. The exterior noise level standards for hospitals are applicable only at clearly identified areas designated for outdoor relaxation by either hospital staff or patients.
[5] If this use is affected by railroad noise, a maximum (L_{max}) noise level standard of 70 dB shall be applied to all sleeping rooms to reduce the potential for sleep disturbance during nighttime train passages.

Source: Sacramento County General Plan, Noise Element, Table 1. 2011.

Table 8
Non-Transportation Noise Standards – Median (L_{50}) / Maximum (L_{max})[1]

Receiving Land Use	Outdoor Area Daytime (7am-10pm)	Outdoor Area Nighttime (10pm to 7am)	Interior[2] Day & Night	Notes
Residential	55 / 75	50 / 70	35 / 55	--
Transient lodging	55 / 75	--	35 / 55	3
Hospitals, nursing homes	55 / 75	--	35 / 55	4,5
Theaters & auditoriums	--	--	30 / 50	5
Churches, schools, libraries	55 / 75	--	35 / 60	5
Office buildings	60 / 75	--	45 / 65	5
Commercial buildings	--	--	45 / 65	5
Playgrounds, parks	65 / 75	--	--	5
Industry	60 / 80	--	50 / 70	5

[1] The Table 8 standards shall be reduced by 5 dB for sounds consisting primarily of speech or music, and for recurring impulsive sounds. If the existing ambient noise level exceeds the standards of Table 8, then the noise level standards shall be increased at 5 dB increments to encompass the ambient.
[2] Interior noise level standards are applied within noise-sensitive areas with windows and doors in the closed positions.
[3] Outdoor activity areas of transient lodging facilities are not commonly used during nighttime hours.
[4] Hospitals are often noise-generating uses. The exterior noise level standards for hospitals are applicable only at clearly identified areas designated for outdoor relaxation by either hospital staff or patients.
[5] The outdoor activity areas of these uses (if any) are not typically utilized during nighttime hours.
-Where median (L50) noise level data is not available for a particular noise source, average (Leq) values may be substituted for the standards of this table provided the noise source in question operates for at least 30 minutes of an hour. If the source in question operates less than 30 minutes per hour, then the maximum noise level standards shown would apply.

Source: Sacramento County General Plan, Noise Element, Table 2. 2011.

Sacramento County Municipal Code

The provisions of the Sacramento County Municipal Code which would be most applicable to this project are reproduced below. For residential uses affected by non-transportation noise sources, the County Municipal Code standards, provided below in Section 6.68.070, are effectively identical to the County's General Plan Noise Element standards shown in Table 8. Because the Municipal Code standards are consistent with the General Plan standards, compliance with the General Plan standards in Table 8 would ensure satisfaction of both the Noise Element and Municipal Code standards.

6.68.070 Exterior Noise Standards.

A. The following noise standards, unless otherwise specifically indicated in this chapter, shall apply to all properties within a designated noise area.

Noise Area	County Zoning Districts	Time Period	Exterior Noise Standard
1	RE-1, RD-1, RE-2, RD-2, RE-3, RED-3, RD-4, R-1-A, RD-5, R-2, RD-10, R-2A, RD-20, R-3, RD-30, RD-40, RM-1, RM-2, A-1-B, AR-1, A-2, AR-2, A-5, AR-5	7:00 a.m. to 10:00 p.m.	55 dBA
		10:00 p.m. to 7:00 a.m.	50 dBA

B. It is unlawful for any person at any location within the County to create any noise which causes the noise levels on an affected property, when measured in the designated noise area, to exceed for the duration of time set forth following, the specified exterior noise standards in any one hour by:

Cumulative Duration of the Intrusive Sound	Allowance Decibels
1. Cumulative period of 30 minutes per hour	0
2. Cumulative period of 15 minutes per hour	+5
3. Cumulative period of 5 minutes per hour	+10
4. Cumulative period of 1 minute per hour	+15
5. Level not to be exceeded for any time per hour	+20

C. Each of the noise limits specified in subdivision (B) of this section shall be reduced by five dBA for impulsive or simple tone noises, or for noises consisting of speech or music.

D. If the ambient noise level exceeds that permitted by any of the first four noise limit categories specified in subdivision (B), the allowable noise limit shall be increased in five dBA increments in each category to encompass the ambient noise level. If the ambient noise level exceeds the fifth noise level category, the maximum ambient noise level shall be the noise limit for that category.

6.68.090 Exemptions.

The following activities shall be exempted from the provisions of this chapter:

E. Noise sources associated with construction, repair, remodeling, demolition, paving or grading of any real property, provided said activities do not take place between the hours of eight p.m. and six a.m. on weekdays and Friday commencing at eight p.m. through and including seven a.m. on Saturday; Saturdays commencing at eight p.m. through and including seven a.m. on the next following Sunday and on each Sunday after the hour of eight p.m. Provided, however, when an unforeseen or unavoidable conditions occurs during a construction project and the nature of the project necessitates that work in process be continued until a specific phase is completed, the contractor or owner shall be allowed to continue work after eight p.m. and to operate machinery and equipment necessary until completion of the specific work in progress can be brought to conclusion under conditions which will not jeopardize inspection acceptance or create undue financial hardships for the contractor or owner;

<u>Adjustments to County Exterior Noise Level Standards Based on Measured Ambient Conditions</u>

For the purposes of this assessment, the County's daytime and nighttime noise level standards shown in Table 8 were applied to noise sources associated with all proposed on-site commercial uses.

Pursuant to footnote 1 of Table 8, the County's exterior noise level standards shall be increased in 5 dB increments to encompass the ambient in cases where ambient noise levels already exceed the Table 8 standards. As discussed previously, BAC conducted ambient noise level measurements at four (4) locations on August 9th, 2022 (Table 2). Comparison of the ambient noise level data contained in Table 2 and the County noise level standards in Table 8 revealed that a portion of the County's criteria are being exceeded at the measurement sites, representative of the ambient noise level environment at the nearest residential uses.

Based on the results from the BAC ambient noise survey, and pursuant to the County's adjustment criteria discussed above, the following exterior noise level standards shown in Tables 9 and 10 have been applied to proposed on-site commercial operations and assessed at the nearest existing residential uses to the project.

Table 9
Sacramento County Daytime Exterior Noise Level Standards Applied to the Project

Residential Use	Representative Measurement Site	Measured Noise Levels (dB)[1]		Unadjusted Noise Standards (dB)[2]		Adjusted for Ambient?		Applied Noise Standards (dB)[3]	
		L_{50}	L_{max}	L_{50}	L_{max}	L_{50}	L_{max}	L_{50}	L_{max}
Northeast	1	59	77	55	75	Yes	Yes	60	80
East	2	69	87			Yes	Yes	70	90
South	3	63	79			Yes	Yes	65	80
Southwest & West	4	70	79			Yes	Yes	70	80

[1] Average of measured daytime noise levels at monitoring sites during BAC noise survey.
[2] Unadjusted County daytime noise level standards applicable to residential uses.
[3] Applied daytime noise standards based on BAC ambient noise survey and County ambient noise adjustment criteria.

Table 10
Sacramento County Nighttime Exterior Noise Level Standards Applied to the Project

Residential Use	Representative Measurement Site	Measured Noise Levels (dB)[1]		Unadjusted Noise Standards (dB)[2]		Adjusted for Ambient?		Applied Noise Standards (dB)[3]	
		L_{50}	L_{max}	L_{50}	L_{max}	L_{50}	L_{max}	L_{50}	L_{max}
Northeast	1	45	71	50	70	No	Yes	50	75
East	2	44	53			No	No	50	70
South	3	50	69			No	No	50	70
Southwest & West	4	60	80			Yes	Yes	60	80

[1] Measured nighttime noise levels at monitoring sites during BAC noise survey.
[2] Unadjusted County nighttime noise level standards applicable to residential uses.
[3] Applied nighttime noise standards based on BAC ambient noise survey and County ambient noise adjustment criteria.

Impacts and Mitigation Measures

Thresholds of Significance

For the purposes of this assessment, a noise and vibration impact is considered significant if the project would result in:

- Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or other applicable standards of other agencies; or

- Generation of excessive groundborne vibration or groundborne noise levels; or

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

The project site is not within the vicinity of a private airstrip, an airport land use plan, or within two miles of a public airport. Therefore, the last threshold listed above is not discussed further.

For the purposes of this assessment, a noise or vibration impact may be considered significant if the project would result in exceedance of the following criteria based on standards established by the Federal Interagency Commission on Noise (FICON), California Department of Transportation (Caltrans), Sacramento County General Plan and Municipal Code:

- A significant noise impact would be identified if the project would expose persons to or generate noise levels that would exceed applicable noise standards presented in the Sacramento County General Plan or Municipal Code.

- A significant impact would be identified if project-generated off-site traffic, on-site operations, or on-site construction activities would substantially increase noise levels at existing sensitive receptors in the vicinity. A substantial increase in off-site traffic noise levels would be identified relative to the FICON noise level increase significance criteria presented in Table 4.

  In terms of determining the temporary noise increase due to project on-site operations and construction activities, an impact would occur if those activities would noticeably increase ambient noise levels above background levels. The threshold of perception of the human ear is approximately 3 to 5 dB – a 5 dB change is considered to be clearly noticeable. For the analysis of project on-site operations and construction activity noise level increases, a noticeable increase in ambient noise levels is assumed to occur where those activities would result in an increase by 5 dB or more over existing ambient noise levels at nearby existing sensitive receptors.

- A significant impact would be identified if project construction activities or proposed on-site operations would expose noise-sensitive receptors to excessive groundborne vibration levels. Specifically, an impact would be identified if groundborne vibration levels due to these sources would exceed the Caltrans vibration impact criteria.

Noise Impacts Associated with Project-Generated Increases in Off-Site Traffic

With development of the project, traffic volumes on the local roadway network will increase. Those increases in daily traffic volumes will result in a corresponding increase in traffic noise levels at existing uses located along those roadways. Impact 1 evaluates increases in off-site traffic noise levels which would result from the project.

Impact 1: Increases in Existing Traffic Noise Levels due to the Project

The FHWA Traffic Noise Model (FHWA-RD-77-108) was used to quantify increases in existing traffic noise levels at the existing sensitive land uses nearest to the project area roadway network. The FHWA Model predicts hourly L_{eq} values for free-flowing traffic conditions. Estimates of the hourly distribution of traffic for a typical 24-hour period were used to develop DNL values from L_{eq} values.

Traffic data in the form of peak hour intersection turning movements were provided by the project transportation consultant (Wood Rodgers). Those data were converted to Average Daily Traffic (ADT) segment volumes by applying a factor of 5 to the sum of AM and PM peak hour conditions. Other inputs were obtained from BAC observations and noise measurement data. Appendices B and D contains the FHWA Model inputs for existing and existing plus project conditions, respectively. The existing and existing plus project traffic noise levels at the distances representing the nearest sensitive land uses to the project area roadways (residential uses) are summarized in Table 11. Table 11 also shows the thresholds for determination of a significant traffic noise increase (relative to applied FICON criteria), whether the roadway segment contains sensitive uses, and whether or not significant noise impacts are identified for each segment.

It should be noted that the FHWA Model predictions presented in Table 11 are based on inputs that include weekday peak hour traffic volumes, day/night, and truck type percentages (e.g., medium and heavy trucks), vehicle speed, and distance from roadway centerlines. Further, the FHWA Model does not account for non-traffic ambient noise sources such as nearby wildlife (e.g., birds chipping) or other anthropogenic noise sources within an area (e.g., distant traffic from other roadways, recreational activities, commercial or industrial operations, etc.).

Table 11
Predicted Traffic Noise Level Increases at Existing Sensitive Receptors – Existing vs. Existing Plus Project Conditions

#	Roadway	Segment Description	Predicted DNL (dB) E	E+ P	Increase	Significance Threshold (dB)[1]	Threshold Exceeded?	Sensitive Receptors Present?	Significant Impact Identified?
1	College Oak Dr	North of Winding Way	59.5	59.8	0.3	5.0	No	**Yes**	No
2	College Oak Dr	South of Winding Way	60.8	61.2	0.5	3.0	No	**Yes**	No
3	Winding Way	West of College Oak Dr	47.6	47.6	0.0	5.0	No	**Yes**	No
4	Winding Way	College Oak to Manzanita Ave	63.4	64.0	0.6	3.0	No	**Yes**	No
5	Winding Way	Manzanita Ave to Rampart Dr	59.2	59.6	0.3	5.0	No	**Yes**	No
6	Winding Way	East of Rampart Dr	63.5	63.7	0.2	6.0	No	**Yes**	No
7	Manzanita Ave	North of Winding Way	63.8	64.1	0.3	3.0	No	**Yes**	No
8	Manzanita Ave	Winding Way to Windmill Way	53.5	54.1	0.6	5.0	No	No	No
9	Manzanita Ave	Winding Way to Lincoln Ave	66.4	66.6	0.3	1.5	No	**Yes**	No
10	Manzanita Ave	Lincoln Ave to Cypress Ave	58.6	58.9	0.3	5.0	No	**Yes**	No
11	Manzanita Ave	South of Cypress Ave	57.2	57.4	0.2	5.0	No	**Yes**	No
12	Windmill Way	West of Manzanita Ave	51.8	51.8	0.0	5.0	No	**Yes**	No
13	Lincoln Ave	West of Manzanita Ave	27.1	27.1	0.0	5.0	No	**Yes**	No
14	Lincoln Ave	East of Manzanita Ave	57.2	57.5	0.3	5.0	No	**Yes**	No
15	Cypress Ave	West of Manzanita Ave	58.2	58.3	0.1	5.0	No	**Yes**	No
16	Cypress Ave	East of Manzanita Ave	36.9	38.4	0.0	5.0	No	No	No
17	Rampart Ave	North of Winding Way	37.8	37.8	0.0	5.0	No	**Yes**	No
18	Rampart Ave	Winding Way to Mary Lynn Ln	35.6	36.6	1.0	5.0	No	**Yes**	No
19	Rampart Ave	South onto Mary Lynn Ln	35.2	35.2	0.0	5.0	No	**Yes**	No
20	Rampart Ave	East of Mary Lynn Ln	49.4	49.4	0.0	5.0	No	**Yes**	No
21	Gas Station Dwy	North of Winding Way	NA[2]	42.1	42.1	--	--	No	No
22	Project Dwy 1	South onto Project Site	NA[2]	37.8	37.8	--	--	No	No
23	Project Dwy 2	East onto Project Site	NA[2]	35.0	35.0	--	--	No	No
24	Project Dwy 3	East onto Project Site	NA[2]	37.9	37.9	--	--	**Yes**	No
25	Project Dwy 4	East onto Project Site	NA[2]	35.9	35.9	--	--	**Yes**	No
26	Project Dwy 5	East onto Project Site	NA[2]	40.9	40.9	--	--	**Yes**	No
27	Shopping Center Dwy	North of Winding Way	NA[2]	42.1	42.1	--	--	No	No
28	Project Street 1	South onto Project Site	NA[2]	22.5	22.5	--	--	**Yes**	No
29	Project Street 6	West of Rampart Ave	NA[2]	24.4	24.4	--	--	**Yes**	No

[1] FICON significance thresholds provided in Table 4 of this report.
[2] The project traffic study did not contain existing conditions data for segments 21-27.

Source: FHWA-RD-77-108 with inputs from Wood Rodgers. Appendices B & D contain FHWA Model inputs.

As indicated in Table 11, the proposed project's contribution is calculated to result in increases ranging from approximately 23 to 42 dB DNL along roadway segments 21-27. Of those roadway segments, seven (7) are access points to the proposed development and are located on-site (segments 22-26). The remaining two (2) identified roadway segments are located off-site and have been identified as access points/parking aisles associated with the existing gas station/convenience store and shopping center to the north of the project area (segments 21 and 27).

As stated previously, the FHWA Model does not account for non-traffic ambient noise sources such as nearby wildlife or other anthropogenic noise sources within an area. Consideration of such sources typically results in higher ambient noise levels (i.e., existing no project) than those predicted by the FHWA Model alone. Thus, baseline ambient conditions are considerably higher than baseline traffic noise levels alone. After consideration of the measured existing ambient environment within the project vicinity (BAC noise survey) and taking into consideration typical noise levels associated with the existing commercial uses located north of the project area (e.g., parking movements, on-site traffic circulation, truck deliveries, etc.), project-related traffic noise level increases along roadway segments 21-27 are not expected to be substantial relative to the applicable FICON criteria. Further, although existing residential uses were identified along a portion of those roadway segments, it should be noted that the predicted Existing Plus Project traffic noise levels for those segments are well below the Sacramento County General Plan exterior noise level standard of 65 dB DNL applicable to traffic noise affecting residential uses.

Based on the analysis presented above, including consideration of measured ambient noise conditions within the project area and noise associated with nearby existing commercial operations, off-site traffic noise impacts related to increases in traffic resulting from the implementation of the project are identified as being ***less than significant***.

Off-Site Noise Impacts Associated with Proposed On-Site Commercial Operations

As mentioned previously, the commercial component consists of a total of six parcels – one parcel containing a gas station/convenience store (with car wash tunnel), and five parcels containing a retail/restaurant use (of which three will have drive-through lanes). The commercial component is presented in Figure 3.

Pursuant to Comment 30(C) of a Sacramento County Planning and Environmental Review letter to the project applicant, noise analyses for project car wash operations (i.e., drying assembly), vacuum equipment and drive-through operations (i.e., amplified menu speaker boards) are required. Impact discussions for each of the identified noise sources at nearby existing single-family residential (SFR) and multi-family residential (MFR) uses are provided in the following section.

For noise generated by on-site commercial operations, the Sacramento County General Plan's non-transportation noise standards for residential uses (shown in Table 8) were applied to the project. The General Plan's noise level limits are to be assessed at the outdoor areas of residential uses, which are considered to be backyards for single-family residential uses and common outdoor spaces such as pools or parks for multi-family residential uses. In terms of determining the noise level increase due to on-site noise sources, an impact would occur if those sources would noticeably increase ambient noise levels above background levels. The threshold of perception of the human ear is approximately 3 to 5 dB – a 5 dB change is considered to be clearly noticeable. For the following analyses of commercial operations noise sources, a noticeable increase in ambient noise levels is assumed to occur where noise levels increase by 5 dB or more over existing ambient noise levels at existing nearby residential uses.

Finally, the following analyses of project on-site operations noise at the nearest residential uses include consideration of shielding (where applicable) that would be provided by a masonry wall ranging from 6 to 7' proposed for construction along the eastern and southern boundary of the commercial component. The location of the proposed masonry noise barrier is illustrated in Figure 3.

Impact 2: Car Wash Drying Assembly Noise at Nearest Existing Residential Uses

According to the project applicant, the project proposes the installation of a 40 Horsepower (HP) AquaDri Freestanding Drying System (Model FS-40) manufactured by Mark VII / WashTec within a car wash tunnel. The location of the proposed car wash tunnel is shown in Figure 3. The manufacturer's sound level data for the proposed drying system are provided in Appendix E and are summarized in Table 12. The equipment manufacturer's sound level data presented in Table 12 and Appendix E are in terms of maximum (L_{max}) sound levels.

Table 12
AquaDri 40 HP Freestanding Drying System Reference Noise Levels

Exit End					Entrance End				
dBA (L_{max}) at distance (ft)					dBA (L_{max}) at distance (ft)				
10	20	30	40	50	10	20	30	40	50
92	87	84	81	77	89	84	81	80	78

Source: Mark VII / WashTec.

As indicated in Table 12, the noise level generation of the car wash drying assembly varies depending on the distance from the tunnel entrance/exit ends. It is the experience of BAC in previous car wash projects that drying assembly noise levels also vary depending on orientation of the measurement position relative to the tunnel openings. Worst-case drying assembly noise levels occur at a position directly facing the car wash exit, considered to be 0 degrees off-axis. At off-axis positions, the car wash building facade provides varying degrees of noise level reduction. At positions 45 degrees off-axis relative to the building facade of the car wash exit and entrance, drying assembly noise levels are approximately 5 dB lower. At 90 degrees off-axis, drying assembly noise levels are approximately 10 dB lower.

It is the experience of BAC in similarly configured car wash projects that the average car wash cycle is approximately 5 minutes in duration. The dryers would operate during the last 1 minute of the cycle. Therefore, during a worst-case hour, the car wash would go through 12 full cycles and the dryer would operate for approximately 12 minutes during a busy hour. Based on the above operation duration assumptions (i.e., less than 30 minutes of equipment operation during a given hour), and pursuant to the noise source duration criteria footnoted in Table 8, the County's maximum (L_{max}) noise level standards would be applicable to the project car wash drying assembly.

Based on the information above, and after consideration of screening of residential outdoor areas that would be provided by existing intervening structures, the following reference noise levels and offsets shown in Table 13 were applied to project car wash drying assembly noise level exposure at the nearest residential uses.

Table 13
Equipment Reference Noise Level Data and Applied Offsets

Nearest Residential Use	Base Reference Noise Level, L_{max} (dB)[1]	Orientation Relative to Tunnel Exit/Entrance	Applied Offsets (dB)		
			Orientation[2]	Proposed Sound Wall[3]	Existing Shielding[4]
Northeast – MFR	78 dB @ 50 feet	0°	--	-6	-7
East – MFR	78 dB @ 50 feet	0°	--	-6	-10
South – SFR	78 dB @ 50 feet	90°	-10	-6	--
Southwest – SFR	77 dB @ 50 feet	90°	-10	--	--
West – MFR	77 dB @ 50 feet	45°	-5	--	--

1 Because all of the nearest existing residential uses are located in excess of 50' from the tunnel exit/entrance, the base reference noise levels at 50' from tunnel exit/entrance shown in Table 12 were utilized in the analysis.
2 Orientation offsets based on BAC measurements at off-axis locations from tunnel exit/entrance, as discussed in report.
3 Sound wall offset applied where shielding would be provided by proposed 6' to 7' masonry wall, as indicated in Figure 3.
4 Existing shielding offsets applied where screening of outdoor area would occur from existing intervening buildings.

Source: BAC 2023.

Using the information shown in Table 13, and assuming standard spherical spreading loss from a point source (-6 dB per doubling of distance from a stationary noise source), project car wash drying assembly noise exposure at the closest existing residential uses was calculated and the results of those calculations are presented in Table 14.

Table 14
Predicted Car Wash Drying Assembly Noise Levels at Nearest Existing Residential Uses

Nearest Residential Use[1]	Distance (ft)[2]	Offset (dB)[3]	Predicted Noise Level, L_{max} (dB)	Applied County Standards, L_{max} (dB)[4]	
				Daytime	Nighttime
Northeast – MFR	775	-13	41	**80**	**75**
East – MFR	750	-16	38	**90**	**70**
South – SFR	1,200	-6	34	**80**	**70**
Southwest – SFR	1,100	0	40	**80**	**80**
West – MFR	650	0	50	**80**	**80**

1 Residential uses are shown in Figure 1.
2 Distances scaled from either tunnel entrance or exit to outdoor spaces of residential uses using site plans.
3 Applied offsets are shown in Table 13.
4 Applied noise standards based on BAC ambient noise survey results and County adjustment criteria.

Source: BAC 2023.

As indicated in Table 14, project car wash drying assembly noise level exposure is predicted to satisfy the applied Sacramento County General Plan daytime and nighttime exterior noise level standards at the nearest existing residential uses by a wide margin. In addition, standard residential construction (e.g., stucco siding, STC-27 windows, door weather-stripping, exterior wall insulation, composition plywood roof), typically results in an exterior to interior noise reduction of approximately 25 dB with windows closed and approximately 15 dB with windows open. Given this exterior to interior noise reduction typically achieved from standard residential construction and based on the predicted exterior noise levels in Table 14, project car wash drying assembly noise level exposure is expected to be well below the General Plan's daytime and nighttime interior noise level standards within the nearest existing residences.

Table 2 of this report summarizes the results from the BAC short-term ambient noise survey. Using the calculated averages of measured daytime and nighttime noise levels presented in Table 2, ambient plus project car wash drying assembly noise level increases were calculated at the nearest residential uses and the results of those calculations are presented in Tables 15 and 16.

Table 15
Ambient Plus Project Car Wash Noise Increases at Nearest Residential Uses – Daytime L_{max}

Nearest Residential Use	Predicted Noise Level, L_{max} (dB)[1]	Ambient Plus Project, L_{max} (dB)[2]	Increase in Ambient, L_{max}(dB)[3]
Northeast – MFR	41	80.0	<0.1
East – MFR	38	90.0	<0.1
South – SFR	34	80.0	<0.1
Southwest – SFR	40	80.0	<0.1
West – MFR	50	80.0	<0.1

[1] Predicted noise levels from Table 14 which include offsets as indicated.
[2] Sum of predicted and measured ambient daytime noise levels.
[3] Calculated increase in ambient daytime noise levels.

Source: BAC 2023.

Table 16
Ambient Plus Project Car Wash Noise Increases at Nearest Residential Uses – Nighttime L_{max}

Nearest Residential Use	Predicted Noise Level, L_{max} (dB)[1]	Ambient Plus Project, L_{max} (dB)[2]	Increase in Ambient, L_{max}(dB)[3]
Northeast – MFR	41	75.0	<0.1
East – MFR	38	70.0	<0.1
South – SFR	34	70.0	<0.1
Southwest – SFR	40	80.0	<0.1
West – MFR	50	80.0	<0.1

[1] Predicted noise levels from Table 14 which include offsets as indicated
[2] Sum of predicted and measured ambient nighttime noise levels.
[3] Calculated increase in ambient nighttime noise levels.

Source: BAC 2023.

As shown in Tables 15 and 16, the increases in ambient noise levels from project car wash drying assembly equipment are calculated to be well below the applied significance criterion of 5 dB.

Because noise exposure from project car wash drying assembly equipment is predicted to satisfy applicable Sacramento County General Plan noise level standards at the nearest existing residential uses, and because noise exposure from those activities is not calculated to significantly increase ambient noise levels at those uses, this impact is identified as being ***less than significant***.

Impact 3: Vacuum Equipment Noise at Nearest Existing Residential Uses

A vehicle vacuum area is proposed to be located adjacent to the proposed car wash tunnel within the commercial component. According to information provided to BAC, the project proposes the installation of JE Adams Super Vac Model #9200 series vacuum units.

The manufacturer's specifications, provided as Appendix F, indicate that the sound level exposure associated with the vacuum system varies depending on motor type configuration. For the purposes of this analysis, it was conservatively assumed that that project would have the loudest vacuum assembly indicated in Appendix F (regular 2-motor plastic dome configuration, 65 dB at 40 feet). Because the number of proposed vacuum units is unclear after a review of the project plan, it was further conservatively assumed that the project would have a total of six (6) within the vacuum area.

Because operation of the project vacuum equipment could exceed 30 continuous minutes in duration during a given worst-case busy hour, and pursuant to the noise source duration criteria footnoted in Table 8, the County's median (L_{50}) noise level standards would be applicable to the vacuum equipment. Based upon the manufacturer's data (Appendix F), the operations assumptions above, and assuming standard spherical spreading loss (-6 dB per doubling of distance), worst-case (all 6 combined units) project vacuum equipment noise exposure at the nearest existing residential uses was calculated and the results of those calculations are presented in Table 17. The results presented in Table 17 include consideration of shielding that would be provided by the masonry wall proposed for construction along the eastern and southern commercial component project boundary (ranging from 6 to 7' in height). The location of the proposed noise barrier is shown in Figure 3.

Table 17
Predicted Vacuum Equipment Noise Levels at Nearest Existing Residential Uses

Nearest Residential Use[1]	Distance (ft)[2]	Offset (dB)[3]	Predicted Noise Level, L_{50} (dB)	Applied County Standards, L_{50} (dB)[4]	
				Daytime	Nighttime
Northeast – MFR	800	-13	34	**60**	**50**
East – MFR	780	-16	31	**70**	**50**
South – SFR	1,330	-16	26	**65**	**50**
Southwest – SFR	1,100	0	44	**70**	**60**
West – MFR	680	0	48	**70**	**60**

1 Residential uses are shown in Figure 1.
2 Distances scaled from proposed vacuum area to outdoor spaces of residential uses using site plans.
3 Offsets account for existing and proposed building shielding (-7 to -10 dB) and proposed walls (-6 dB).
4 Predicted combined noise level exposure from 6 vacuum units (reference noise level of 73 dB at 40 feet).
5 Applied noise standards based on BAC ambient noise survey results and County adjustment criteria.

Source: BAC 2023.

The Table 17 data indicate that worst-case vacuum equipment noise level exposure is predicted to satisfy the applied Sacramento County General Plan daytime and nighttime exterior noise level standards at the nearest existing residential uses by a wide margin. In addition, given the exterior to interior noise reduction typically achieved from standard residential construction (approximately 25 dB with windows closed and approximately 15 dB with windows open), and based on the predicted exterior noise levels in Table 17, project vacuum equipment noise level exposure is expected to be well below the General Plan's daytime and nighttime interior noise level standards within the nearest existing residences.

Table 2 of this report summarizes the results from the BAC short-term ambient noise survey. Using the calculated averages of measured daytime and nighttime noise levels presented in Table 2, ambient plus project vacuum equipment noise level increases were calculated at the nearest residential uses and the results of those calculations are presented in Tables 18 and 19.

Table 18
Ambient Plus Project Vacuum Noise Increases at Nearest Residential Uses – Daytime L_{50}

Nearest Residential Use	Predicted Noise Level, L_{50} (dB)[1]	Ambient Plus Project, L_{50} (dB)[2]	Increase in Ambient, L_{50} (dB)[3]
Northeast – MFR	34	60.0	<0.1
East – MFR	31	70.0	<0.1
South – SFR	26	65.0	<0.1
Southwest – SFR	44	70.0	<0.1
West – MFR	48	70.0	<0.1

1 Predicted noise levels from Table 17 which include offsets as indicated.
2 Sum of predicted and measured ambient daytime noise levels.
3 Calculated increase in ambient daytime noise levels.

Source: BAC 2023.

Table 19
Ambient Plus Project Vacuum Noise Increases at Nearest Residential Uses – Nighttime L_{50}

Nearest Residential Use	Predicted Noise Level, L_{50} (dB)[1]	Ambient Plus Project, L_{50} (dB)[2]	Increase in Ambient, L_{50} (dB)[3]
Northeast – MFR	34	50.1	0.1
East – MFR	31	50.1	0.1
South – SFR	26	50.0	<0.1
Southwest – SFR	44	60.1	0.1
West – MFR	48	60.3	0.3

[1] Predicted noise levels from Table 17 which include offsets as indicated.
[2] Sum of predicted and measured ambient nighttime noise levels.
[3] Calculated increase in ambient nighttime noise levels.

Source: BAC 2023.

The data in Tables 18 and 19 indicate that the increases in ambient noise levels from worst-case project vacuum equipment operations are calculated to be well below the applied significance criterion of 5 dB.

Because noise exposure from project vacuum equipment is predicted to satisfy applicable Sacramento County General Plan noise level standards at the nearest existing residential uses, and because noise exposure from those activities is not calculated to significantly increase ambient noise levels at those uses, this impact is identified as being ***less than significant***.

Impact 4: Drive-Through Operations Noise at Nearest Existing Residential Uses

According to the project site plans, the project proposes drive-through lanes at Building Pads P2 through P6. Information on the menu speaker board models for the proposed drive-through lanes was not available at the time of writing this report. To quantify the noise emissions of proposed drive-through operations (i.e., menu speaker board and vehicles passages), BAC utilized noise level measurement data collected by BAC at other similar drive-through facilities located within the Sacramento region in recent years. Table 20 contains the reference sound levels utilized in this analysis (also contained in Appendix G).

Table 20
Reference Drive-Through Noise Levels

Noise Source	Measured Noise Levels (dB)	
	Average (L_{50})	Maximum (L_{max})
Speaker[1]	63 dB at 10 feet	67 dB at 10 feet
Vehicles[2]	60 dB at 5 feet	70 dB at 5 feet

[1] Noise level data obtained from measurements conducted at a drive-through restaurant located at 2845 Bell Road in Auburn, California in 2018 (Appendix G).

Source: BAC 2018.

Because project drive-through operations could exceed 30 continuous minutes in duration during a given worst-case busy hour, and pursuant to the noise source duration criteria footnoted in Table 8, the County's median (L_{50}) noise level standards were applied. Using the BAC speaker and drive-through vehicle passby data presented in Table 20, and assuming standard spherical spreading loss (-6 dB per doubling of distance), data were projected from each of the proposed drive-through lane/speaker board areas to the nearest existing residential uses. The results of those projections are provided in Table 21. The results presented in Table 21 include consideration of shielding that would be provided by the masonry wall proposed for construction along the eastern and southern commercial component project boundary (ranging from 6 to 7' in height). The location of the proposed noise barrier is shown in Figure 3.

Table 21
Predicted Drive-Through Operations Noise Levels at Nearest Existing Residential Uses

Residential Use[1]	Nearest Building Pads	Distance from Sources (ft)[2]		Predicted Combined Level, L_{50} (dB)[3]		Applied County Standards, L_{50} (dB)[4]	
		Speaker	Vehicles	Speaker	Vehicles	Daytime	Nighttime
Northeast – MFR	P2 P3	715 740	705 620	<20	<20	**60**	**50**
East – MFR	P5	650	600	<20	<20	**70**	**50**
South – SFR	P5	775	715	24	22	**65**	**50**
Southwest – SFR	P5	600	575	28	26	**70**	**60**
West – MFR	P5	660	630	22	<20	**70**	**60**

[1] Residential uses are shown in Figure 1.
[2] Distances scaled from nearest drive-throughs components to outdoor spaces of residential uses using site plans.
[3] Predicted noise levels include offsets that account for existing and proposed building shielding (-3 to -10 dB) and proposed walls (-6 dB).
[4] Applied noise standards based on BAC ambient noise survey results and County adjustment criteria.

Source: BAC 2023.

As shown in Table 21, project drive-through operations noise level exposure is predicted to satisfy the applied Sacramento County General Plan daytime and nighttime exterior noise level standards at the nearest existing residential uses by a wide margin. In addition, given the exterior to interior noise reduction typically achieved from standard residential construction (approximately 25 dB with windows closed and approximately 15 dB with windows open), and based on the predicted exterior noise levels in Table 21, project drive-through operations noise level exposure is expected to be well below the General Plan's daytime and nighttime interior noise level standards within the nearest existing residences. It should be noted that the predicted noise levels in Table 21 would also comply with the County's 5 dB downward adjusted noise criteria, which would be applicable to noise sources consisting primarily of music or speech.

Table 2 of this report summarizes the results from the BAC short-term ambient noise survey. Using the calculated averages of measured daytime and nighttime noise levels presented in Table 2, ambient plus project drive-through operations noise level increases were calculated at the nearest residential uses and the results of those calculations are presented in Tables 22 and 23.

Table 22
Ambient Plus Project Drive-Thru Noise Increases at Nearest Residential Uses – Daytime L_{50}

Nearest Residential Use	Highest Predicted Noise Level, L_{50} (dB)[1]	Ambient Plus Project, L_{50} (dB)[2]	Increase in Ambient, L_{50} (dB)[3]
Northeast – MFR	<20	60.0	<0.1
East – MFR	<20	70.0	<0.1
South – SFR	24	65.0	<0.1
Southwest – SFR	28	70.0	<0.1
West – MFR	22	70.0	<0.1

[1] Highest predicted noise levels from Table 21 which include offsets as footnoted in table.
[2] Sum of highest predicted and measured ambient daytime noise levels.
[3] Calculated increase in ambient daytime noise levels.

Source: BAC 2023.

Table 23
Ambient Plus Project Drive-Thru Noise Increases at Nearest Residential Uses – Nighttime L_{50}

Nearest Residential Use	Highest Predicted Noise Level, L_{50} (dB)[1]	Ambient Plus Project, L_{50} (dB)[2]	Increase in Ambient, L_{50} (dB)[3]
Northeast – MFR	<20	50.1	<0.1
East – MFR	<20	50.1	<0.1
South – SFR	24	50.0	<0.1
Southwest – SFR	28	60.1	<0.1
West – MFR	22	60.3	<0.1

[1] Highest predicted noise levels from Table 21 which include offsets as footnoted in table.
[2] Sum of highest predicted and measured ambient nighttime noise levels.
[3] Calculated increase in ambient nighttime noise levels.

Source: BAC 2023.

As indicated in Tables 22 and 23, the increases in ambient noise levels from project drive-through operations are calculated to be well below the applied significance criterion of 5 dB.

Because noise exposure from project drive-through operations is predicted to satisfy applicable Sacramento County General Plan noise level standards at the nearest existing residential uses, and because noise exposure from those activities is not calculated to significantly increase ambient noise levels at those uses, this impact is identified as being ***less than significant***.

Impact 5: Cumulative (Combined) Project Noise at Existing Nearest Residential Uses

The calculated combined median (L_{50}) noise level exposure from analyzed on-site noise sources at the nearest existing residential uses is presented in Tables 24 and 25. It should be noted that due to the logarithmic nature of the decibel scale, the sum of two noise values which differ by 10 dB equates to an overall increase in noise levels of 0.4 dB. When the noise sources are equivalent, the sum would result in an overall increase in noise levels of 3 dB.

Table 24
Calculated Cumulative On-Site Operations Noise at Nearest Residential Uses – Daytime L_{50}

Residential Use	Predicted Noise Levels, L_{50} (dB)		Calculated Cumulative, L_{50} (dB)[1]	Applied County Daytime Standard, L_{50} (dB)[2]
	Vacuums	Drive-Through Operations		
Northeast – MFR	34	<20	34	**60**
East – MFR	31	<20	31	**70**
South – SFR	26	24	28	**65**
Southwest – SFR	44	28	44	**70**
West – MFR	48	22	48	**70**

[1] Calculated cumulative noise levels based on predicted noise levels presented in Impacts 2-4.
[2] Applied noise standards based on BAC noise survey results and County adjustment criteria.

Source: BAC 2023.

Table 25
Calculated Cumulative On-Site Operations Noise at Nearest Residential Uses – Nighttime L_{50}

Residential Use	Predicted Noise Levels, L_{50} (dB)		Calculated Cumulative, L_{50} (dB)[1]	Applied County Nighttime Standard, L_{50} (dB)[2]
	Vacuums	Drive-Through Operations		
Northeast – MFR	34	<20	34	**50**
East – MFR	31	<20	31	**50**
South – SFR	26	24	28	**50**
Southwest – SFR	44	28	44	**60**
West – MFR	48	22	48	**60**

[1] Calculated cumulative noise levels based on predicted noise levels presented in Impacts 2-4.
[2] Applied noise standards based on BAC noise survey results and County adjustment criteria.

Source: BAC 2023.

The data in Tables 24 and 25 indicate that calculated cumulative median (L_{50}) noise level exposure from analyzed on-site operations would comply with the applied Sacramento County General Plan daytime and nighttime exterior noise level standards at the nearest existing residential uses by a wide margin. In addition, given the exterior to interior noise reduction typically achieved from standard residential construction (approximately 25 dB with windows closed and approximately 15 dB with windows open), and based on the predicted exterior noise levels in Tables 24 and 25, combined on-site operations noise level exposure is expected to be well below the General Plan's daytime and nighttime interior noise level standards within the nearest existing residences.

Table 2 of this report summarizes the results from the BAC short-term ambient noise survey. Using the calculated averages of measured daytime and nighttime noise levels presented in Table 2, ambient plus combined project noise level increases were calculated at the nearest residential uses and the results of those calculations are presented in Tables 26 and 27.

Table 26
Ambient Plus Combined Project Noise at Nearest Residential Uses – Daytime L_{50}

Residential Use	Calculated Cumulative, L_{50} (dB)[1]	Ambient Plus Project, L_{50} (dB)[2]	Overall Increase in Ambient, L_{50} (dB)[3]
Northeast – MFR	34	60.0	<0.1
East – MFR	31	70.0	<0.1
South – SFR	28	65.0	<0.1
Southwest – SFR	44	70.0	<0.1
West – MFR	48	70.0	<0.1

[1] Calculated cumulative median noise levels from Table 24.
[2] Sum of calculated combined and measured ambient daytime median noise levels.
[3] Calculated combined increase in ambient daytime median noise levels.

Source: BAC 2023.

Table 27
Ambient Plus Combined Project Noise at Nearest Residential Uses – Nighttime L_{50}

Residential Use	Calculated Cumulative, L_{50} (dB)[1]	Ambient Plus Project, L_{50} (dB)[2]	Overall Increase in Ambient, L_{50} (dB)[3]
Northeast – MFR	34	50.1	0.1
East – MFR	31	50.1	0.1
South – SFR	28	50.0	<0.1
Southwest – SFR	44	60.1	0.1
West – MFR	48	60.3	0.3

[1] Calculated cumulative median noise levels from Table 25.
[2] Sum of calculated combined and measured ambient daytime median noise levels.
[3] Calculated combined increase in ambient daytime median noise levels.

Source: BAC 2023.

The data provided in Tables 26 and 27 indicate that the increases in ambient median (L_{50}) noise levels from combined project on-site operations are calculated to be well below the applied significance criterion of 5 dB.

Because the calculated cumulative (combined) noise exposure from project on-site operations is predicted to satisfy applicable Sacramento County General Plan noise level standards at the nearest existing residential uses, and because cumulative noise exposure is not calculated to significantly increase ambient noise levels at those uses, this impact is identified as being ***less than significant***.

Noise Impacts Associated with Project On-Site Construction Activities

Impact 6: On-Site Project Construction Noise at Existing Residential Uses

During project construction, heavy equipment would be used for grading excavation, paving, and structure construction, which would increase ambient noise levels when in use. Noise levels would vary depending on the type of equipment used, how it is operated, and how well it is maintained. Noise exposure at any single point outside the project work area would also vary depending upon the proximity of equipment activities to that point. Table 28 includes the range of maximum (L_{max}) noise levels for equipment commonly used in general residential construction projects at full-power operation at a distance of 50 feet. Not all of these construction activities would be required of this project. The Table 28 data also include predicted maximum equipment noise levels at the nearest existing residential uses, which assume a standard spherical spreading loss of 6 dB per doubling of distance.

Table 28
Reference and Projected Noise Levels for Typical Construction Equipment

Equipment Description	Reference Maximum Noise Level at 50 Feet (dBA)	Projected Maximum Noise Levels Nearest Receivers (dB)				
		NE-MFR (100 feet)	E-MFR (40 feet)	S-SFR (70 feet)	SW-SFR (100 feet)	W-MFR (100 feet)
Air compressor	80	74	82	77	74	74
Backhoe	80	74	82	77	74	74
Ballast equalizer	82	76	84	79	76	76
Ballast tamper	83	77	85	80	77	77
Compactor	82	76	84	79	76	76
Concrete mixer	85	79	87	82	79	79
Concrete pump	82	76	84	79	76	76
Concrete vibrator	76	70	78	73	70	70
Crane, mobile	83	77	85	80	77	77
Dozer	85	79	87	82	79	79
Excavator	85	79	87	82	79	79
Generator	82	76	84	79	76	76
Grader	85	79	87	82	79	79
Impact wrench	85	79	87	82	79	79
Loader	80	74	82	77	74	74
Paver	85	79	87	82	79	79
Pneumatic tool	85	79	87	82	79	79
Pump	77	71	79	74	71	71
Saw	76	70	78	73	70	70
Scarifier	83	77	85	80	77	77
Scraper	85	79	87	82	79	79
Shovel	82	76	84	79	76	76
Spike driver	77	71	79	74	71	71
Tie cutter	84	78	86	81	78	78
Tie handler	80	74	82	77	74	74
Tie inserter	85	79	87	82	79	79
Truck	84	78	86	81	78	78
	Low	70	78	73	70	70
	High	79	87	82	79	79
	Average	76	84	79	76	76

Source: 2018 Federal Transit Administration Noise and Vibration Impact Assessment Manual, Table 7-1 and BAC.

Sacramento County Municipal Code Section 6.68.090(E) exempts noise sources associated with construction activities provided such activities do not occur between the hours of 8:00 p.m. and 6:00 a.m. on weekdays and Friday commencing at 8:00 p.m. through and including 7:00 a.m. on the next following Sunday and on each Sunday after the hour of 8:00 p.m. It is reasonably assumed for the purposes of this analysis that all on-site noise-generating project construction equipment and activities would occur pursuant to and in compliance with Municipal Code Section 6.68.090(E) and would thereby be exempt from County noise level criteria.

However, noise from project on-site construction activities would add to the noise environment in the immediate vicinity of the work area. In terms of determining the temporary noise increase due to project-related construction activities, an impact would occur if construction activity would noticeably increase ambient noise levels above background levels. The threshold of perception of the human ear is approximately 3 to 5 dB – a 5 dB change is considered to be clearly noticeable. For this analysis, a noticeable increase in ambient noise levels is assumed to occur where noise levels increase by 5 dB or more over existing ambient noise levels.

Table 2 of this report summarizes the results from the BAC short-term ambient noise survey. Using the measured daytime (calculated average) maximum (L_{max}) noise levels presented in Table 2, and the highest predicted construction equipment maximum noise levels shown in Table 28, ambient plus project construction noise level increases were calculated at the nearest residential uses and the results of those calculations are presented in Table 29.

Table 29
Ambient Plus Project Construction Noise Increases at Residential Uses – Daytime L_{max}

Residential Use	Highest Predicted Noise Level, L_{max} (dB)[1]	Measured Ambient Daytime Noise Level, L_{max} (dB)[2]	Ambient Plus Project, L_{max} (dB)[3]	Increase in Ambient, L_{max} (dB)[4]
Northeast – MFR	79	76.8	81.1	4.3
East – MFR	87	86.9	89.9	3.0
South – SFR	82	79.0	83.8	4.8
Southwest – SFR	79	79.1	82.1	3.0
West – MFR	79	79.1	82.0	3.0

[1] Highest predicted maximum equipment noise levels from Table 28.
[2] Calculated average of measured daytime noise levels from Table 2.
[3] Sum of highest predicted equipment noise levels and measured daytime maximum noise levels.
[4] Calculated increase in ambient daytime noise levels.

Source: BAC 2023.

The data provided in Table 29 indicate that the increases in ambient noise levels from on-site project construction activities are calculated to be below the applied significance criterion of 5 dB.

Based on the analysis and results provided above, this impact is identified as being ***less than significant***. Nonetheless, to the reduce the potential for annoyance at nearby noise-sensitive uses, the following measures should be incorporated into project on-site construction operations

- Pursuant to Sacramento County Municipal Code Section 6.68.090(E), noise-generating on-site construction activities should not occur between the hours of 8:00 p.m. and 6:00 a.m. on weekdays and Friday commencing at 8:00 p.m. through and including 7:00 a.m. on the next following Sunday and on each Sunday after the hour of 8:00 p.m.
- 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.
- Electrically powered equipment shall be used instead of pneumatic or internal-combustion-powered equipment, where feasible.
- Material stockpiles and mobile equipment staging, parking, and maintenance areas shall be located as far as practicable from noise-sensitive uses.
- Work area speed limits shall be established and enforced during the construction period.
- Nearby residences shall be notified of construction schedules so that arrangements can be made, if desired, to limit their exposure to short-term increases in ambient noise levels.

Vibration Impacts Associated with On-Site Project Construction & Operations

Impact 7: On-Site Project Vibration Levels at Existing Residential Uses

During project construction, heavy equipment would be used for grading, excavation, paving, and building construction, which would generate localized vibration in the immediate vicinity of the construction. The nearest existing sensitive structures have been identified as residential.

Table 30 includes the range of vibration levels for equipment commonly used in general construction projects at a distance of 25 feet. The Table 30 data also include projected equipment vibration levels at the nearest existing sensitive structures (residences) to the project area.

Table 30
Reference and Projected Vibration Source Amplitudes for Construction Equipment

Equipment	Reference PPV at 25 Feet (in/sec)[1]	Projected PPV at Nearest Receptor (in/sec)				
		NE-MFR (100 feet)	E-MFR (40 feet)	S-SFR (70 feet)	SW-SFR (100 feet)	W-MFR (100 feet)
Vibratory roller	0.210	0.026	0.104	0.045	0.026	0.026
Hoe ram	0.089	0.011	0.044	0.019	0.011	0.011
Large bulldozer	0.089	0.011	0.044	0.019	0.011	0.011
Caisson drilling	0.089	0.011	0.044	0.019	0.011	0.011
Loaded trucks	0.076	0.010	0.038	0.016	0.010	0.010
Jackhammer	0.035	0.004	0.017	0.007	0.004	0.004
Small bulldozer	0.003	<0.001	0.001	0.001	<0.001	<0.001

[1] PPV = Peak Particle Velocity

Source: 2018 FTA Transit Noise and Vibration Impact Assessment Manual (Table 7-4) and BAC.

The Table 30 data indicate that vibration levels generated from on-site project construction activities at the nearest existing residences are predicted to be well below the Caltrans thresholds for damage to residential structures of 0.5 in/sec PPV shown in Table 5 (building structure vibration criteria). In addition, the projected equipment vibration levels in Table 29 would range from well below a “barely/slightly perceptible” human response to “perceptible” human response as defined by Caltrans in Table 6 (vibration annoyance potential threshold criteria). Based on the analysis provided above, construction activities within the project area are not expected to result in excessive groundborne vibration levels at nearby existing residences.

Results from the ambient vibration level monitoring within the project area (Table 3) indicate that measured maximum vibration levels were below the strictest Caltrans thresholds for damage to structures and thresholds for annoyance. Therefore, it is expected that the project would not result in the exposure of persons to excessive groundborne vibration levels at proposed uses of the project.

Finally, the project consists of the development of residential and commercial uses. It is the experience of BAC these uses do not typically have equipment that generates appreciable vibration. Further, it is our understanding that the project does not propose equipment that will produce appreciable vibration.

Because vibration levels due to and upon the proposed project are expected to satisfy the applicable Caltrans groundborne impact vibration criteria, this impact is identified as being ***less than significant***.

Noise Impacts Upon the Development

The California Supreme Court issued an opinion in *California Building Industry Association v. Bay Area Air Quality Management District (2015)* holding that CEQA is primarily concerned with the impacts of a project on the environment and generally does not require agencies to analyze the impact of existing conditions on a project’s future users or residents. Nevertheless, the County of Sacramento has policies that address existing/future conditions affecting the proposed project, which are discussed in the following section.

Future Traffic Noise at Proposed Residential Uses

Issue 1: Future Exterior Traffic Noise at Proposed Single-Family Residential Uses

The FHWA Model (FHWA-RD-77-108) was used with future traffic data to predict future Winding Way and Manzanita Avenue traffic noise levels at the proposed single-family residential uses of the development. The future average daily traffic (ADT) volumes for the roadways were conservatively estimated by increasing the existing ADT volume by a factor of 50%. The existing (2019) ADT volumes for the roadways were obtained from published Sacramento County traffic count data. The day/night distribution, truck percentages, and estimated future traffic speed assumptions for the roadways were derived from BAC file data for similar roadways.

Complete listings of FHWA Model inputs and results for Winding Way and Manzanita Avenue provided in Appendix H. The predicted future traffic noise levels at the development are summarized in Table 31.

Table 31
Predicted Future Exterior Traffic Noise Levels at Proposed Single-Family Residential Uses[1]

Roadway	Location Description	Offset (dB)[2]	Future Exterior DNL (dB)
Winding Way	Nearest backyards		68
	Nearest first-floor building facades		67
	Nearest upper-floor building facades	+2	69
Manzanita Avenue	Nearest backyards		63
	Nearest first-floor building facades		63
	Nearest upper-floor building facades	+2	65

[1] Complete listings of FHWA Model inputs are provided as Appendix H.
[2] A +2 dB offset was applied at upper-floors for reduced ground absorption of sound at elevated locations.

Source: BAC 2022.

As indicated in Table 31, future Winding Way traffic noise level exposure is predicted to exceed the Sacramento County General Plan 65 dB DNL exterior noise level standard at the outdoor activity areas (backyards) of the nearest proposed single-family residential lots to the roadway. As a result, further consideration of exterior traffic noise reduction measures would be warranted for this aspect of the project.

To reduce future Winding Way traffic noise level exposure to a state of compliance with the applicable Sacramento County General Plan 65 dB DNL exterior noise level standard at the project site, it is recommended that the project design include the construction of a 6' traffic noise barrier at the location shown on Figure 5. A barrier insertion loss calculation worksheet is provided as Appendix I. The construction of 6' traffic noise barrier at the location illustrated on Figure 5 is calculated to reduce future Winding Way traffic noise level exposure to 62 dB DNL or less at the nearest proposed backyards to the roadway, which would satisfy the applicable General Plan 65 dB DNL exterior noise level standard. The 6' traffic noise barrier could take the form of a masonry wall, earthen berm, or combination of the two. Other materials may be acceptable but should be reviewed by an acoustical consultant prior to construction.

It should be noted that lot grading plans were not available at the time of preparing this report. As a result, the 6' barrier height assumes that the difference in elevations between Winding Way and proposed adjacent residential lots are within ± 2 feet. Should differences in elevations be greater than ± 2 feet, an additional analysis would be warranted. Nonetheless, the 6' barrier height is relative to lot or roadway elevation, whichever is greater.

Drawing dated January 13, 2023

Legend

Project Area Boundary

6' Traffic Noise Barrier

N

Scale (Feet)

0 100 200

Winding Ranch Project
Sacramento County, California

Recommended Traffic Noise Barrier

Figure 5

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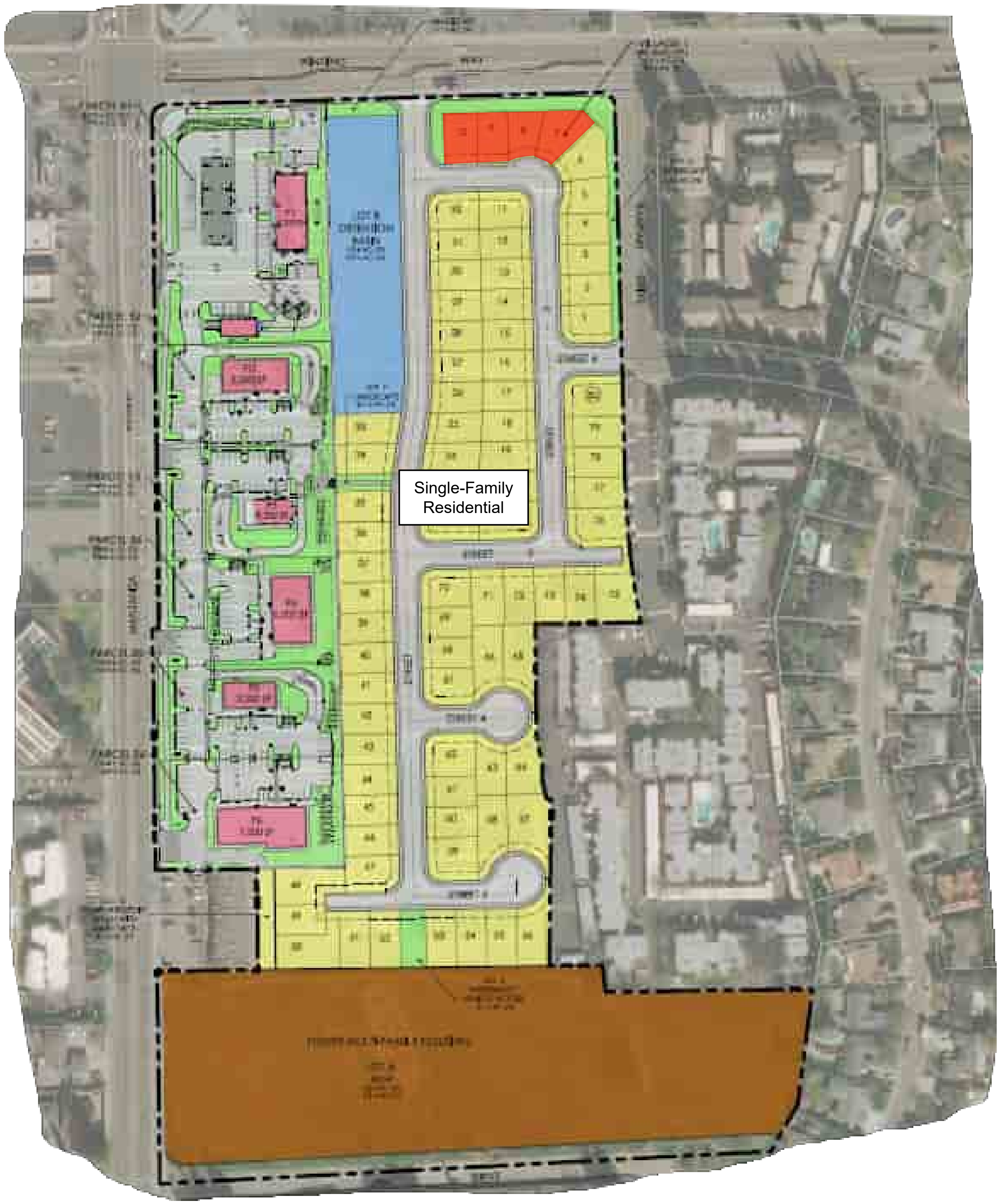
Issue 2: Future Interior Traffic Noise at Proposed Single-Family Residential Uses

Standard residential construction (i.e., stucco siding, STC-27 windows, door weather-stripping, exterior wall insulation, composition plywood roof), *typically* results in an exterior to interior noise reduction of approximately 25 dB with windows closed and approximately 15 dB with windows open. Therefore, provided that future traffic noise levels do not exceed 70 dB DNL at proposed exterior building facades, standard construction should be adequate to ensure compliance with the Sacramento County General Plan 45 dB DNL interior noise level standard within the single-family residences of the development.

The Table 31 data indicate that future exterior Manzanita Avenue traffic noise level exposure is predicted to range from 63 to 65 dB DNL at the single-family residential building facades proposed nearest to the roadway. The Table 31 data also indicate that future exterior Winding Way traffic noise levels are predicted to range from 67 to 69 dB DNL at the single-family residential building facades proposed nearest to the roadway. Although, after implementation of Mitigation Measure 8 (6' traffic noise barrier), future exterior Winding Way traffic noise levels are expected to be reduced to 62 dB DNL or less at the first-floor facades of the residences constructed nearest to the roadway.

Based on the above-identified exterior to interior noise reduction typically achieved with standard residential construction, window and door construction upgrades would not be warranted for satisfaction of the General Plan 45 dB DNL interior noise level standard at the project site. However, if a greater margin of safety is desired, the window assembly upgrades identified on Figure 6 could be integrated into the project design. Specifically, all upper-floor windows of the residences identified on Figure 6 with a view of Winding Way (i.e., north-, east- and west-facing windows) should be upgraded to a minimum Sound Transmission Class (STC) rating of 32. Finally, mechanical ventilation (air conditioning) should be provided for all residences within this development to allow the occupants to close doors and windows as desired to achieve compliance with the interior noise level criterion.



Drawing dated January 13, 2023

Legend

Project Area Boundary

Window Assembly Upgrades: STC 32 (Upper-Floors Only)

N

Scale (Feet)

0 100 200

Winding Ranch Project

Sacramento County, California

Recommended Window Assembly Upgrades

Figure 6

BOLLARD

Acoustical Consultants

Proposed Commercial Operations Noise at Proposed Residential Uses

Issue 3: Project Car Wash Dryer Noise at Proposed Single-Family Residential Uses

An analysis of project car wash drying assembly noise exposure at nearby existing residential uses was presented in **Impact 2**. Using the same methodology identified in **Impact 2**, project car wash drying assembly noise levels were predicted at the nearest proposed single-family residential uses of the development (east of the commercial component). The results of that analysis are provided below in Table 32. The results presented in Table 32 include consideration of shielding that would be provided by the masonry wall proposed for construction along the eastern commercial component project boundary (6' height adjacent to nearest proposed residential lot). The location of the proposed noise barrier is shown in Figure 3.

Table 32
Predicted Car Wash Dryer Noise Levels at Proposed Single-Family Residential Uses

Receiver[1]	Distance (ft)[2]	Offset (dB)[3]	Predicted Noise Level, L_{max} (dB)	County Noise Standards, L_{max} (dB)[4]	
				Daytime	Nighttime
Nearest Proposed SFR Lot	175	-6	61	**75**	**70**

1 Proposed single-family residential uses are shown in Figure 2.
2 Distance scaled from tunnel to property line of nearest proposed single-family residential lot using site plans.
3 Shielding offset of -6 dB to account for the proposed 6' masonry wall.
4 County unadjusted exterior maximum noise level standards for residential uses.

Source: BAC 2023.

As indicated in Table 32, project car wash drying assembly noise level exposure is predicted to satisfy the applicable Sacramento County General Plan's exterior daytime and nighttime maximum (L_{max}) noise level standards at the property line of the nearest proposed single-family residential lot. In addition, given the exterior to interior noise reduction typically achieved from standard residential construction (approximately 25 dB with windows closed and approximately 15 dB with windows open), and based on the predicted exterior noise level in Table 32, project car wash drying assembly noise level exposure is expected to be well below the General Plan's daytime and nighttime interior maximum (L_{max}) noise level standards within the nearest proposed single-family residences. Based on the analysis presented above, no further consideration noise mitigation measures would be warranted for this aspect of the project.

Issue 4: Project Vacuum Noise at Proposed Single-Family Residential Uses

An analysis of project vacuum equipment noise exposure at nearby existing residential uses was presented in **Impact 3**. Using the same methodology identified in **Impact 3**, project vacuum equipment noise levels were predicted at the nearest proposed single-family residential uses of the development (east of the commercial component). The results of that analysis are provided below in Table 33. The results presented in Table 33 include consideration of shielding that would be provided by the masonry wall proposed for construction along the eastern commercial component project boundary (6' height adjacent to nearest proposed residential lot). The location of the proposed noise barrier is shown in Figure 3.

Table 33
Predicted Vacuum Noise Levels at Proposed Single-Family Residential Uses

Receiver[1]	Distance (ft)[2]	Offset (dB)[3]	Predicted Noise Level, L_{50} (dB)	County Noise Standards, L_{50} (dB)[4]	
				Daytime	Nighttime
Nearest Proposed SFR Lot	220	-9	49	**55**	**50**

1 Proposed single-family residential uses are shown in Figure 2.
2 Distance scaled from vacuum area to nearest proposed single-family residential lot using site plans.
3 Shielding offset of -9 dB was applied to account for the proposed 6' masonry wall (-6 dB) and proposed intervening structure (car wash tunnel, -3 dB).
4 County unadjusted exterior median noise level standards for residential uses.

Source: BAC 2023.

The Table 33 data indicate that project vacuum equipment noise level exposure is predicted to satisfy the applicable Sacramento County General Plan's (unadjusted) exterior daytime and nighttime median (L_{50}) noise level standards at the property line of the nearest proposed single-family residential lot. In addition, given the exterior to interior noise reduction typically achieved from standard residential construction (approximately 25 dB with windows closed and approximately 15 dB with windows open), and based on the predicted exterior noise level in Table 33, project vacuum equipment noise level exposure is expected to be well below the General Plan's daytime and nighttime interior median (L_{50}) noise level standards within the nearest proposed single-family residences. Based on the analysis presented above, no further consideration noise mitigation measures would be warranted for this aspect of the project.

Issue 5: Project Drive-Through Noise at Proposed Single-Family Residential Uses

An analysis of drive-through operations noise exposure at nearby existing residential uses was presented in **Impact 4**. Using the same methodology identified in **Impact 4**, project drive-through operations noise levels were predicted at the nearest proposed single-family residential uses of the development (east of the commercial component). The results of that analysis are provided below in Table 34. The results presented in Table 34 include consideration of shielding that would be provided by the masonry wall proposed for construction along the eastern commercial component project boundary (6' in height adjacent to drive-through lanes). The location of the proposed noise barrier is shown in Figure 3.

Table 34
Predicted Drive-Through Noise Levels at Proposed Single-Family Residential Uses

Reciever[1]	Building Pad	Distance (ft)[2]		Offset (dB)[3]	Predicted Noise Level, L_{50} (dB)[4]	County Noise Standards, L_{50} (dB)[5]	
		Speaker	Vehicles			Daytime	Nighttime
Nearest Proposed SFR Lots	P2	90	50	-6	39	**50**	**45**
	P3	170	55	-6	33		
	P5	75	35	-6	41		

[1] Proposed single-family residential uses are shown in Figure 2.
[2] Distances scaled from drive-thru components to nearest proposed single-family residential lots using site plans.
[3] Shielding offset of -6 dB was applied to account for the proposed 6' masonry wall.
[4] Predicted combined noise level exposure from sources.
[5] County downward-adjusted (-5 dB) exterior median noise level standards for residential uses affected by sources consisting primarily of music or speech.

Source: BAC 2023.

As shown in Table 34, project drive-through operations noise level exposure is predicted to satisfy the applicable (downward adjusted for speech) Sacramento County General Plan's exterior daytime and nighttime median (L_{50}) noise level standards at the property lines of the nearest proposed single-family residential lots. The predicted exterior noise level in Table 34 would also satisfy the General Plan's daytime and nighttime interior median (L_{50}) noise level standards within the nearest proposed single-family residences. Based on the analysis presented above, no further consideration noise mitigation measures would be warranted for this aspect of the project.

Issue 6: Cumulative Commercial Noise at Proposed Single-Family Residential Uses

The calculated combined median (L_{50}) noise level exposure from analyzed on-site noise sources at the nearest proposed single-family residential uses is presented in Tables 35 and 36. It should be noted that due to the logarithmic nature of the decibel scale, the sum of two noise values which differ by 10 dB equates to an overall increase in noise levels of 0.4 dB. When the noise sources are equivalent, the sum would result in an overall increase in noise levels of 3 dB.

Table 35
Calculated Cumulative Commercial Noise at Proposed Residential Uses – Daytime L_{50}

Receiver	Predicted Noise Levels, L_{50} (dB)		Calculated Cumulative, L_{50} (dB)[1]	County Daytime Standard, L_{50} (dB)[2]
	Vacuums	Drive-Through Operations		
Nearest Proposed SFR Lot	49	39	49	**55**

[1] Calculated worst-case cumulative noise levels at a proposed single-family residential lot (with stated barrier offset).
[2] County unadjusted exterior median daytime noise level standard for residential uses.

Source: BAC 2023.

Table 36
Calculated Cumulative Commercial Noise at Proposed Residential Uses – Nighttime L_{50}

Receiver	Predicted Noise Levels, L_{50} (dB) Vacuums	Predicted Noise Levels, L_{50} (dB) Drive-Through Operations	Calculated Cumulative, L_{50} (dB)[1]	County Nighttime Standard, L_{50} (dB)[2]
Nearest Proposed SFR Lot	49	39	49	**50**

[1] Calculated worst-case cumulative noise levels at a proposed single-family residential lot (with stated barrier offset).
[2] County unadjusted exterior median nighttime noise level standard for residential uses.

Source: BAC 2023.

Table 35 and 36 data indicate that calculated cumulative median (L_{50}) noise level exposure from analyzed on-site operations would comply with the applicable Sacramento County General Plan's (unadjusted) exterior daytime and nighttime median (L_{50}) noise level standards at the property line of the nearest proposed single-family residential lot. In addition, given the exterior to interior noise reduction typically achieved from standard residential construction (approximately 25 dB with windows closed and approximately 15 dB with windows open), and based on the predicted exterior noise level in Tables 35 and 36, cumulative median noise level exposure from analyzed on-site operations is expected to be well below the General Plan's daytime and nighttime interior median noise level standards within the nearest proposed single-family residences. Based on the analysis presented above, no further consideration noise mitigation measures would be warranted for this aspect of the project.

This concludes BAC's noise and vibration assessment of the Winding Ranch project in Sacramento County, California. Please contact BAC at (530) 537-2328 or info@bacnoise.com if you have any comments or questions regarding this report.

Appendix A
Acoustical Terminology

Acoustics	The science of sound.
Ambient Noise	The distinctive acoustical characteristics of a given space consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.
Attenuation	The reduction of an acoustic signal.
A-Weighting	A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.
Decibel or dB	Fundamental unit of sound. A Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell.
CNEL	Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by a factor of three and nighttime hours weighted by a factor of 10 prior to averaging.
Frequency	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz.
IIC	Impact Insulation Class (IIC): A single-number representation of a floor/ceiling partition's impact generated noise insulation performance. The field-measured version of this number is the FIIC.
L_{dn}	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
L_{eq}	Equivalent or energy-averaged sound level.
L_{max}	The highest root-mean-square (RMS) sound level measured over a given period of time.
Loudness	A subjective term for the sensation of the magnitude of sound.
Masking	The amount (or the process) by which the threshold of audibility is for one sound is raised by the presence of another (masking) sound.
Noise	Unwanted sound.
Peak Noise	The level corresponding to the highest (not RMS) sound pressure measured over a given period of time. This term is often confused with the "Maximum" level, which is the highest RMS level.
RT_{60}	The time it takes reverberant sound to decay by 60 dB once the source has been removed.
STC	Sound Transmission Class (STC): A single-number representation of a partition's noise insulation performance. This number is based on laboratory-measured, 16-band (1/3-octave) transmission loss (TL) data of the subject partition. The field-measured version of this number is the FSTC.

Appendix B-1 of 1
FHWA Highway Traffic Noise Prediction Model Inputs
Winding Way Development
File Name: Existing
Run Date: 8/17/2023

#	Roadway	Description	ADT	Day %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance to Receptor	Offset (dB)
1	Collge Oak Dr	North of Winding Way	8,110	83	17	2	1	35	100	0
2	Collge Oak Dr	South of Winding Way	6,970	83	17	2	1	25	50	0
3	Winding Way	West of College Oak Dr	335	83	17	2	1	25	50	0
4	Winding Way	College Oak Dr to Manzanita Ave	12,865	83	17	2	1	25	50	0
5	Winding Way	Manzanita Ave to Rampart Dr	15,665	83	17	2	1	40	200	0
6	Winding Way	East of Rampart Dr	14,650	83	17	2	1	40	100	0
7	Manzanita Ave	North of Winding Way	15,695	83	17	2	1	40	100	0
8	Manzanita Ave	Winding Way to Windmill Way	16,490	83	17	2	1	40	500	0
9	Manzanita Ave	Windmill Way to Lincoln Ave	18,525	83	17	2	1	40	75	0
10	Manzanita Ave	Lincoln Ave to Cypress Ave	18,925	83	17	2	1	40	250	0
11	Manzanita Ave	South of Cypress Ave	22,450	83	17	2	1	40	350	0
12	Windmill Way	West of Manzanita Ave	2,485	83	17	2	1	35	150	0
13	Lincoln Ave	West of Manzanita Ave	570	83	17	2	1	15	200	-10
14	Lincoln Ave	East of Manzanita Ave	3,060	83	17	2	1	35	75	0
15	Cypress Ave	West of Manzanita Ave	10,910	83	17	2	1	25	100	0
16	Cypress Ave	East of Manzanita Ave	2,175	83	17	2	1	15	500	0
17	Rampart Ave	North of Winding Way	475	83	17	1	1	15	150	0
18	Rampart Ave	Winding Way to Mary Lynn Lane	1,800	83	17	1	1	25	200	-10
19	Rampart Ave	South onto Mary Lynn Lane	585	83	17	1	1	25	100	-10
20	Rampart Ave	East of Mary Lynn Lane	1,005	83	17	1	1	25	75	0

Notes: Where a noise-sensitive receiver is not identified a distance of 500 feet is used

Legend

- A Site 1: Northeast end of project area
- B Site 2: East end of project area
- C Site 3: South of project area across Jan Drive
- D Site 4: West of project area across Manzanita Avenue

Winding Ranch
Sacramento County, California

Noise & Vibration Survey Photographs

Appendix C

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Appendix D-1 of 1
FHWA Highway Traffic Noise Prediction Model Inputs
Winding Way Development
File Name: Existing+Project (V4)
Run Date: 11/20/2023

#	Roadway	Description	ADT	Day %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance to Receptor	Offset (dB)
1	Collge Oak Dr	North of Winding Way	8,665	83	17	2	1	35	100	0
2	Collge Oak Dr	South of Winding Way	7,760	83	17	2	1	25	50	0
3	Winding Way	West of College Oak Dr	335	83	17	2	1	25	50	0
4	Winding Way	College Oak Dr to Manzanita Ave	14,635	83	17	2	1	25	50	0
5	Winding Way	Manzanita Ave to Rampart Dr	16,870	83	17	2	1	40	200	0
6	Winding Way	East of Rampart Dr	15,450	83	17	2	1	40	100	0
7	Manzanita Ave	North of Winding Way	16,775	83	17	2	1	40	100	0
8	Manzanita Ave	Winding Way to Windmill Way	18,920	83	17	2	1	40	500	0
9	Manzanita Ave	Windmill Way to Lincoln Ave	19,780	83	17	2	1	40	75	0
10	Manzanita Ave	Lincoln Ave to Cypress Ave	20,260	83	17	2	1	40	250	0
11	Manzanita Ave	South of Cypress Ave	23,550	83	17	2	1	40	350	0
12	Windmill Way	West of Manzanita Ave	2,485	83	17	2	1	35	150	0
13	Lincoln Ave	West of Manzanita Ave	570	83	17	2	1	15	200	-10
14	Lincoln Ave	East of Manzanita Ave	3,310	83	17	2	1	35	75	0
15	Cypress Ave	West of Manzanita Ave	11,145	83	17	2	1	25	100	0
16	Cypress Ave	East of Manzanita Ave	2,175	83	17	2	1	15	400	0
17	Rampart Ave	North of Winding Way	475	83	17	1	1	15	150	0
18	Rampart Ave	Winding Way to Mary Lynn Lane	2,265	83	17	1	1	25	200	-10
19	Rampart Ave	South onto Mary Lynn Lane	585	83	17	1	1	25	100	-10
20	Rampart Ave	East of Mary Lynn Lane	1,005	83	17	1	1	25	75	0
21	Gas Station Dwy	North of Winding Way	7,660	83	17	1	1	15	500	0
22	Project Dwy 1	South onto Project Site	2,845	83	17	1	1	15	500	0
23	Project Dwy 2	East onto Project Site	1,525	83	17	1	1	15	500	0
24	Project Dwy 3	East onto Project Site	1,705	83	17	1	1	15	350	0
25	Project Dwy 4	East onto Project Site	2,730	83	17	1	1	15	300	-5
26	Project Dwy 5	East onto Project Site	2,700	83	17	1	1	15	300	0
27	Shopping Center Dwy	North of Winding Way	7,660	83	17	1	1	15	500	0
28	Project Street 1	South onto Project Site	250	83	17	1	1	25	400	-10
29	Project Street 6	West of Rampart	465	83	17	1	1	15	250	-10

Notes: Where a noise-sensitive receiver is not present a default distance of 500 feet was used.

Appendix E
AquaDri Drying System Reference Noise Level Data

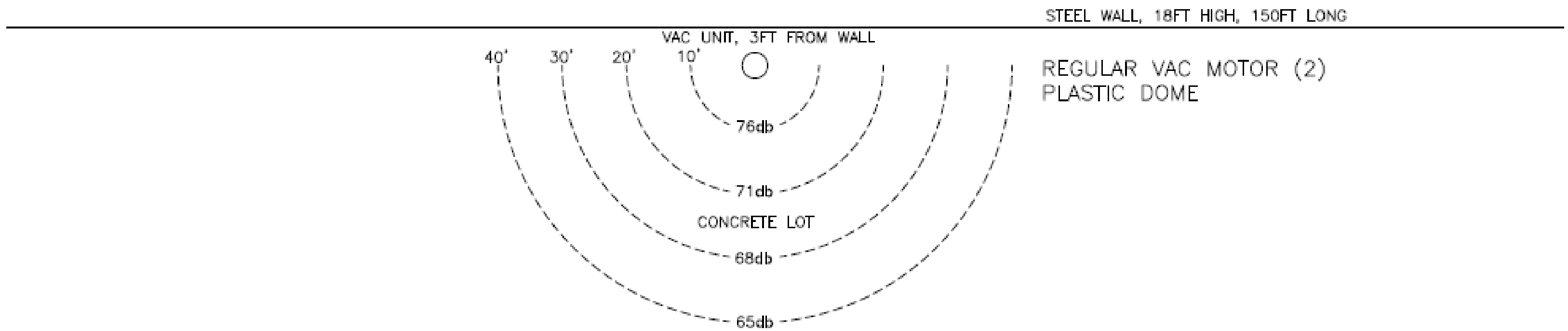
Mark VII®
A subsidiary of WashTec AG

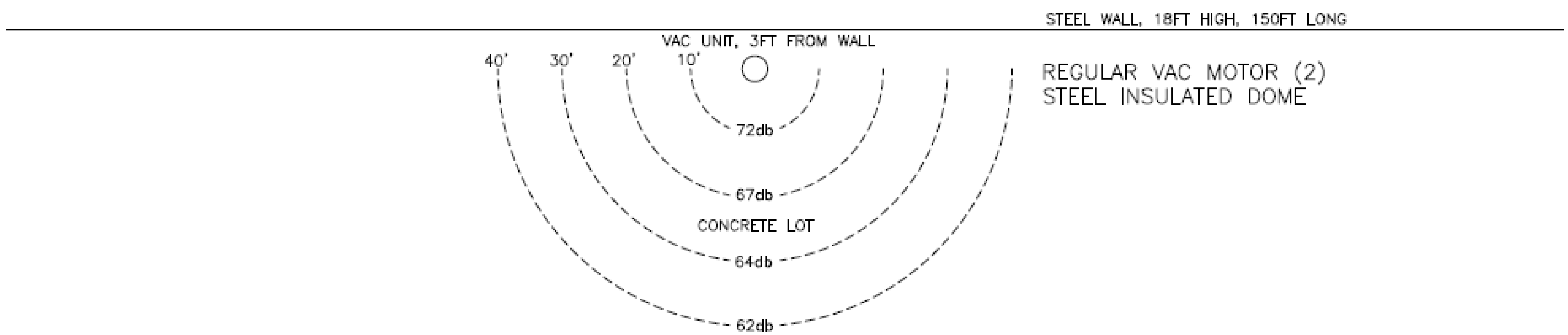
AquaDri® Dryers

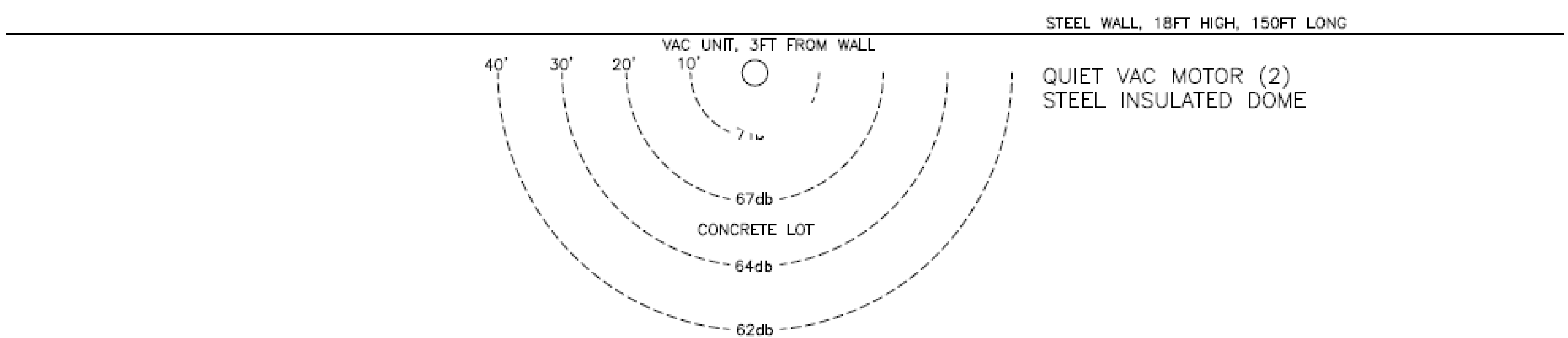
Dryer Noise Levels

	Exit End					Entrance End				
Dryer	dBA @ 10'	dBA @ 20'	dBA @ 30'	dBA @ 40'	dBA @ 50'	dBA @ 10'	dBA @ 20'	dBA @ 30'	dBA @ 40'	dBA @ 50'
AquaDri® FS-30 30hp Freestanding	91	86	83	80	75	88	85	80	79	77
AquaDri® FS-40 40hp Freestanding	92	87	84	81	77	89	84	81	80	78
AquaDri® E-20i 20hp On-Board	84	82	78	74	72	83	80	75	73	71
AquaDri® E-30i 30hp On-Board	85	83	80	76	74	84	81	78	75	72
AquaDri® C-15 15hp Contouring	92	88	84	80	77	90	86	82	80	77

Appendix F
JE Adams Vacuum Reference Noise Level Data







Appendix G
BAC File Data
Drive-Through Operations

Test Date: 10/13/2018
Location: Panera Bread (2845 Bell Road, Auburn, CA)

Site	Time	Duration	Measured Noise Levels (dB) Leq/L50	Lmax	Distance ft
1	12:00 p.m. to 1:00 p.m.	1 hr	63.4	67.2	10
2	12:00 p.m. to 1:00 p.m.	1 hr	59.8	70.3	5

Notes:
-Measurements at 10 feet of drive-through speaker with no car present.
'-Measurements at 5 feet from drive-through vehicles with no speaker.

Appendix H-1
FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Prediction Worksheet

Project Information:

Job Number:	2022-121
Project Name:	Winding Ranch Project
Roadway Name:	Winding Way

Traffic Data:

Year:	Future
Average Daily Traffic Volume:	25,671
Percent Daytime Traffic:	83
Percent Nighttime Traffic:	17
Percent Medium Trucks (2 axle):	2
Percent Heavy Trucks (3+ axle):	1
Assumed Vehicle Speed (mph):	40
Intervening Ground Type (hard/soft):	**Soft**

Traffic Noise Levels:

				---------------- DNL (dB) ------------------			
Location	**Description**	**Distance**	**Offset (dB)**	**Autos**	**Medium Trucks**	**Heavy Trucks**	**Total**
1	SFR - Nearest Backyards	75		66	58	60	68
2	SFR - Nearest First-Floor Facades	85		65	58	59	67
3	SFR - Nearest Upper-Floor facades	85	2	67	60	61	69

Traffic Noise Contours (No Calibration Offset):

DNL Contour (dB)	Distance from Centerline (ft)
75	25
70	53
65	115
60	247

Notes: Future ADT was conservatively estimated by increasing the existing (2019) ADT volume of the section of Winding Way adjacent to the project site by 50%. Existing (2019) ADT obtained from published Sacramento County traffic counts (Winding Way - 17,114 ADT).

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Appendix H-2
FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Prediction Worksheet

Project Information:

Job Number:	2022-121
Project Name:	Winding Ranch Project
Roadway Name:	Manzanita Avenue

Traffic Data:

Year:	Future
Average Daily Traffic Volume:	37,287
Percent Daytime Traffic:	83
Percent Nighttime Traffic:	17
Percent Medium Trucks (2 axle):	2
Percent Heavy Trucks (3+ axle):	1
Assumed Vehicle Speed (mph):	40
Intervening Ground Type (hard/soft):	**Soft**

Traffic Noise Levels:

				---------------- DNL (dB) ------------------			
Location	**Description**	**Distance**	**Offset (dB)**	**Autos**	**Medium Trucks**	**Heavy Trucks**	**Total**
1	SFR - Nearest Backyards	190		62	54	56	63
2	SFR - Nearest First-Floor Facades	200		62	54	55	63
3	SFR - Nearest Upper-Floor facades	200	2	64	56	57	65

Traffic Noise Contours (No Calibration Offset):

DNL Contour (dB)	Distance from Centerline (ft)
75	32
70	68
65	147
60	317

Notes: Future ADT was conservatively estimated by increasing the existing (2019) ADT volume of the section of Manzanita Avenue adjacent to the project site by 50%. Existing (2019) ADT obtained from published Sacramento County traffic counts (Manzanita Avenue - 24,858 ADT).

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Appendix I
FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 2022-121
Project Name: Winding Ranch Project
Roadway Name: Winding Way

Noise Level Data:

Year: Future
Auto DNL (dB): 66
Medium Truck DNL (dB): 58
Heavy Truck DNL (dB): 60

Site Geometry:

Receiver Description: SFR - Nearest Backyards
Centerline to Barrier Distance (C_1): 65
Barrier to Receiver Distance (C_2): 10
Automobile Elevation: 0
Medium Truck Elevation: 2
Heavy Truck Elevation: 8
Pad/Ground Elevation at Receiver: 0
Receiver Elevation: 5
Base of Barrier Elevation: 0
Starting Barrier Height 6

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height (ft)	-------------------- DNL (dB) --------------------				Barrier Breaks Line of Sight to…		
		Autos	Medium Trucks	Heavy Trucks	Total	Autos?	Medium Trucks?	Heavy Trucks?
6	6	60	52	55	**62**	Yes	Yes	Yes
7	7	58	51	54	**60**	Yes	Yes	Yes
8	8	57	49	52	**59**	Yes	Yes	Yes
9	9	56	48	51	**58**	Yes	Yes	Yes
10	10	55	47	50	**56**	Yes	Yes	Yes
11	11	53	46	49	**55**	Yes	Yes	Yes
12	12	53	45	48	**54**	Yes	Yes	Yes
13	13	52	44	47	**54**	Yes	Yes	Yes
14	14	52	44	46	**53**	Yes	Yes	Yes

Notes: 1. Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s).

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Appendix H Focused Access and Circulation Study

Memorandum

WOOD RODGERS
BUILDING RELATIONSHIPS ONE PROJECT AT A TIME

To: Gary Gasperi, PE
Senior Civil Engineer, Sacramento County Department of Transportation

From: Mario Tambellini, PE, TE
Nicole Scappaticci, PE

Date: February 16, 2023

Subject: **Winding Ranch Focused Access and Circulation Study and Queue Management Plan**

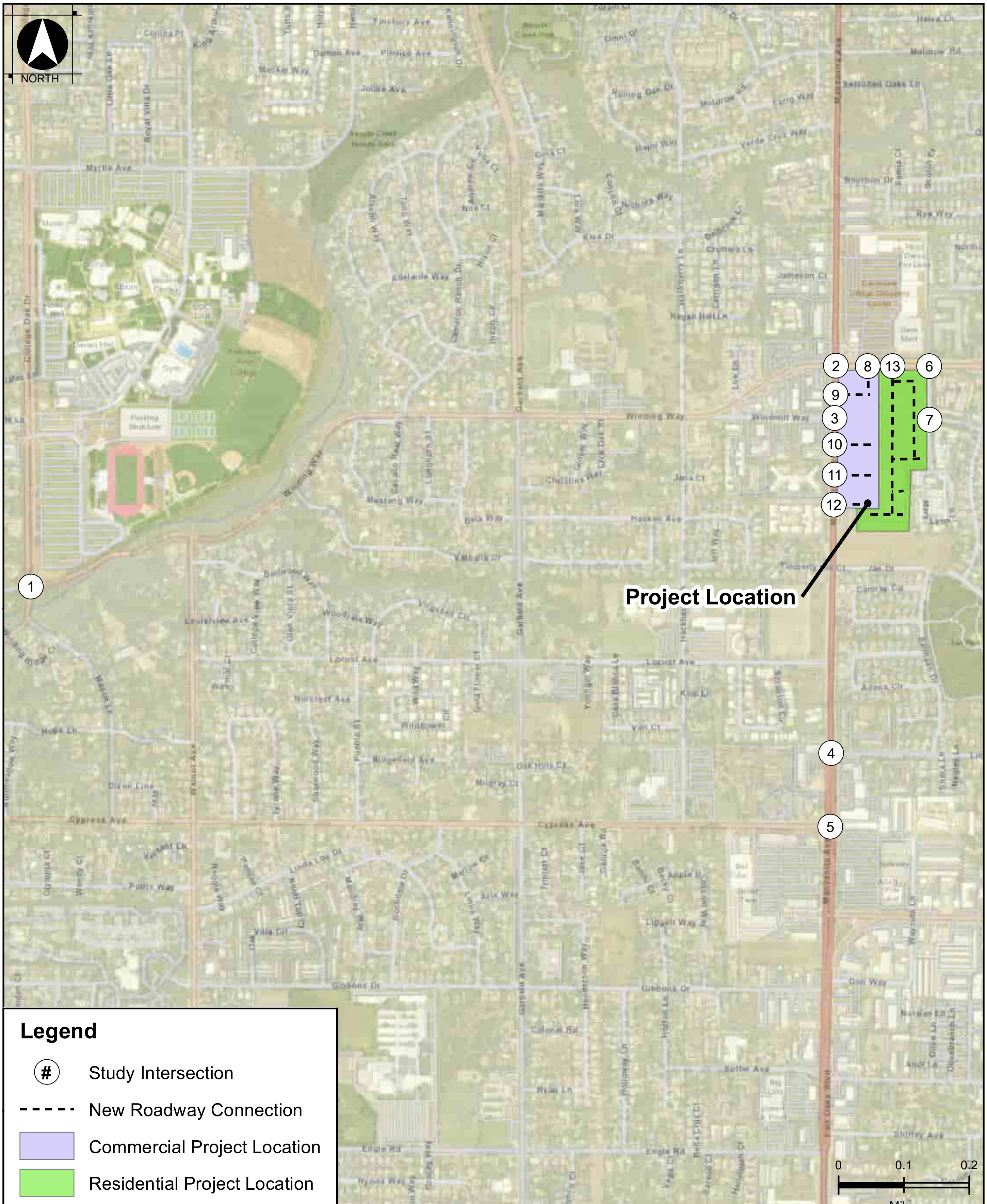
INTRODUCTION

This memorandum has been prepared to present the findings of a Focused Access and Circulation Study (FACS) and Queue Management Plan for the proposed Winding Ranch Commercial and Residential Project (Project) located in Sacramento County (County). The Project is located on the southeast corner of the Manzanita Avenue and Winding Way intersection, and consists of four currently undeveloped parcels (245-0011-018,-020,-021,-012). The Project is located within the Manzanita District of the Fair Oaks Boulevard Corridor Plan Area. The Project location is shown in **Figure 1**.

The commercial component of the Project totals 6.801 acres and consists of a gas station with 16 fueling positions, a 5,200 square foot convenience store, and a 1,458 square foot single-lane drive-through car wash; and five separate drive-through food-service facilities totaling 22,900 square feet. For the purposes of this analysis, it was assumed that four of the five food service buildings would be Fast-Food Restaurants With Drive-Through Windows and one would be a Coffee/Donut Shop With Drive-Through Window. The residential component of the Project totals 10.3 acres and consists of up to 81 single-family home lots. The commercial component would gain access to the surrounding roadway network via two right-in/right-out driveways on Manzanita Avenue, two full-access driveways on Manzanita Avenue, and one right-in/right-out driveway on Winding Way. The single-family residential component would gain access to the surrounding roadway network via one new roadway connection to Winding Way and one new roadway connection to existing Rampart Drive. The Project commercial site plan is shown in **Figure 2a** and the residential site plan is shown in **Figure 2b**. Note that the residential site plan has been updated since work on this FACS began to only include 78 single-family home lots. Therefore, the analysis in this FACS, which assumes up to 81 single-family home lots, can be considered conservative.

The purpose of this FACS and Queue Management Plan is to fulfill the requirements outlined in the County comment letter regarding the Project (dated April 7, 2022) by evaluating potential traffic deficiencies caused by the Project on surrounding roadway facilities. This FACS will be prepared in accordance with Sacramento County Transportation Analysis Guidelines and contains the following sections:

- Study Facilities
- Analysis Methodology
- Existing Conditions Intersection Operations
- Existing Plus Project Conditions Intersection Operations
- Intersection Queueing Analysis
- Site Access and Internal Circulation
- Multimodal Facilities
- Crash History Evaluation
- Drive-Through Queue Management Plan



Project Location and Study Facilities

Winding Ranch Queue Management Plan and Focused Access and Circulation Study

Sacramento County, CA

February 2023

Figure 1

WOOD RODGERS

\\woodrodgers.loc\ProductionData\Jobs\3000-s\3814_Manzanita\Manzanita_OA\GIS\Tasks\Fig_1_Location_and_Facilities_Map.mxd 10/5/2022 10:41:01 AM nscappaticci

Figure 2a. Project Site Plan – Commercial Component

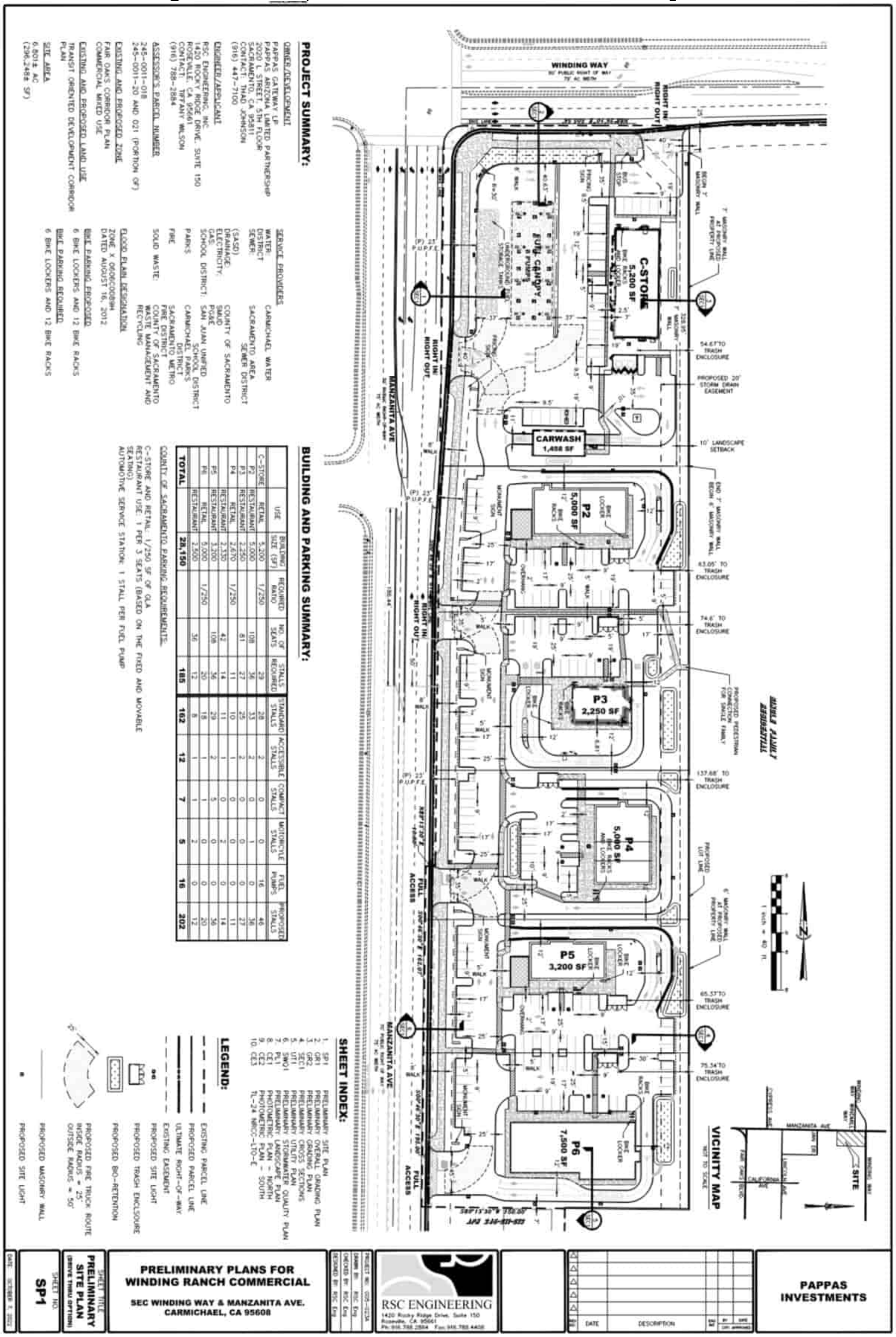


Figure 2b. Project Site Plan – Residential Component

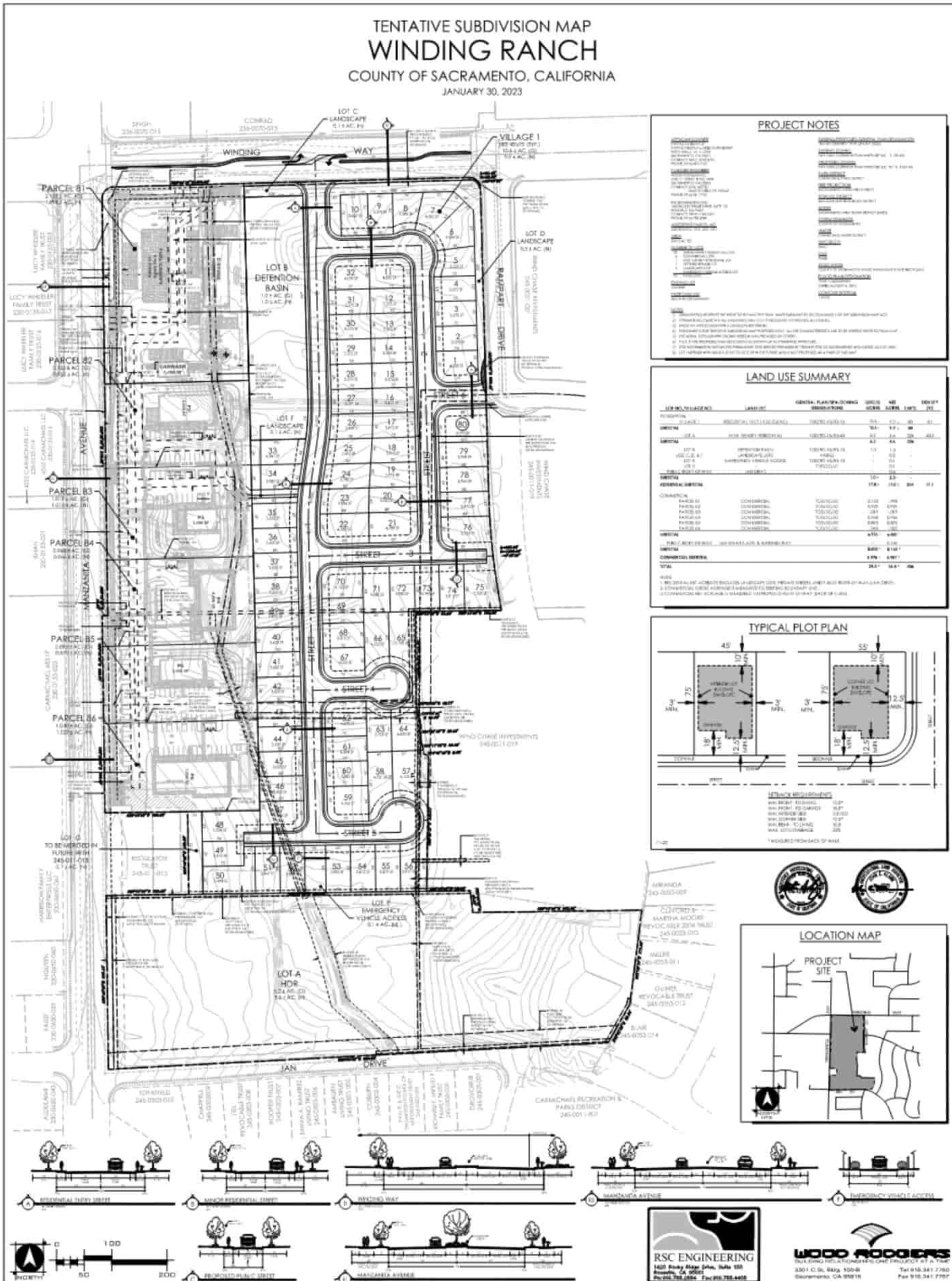


Figure 2b. Project Site Plan – Residential Component (continued)

PROJECT NOTES

APPLICANT/OWNER
PAPPAS GATEWAY LP
PAPPAS ARIZONA LIMITED PARTNERSHIP
2020 L STREET, 5TH FLOOR
SACRAMENTO, CA 95811
CONTACT: THAD JOHNSON
PHONE: (916) 447-7100

PLANNER/ENGINEER
WOOD RODGERS INC.
3301 'C' STREET, BLDG. 100B
SACRAMENTO, CA 95816
CONTACT: STAN METTE/
MATT SPOKELY, PE #57647
PHONE: (916) 341-7760

RSC ENGINEERING, INC.
1420 ROCKY RIDGE DRIVE, SUITE 150
ROSEVILLE, CA 95661
CONTACT: TIFFANY WILSON
PHONE: (916) 788-2884

ASSESSOR'S PARCEL NO.
245-0011-012, -018, -020, -021

AREA
24.8 ± ACRES

NUMBER OF LOTS

80	SINGLE-FAMILY RESIDENTIAL LOTS
6	COMMERCIAL LOTS
1	HIGH-DENSITY RESIDENTIAL LOT
1	DETENTION BASIN LOT
3	LANDSCAPE LOTS
1	EMERGENCY VEHICLE ACCESS LOT
92	TOTAL LOTS

EXISTING USE
VACANT

PROPOSED USE
SEE LAND USE SUMMARY

EXISTING/PROPOSED GENERAL PLAN DESIGNATION
TRANSIT-ORIENTED DEVELOPMENT (TOD)

EXISTING ZONING
FAIR OAKS CORRIDOR PLAN MIXED USE (SC, LC, RD-40)

PROPOSED ZONING
FAIR OAKS CORRIDOR PLAN MIXED USE (SC, RD-10, & RD-40)

PARK DISTRICT
CARMICHAEL PARKS DISTRICT

FIRE PROTECTION
SACRAMENTO METRO FIRE DISTRICT

SCHOOL DISTRICT
SAN JUAN UNIFIED SCHOOL DISTRICT

SEWER
SACRAMENTO AREA SEWER DISTRICT (SASD)

STORM DRAINAGE
COUNTY OF SACRAMENTO

WATER
CARMICHAEL WATER DISTRICT

ELECTRICITY
SMUD

GAS
PG&E

SOLID WASTE
COUNTY OF SACRAMENTO WASTE MANAGEMENT AND RECYCLING

FLOOD PLAIN DESIGNATION
ZONE X 0606C0089H
DATED AUGUST 16, 2012

CONTOUR INTERVAL
1-FOOT

NOTES

1) *SUBDIVIDER(S) RESERVES THE RIGHT TO FILE MULTIPLE FINAL MAPS PURSUANT TO SECTION 66456.1 OF THE SUBDIVISION MAP ACT.*
2) *OWNER SHALL DEDICATE ALL EASEMENTS AND I.O.D.'S NECESSARY TO PROVIDE ALL UTILITIES.*
3) *THIS IS AN APPLICATION FOR A DEVELOPMENT PERMIT.*
4) *THIS EXHIBIT IS FOR TENTATIVE SUBDIVISION MAP PURPOSES ONLY. ALL SITE CHARACTERISTICS ARE TO BE VERIFIED PRIOR TO FINAL MAP.*
5) *THE AERIAL TOPOGRAPHY SHOWN HEREON WAS PROVIDED BY OTHERS.*
6) *P.U.E.'S ARE PROPOSED FOR DEDICATION AS SHOWN OR AS OTHERWISE APPROVED.*
7) *TITLE INFORMATION SHOWN PER PRELIMINARY TITLE REPORT PREPARED BY STEWART TITLE OF SACRAMENTO AND DATED JULY 20, 2021.*
8) *LOT I MERGER WITH 245-011-013 IS TO OCCUR IN THE FUTURE AND IS NOT PROPOSED AS A PART OF THIS MAP.*

STUDY FACILITIES

The following thirteen (13) existing and proposed intersections were included in the analysis (planned intersection controls are shown in parentheses):

1. Winding Way & College Oak Drive
2. Manzanita Avenue & Winding Way
3. Manzanita Avenue & Windmill Way
4. Manzanita Avenue & Lincoln Avenue
5. Manzanita Avenue & Cypress Avenue
6. Winding Way & Rampart Drive
7. Rampart Drive/Mary Lynn Lane & Street 6 (eastbound/westbound approaches are assumed to be stop-controlled under Plus Project conditions)
8. Commercial Project Driveway 1 & Winding Way (minor street stop-controlled, right-in/right-out)
9. Manzanita Avenue & Commercial Project Driveway 2 (minor street stop-controlled, right-in/right-out)
10. Manzanita Avenue & Commercial Project Driveway 3 (minor street stop-controlled, right-in/right-out)
11. Manzanita Avenue & Commercial Project Driveway 4 (minor street stop-controlled, full-access)
12. Manzanita Avenue & Commercial Project Driveway 5 (minor street stop-controlled, full-access)
13. Street 1 & Winding Way (minor street stop-controlled, left-out restricted)

The study intersections are shown in **Figure 1**.

ANALYSIS METHODOLOGY

MODEL PARAMETERS

A model of the proposed study network was built in *Synchro 11* using signal timing inputs consistent with timing sheets provided by the County. Synchro model parameters were set up consistent with Sacramento County Transportation Analysis Guidelines for Local Transportation Analyses.

LEVEL OF SERVICE THRESHOLDS

For one-way stop-controlled (OWSC) and two-way stop-controlled (TWSC) intersections, the "worst-case" movement delays and LOS are reported. For signalized intersections and all-way stop-controlled (AWSC) intersections, the intersection delays and LOS reported are the "average" values for the full intersection. The delay based HCM 6th Edition LOS criteria for different types of intersection controls are outlined in **Table 1.**

Table 1. HCM 6th Edition Intersection LOS Thresholds

Level of Service	Description	Intersection Control Delay (seconds/vehicle)	
		Unsignalized	Signalized
A	Free-flow conditions with negligible to minimal delays.	delay ≤ 10.0	delay ≤ 10.0
B	Good progression with slight delays.	10.0 < delay ≤ 15.0	10.0 < delay ≤ 20.0
C	Relatively higher delays.	15.0 < delay ≤ 25.0	20.0 < delay ≤ 35.0
D	Somewhat congested conditions with longer but tolerable delays.	25.0 < delay ≤ 35.0	35.0 < delay ≤ 55.0
E	Congested conditions with significant delays.	35.0 < delay ≤ 50.0	55.0 < delay ≤ 80.0
F	Jammed or grid-lock type operating conditions.	delay > 50.0	delay > 80.0
Source: HCM 6th Edition Exhibit 19-8 and 20-2.			

County LOS Criteria

This analysis adheres to the County of Sacramento General Plan Policy CI-9, which defines the minimum acceptable operation level is LOS D for rural roadways and intersections and LOS E for urban roadways and intersections. Based on Figure F-1 of the Sacramento County Transportation Analysis Guidelines, the Project site and study facilities are located in an urban area, and therefore, the minimum acceptable operation level is LOS E.

The County Transportation Analysis Guidelines outline the following conditions for when significant transportation effects are caused by a proposed project:

Signalized Intersections: A project is considered to have a significant effect if it would:

- result in a signalized intersection operating at an acceptable LOS to deteriorate to an unacceptable LOS; or
- increase the average delay by more than 5 seconds at a signalized intersection that is operating at an unacceptable LOS without the project.

Unsignalized Intersections: A project is considered to have a significant effect if it would:

- result in an unsignalized intersection movement/approach operating at an acceptable LOS to deteriorate to an unacceptable LOS, and also cause the intersection to meet a traffic signal warrant; or
- for an unsignalized intersection that meets a signal warrant, increase the delay by more than 5 seconds at a movement/approach that is operating at an unacceptable LOS without the project.

Signal Warrants

Signal warrant analysis was performed at all stop-controlled study intersections using California Manual on Uniform Traffic Control Devices (CA MUTCD) Peak Hour Signal Warrant #3.

Bicycle, Pedestrian, Transit, and Safety

The County Transportation Analysis Guidelines outline the following conditions for when significant bicycle, pedestrian, transit, and safety effects are caused by a proposed project:

Bicycle and Pedestrian Facilities: A project is considered to have a significant effect if it would:

- eliminate or adversely affect an existing bikeway or pedestrian facility in a way that would discourage its use;
- interfere with the implementation of a planned bikeway as shown in the Bicycle Master Plan, or be in conflict with the Pedestrian Master Plan; or
- fail to provide adequate access for bicyclists and pedestrians, resulting in unsafe conditions, including unsafe bicycle/pedestrian, bicycle/motor vehicle, or pedestrian/motor vehicle conflicts.

Transit: A project is considered to have a significant effect if it would:

- eliminate or adversely affect existing transit access, service, or operations; or
- interfere with the implementation of transit service as planned in the Metropolitan Transportation Plan/Sustainable Communities Strategy (MTP/SCS); or
- substantially increase transit demand and fail to provide adequate transit service.

Safety: A project is considered to have a significant effect if it would:

- substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).

EXISTING CONDITIONS INTERSECTION OPERATIONS

EXISTING TRAFFIC VOLUMES

Vehicle, bicycle, and pedestrian counts were collected at all existing study intersections during weekday AM (7AM-9AM) and PM (4PM-6PM) peak hours on Wednesday, June 22, 2022, except for the intersection of Rampart Drive & Mary Lynn Lane, which were collected on Wednesday June 29, 2022. Existing traffic volume count sheets are included in **Attachment A**. Factors have been applied to the count data to account for lower-volume traffic conditions that occur when local schools are not in session. Peak hour time-of-year factors were determined based on historical count data on Manzanita Avenue and Winding Way provided by County staff and found on the County Traffic Count Program website. Growth factor calculations and data can be found in **Attachment B**. Existing Lane geometrics and control are shown in **Figure 3** and Existing traffic volumes are shown in **Figure 4**.

Existing Intersection Level of Service

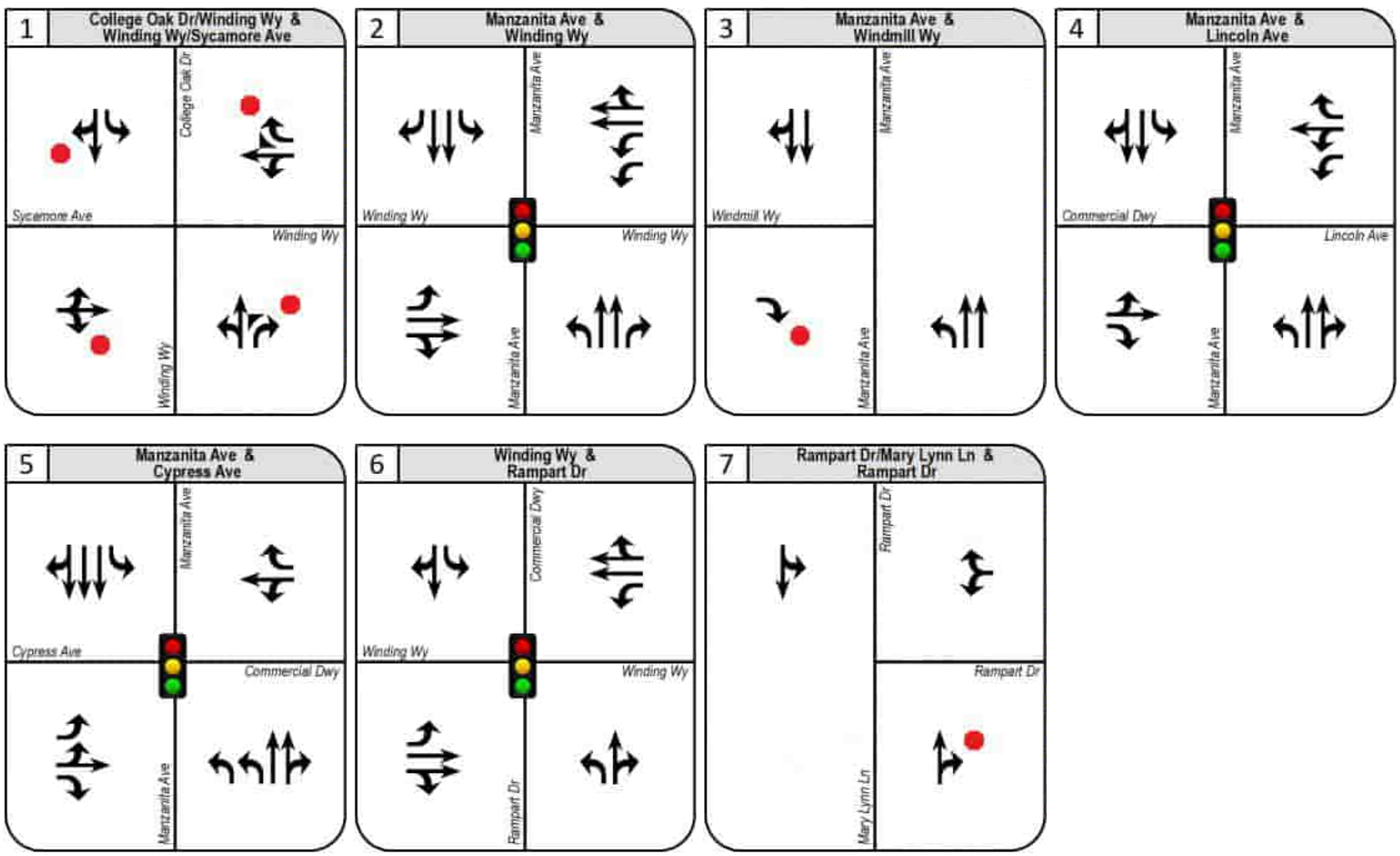
Existing conditions intersection delay and LOS were analyzed under Existing lane geometrics and control (shown in **Figure 3**) and Existing traffic volumes (shown in **Figure 4**). Existing conditions intersection operations are shown in **Table 2**.

Table 2. Existing Intersection Operations

#	Intersection	Control Type	LOS Criteria	Peak Hour	Delay (S/V)[1]	LOS	Wrnt Met?[2]
1	Winding Way & College Oak Drive	AWSC	E	AM	18.3	C	Yes
				PM	27.1	D	Yes
2	Manzanita Avenue & Winding Way	Signal	E	AM	19.7	B	-
				PM	20.5	C	-
3	Manzanita Avenue & Windmill Way	OWSC	E	AM	13.0	B	Yes
				PM	13.4	B	Yes
4	Manzanita Avenue & Lincoln Avenue	Signal	E	AM	11.6	B	-
				PM	11.5	B	-
5	Manzanita Avenue & Cypress Avenue	Signal	E	AM	24.1	C	-
				PM	38.0	D	-
6	Rampart Drive & Winding Way	Signal	E	AM	11.3	B	-
				PM	10.8	B	-
7	Rampart Drive & Mary Lynn Lane	OWSC	E	AM	8.5	A	No
				PM	7.3	A	No

Notes:
[1] "Average" control delays (in seconds/vehicle) are indicated for All-Way Stop-Control (AWSC) and Signal controlled intersections. "Worst-movement delay" (in seconds/vehicle) is indicated for One-Way Stop-Controlled (OWSC), Two-Way Stop-Controlled (TWSC), and uncontrolled intersections.
[2] Wrnt Met? = CA MUTCD based Peak Hour Signal Warrant #3

As shown in **Table 2**, all study intersections are currently operating acceptably under Existing conditions. CA MUTCD Peak Hour Signal Warrant #3 is currently met at the Winding Way & College Oak Drive and Manzanita Avenue & Windmill Way intersections under AM and PM peak Hour conditions. Synchro intersection LOS reports are contained in **Attachment C** and signal warrant worksheets are contained in **Attachment D**.



"Existing" Intersection Lane Geometrics and Control

Winding Ranch Queue Management Plan and Focused Access and Circulation Study

Sacramento County, CA

February 2023

Figure 3

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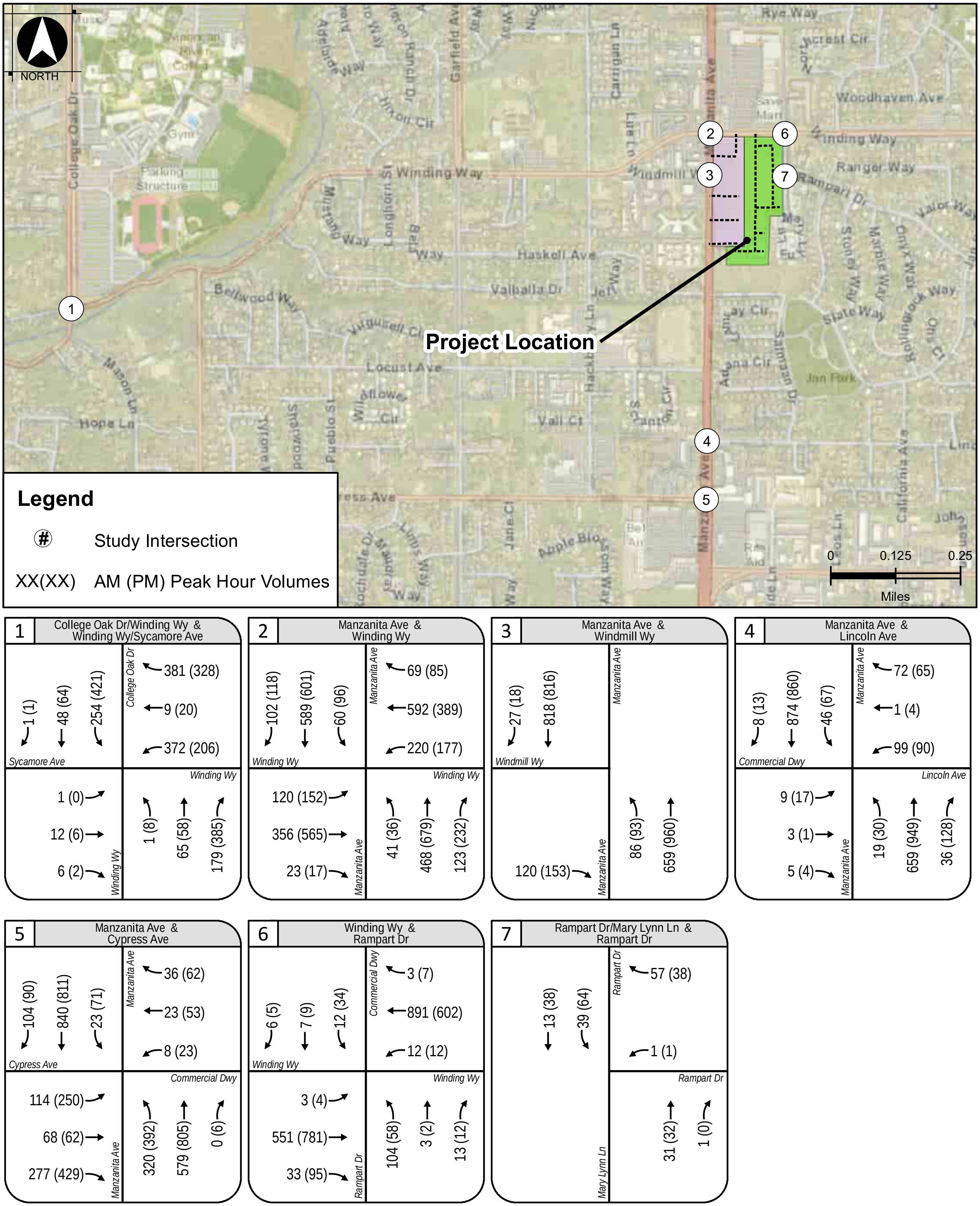

"Existing" Intersection Turning Movement Volumes

Winding Ranch Queue Management Plan and Focused Access and Circulation Study

Sacramento County, CA

February 2023

Figure 4

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EXISTING PLUS PROJECT INTERSECTION OPERATIONS

EXISTING PLUS PROJECT ROADWAY NETWORK

The commercial component of the Project plans to construct five new Project Driveways. The gas station would primarily be served by one right-in/right-out driveway on Manzanita Avenue and one right-in/right-out driveway on Winding Way. The restaurant facilities would primarily be served by one right-in/right-out driveway on Manzanita Avenue and two full access driveways on Manzanita Avenue. The residential component of the Project would be served by a new left-out restricted driveway on Winding Way and a new driveway on Rampart Drive that would form the eastbound approach of the existing Rampart Drive & Mary Lynn Lane intersection, which is assumed to be two-way stop-controlled in the eastbound and westbound directions with development of the Project. Proposed lane geometrics at all study intersections under Existing Plus Project conditions are shown in **Figure 5**.

PROJECT TRIP GENERATION

Existing Plus Project volumes were developed by adding Project trips to the Existing trip on the study roadway network. Project trips were estimated using rates from the Institute of Transportation Engineers (ITE) *Trip Generation Manual 11th Edition*. The following land uses and Project quantities were used to estimate Project trips:

- Single Family Detached Housing (ITE Code 210) – 81 Dwelling Units
- Convenience Store/Gas Station (4,500 to 5,500 square feet floor area) (ITE Code 945) – 16 Fueling Positions
- Fast-Food Restaurant with Drive-Through Window (ITE Code 934) – 20,700 square feet
- Coffee/Donut Shop with Drive-Through Window (ITE Code 937) – 2,200 square feet

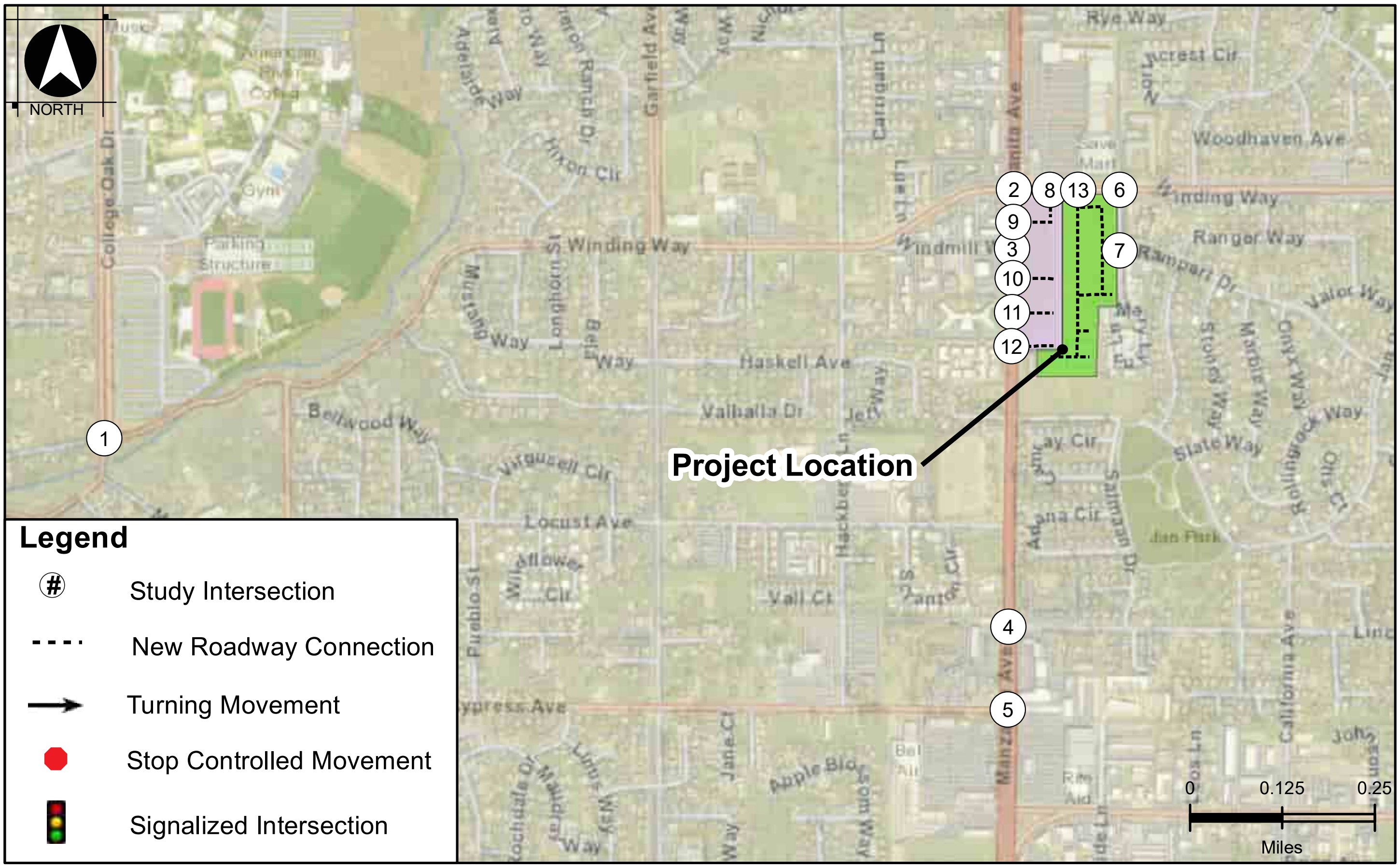
Internal capture was assumed to occur between gas station and fast-food/coffee shop trips and was calculated using the National Cooperative Highway Research Program (NCHRP) Report 684 estimator tool and capped at 10%. Pass-by trips to the gas station and fast-food/coffee shop restaurants were assumed to occur on Manzanita Avenue and Winding Way. Pass-by trips are defined as trips made to the Project site by vehicles that are already on the adjacent roadway network. A summary of the Project trip generation is shown in **Table 3**.

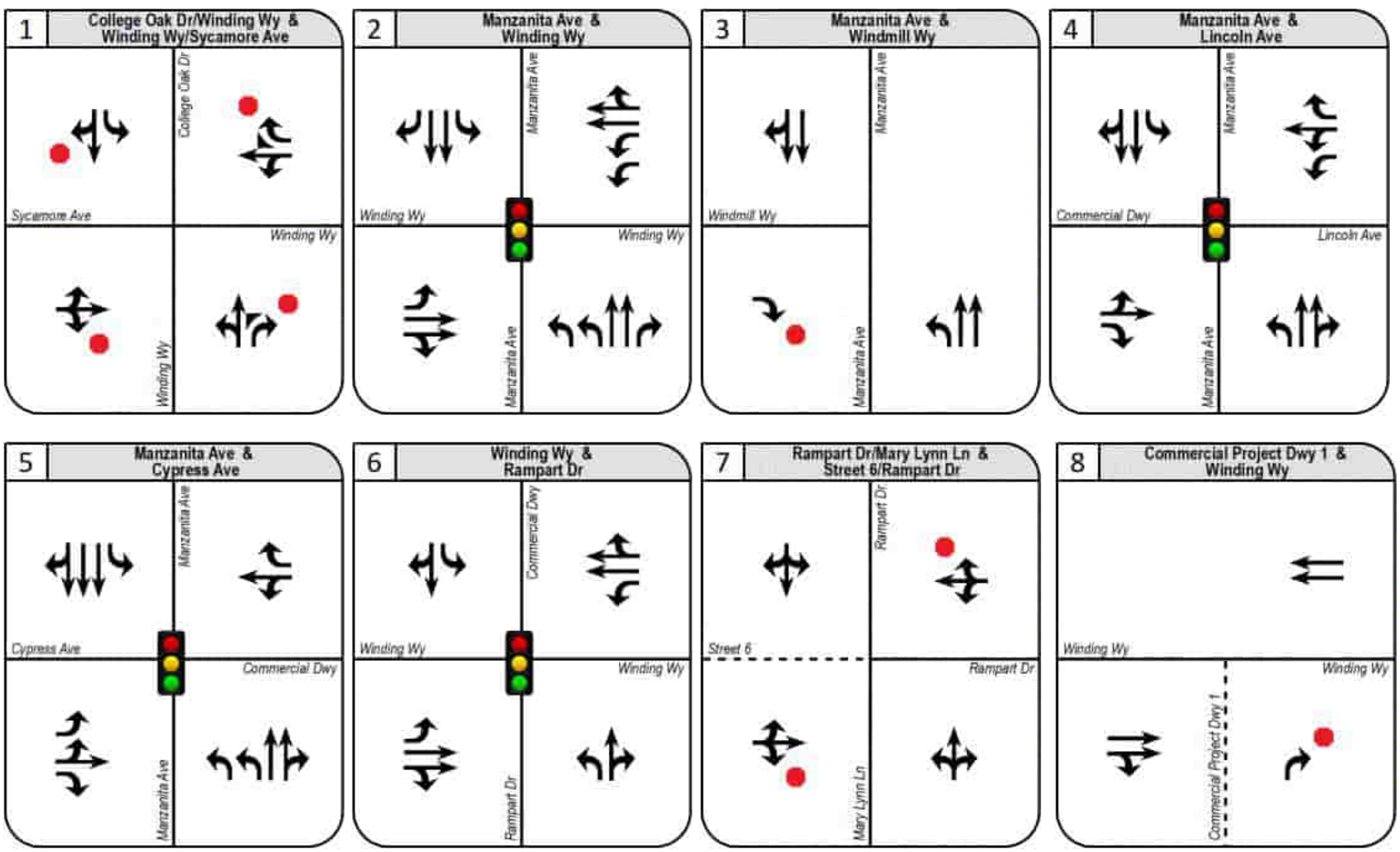
As shown in **Table 3**, the Project is estimated to generate 6,993 daily primary trips, 692 AM peak hour primary trips (336 inbound, 356 outbound), and 498 PM peak hour primary trips (266 inbound, 232 outbound). Separate Project trip distributions for the residential and commercial (gas station and restaurant/coffee shop) uses are shown in **Figures 6** and **7**, respectively. Residential Project volumes are shown in **Figure 6**, commercial primary Project volumes are shown in **Figure 7**, commercial pass-by volumes are shown in **Figure 8**, and total combined Project volumes are shown in **Figure 9**.

Table 3. Project Trip Generation

Land Use	ITE Code	Quantity	Units	Weekday Daily[1]	AM Peak Hour[1]			PM Peak Hour[1]		
					In	Out	Total	In	Out	Total
Single-Family Detached Housing	210	81	DU[2]	831	16	45	61	52	30	82
Convenience Stope/Gas Station (4.5-5.5k)	945	16	FP[3]	4,114	217	216	433	182	182	364
Gas Station-Restaurant Internal Capture Trips[6]				*-389*	*-17*	*-22*	*-39*	*-18*	*-18*	*-36*
Gas Station Pass-By Trips (AM = 76%, PM/Daily = 75%)[5]				*2,794*	*152*	*147*	*299*	*123*	*123*	*246*
Gas Station Primary Trips				*931*	*48*	*47*	*95*	*41*	*41*	*82*
Fast-Food Restaurant w/ Drive-Through Window	934	20.7	KSF[4]	9,677	471	452	923	356	328	684
Gas Station-Fast-Food Internal Capture Trips[6]				*-347*	*-18*	*-14*	*-32*	*-16*	*-16*	*-32*
Fast-Food Pass-By Trips (AM/Daily = 50%, PM = 55%)[5]				*4,665*	*227*	*219*	*446*	*187*	*172*	*359*
Coffee/Donut Shop w/ Drive-Through Window	937	2.2	KSF[4]	1,174	96	93	189	43	43	86
Gas Station-Coffee/Donut Shop Internal Capture Trips[6]				*-42*	*-4*	*-3*	*-7*	*-2*	*-2*	*-4*
Coffee/Donut Shop Pass-By Trips (AM/Daily = 50%, PM = 55%)[5]				*566*	*46*	*45*	*91*	*21*	*20*	*41*
Total Drive-Through Restaurant Primary Trips				*5,231*	*272*	*264*	*536*	*173*	*161*	*334*
TOTAL PRIMARY PROJECT TRIPS				**6,993**	**336**	**356**	**692**	**266**	**232**	**498**

Notes:
[1]Trip rates are calculated based on ITE Trip Generation Manual (11th Edition) fitted curve equations or average rates.
[2]DU = Dwelling Unit
[3]FP = Fueling Positions
[4]KSF = 1,000 square feet
[5]Pass-By Trip percentages are from the ITE Trip Generation Manual (11th Edition) Appendices.
[6]Internal capture is calculated using the NCHRP Report 684 estimator tool as outlined in the ITE Trip Generation Handbook (3rd Edition) and capped at 10%.





"Existing Plus Project" Lane Geometrics and Control

Winding Ranch Queue Management Plan and Focused Access and Circulation Study

Sacramento County, CA

February 2023

Figure 5

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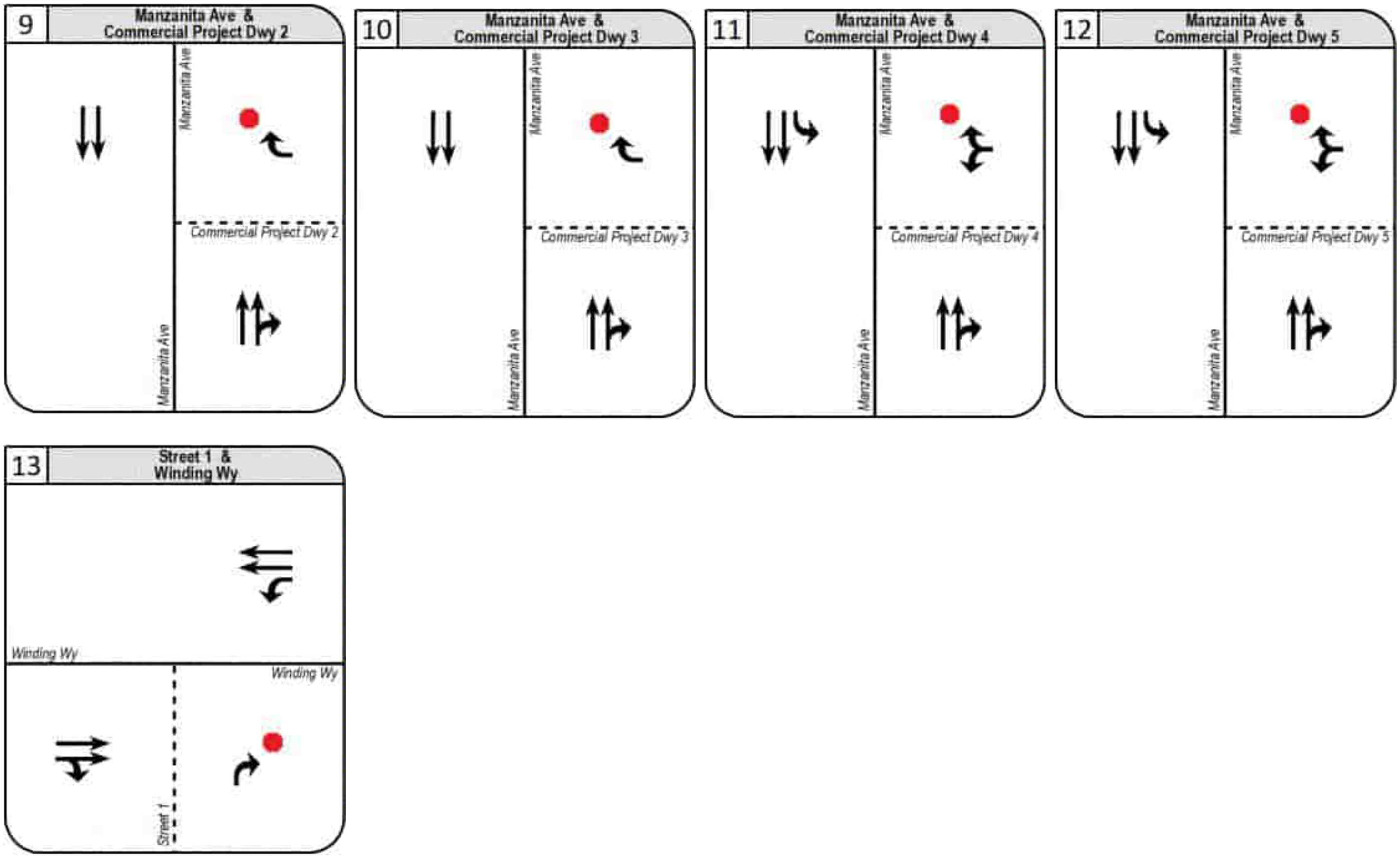


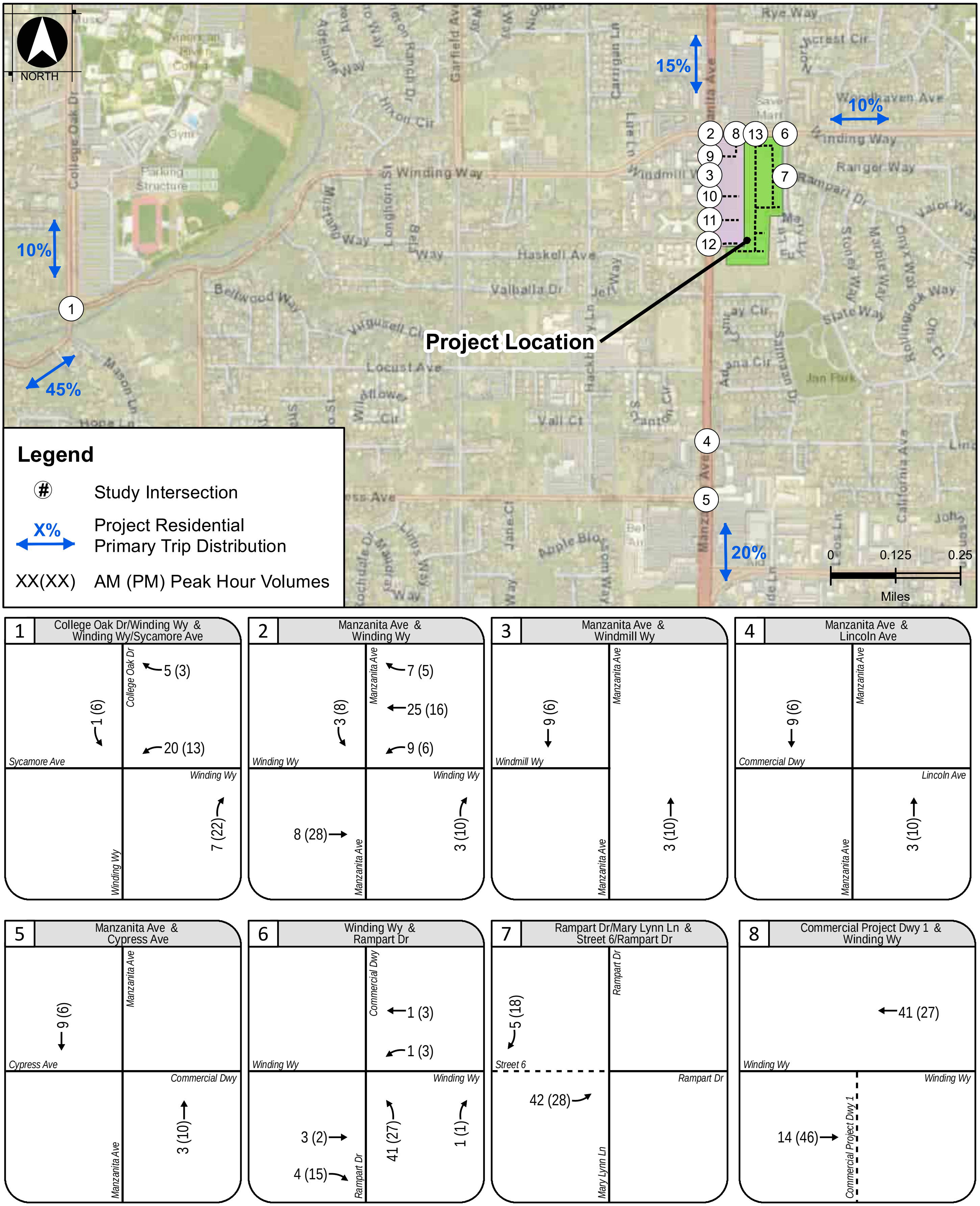
"Existing Plus Project" Lane Geometrics and Control

Winding Ranch Queue Management Plan and Focused Access and Circulation Study

Sacramento County, CA

February 2023

Figure 5-2



Residential Primary Project Trips

Winding Ranch Queue Management Plan and Focused Access and Circulation Study

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Figure 6

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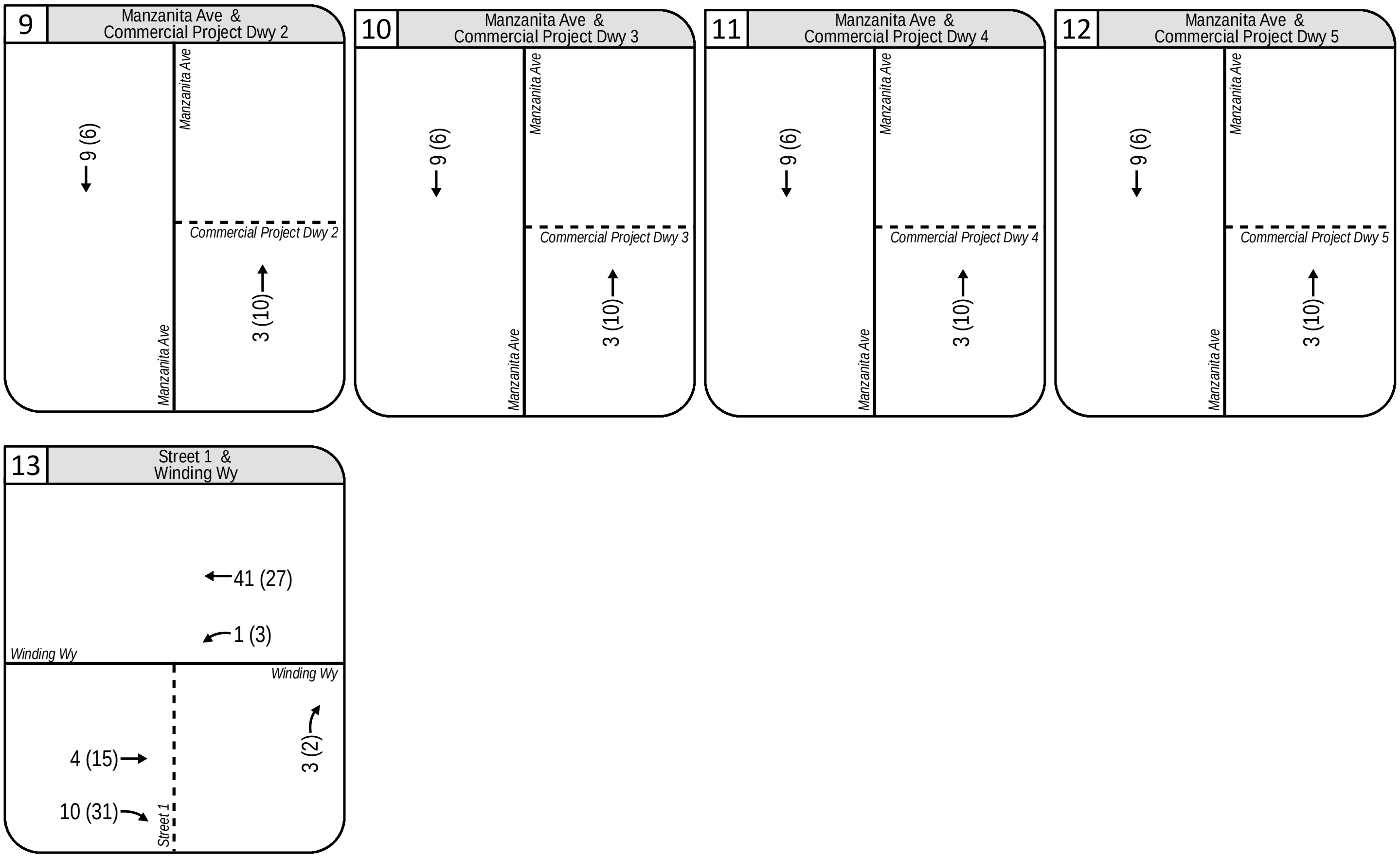


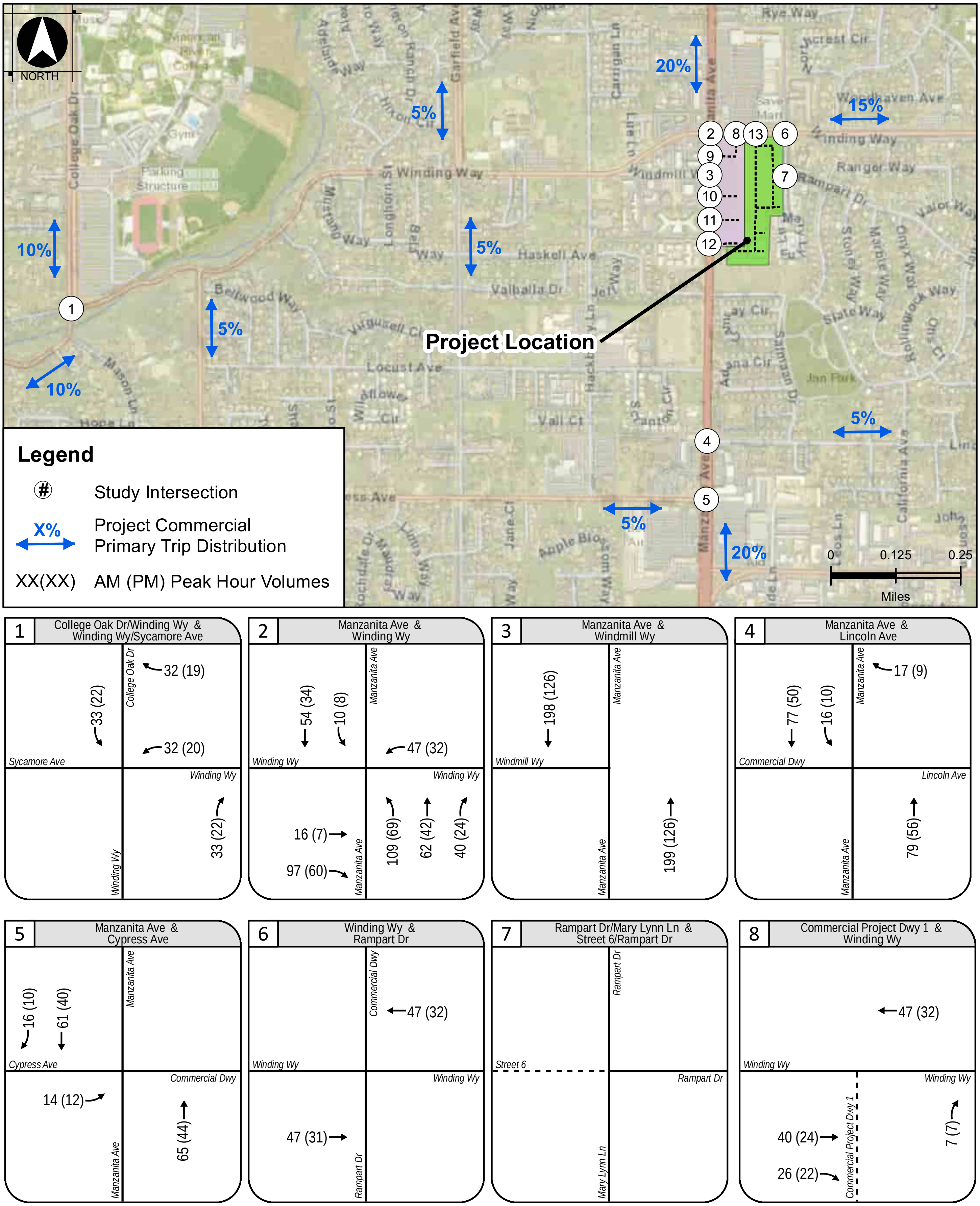
Residential Primary Project Trips

Winding Ranch Queue Management Plan and Focused Access and Circulation Study

Sacramento County, CA

February 2023

Figure 6-2



Commercial Primary Project Trips

Winding Ranch Queue Management Plan and Focused Access and Circulation Study
Sacramento County, CA
February 2023

Figure 7

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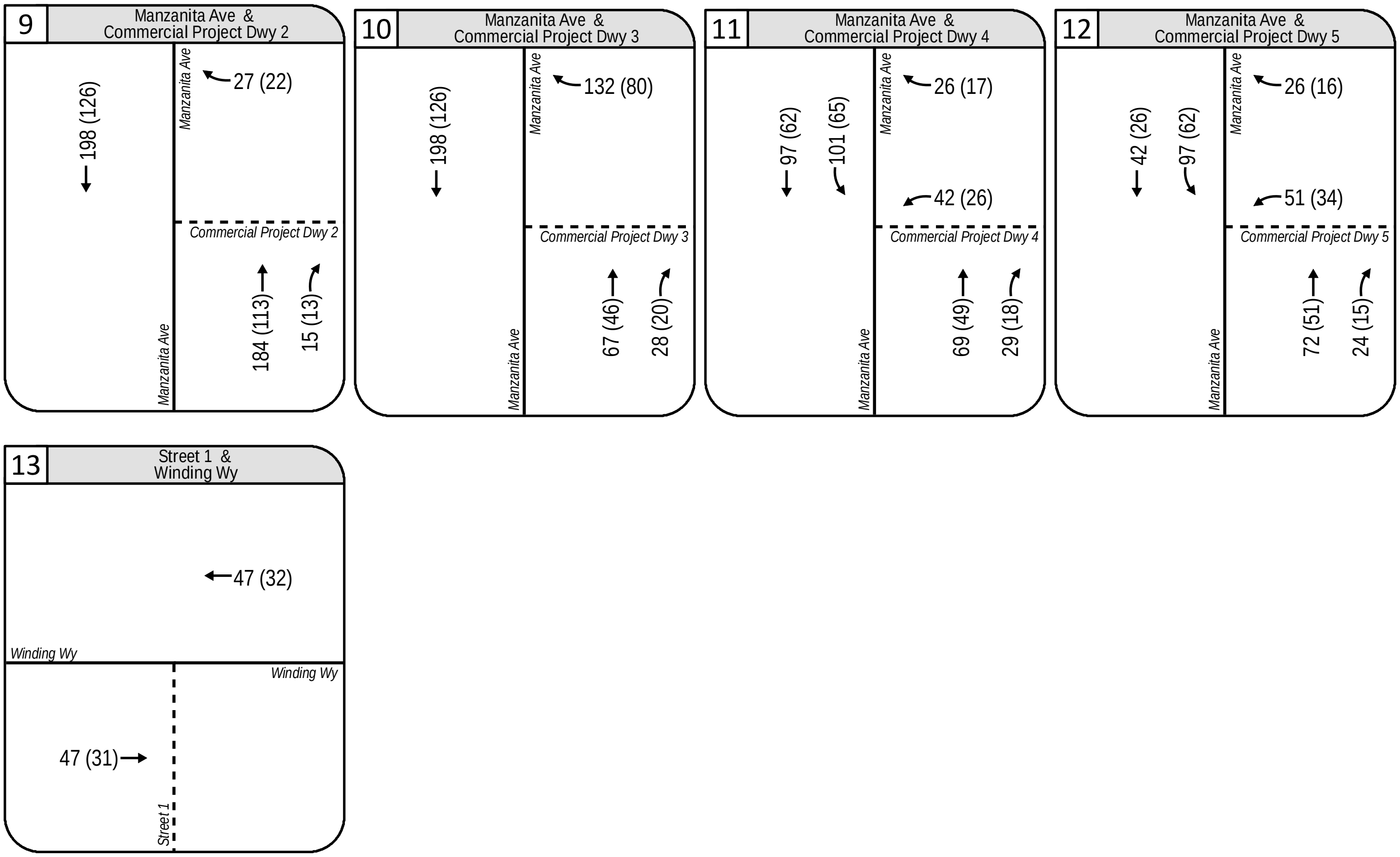


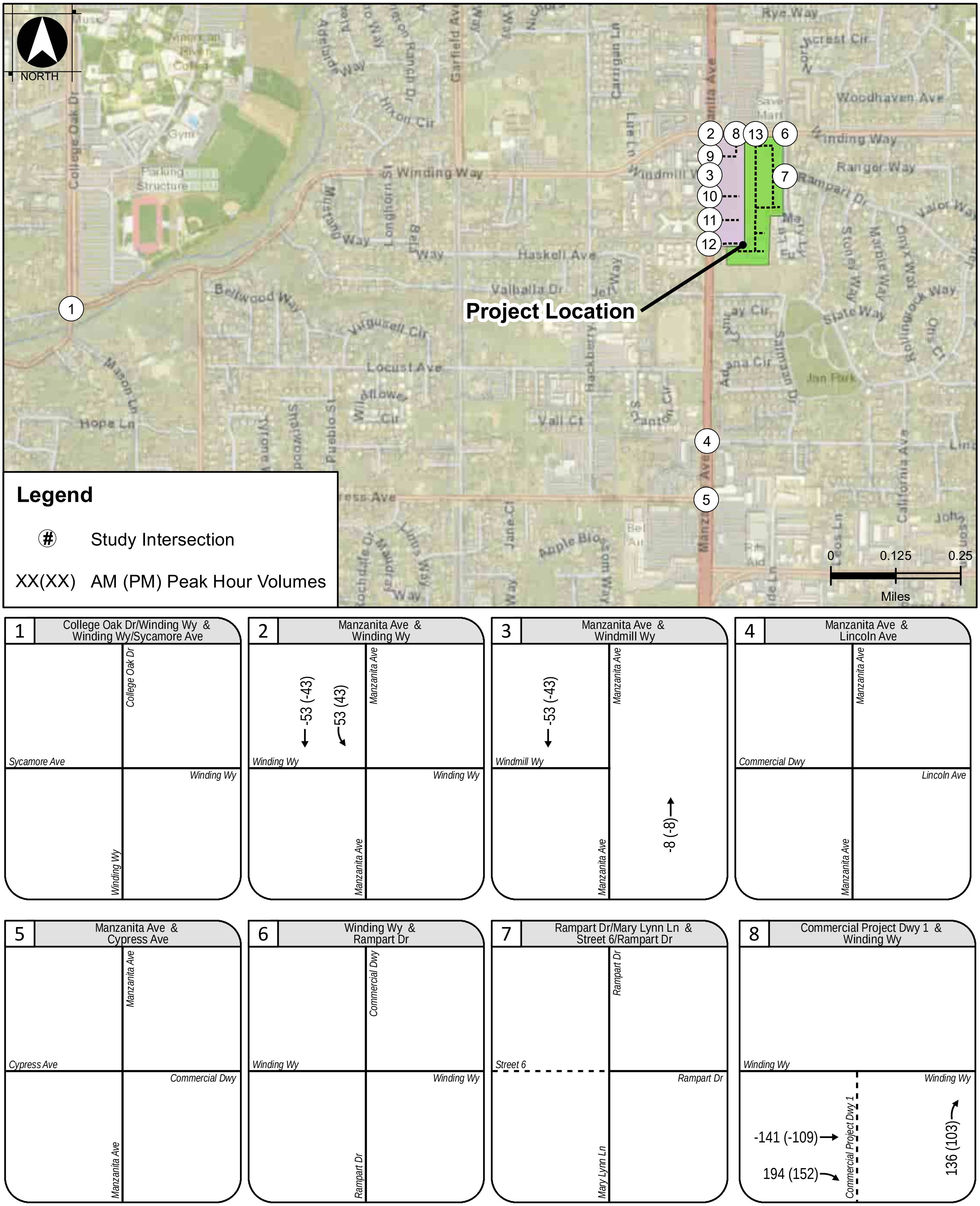
Commercial Primary Project Trips

Winding Ranch Queue Management Plan and Focused Access and Circulation Study

Sacramento County, CA

February 2023

Figure 7-2



Commercial Pass-By Project Trips

Winding Ranch Queue Management Plan and Focused Access and Circulation Study

Sacramento County, CA

February 2023

Figure 8

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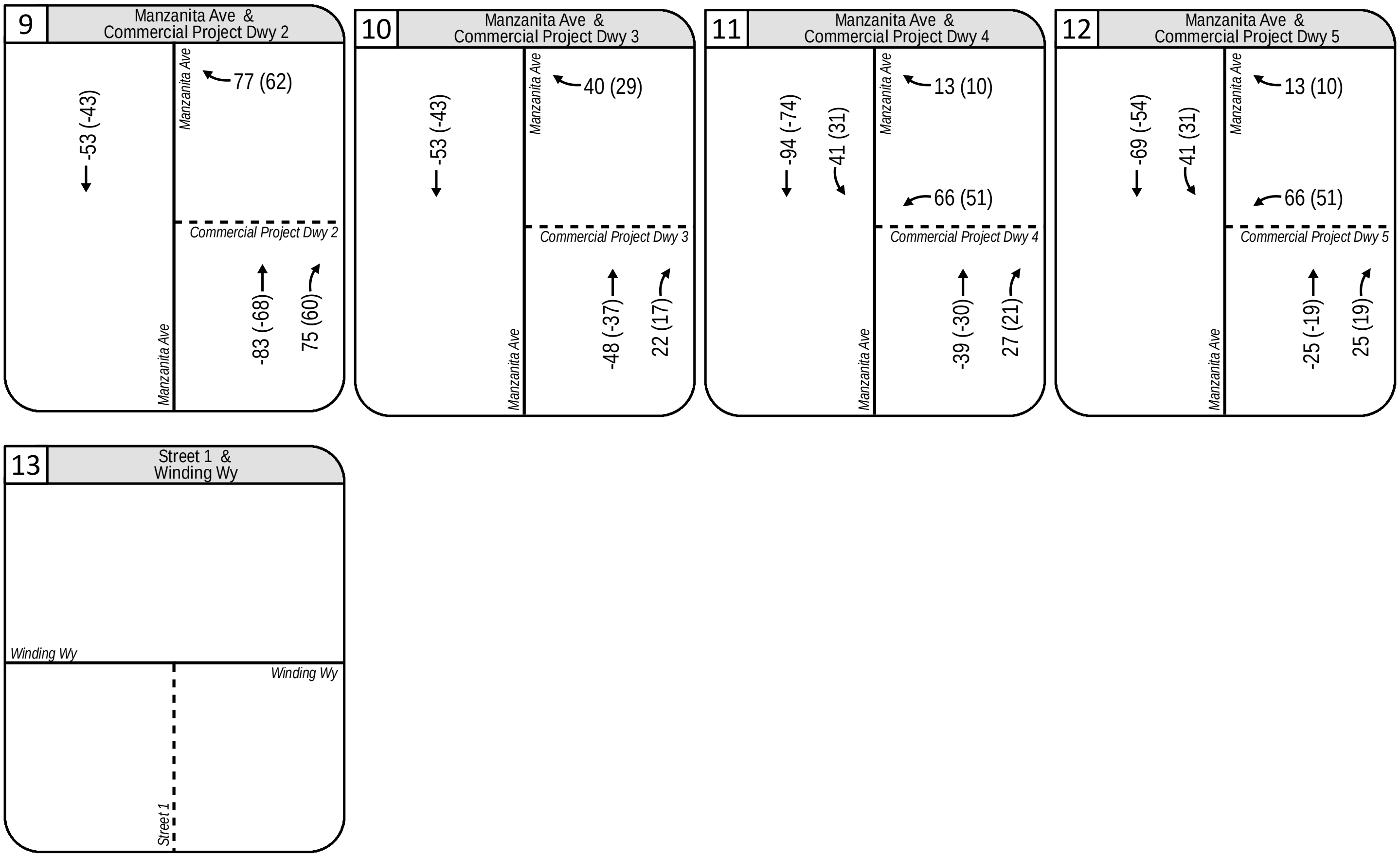


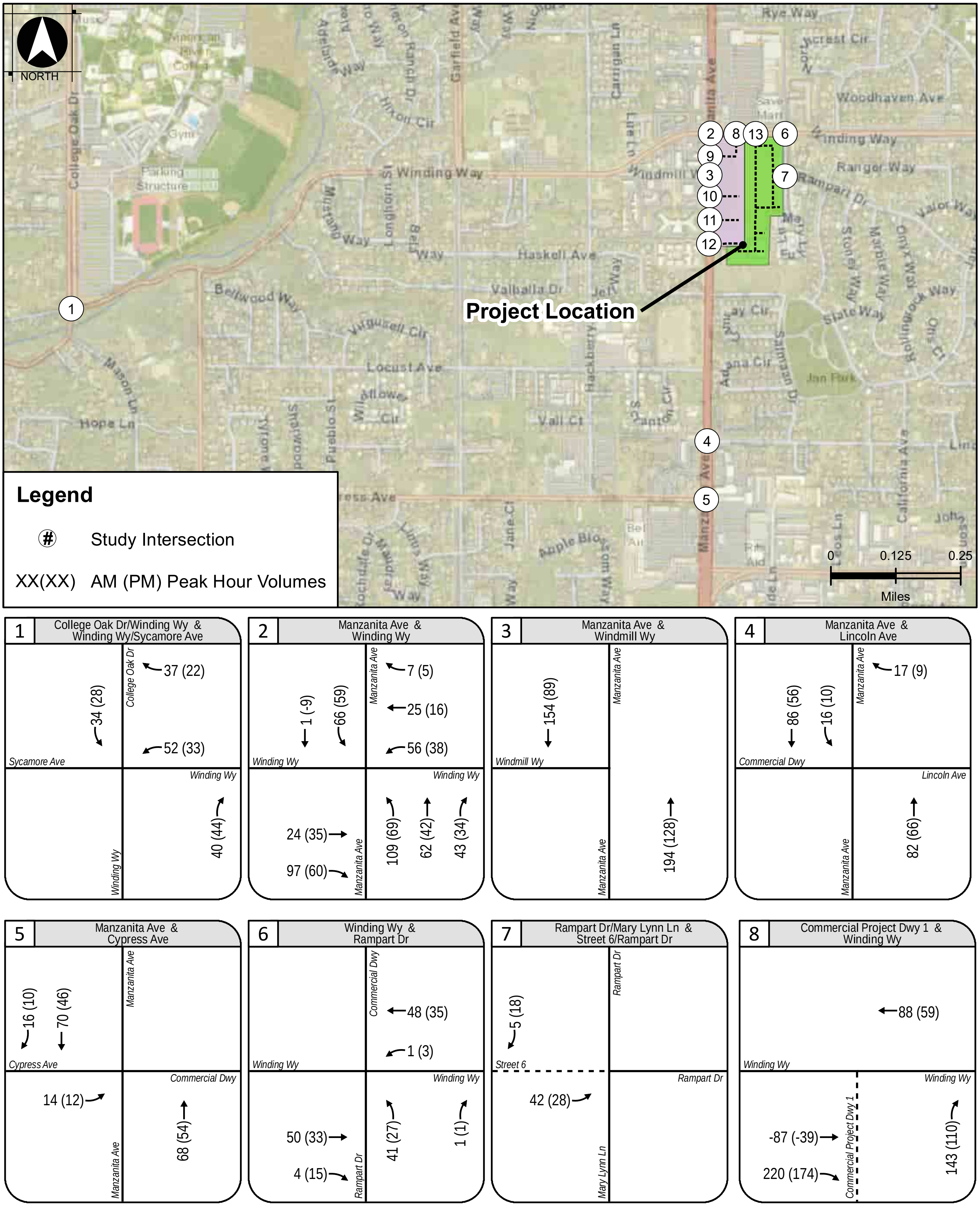
Commercial Pass-By Project Trips

Winding Ranch Queue Management Plan and Focused Access and Circulation Study

Sacramento County, CA

February 2023

Figure 8-2



Combined Project Trips

Winding Ranch Queue Management Plan and Focused Access and Circulation Study

Sacramento County, CA

February 2023

Figure 9

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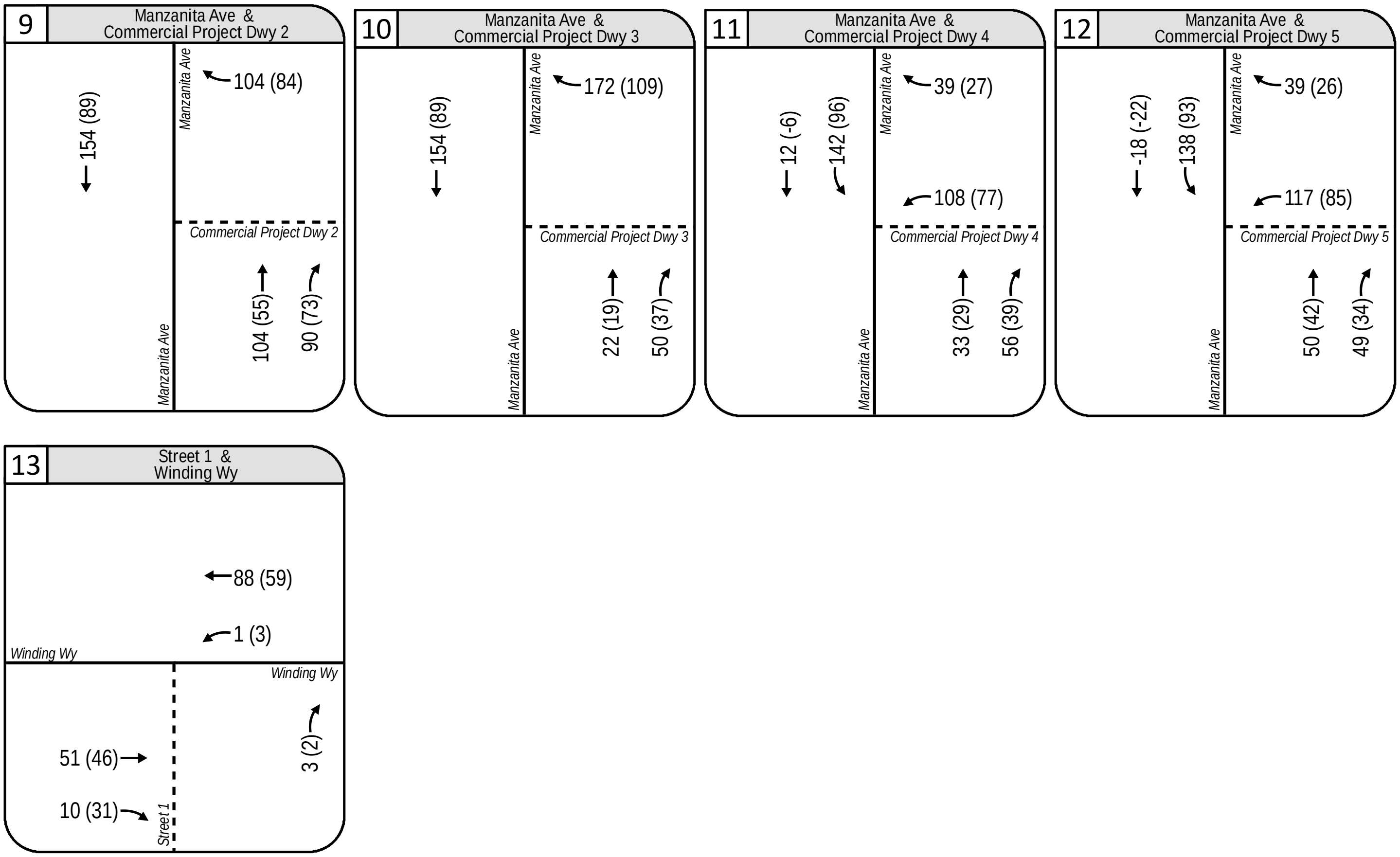


Combined Project Trips
Winding Ranch Queue Management Plan and Focused Access and Circulation Study
Sacramento County, CA
February 2023

Figure 9-2

Existing Plus Project Intersection Operations

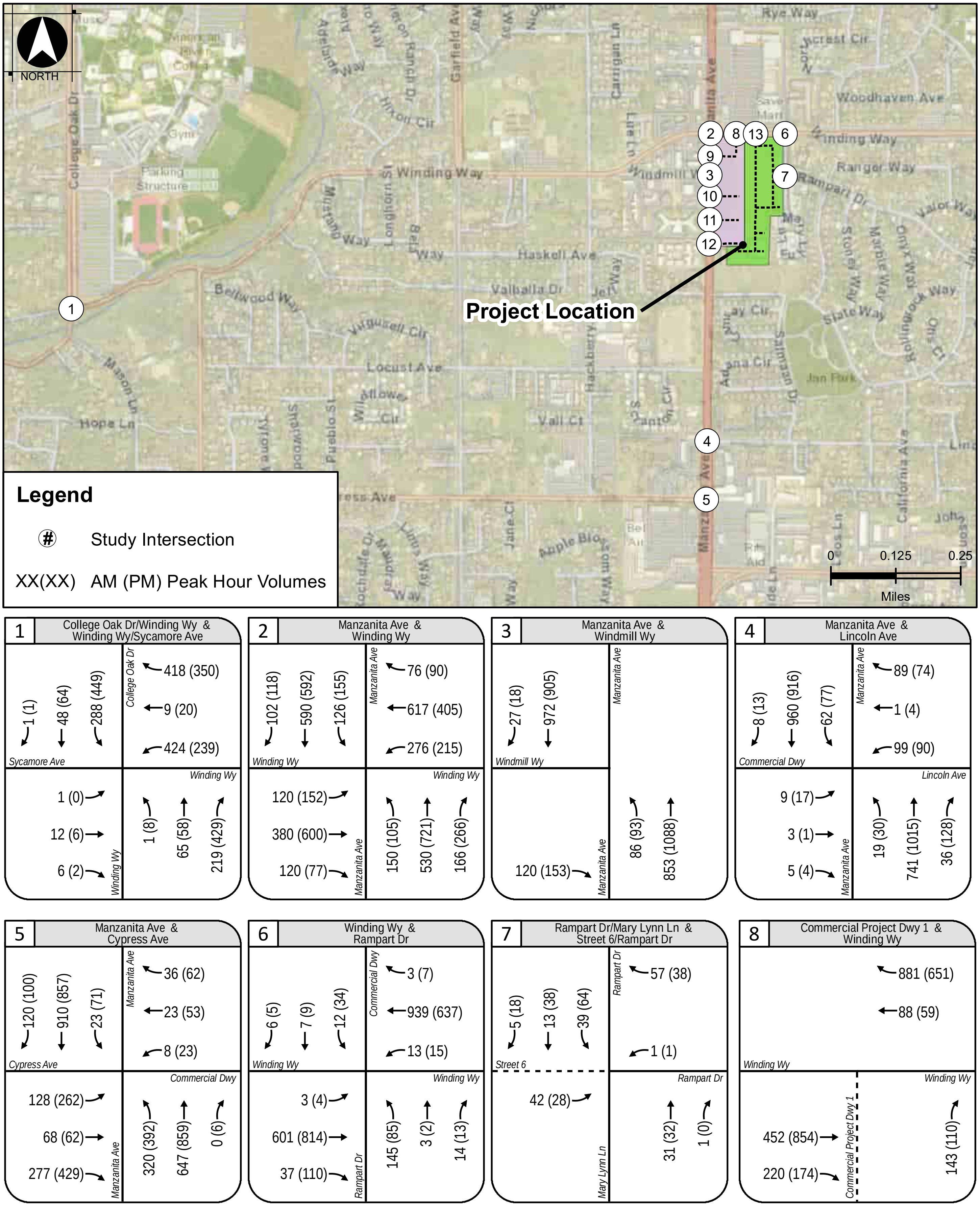
Existing Plus Project volumes were developed by adding the total Project volumes (shown in **Figure 9**) to Existing traffic volumes (shown in **Figure 4**). Existing Plus Project traffic volumes are shown in **Figure 10**. Existing Plus Project intersection operations are shown in **Table 4**.

Table 4. Existing Plus Project Intersection Operations

#	Intersection	Control Type	LOS Criteria	Peak Hour	Existing Conditions			Existing Plus Project Conditions		
					Delay (S/V)[1]	LOS	Wrnt Met?[2]	Delay (S/V)[1]	LOS	Wrnt Met?[2]
1	Winding Way & College Oak Drive	AWSC	E	AM	18.3	C	Yes	24.6	C	Yes
				PM	27.1	D	Yes	36.9	E	Yes
2	Manzanita Avenue & Winding Way	Signal	E	AM	19.7	B	-	22.4	C	-
				PM	20.5	C	-	24.5	C	-
3	Manzanita Avenue & Windmill Way	OWSC	E	AM	13.0	B	Yes	14.2	B	Yes
				PM	13.4	B	Yes	14.3	B	Yes
4	Manzanita Avenue & Lincoln Avenue	Signal	E	AM	11.6	B	-	12.1	B	-
				PM	11.5	B	-	12.0	B	-
5	Manzanita Avenue & Cypress Avenue	Signal	E	AM	24.1	C	-	24.8	C	-
				PM	38.0	D	-	39.5	D	-
6	Rampart Drive & Winding Way	Signal	E	AM	11.3	B	-	12.1	B	-
				PM	10.8	B	-	11.3	B	-
7	Rampart Drive/Mary Lynn Lane & Street 6	TWSC	E	AM	8.5	A	No	10.1	B	No
				PM	7.3	A	No	10.7	B	No
8	Commercial Driveway 1 & Winding Way	OWSC	E	AM	-	-	-	12.0	B	Yes
				PM	-	-	-	14.1	B	Yes
9	Manzanita Avenue & Commercial Project Driveway 2	OWSC	E	AM	-	-	-	12.4	B	Yes
				PM	-	-	-	13.9	B	No
10	Manzanita Avenue & Commercial Project Driveway 3	OWSC	E	AM	-	-	-	13.6	B	Yes
				PM	-	-	-	14.8	B	Yes
11	Manzanita Avenue & Commercial Project Driveway 4	OWSC	E	AM	-	-	-	27.2	D	Yes
				PM	-	-	-	28.1	D	Yes
12	Manzanita Avenue & Commercial Project Driveway 5	OWSC	E	AM	-	-	-	28.4	D	Yes
				PM	-	-	-	29.7	D	Yes
13	Street 1 & Winding Way	OWSC	E	AM	-	-	-	10.2	B	No
				PM	-	-	-	11.8	B	No

Notes:
[1] "Average" control delays (in seconds/vehicle) are indicated for All-Way Stop-Control (AWSC) and Signal controlled intersections. "Worst-movement delay" (in seconds/vehicle) is indicated for One-Way Stop-Controlled (OWSC), Two-Way Stop-Controlled (TWSC), and uncontrolled intersections.
[2] Wrnt Met? = CA MUTCD based Peak Hour Signal Warrant #3

As shown in **Table 4**, all study intersections are projected to operate at acceptable LOS under Existing Plus Project conditions. CA MUTCD Peak Hour Signal Warrant #3 is projected to be met at the Winding Way & College Oak Drive and Manzanita Avenue & Windmill Way intersections under AM and PM peak hour conditions, and at the intersections of Manzanita Avenue with Commercial Project Driveways 1, 3, 4 and 5 under the AM and PM peak hours and the intersection of Manzanita Avenue & Commercial Driveway 2 under the PM peak hour. Synchro intersection LOS reports are contained in **Attachment C** and signal warrant worksheets are contained in **Attachment D**.



"Existing Plus Project" Intersection Turning Movement Volumes

Winding Ranch Queue Management Plan and Focused Access and Circulation Study
Sacramento County, CA
February 2023

Figure 10

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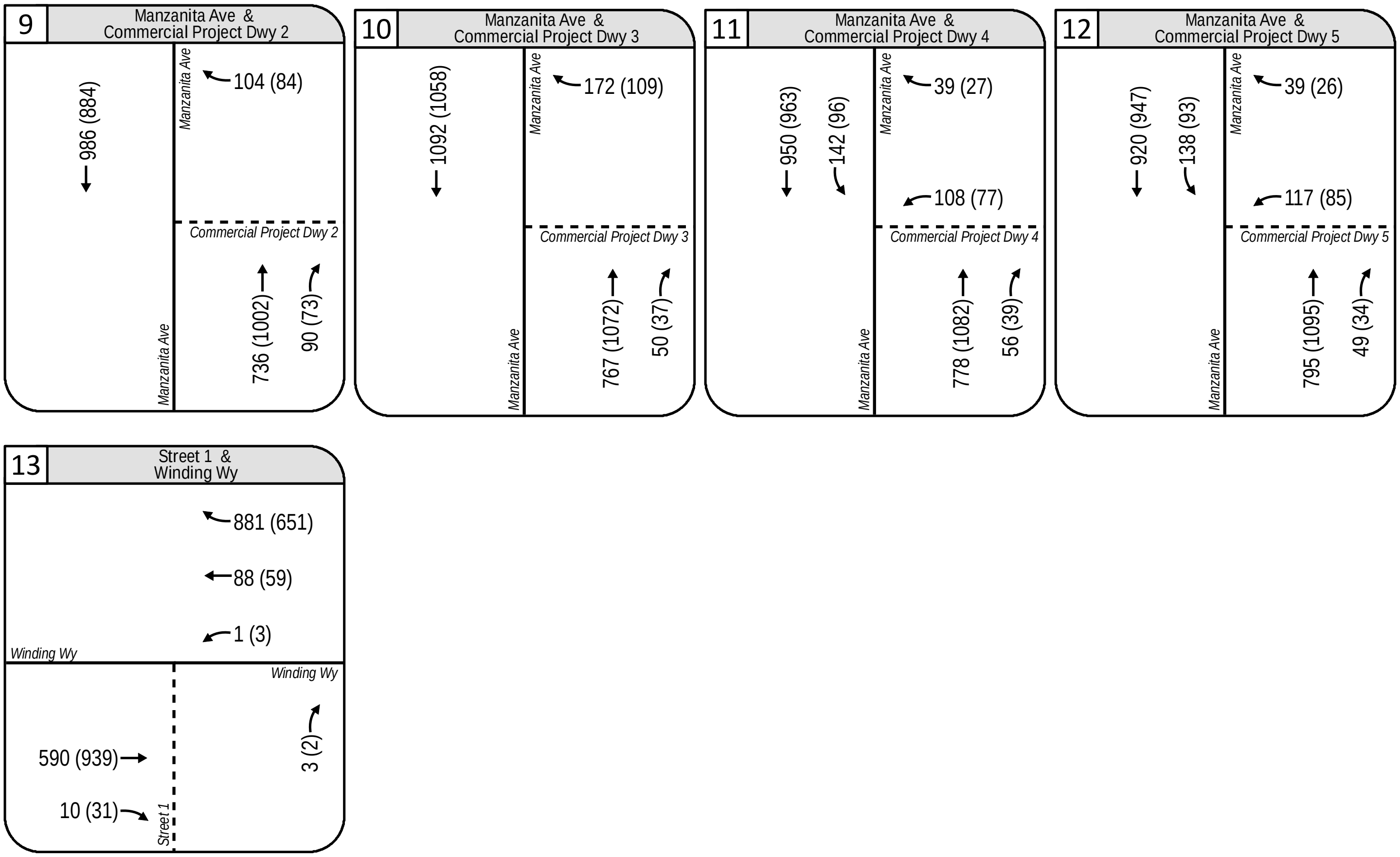


"Existing Plus Project" Intersection Turning Movement Volumes

Figure 10-2

Winding Ranch Queue Management Plan and Focused Access and Circulation Study
Sacramento County, CA
February 2023

SIGNIFICANT TRANSPORTATION EFFECTS

Since all study intersections are projected to operate at acceptable LOS under Existing Plus Project conditions, the Project is not projected to have any significant transportation effects.

INTERSECTION QUEUEING ANALYSIS

Table 5 shows the 95th percentile queueing at each study intersection approach under Existing and Existing Plus Project conditions compared to the available storage length. Queues were reported for movements with turn pockets where at least one Project trip would be added.

Table 5. Intersection Queueing

#	Intersection	Available Storage (ft)[1]	Movement	Peak hour	Existing Conditions	Existing Plus Project Conditions
2	Manzanita Avenue & Winding Way	190	NBL	AM	61	90
				PM	62	77
		105/185[2]	NBR	AM	67	102
				PM	**149**	**192**
		265	SBL	AM	80	152
				PM	127	202
		180	WBL	AM	108	146
				PM	105	135
4	Manzanita Avenue & Lincoln Avenue	190	SBL	AM	68	89
				PM	95	112
		140	WBR	AM	38	44
				PM	39	43
5	Manzanita Avenue & Cypress Avenue	330	EBL	AM	122	138
				PM	251	268
6	Winding Way & Rampart Drive	130	NBL	AM	106	**147**
				PM	66	93
		90	WBL	AM	25	27
				PM	24	29
11	Manzanita Avenue & Commercial Project Driveway 4	50	SBL	AM	-	12
				PM	-	10
12	Manzanita Ave & Commercial Project Driveway 5	50	SBL	AM	-	12
				PM	-	10
13	Street 1 & Winding Way	110	WBL	AM	-	0
				PM	-	0

Notes:
***Bold** values indicate the queue exceeds available storage length.*
[1] For dual turn pockets, storage and queues are reported for the highest single lane.
[2] The northbound right turn pocket at Manzanita Avenue & Winding Way would be striped for approximately 185 feet of storage with development of the Project.

As shown in **Table 5,** the northbound right-turn 95th percentile queue at the Manzanita Avenue and Winding Way intersection is projected to exceed the planned right-turn pocket length by seven (7) feet. However, this small excess queue would be accommodated within the taper area of the turn pocket**.** The AM peak hour northbound left turn 95th percentile queue at the Winding Way and Rampart Drive intersection is projected to occasionally block the egress lane of the Crestview Townhomes gated driveway. It is approximately 130 feet from the crosswalk on the south leg of the Rampart Drive and Winding Way intersection to the northern edge of the Crestview Townhomes driveway, which means the northbound left turn AM peak period 95th percentile queue would extend 17 feet through the driveway. As this queue length would likely only occur rarely during the peak hour, and the queue would likely clear during the next cycle, no improvements are recommended. All other 95th percentile intersection queues are projected to be accommodated by the available turn pocket storage space under Existing Plus Project conditions Synchro queueing reports are contained in **Attachment E**.

SITE ACCESS AND INTERNAL CIRCULATION

PROJECT ACCESS DRIVEWAYS AND ROADWAYS

The residential component of the Project proposes the following two new Project Driveway connections (note that the length of a queued vehicle is assumed to be 20 feet):

Street 6: This roadway would form the eastbound leg of the existing Rampart Drive/Mary Lynn Lane & Rampart Drive intersection. Intersection control under Plus Project conditions is assumed to be two-way stop-controlled with the eastbound and westbound approaches being stop-controlled. The throat depth of this new roadway segment is approximately 75 feet and the maximum projected 95th percentile peak hour ingress and egress queues are less than one vehicle.

Street 1: This roadway would extend south from Winding Way, approximately 330 feet west of the existing Rampart Drive & Winding Way intersection. Intersection control under Plus Project conditions is assumed to be one-way stop-controlled with the driveway approach being stop-controlled. Street 1 would allow right turns only onto Winding Way (i.e., northbound left turns and through movements would be restricted). This study assumes that left-turns into the driveway would be accommodated by an existing westbound left-turn pocket on Winding Way. The throat depth of this roadway is approximately 100 feet and the maximum projected 95th percentile peak hour ingress and egress queues are less than one vehicle. It is recommended that a "Right-Turn Only" sign be installed on the south leg of the Street 1 and Winding Way intersection. It is also recommended that the existing median on Winding Way is extended consisted with County Improvement Standard Detail 4-17 in order to restrict northbound and southbound left-turns exiting from Street 1 and the shopping center driveway to the north.

The commercial component of the Project proposes the following five new Project Driveway connections:

Commercial Project Driveway 1: This 43-foot driveway is located on Winding Way, approximately 265 feet east of the existing Manzanita Avenue & Winding Way intersection and is proposed to have right-in/right-out control. The driveway would primarily serve the gas station, convenience market, and car wash portion of the Project site. The throat depth of this driveway is approximately 130 feet (about 6 vehicles) and the maximum projected 95th percentile peak hour ingress and egress queues are less than one vehicle.

Commercial Project Driveway 2: This 40-foot driveway is located on Manzanita Avenue, approximately 275 feet south of the existing Manzanita Avenue & Winding Way intersection and is proposed to have right-in/right-out control. The driveway would primarily serve the gas station, convenience market, and car wash portion of the Project site. The throat depth of this driveway is approximately 25 feet (about one vehicle) and the maximum projected 95th percentile peak hour ingress and egress queues are less than one vehicle. Installation of a "Right-Turn Only" sign is recommended at this location. The existing concrete bumps in the center median of Manzanita Avenue in the vicinity of Project Driveway 2 will be replaced with a full median as the median is extended to the south.

Commercial Project Driveway 3: This 35-foot driveway is located on Manzanita Avenue, approximately 280 feet south of the proposed Commercial Project Driveway 2 intersection and is proposed to have right-in/right-out control. The driveway would primarily serve the fast-food/coffee shop portion of the Project site. The throat depth of this driveway is approximately 45 feet (about two vehicles) and the maximum projected 95th percentile peak hour ingress queue is less than one vehicle. The maximum projected 95th percentile peak hour egress queue is 24 feet. Installation of a "Right-Turn Only" sign is recommended at this location. Additionally, the raised median on Manzanita Avenue should be extended to the south 50 feet beyond Commercial Driveway 3 in order to restrict left-turns from Commercial Driveway 3 and Windmill Way. The northbound left-turn pocket onto Windmill Way would remain.

Commercial Project Driveway 4: This 35-foot driveway is located on Manzanita Avenue, approximately 280 feet south of the proposed Commercial Project Driveway 3 intersection and is proposed to have full access control. The driveway would primarily serve the fast-food/coffee shop portion of the Project site, as well as gas station trips that are looking to exit the site and travel north on Manzanita Avenue. A southbound left-turn ingress movement would be provided at this driveway within a proposed two-way left-un lane on Manzanita Avenue along Project frontage. The throat depth of this driveway is approximately 43 feet (about two vehicles) and the maximum projected 95th percentile peak hour ingress queue (southbound left-turn movement) is less than one vehicle. The maximum projected 95th percentile peak hour egress queue (westbound left/right-turn movement) is 50 feet (slightly over two vehicles). In the event that over two vehicles were waiting to exit at the driveway, there would be room for one more vehicle to queue in the main drive aisle without blocking a parking stall.

Commercial Project Driveway 5: This 45-foot driveway is located on Manzanita Avenue, approximately 295 feet south of the proposed Commercial Project Driveway 4 intersection and approximately 150 feet north of the existing commercial driveway to the south. The driveway is proposed to have full access control and would primarily serve the fast-food/coffee shop portion of the Project site, as well as gas station trips that are looking to exit the site and travel north on Manzanita Avenue. A southbound left-turn ingress movement would be provided at this driveway within a proposed two-way left-un lane on Manzanita Avenue along Project frontage. The throat depth of this driveway is approximately 43 feet (about two vehicles) and the maximum projected 95th percentile peak hour ingress queue (southbound left-turn movement) is less than one vehicle. The maximum projected 95th percentile peak hour egress queue (westbound left/right-turn movement) is 54 feet (slightly over two vehicles). In the event that over two vehicles were waiting to exit at the driveway, there would be room for one more vehicle to queue in the main drive aisle without blocking a parking stall.

Section 4 of the Sacramento County 2018 Improvement Standards state that “Driveways should be located as far apart as practical with a minimum of 150 feet between driveways or from driveways to intersections.” All proposed Project driveways would meet or exceed the minimum requirements for driveway spacing.

INTERNAL SITE CIRCULATION, PARKING, AND EMERGENCY ACCESS

A two-way drive aisle would run the length of the commercial site and provide access to each of the five restaurant buildings and the gas station/convenience store. East restaurant facility would also contain its own parking area and drive-through lane(s), which would be accessible via the main drive aisle. Delivery truck routing would generally occur at Commercial Project Driveways 1, 2, and 5. Project site driveway access, internal drive aisle access, and cul-de-sac width should adhere to County construction standards. Clear sight triangles should be maintained at all proposed driveways, with corners clear of vegetation or equipment that would obstruct sight distance.

Table 5.21 of the Sacramento County Zoning Code Development Standards states that for drive-through restaurants, one parking space per three seats should be provided and for automotive service stations, four spaces for every 1,000 square feet of gross floor area should be required. Based on the proposed Project total of 375 restaurant seats and 12,870 square feet of gas station/convenience store/car wash gross floor area, a total of 177 parking spaces should be provided. The Project proposes a total of 194 parking spaces, exceeding the minimum parking requirements.

Section 4 of the Sacramento County 2018 Improvement Standards state that "A minimum 35-foot driveway width is required for all commercial, industrial, school and church developments. A 45-foot driveway width is required along any roadway if significant truck traffic is anticipated to use the driveway. The standard driveway width shall be 45 feet on Arterial and Thoroughfare roadways.” All commercial Project driveways meets the minimum required width and The Project would provide a 45-foot driveway, as Manzanita Avenue is designated as an Arterial Roadway in the County General Plan. Within the Project area, Manzanita Avenue and Winding Way include center medians that would be traversable by emergency vehicles. The residential and commercial Project sites include internal roadway and drive aisle circulation that would allow emergency vehicles to access the sites, as well as multiple access points into and out of the sites.

The potential for cut-through traffic would exist for vehicles on northbound Manzanita Avenue to avoid the northbound right-turn movement at the Manzanita Avenue and Winding Way intersection by utilizing the Project driveways to cut-through the commercial Project site. However, as the northbound right-turn pocket would be extended to accommodate queueing, it is unlikely that potential cut-through traffic would find using Project driveways faster than the non-cut-through route. Additionally, potential cut-through vehicles would likely be deterred by the multiple low-speed internal parking drive aisle and drive-through conflicts within the site. The residential Project site circulation does not provide opportunities for cut-through traffic.

DRIVE-THROUGH QUEUEING

The queue storage at the proposed commercial drive-through facilities was analyzed to determine if the proposed storage would accommodate potential queues.

In order to evaluate the adequacy of the drive-through queuing and circulation, peak lunch hour (12PM-1PM) drive-through queue data was collected at local drive-through facilities. Specifically, drive-through queue data was collected at one McDonald's and one Carl's Jr location in Carmichael, California on Tuesday, June 21, 2022 and Wednesday, June 22, 2022, respectively. The local data collected was selected due to proximity to the Project site and includes the maximum queue (in vehicles) observed for each drive-through. The queue study data is provided in **Attachment A**. Queuing data for the Dutch Bros coffee kiosk located on Manzanita Avenue across from the Project site was obtained from a Sacramento County memorandum: *Recommendations for Updates to the Sacramento County Zoning Code Section 3.9.3.V ("Drive-Throughs")* (December 30, 2020) (County Drive-Through Memo).

Table 6 provides a summary of the local drive-through queuing data.

Table 6. Existing Local Drive-Through Queueing Data Summary

Location	Stacking Length (feet)	Maximum Recorded Queue (vehicles)
McDonald's [1]	265	12
Carl's Jr [2]	160	6
Dutch Bros Coffee [3]	270	10

Notes:
[1] McDonald's address: 7329 Fair Oaks Blvd, Carmichael, CA 59608
[2] Carl's Jr address: 5935 Madison Ave, Carmichael, CA 59608
[3] Dutch Bros address: 4625 Manzanita Ave, Carmichael, CA 95608
[4] Available queue storage assuming 20-feet per vehicle.

As shown in **Table 6**, existing local data shows a maximum drive-through restaurant queue of 12 vehicles and a maximum coffee-shop drive-through queue of 10 vehicles. **Table 7** provides a summary of the proposed Project drive-through queue storage.

Table 7. Proposed Project Drive-Through Queue Storage

Location	Stacking Length (feet)	Available Queue Storage[4] (vehicles)
P2 – Quick Service Restaurant	315	16
P3 – Coffee Shop/Coffee Kiosk	390	20
P4 – Quick Service Restaurant	250	13
P5 – Quick Service Restaurant	270	14
P6 – Quick Service Restaurant	290	15

Notes:
[1] McDonald's address: 7329 Fair Oaks Blvd, Carmichael, CA 59608
[2] Carl's Jr address: 5935 Madison Ave, Carmichael, CA 59608
[3] Dutch Bros address: 4625 Manzanita Ave, Carmichael, CA 95608
[4] Available queue storage assuming 20-feet per vehicle.

The County Drive-Through Memo proposes to amend the current Sacramento County Zoning Code as follows:

> *"Drive-throughs shall provide at least the minimum reservoir space (stacking lane) specified in **Table X**, as measured from the service window or unit to the entry point into the drive through lane. When multiple lanes are provided, the length of each lane may be counted."*

***"Table X.** Sacramento County Proposed Minimum Reservoir Space"*

Business Type	***Minimum Reservoir Space (feet)***
Quick Service Restaurant	*240*
Coffee Shop/Coffee Kiosk	*280*
Car Wash[1]	*180*
Bank	*120*
Pharmacy	*60*
Other	*As determined by a traffic study, or approved by the Department of Transportation.*

[1] does not apply to car washes ancillary to gas stations.

As shown above, the County Drive-Through Memo recommends a minimum reservoir space of 240-feet for a quick service restaurant and 280-feet for a coffee shop/coffee kiosk. Current County Zoning Code 3.9.3.V indicates a minimum required drive-through reservoir space of 180 feet. As shown in **Table 7**, the proposed Project drive-through stacking lengths exceed the recommended minimum lengths for quick service restaurants and coffee shops/coffee kiosks shown in Table X from the County Drive Through Memo. Additionally, the findings of the County Drive-Through Memo were shown to be consistent with maximum observed queues found in locally collected drive-through data summarized in **Table 6**. Therefore, the proposed drive-through stacking lengths are considered more than adequate as they exceed County standards under both the current code and the recommended update.

MULTIMODAL FACILITIES

BICYCLE AND PEDESTRIAN CIRCULATION

The residential component of the Project site would construct sidewalks on all internal roadways. There are currently no existing sidewalks on Winding Way and Rampart Drive along Project frontage. This study recommends that the residential component of the Project construct sidewalks along Project frontage in order to connect to the existing sidewalk network beyond the project limits. There are currently no sidewalks along Project frontage on Manzanita Avenue. The commercial component of the Project proposes to construct sidewalks along Manzanita Avenue. Internal pedestrian accessible walkways would be provided and would connect the various uses within the site. A proposed pedestrian connection between the commercial site and residential site is located between buildings P2 and P3. Bike lockers and bike racks are proposed in front of each restaurant building and the convenience store.

The *Sacramento County Active Transportation Plan* (County ATP)(June 2022) specifies that a "Study Corridor" for potential Class IV bike lanes is proposed on Manzanita Avenue and Winding Way. This indicates that a planned bikeway project does not currently exist and final selection of a bicycle facility type would require further study. The *Sacramento County Bicycle Master Plan* (April 2011) indicates that a Class II bike lane is proposed on Winding Way within the study area. Currently a Class II bike lane is present on both sides of Winding Way between Manzanita Avenue and Rampart Drive. Project frontage should maintain the existing Class II Bike Lane on eastbound Winding Way. The Project would maintain the existing Class II northbound Bike Lane on Manzanita Avenue. The County ATP indicates that a Class IIIB bicycle boulevard is proposed on Rampart Drive. The *Sacramento County Bicycle Master Plan* also indicates a proposed class II bike route on Rampart Drive between Winding Way and Barrett Road. Project frontage improvements on Rampart Drive should take into account proposed bike route improvements on this segment.

Based on the criteria outlined in the County Transportation Analysis Guidelines, the Project is not anticipated eliminate or adversely affect existing bikeway or pedestrian facilities in a way that it would discourage their use; interfere with the implementation of a planned bikeways as shown in the Bicycle Master Plan, or be in conflict with the Pedestrian Master Plan; or fail to provide adequate access for bicyclists and pedestrians, resulting in unsafe conditions, including unsafe bicycle/pedestrian, bicycle/motor vehicle, or pedestrian/motor vehicle conflicts.

TRANSIT CIRCULATION

The nearest transit stops serve Sacramento Regional Transit bus route 25 and are located on northbound and southbound Manzanita Avenue near the southern limits of the Project site, and on northbound and southbound Manzanita Avenue just north and south of Winding Way near the northern limits of the project site. The Project's pedestrian improvements would provide connectivity to these existing bus stops. A new bus stop is proposed as part of the Project on the site near Commercial Project Driveway 1 on Winding Way.

Based on the criteria outlined in the County Transportation Analysis Guidelines, the Project is not anticipated eliminate or adversely affect existing transit access, service, or operations; interfere with the implementation of transit service as planned in the MTP/SCS; or substantially increase transit demand and fail to provide adequate transit service.

COLLISION HISTORY ANALYSIS

This section discusses the collision history in the vicinity of the study intersections. Approximately five-and-a-half years of crash data (January 2017 – June 2022) were obtained from County staff and the Statewide Integrated Traffic Records System (SWITRS) to identify collision locations and characteristics in the study area. **Table 8** summarizes the collisions in the study area and describes the collision severity (fatal, serious injury, other visible injury, complaint of pain, and property damage (PDO)) and the collision type (broadside, sideswipe, rear-end, head-on, hit object, overturned, other, and vehicle/pedestrian).

As shown in **Table 8**, the intersection of Manzanita Avenue and Winding Way experienced the highest number of collisions in the study area. There was one Fatal collision and one Serious Injury collision recorded in the study area over the five-and-a-half-year period. The most common type of collision in the study area was Rear-End, followed by Broadside collisions. The most common primary collision factors were unsafe speed, traffic signals and signs, automobile right-of-way violation, improper turning, and unsafe lane change. No atypical trends in the study area collision history were noted.

Table 9 shows the 5-yr collision rate per million entering vehicles at each study intersection compared to the statewide average rate per million entering vehicles. As shown in **Table 9**, the intersection of Winding Way & College Oak Drive and the intersections of Manzanita Avenue with Winding Way, Windmill Way, and Cypress Avenue were shown to experience a higher rate of collisions compared to the statewide average. The intersection of Manzanita Avenue & Lincoln Avenue experienced the same rate as the statewide average and the intersections of Winding Way & Rampart Drive and Rampart Drive/Mary Lynn Lane & Rampart Drive experienced a lower rate than the statewide average.

The project is not anticipated to substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).

Table 8. Summary of Collisions in Study Area (2017 – 2022)

Intersection	Total Collisions	Severity					Type						
		Fatal	Serious Injury	Other Visible Injury	Complaint of Pain	PDO	Broadside	Sideswipe	Rear-End	Head-On	Hit Object	Overturned	Vehicle/ Pedestrian
#1, Winding Way & College Oak Drive	12	0	0	0	3	9	4	0	8	0	0	0	0
#2, Manzanita Avenue & Winding Way	41	0	0	2	12	27	16	6	16	1	1	0	1
#3, Manzanita Avenue & Windmill Way	14	0	1	2	5	6	2	3	5	1	1	0	2
#4, Manzanita Avenue & Lincoln Avenue	17	0	0	5	2	10	5	3	6	0	2	0	1
#5, Manzanita Avenue & Cypress Avenue	35	0	0	2	15	18	9	6	10	4	3	1	2
#6, Winding Way & Rampart Drive	10	1	0	1	2	6	4	1	4	0	0	1	0
#7, Rampart Drive/Mary Lynn Lane & Rampart Drive	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	**129**	**1**	**1**	**12**	**39**	**76**	**40**	**19**	**49**	**6**	**7**	**2**	**6**

Table 9. Summary of Collisions Rate per Million Entering Vehicles

Location	Collision Rate in Study Area (per MV[1])	State Average Intersection Collision Rate (per MV)[2]	Difference in Study Area Rate vs. Statewide Rate
#1, Winding Way & College Oak Drive	0.44	0.43	+0.01
#2, Manzanita Avenue & Winding Way	0.71	0.42	+0.29
#3, Manzanita Avenue & Windmill Way	0.38	0.17	+0.21
#4, Manzanita Avenue & Lincoln Avenue	0.42	0.42	0.00
#5, Manzanita Avenue & Cypress Avenue	0.63	0.42	+0.21
#6, Winding Way & Rampart Drive	0.33	0.42	-0.09
#7, Rampart Drive/Mary Lynn Lane & Rampart Drive	0.00	0.17	-0.17

Notes:
[1] MV = Million Vehicle Entering the Intersection. Rate = (1,000,000 x Crashes over 5 yrs) / (365 x 5 yrs x Number of Vehicles Entering Intersection Daily)
[2] Source: 2019 Crash Data on California State Highways (Caltrans, 2019).

QUEUE MANAGEMENT PLAN

As discussed previously in the drive-through queuing and circulation evaluation, the proposed drive-through stacking lengths are considered more than adequate as they exceed County standards under both the current code and the recommended update. However, it is important to outline the strategies to handle potential drive-through queue overflow, if it occurs, as to not affect parking lot or public roadway circulation. Recommended queue management strategies for individual food operators to implement during drive-through queue overflow conditions, if necessary, are as follows:

- Provide additional staffing during peak hours to decrease service times.
- Have staff trained/prepared to take drive-thru orders via tablet to expedite order times.
- Designate dedicated overflow queuing areas in the parking lot to keep the main drive aisles clear and have staff trained/prepared to direct vehicles where to queue. Vehicles could also be directed with cones during peak times.
- Divert large orders and/or excess vehicles to designated waiting spaces. Waiting spaces could include the portion of the drive-through aisle beyond the service window or specific parking spaces that are temporarily repurposed for waiting drive-through vehicles.
- Install "KEEP CLEAR" pavement markings on the three southernmost Commercial Project Driveways to prevent drive-thru vehicles from blocking driveways.

It is recommended that the drive-through facilities implement these strategies as needed to minimize or eliminate effects of drive-through queue overflow.

CONCLUSION

The Project is estimated to generate 6,513 daily primary trips, 687 AM peak hour primary trips (333 inbound, 354 outbound), and 422 PM peak hour primary trips (232 inbound, 190 outbound).

LOS AND QUEUEING

All study intersections are currently operating at acceptable LOS under Existing conditions. CA MUTCD Peak Hour Signal Warrant #3 is currently met at the Winding Way & College Oak Drive and Manzanita Avenue & Windmill Way intersections under AM and PM peak Hour conditions. All study intersections are projected to operate at acceptable LOS under Existing Plus Project conditions. CA MUTCD Peak Hour Signal Warrant #3 is projected to be met at the Winding Way & College Oak Drive and Manzanita Avenue & Windmill Way intersections under AM and PM peak hour conditions, and at the intersections of Manzanita Avenue with Commercial Project Driveways 1, 3, 4 and 5 under the AM and PM peak hours and the intersection of Manzanita Avenue & Commercial Driveway 2 under the PM peak hour. The Project is not anticipated to cause significant adverse effects at study intersections. Therefore, there are no recommended intersection improvements.

95th Percentile queueing analysis was performed at study intersections for movements with turn pockets where the Project would add at least one trip. The northbound right-turn 95th percentile queue at the Manzanita Avenue and Winding Way intersection is projected to exceed the planned right-turn pocket length by seven (7) feet. However, this small excess queue would be accommodated within the taper area of the turn pocket**.** The AM peak hour northbound left turn 95th percentile queue at the Winding Way and Rampart Drive intersection is projected to occasionally block the egress lane of the Crestview Townhomes gated driveway. As this queue length would likely only occur rarely during the peak hour, and the queue would likely clear during the next cycle, no improvements are recommended. All other 95th percentile intersection queues are projected to be accommodated by the available turn pocket storage space under Existing Plus Project conditions.

Site Access and Circulation

The Project proposes to construct two new driveways for the residential site and five new driveways for the commercial site. All Project Driveway throat depths are projected to accommodate egress queueing. Driveway spacing is also shown to meet minimum County requirements. The following improvement are recommended at Project driveways:

Street 1: It is recommended that a "Right-Turn Only" sign be installed on the south leg of the Street 1 and Winding Way intersection. The pork chop would discourage vehicles from making a left-turn egress movement onto Winding Way. It is also recommended the existing median on Winding Way is extended consisted with County Improvement Standard Detail 4-17 in order to restrict northbound and southbound left-turns existing from Street 1 and the shopping center driveway to the north.

Commercial Project Driveway 2: Installation of a "Right-Turn Only" sign is recommended at this location. The existing concrete bumps in the center median of Manzanita Avenue in the vicinity of Project Driveway 2 will be replaced with a full median as the median is extended to the south.

Commercial Project Driveway 3: Installation of a "Right-Turn Only" sign is recommended at this location. Additionally, the raised median on Manzanita Avenue should be extended to the south 50 feet beyond Commercial Driveway 3 in order to restrict left-turns from Commercial Driveway 3 and Windmill Way, as well as to increase the storage of the northbound left-turn pocket at the Manzanita Avenue and Winding Way intersection. The northbound left-turn pocket onto Windmill Way would remain.

The Project would provide adequate emergency vehicle access and cut-through traffic is not to occur on the commercial or residential Project sites.

Multimodal Facilities

The Project plans to construct pedestrian sidewalk improvements along commercial frontage. This study recommends that the residential component of the Project also construct sidewalks along Project frontage in order to connect to the existing sidewalk network beyond the project limits. The Project would maintain existing Class II Bike Lanes along Manzanita Avenue and Winding Way frontage. Adequate internal pedestrian paths would be provided within the commercial site and would provide connectivity to the residential site. The Project is not anticipated to have a significant adverse effect on existing bicycle, pedestrian, or transit circulation or facilities.

Safety

Five-and-a-half-year collision history of the study area showed that the intersection of Manzanita Avenue and Winding Way experienced the highest number of collisions in the study area. There was one Fatal collision and one Serious Injury collision recorded in the study area over the five-and-a-half-year period. The most common type of collision in the study area was Rear-End, followed by Broadside collisions. The most common primary collision factors were unsafe speed, traffic signals and signs, automobile right-of-way violation, improper turning, and unsafe lane change. No atypical trends in the study area collision history were noted.

Drive-Through Queueing

Based on data collected at nearby drive-through restaurants and coffee shops, the proposed stacking lengths at each food service facility would accommodate maximum anticipated drive-through queues. However, the Project should have strategies for queue management in place in the unlikely event that drive-through queues consistently exceed available storage. It is recommended that the Project drive-through facilities implement the strategies identified by the Queue Management Plan as needed to minimize or eliminate effects of drive-through queue overflow. See the Queue Management Plan section on page 32 for more details.

ATTACHMENTS:

Attachment A: Intersection Counts and Drive-Through Queue Counts

Attachment B: Summer Traffic Count Growth Factors

Attachment C: Synchro HCM 6th Edition Intersection LOS Reports

Attachment D: CA MUTCD Peak Hour Signal Warrant #3 Worksheets

Attachment E: Synchro Queueing Reports

Attachment A:

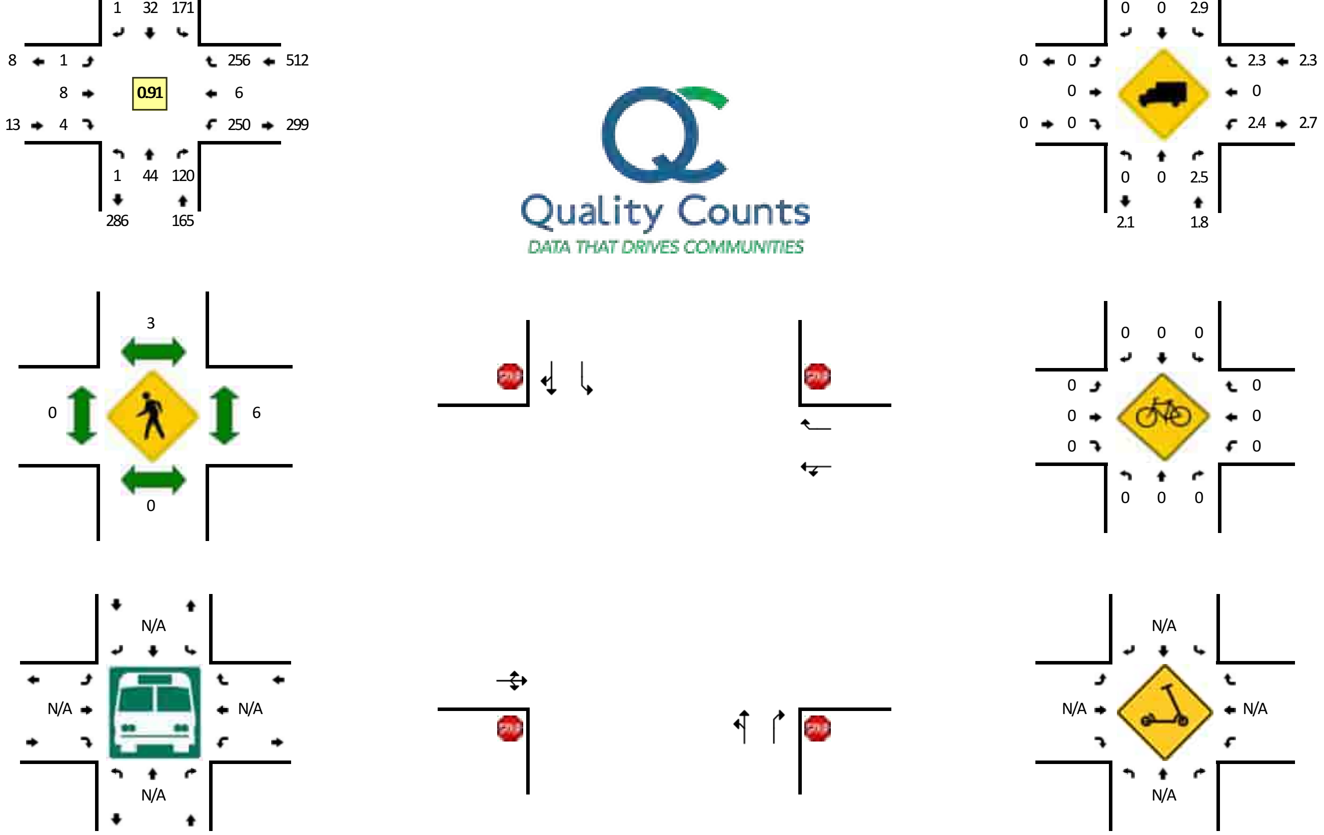
Intersection Counts and Drive-Through Queueing Counts

Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

LOCATION: College Oak Dr -- Winding Wy | **QC JOB #:** 15852701

CITY/STATE: North Highlands, CA | **DATE:** Wed, Jun 22 2022

Peak-Hour: 7:30 AM -- 8:30 AM
Peak 15-Min: 7:45 AM -- 8:00 AM



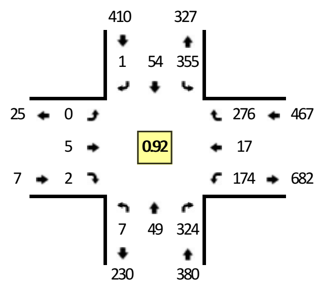
15-Min Count Period Beginning At	College Oak Dr (Northbound)				College Oak Dr (Southbound)				Winding Wy (Eastbound)				Winding Wy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	8	16	0	34	2	0	0	0	1	0	0	58	0	40	0	159	
7:15 AM	1	7	29	0	27	7	0	1	0	0	0	0	64	1	51	0	188	
7:30 AM	0	12	32	0	31	3	0	0	1	2	0	0	69	1	59	0	210	
7:45 AM	0	16	29	0	54	11	0	0	0	3	0	0	56	0	76	0	245	802
8:00 AM	0	5	34	0	39	5	0	0	0	1	2	0	60	3	58	0	207	850
8:15 AM	1	11	25	0	47	13	1	0	0	2	2	0	65	2	63	0	232	894
8:30 AM	1	8	23	0	38	15	0	0	0	1	0	0	61	4	48	0	199	883
8:45 AM	0	7	31	0	43	11	0	0	0	3	2	0	56	1	77	0	231	869

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	64	116	0	216	44	0	0	0	12	0	0	224	0	304	0	980
Heavy Trucks	0	0	4		4	0	0		0	0	0		4	0	8		20
Buses																	
Pedestrians		0				4				0				0			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

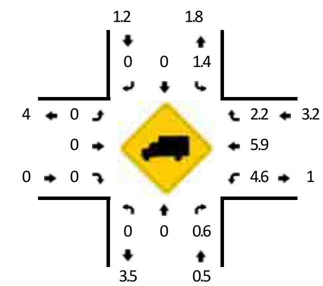
Comments:

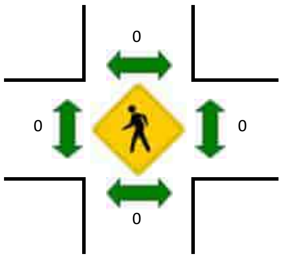
Report generated on 7/1/2022 1:53 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

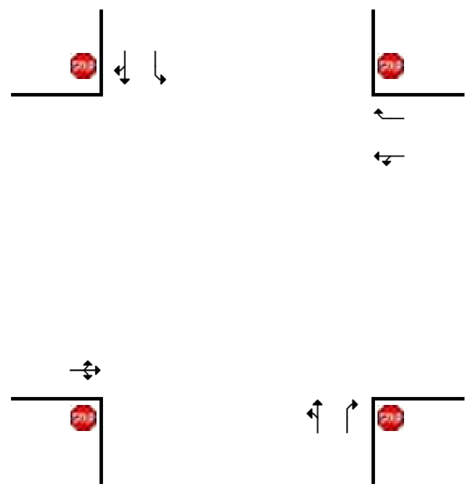
LOCATION: College Oak Dr -- Winding Wy | **QC JOB #:** 15852702
CITY/STATE: North Highlands, CA | **DATE:** Wed, Jun 22 2022

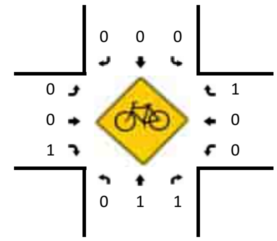


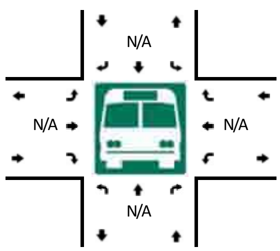
Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 5:15 PM -- 5:30 PM

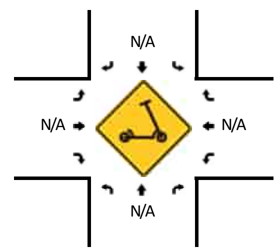












15-Min Count Period Beginning At	College Oak Dr (Northbound)				College Oak Dr (Southbound)				Winding Wy (Eastbound)				Winding Wy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	1	7	64	0	90	11	0	0	0	2	0	0	31	4	62	0	272	
4:15 PM	2	18	87	0	61	12	0	0	0	2	0	0	37	0	59	0	278	
4:30 PM	1	10	81	0	90	13	0	0	0	4	0	0	38	6	74	0	317	
4:45 PM	2	13	60	0	89	14	0	0	0	0	0	0	41	4	60	0	283	1150
5:00 PM	1	14	86	0	86	18	1	1	0	1	1	0	50	3	60	0	322	1200
5:15 PM	3	12	97	0	88	9	0	1	0	0	1	0	45	4	82	0	342	1264
5:30 PM	0	12	69	0	77	6	0	0	1	1	0	0	38	3	56	0	263	1210
5:45 PM	1	10	63	0	54	10	4	0	1	4	1	0	47	0	58	2	255	1182

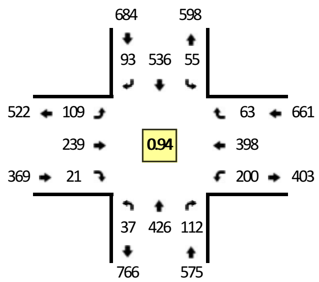
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	12	48	388	0	352	36	0	4	0	0	4	0	180	16	328	0	1368
Heavy Trucks	0	0	0		0	0	0		0	0	0		8	0	12		20
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

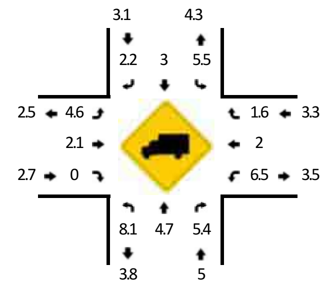
Report generated on 7/1/2022 1:53 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

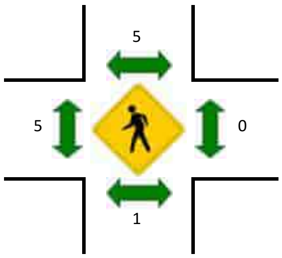
LOCATION: Manzanita Ave -- Winding Wy
CITY/STATE: Carmichael, CA

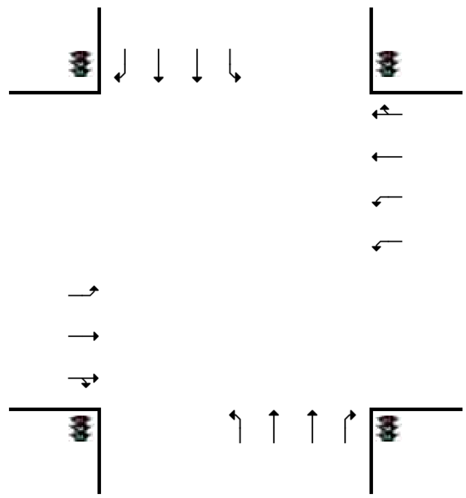
QC JOB #: 15852703
DATE: Wed, Jun 22 2022

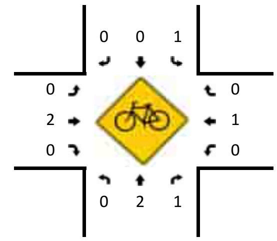


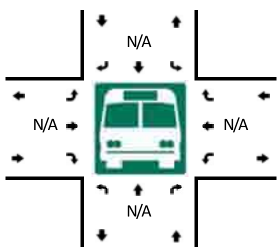
Peak-Hour: 7:30 AM -- 8:30 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

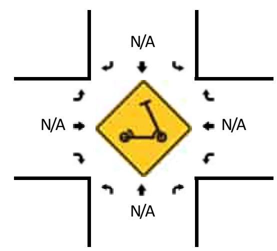












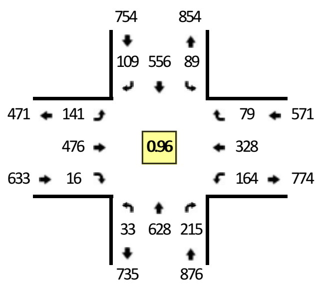
15-Min Count Period Beginning At	Manzanita Ave (Northbound)				Manzanita Ave (Southbound)				Winding Wy (Eastbound)				Winding Wy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	2	83	10	0	11	96	15	2	16	41	3	2	25	69	8	0	383	
7:15 AM	6	92	27	8	16	126	17	2	15	43	3	1	40	88	12	0	496	
7:30 AM	4	115	30	2	10	143	17	3	23	56	3	0	52	95	16	1	570	
7:45 AM	6	118	35	3	15	119	31	0	24	71	8	2	55	97	24	0	608	2057
8:00 AM	12	98	23	1	11	153	21	0	20	49	4	1	43	89	15	0	540	2214
8:15 AM	5	95	24	4	15	121	24	1	38	63	6	1	49	117	8	0	571	2289
8:30 AM	6	125	19	2	14	144	22	1	25	63	4	3	42	61	17	0	548	2267
8:45 AM	10	109	20	2	13	132	20	0	33	52	2	2	40	79	18	1	533	2192

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	24	472	140	12	60	476	124	0	96	284	32	8	220	388	96	0	2432
Heavy Trucks	4	32	4		4	24	8		4	8	0		4	4	0		96
Buses																	
Pedestrians		4				4				4				0			12
Bicycles	0	8	0		0	0	0		0	0	0		0	0	0		8
Scooters																	

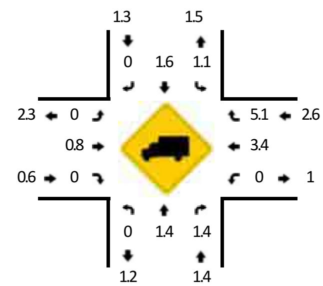
Comments:

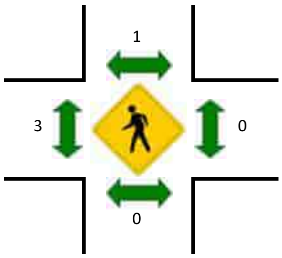
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

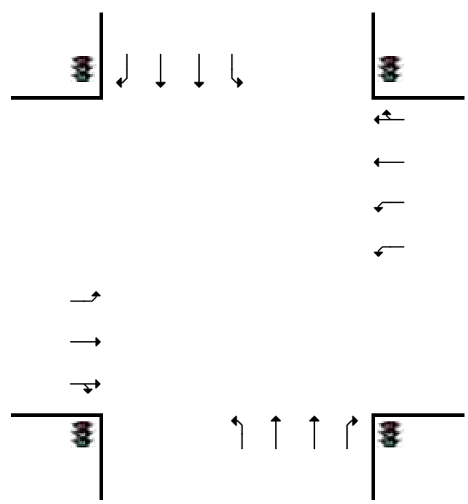
LOCATION: Manzanita Ave -- Winding Wy | **QC JOB #:** 15852704
CITY/STATE: Carmichael, CA | **DATE:** Wed, Jun 22 2022

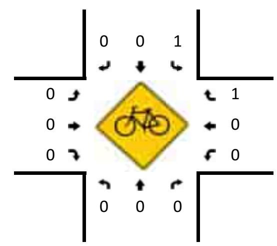


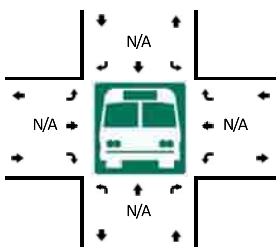
Peak-Hour: 4:45 PM -- 5:45 PM
Peak 15-Min: 5:00 PM -- 5:15 PM

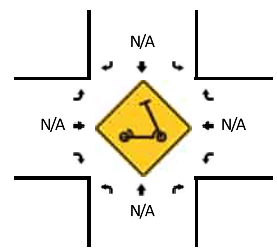












15-Min Count Period Beginning At	Manzanita Ave (Northbound)				Manzanita Ave (Southbound)				Winding Wy (Eastbound)				Winding Wy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	6	157	42	0	18	167	20	1	38	115	8	0	43	65	19	0	699	
4:15 PM	6	176	50	0	19	116	27	0	28	105	3	1	32	77	13	1	654	
4:30 PM	7	170	51	0	9	149	26	1	43	105	2	0	44	64	13	0	684	
4:45 PM	7	142	54	1	19	156	28	0	29	111	2	1	35	79	30	2	696	2733
5:00 PM	12	166	56	0	27	127	39	3	43	128	5	0	30	79	22	0	737	2771
5:15 PM	7	158	51	0	6	150	16	4	33	120	6	1	54	91	9	0	706	2823
5:30 PM	6	162	54	0	29	123	26	1	34	117	3	0	43	79	18	0	695	2834
5:45 PM	11	170	47	0	8	126	24	2	25	89	2	1	38	85	27	0	655	2793

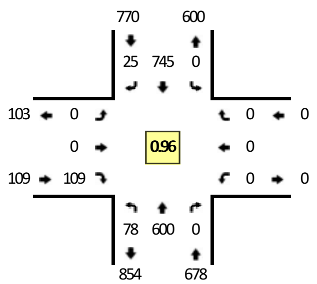
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	48	664	224	0	108	508	156	12	172	512	20	0	120	316	88	0	2948
Heavy Trucks	0	4	8		0	16	0		0	0	0		0	8	12		48
Buses																	
Pedestrians		0				0				4				0			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	4		4
Scooters																	

Comments:

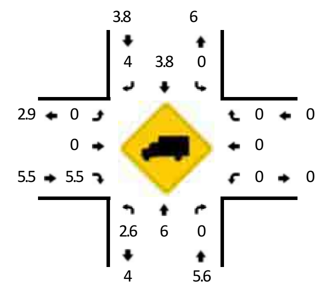
Report generated on 7/1/2022 1:53 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

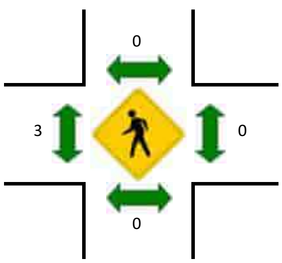
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

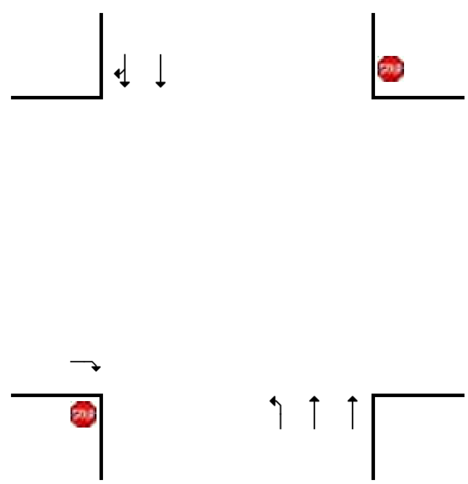
LOCATION: Manzanita Ave -- Windmill Wy | **QC JOB #:** 15852705
CITY/STATE: Carmichael, CA | **DATE:** Wed, Jun 22 2022

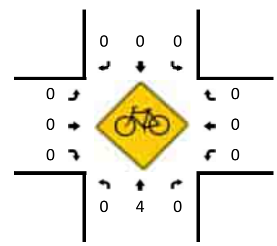


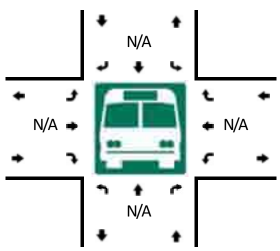
Peak-Hour: 7:30 AM -- 8:30 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

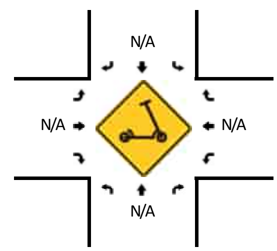












15-Min Count Period Beginning At	Manzanita Ave (Northbound)				Manzanita Ave (Southbound)				Windmill Wy (Eastbound)				Windmill Wy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	13	96	0	0	0	127	1	0	0	0	16	0	0	0	0	0	253	
7:15 AM	11	135	0	0	0	164	5	0	0	0	11	0	0	0	0	0	326	
7:30 AM	21	154	0	0	0	195	3	0	0	0	19	0	0	0	0	0	392	
7:45 AM	19	173	0	0	0	180	4	0	0	0	29	0	0	0	0	0	405	1376
8:00 AM	16	130	0	0	0	195	8	0	0	0	35	0	0	0	0	0	384	1507
8:15 AM	22	143	0	0	0	175	10	0	0	0	26	0	0	0	0	0	376	1557
8:30 AM	11	137	0	0	0	190	6	0	0	0	30	0	0	0	0	0	374	1539
8:45 AM	21	147	0	0	0	167	4	0	0	0	26	0	0	0	0	0	365	1499

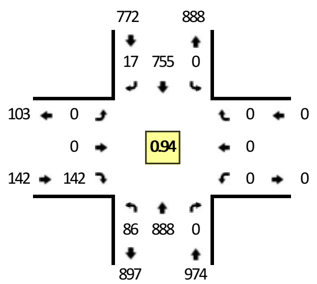
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	76	692	0	0	0	720	16	0	0	0	116	0	0	0	0	0	1620
Heavy Trucks	0	56	0		0	20	4		0	0	8		0	0	0		88
Buses																	
Pedestrians		0				0				4				0			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

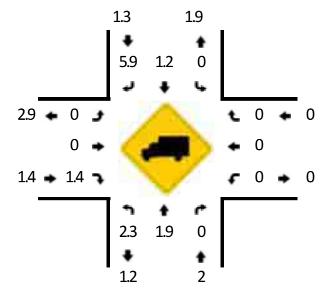
Report generated on 7/1/2022 1:53 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

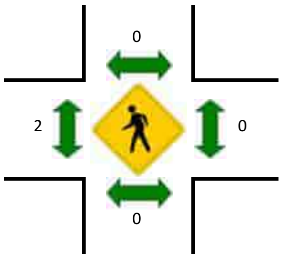
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

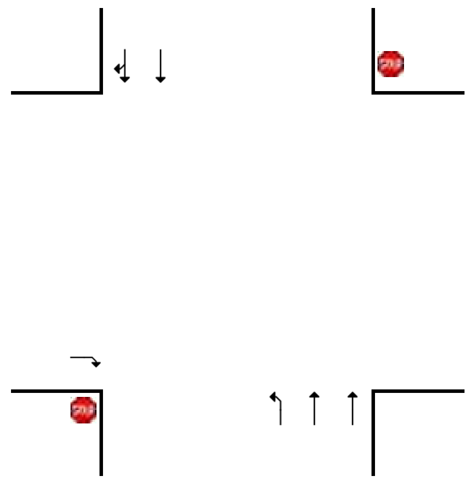
LOCATION: Manzanita Ave -- Windmill Wy | **QC JOB #:** 15852706
CITY/STATE: Carmichael, CA | **DATE:** Wed, Jun 22 2022

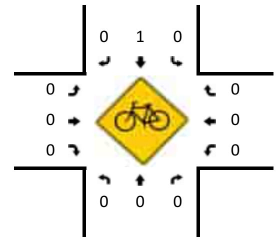


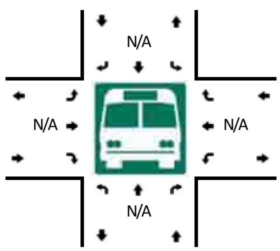
Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 5:15 PM -- 5:30 PM

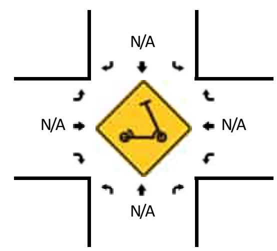












15-Min Count Period Beginning At	Manzanita Ave (Northbound)				Manzanita Ave (Southbound)				Windmill Wy (Eastbound)				Windmill Wy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	20	205	0	0	0	213	4	0	0	0	36	0	0	0	0	0	478	
4:15 PM	14	238	0	0	0	158	4	0	0	0	29	0	0	0	0	0	443	
4:30 PM	15	222	0	0	0	194	1	0	0	0	30	0	0	0	0	0	462	
4:45 PM	24	222	0	0	0	192	5	0	0	0	36	0	0	0	0	0	479	1862
5:00 PM	22	220	0	0	0	162	4	0	0	0	35	0	0	0	0	0	443	1827
5:15 PM	25	224	0	0	0	207	7	0	0	0	41	0	0	0	0	0	504	1888
5:30 PM	19	217	0	0	0	170	2	0	0	0	39	0	0	0	0	0	447	1873
5:45 PM	25	234	0	0	0	161	5	0	0	0	31	0	0	0	0	0	456	1850

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	100	896	0	0	0	828	28	0	0	0	164	0	0	0	0	0	2016
Heavy Trucks	0	12	0		0	0	0		0	0	0		0	0	0		12
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

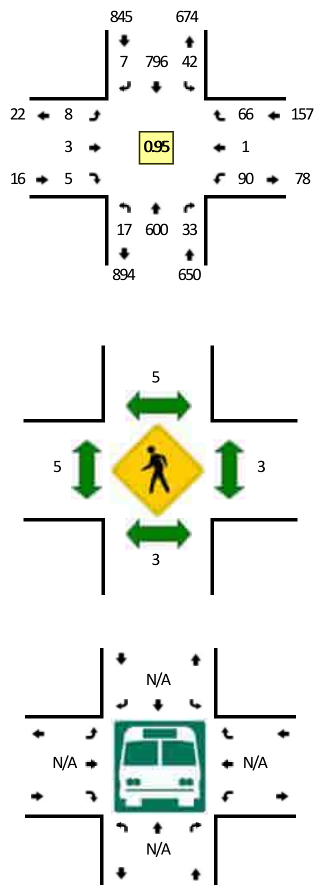
Comments:

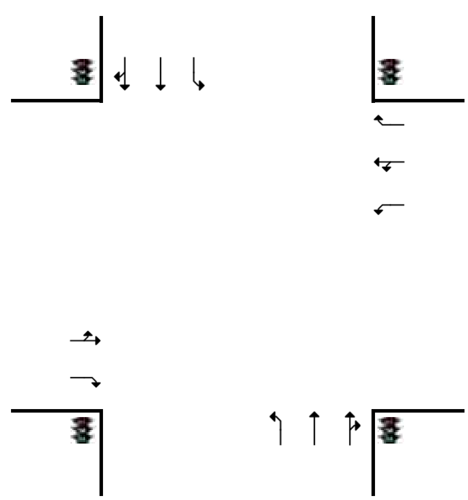
Report generated on 7/1/2022 1:53 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

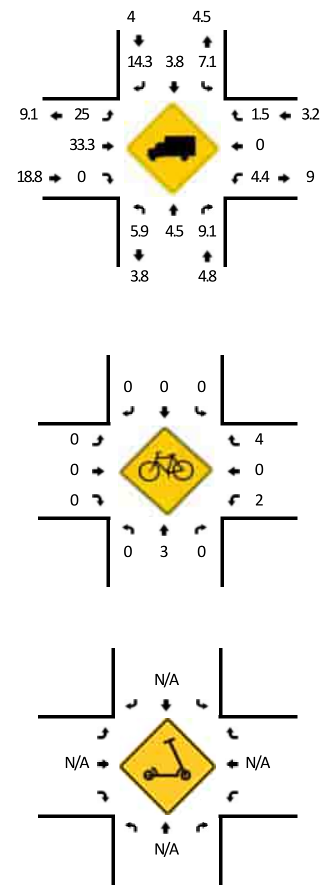
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

LOCATION: Manzanita Ave -- Lincoln Ave | **QC JOB #:** 15852707
CITY/STATE: Carmichael, CA | **DATE:** Wed, Jun 22 2022

Peak-Hour: 7:30 AM -- 8:30 AM
Peak 15-Min: 7:45 AM -- 8:00 AM







15-Min Count Period Beginning At	Manzanita Ave (Northbound)				Manzanita Ave (Southbound)				Lincoln Ave (Eastbound)				Lincoln Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	5	95	7	0	3	143	2	0	3	0	1	0	15	0	11	0	285	
7:15 AM	3	140	8	3	5	170	2	0	2	0	1	0	16	0	11	0	361	
7:30 AM	2	148	8	0	3	194	4	0	2	0	1	0	24	0	16	0	402	
7:45 AM	7	168	7	1	11	206	0	0	4	1	0	0	17	0	18	0	440	1488
8:00 AM	2	137	13	2	16	212	3	0	2	1	2	0	20	1	15	0	426	1629
8:15 AM	3	147	5	0	12	184	0	0	0	1	2	0	29	0	17	0	400	1668
8:30 AM	3	140	13	1	4	200	2	0	2	0	3	0	17	0	14	0	399	1665
8:45 AM	4	142	15	4	15	179	6	1	1	3	0	0	23	0	7	0	400	1625

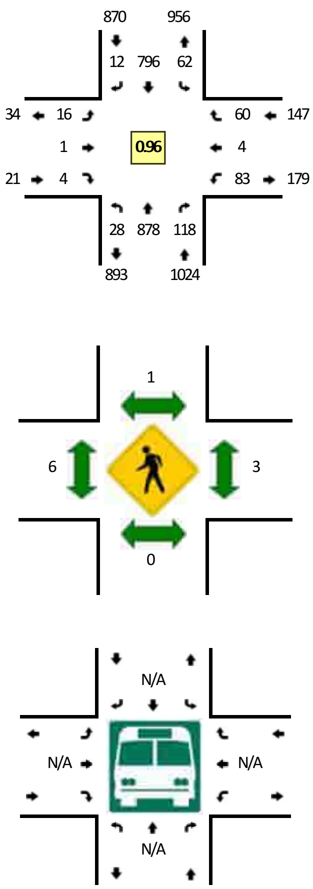
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	28	672	28	4	44	824	0	0	16	4	0	0	68	0	72	0	1760
Heavy Trucks	4	36	0		4	20	0		4	0	0		4	0	4		76
Buses																	
Pedestrians		4				8				0				8			20
Bicycles	0	0	0		0	0	0		0	0	0		8	0	8		16
Scooters																	

Comments:

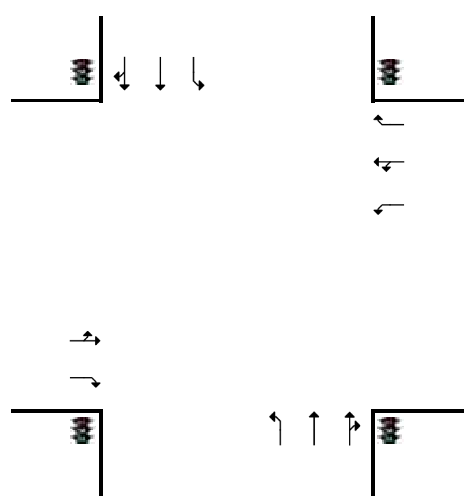
Report generated on 7/1/2022 1:53 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

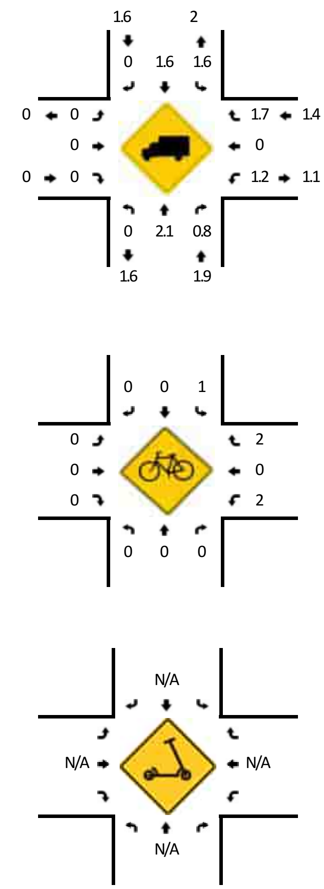
LOCATION: Manzanita Ave -- Lincoln Ave | **QC JOB #:** 15852708
CITY/STATE: Carmichael, CA | **DATE:** Wed, Jun 22 2022

Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 5:15 PM -- 5:30 PM



Quality Counts
DATA THAT DRIVES COMMUNITIES





15-Min Count Period Beginning At	Manzanita Ave (Northbound)				Manzanita Ave (Southbound)				Lincoln Ave (Eastbound)				Lincoln Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	3	237	26	0	21	229	2	1	1	0	1	0	14	0	6	0	541	
4:15 PM	4	228	26	2	9	163	1	0	3	0	1	0	17	1	11	0	466	
4:30 PM	3	222	18	0	10	211	3	1	4	1	0	0	21	0	13	0	507	
4:45 PM	6	205	27	3	17	191	1	0	3	0	3	0	21	2	14	0	493	2007
5:00 PM	6	231	40	1	13	183	2	1	6	0	0	0	19	1	20	0	523	1989
5:15 PM	3	220	33	6	20	211	6	0	3	0	1	0	22	1	13	0	539	2062
5:30 PM	4	242	29	0	11	180	2	0	2	0	1	0	15	1	9	0	496	2051
5:45 PM	2	226	25	3	10	180	2	1	1	1	3	0	22	0	18	0	494	2052

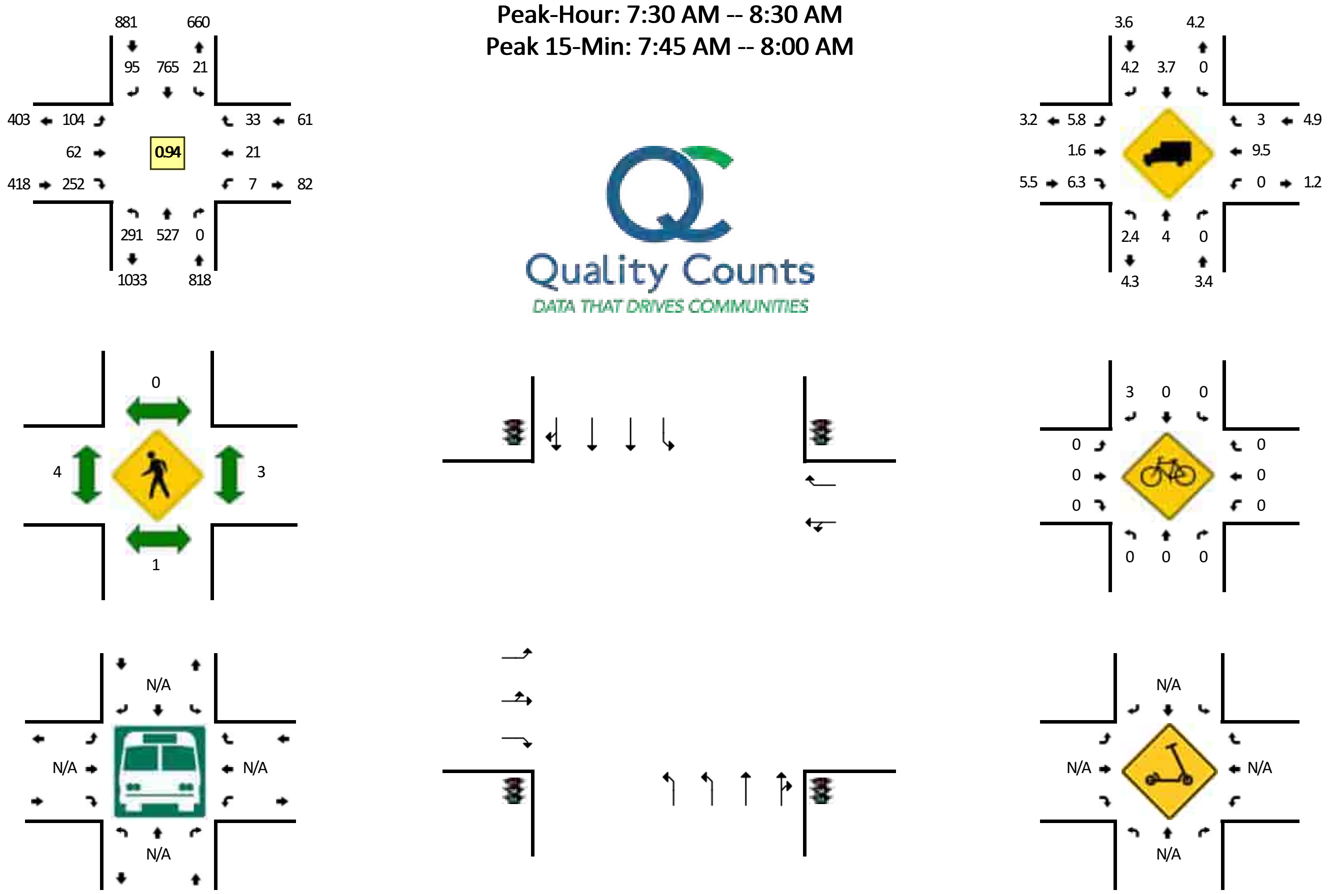
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	12	880	132	24	80	844	24	0	12	0	4	0	88	4	52	0	2156
Heavy Trucks	0	20	0		0	4	0		0	0	0		0	0	4		28
Buses																	
Pedestrians		0				4				8				12			24
Bicycles	0	0	0		0	0	0		0	0	0		4	0	4		8
Scooters																	

Comments:

Report generated on 7/1/2022 1:53 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

LOCATION: Manzanita Ave -- Cypress Ave | **QC JOB #:** 15852709
CITY/STATE: Carmichael, CA | **DATE:** Wed, Jun 22 2022

Peak-Hour: 7:30 AM -- 8:30 AM
Peak 15-Min: 7:45 AM -- 8:00 AM



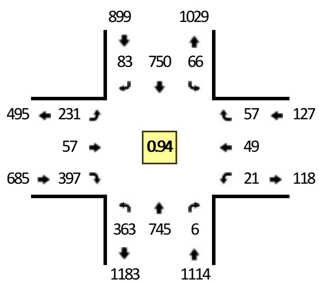
15-Min Count Period Beginning At	Manzanita Ave (Northbound)				Manzanita Ave (Southbound)				Cypress Ave (Eastbound)				Cypress Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	56	80	0	0	4	122	19	2	16	6	58	1	2	2	3	0	371	
7:15 AM	56	126	0	1	7	160	24	1	26	8	51	0	1	4	2	0	467	
7:30 AM	73	124	0	1	6	190	27	0	25	16	56	3	4	4	10	0	539	
7:45 AM	69	151	0	5	5	197	16	1	35	23	66	1	0	7	4	0	580	1957
8:00 AM	65	123	0	2	6	201	29	0	20	12	62	0	2	2	9	0	533	2119
8:15 AM	75	129	0	1	3	177	23	0	19	11	68	1	1	8	10	0	526	2178
8:30 AM	74	127	0	2	8	189	28	0	25	7	56	1	2	2	6	0	527	2166
8:45 AM	86	129	0	2	8	161	35	1	36	10	64	3	2	7	9	0	553	2139

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	276	604	0	20	20	788	64	4	140	92	264	4	0	28	16	0	2320
Heavy Trucks	8	36	0		0	20	0		4	4	12		0	0	0		84
Buses																	
Pedestrians		0				0				0				8			8
Bicycles	0	0	0		0	0	8		0	0	0		0	0	0		8
Scooters																	

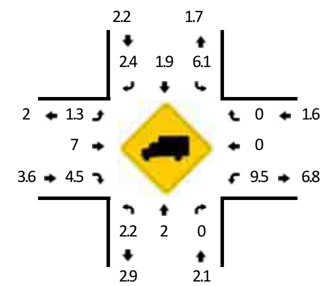
Comments:

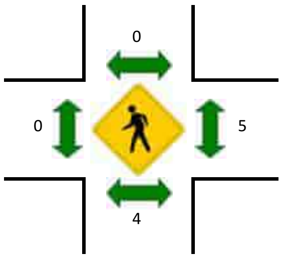
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

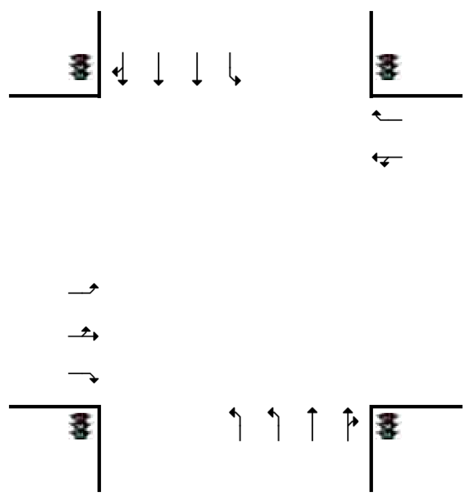
LOCATION: Manzanita Ave -- Cypress Ave | **QC JOB #:** 15852710
CITY/STATE: Carmichael, CA | **DATE:** Wed, Jun 22 2022

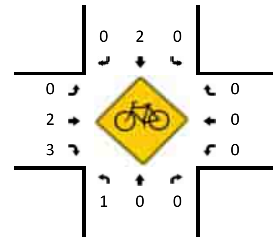


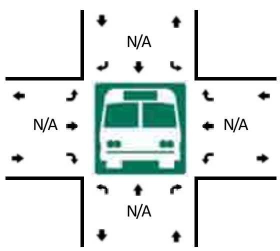
Peak-Hour: 4:45 PM -- 5:45 PM
Peak 15-Min: 5:15 PM -- 5:30 PM

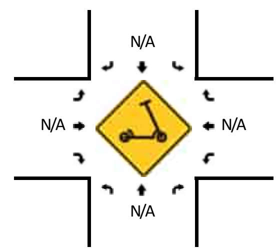












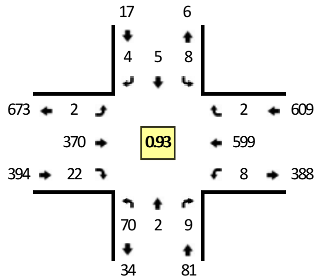
15-Min Count Period Beginning At	Manzanita Ave (Northbound)				Manzanita Ave (Southbound)				Cypress Ave (Eastbound)				Cypress Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	80	193	4	3	19	212	26	1	67	17	99	1	6	8	14	0	750	
4:15 PM	73	198	0	3	9	158	19	0	45	11	77	4	11	9	11	0	628	
4:30 PM	83	186	0	1	8	195	22	3	38	15	78	5	4	8	16	0	662	
4:45 PM	79	170	2	5	7	192	24	2	56	10	109	5	2	11	17	0	691	2731
5:00 PM	80	191	2	3	17	177	16	4	55	11	91	5	8	8	15	0	683	2664
5:15 PM	99	188	0	2	15	207	27	3	49	13	111	2	5	22	12	0	755	2791
5:30 PM	90	196	2	5	16	174	16	2	56	23	86	3	6	8	13	0	696	2825
5:45 PM	82	198	2	5	13	180	23	1	40	13	73	1	6	11	10	0	658	2792

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	396	752	0	8	60	828	108	12	196	52	444	8	20	88	48	0	3020
Heavy Trucks	12	24	0		4	8	4		0	0	16		0	0	0		68
Buses																	
Pedestrians		8				0				0				8			16
Bicycles	4	0	0		0	0	0		0	0	12		0	0	0		16
Scooters																	

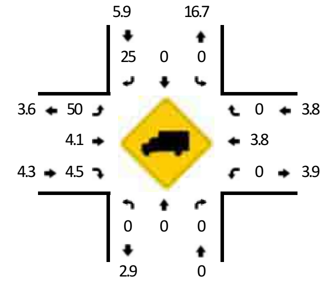
Comments:

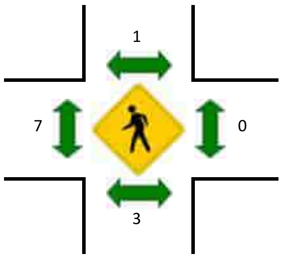
Report generated on 7/1/2022 1:53 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

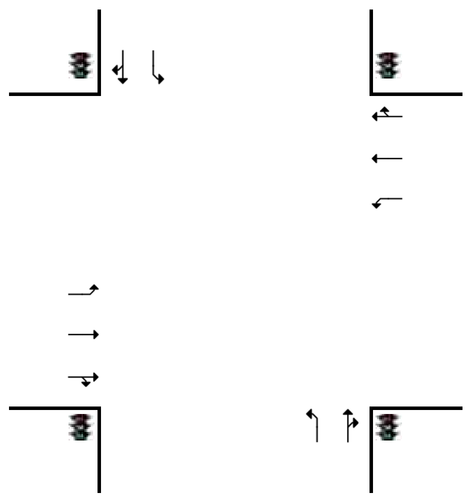
LOCATION: Rampart Dr -- Winding Wy
CITY/STATE: Carmichael, CA
QC JOB #: 15852711
DATE: Wed, Jun 22 2022

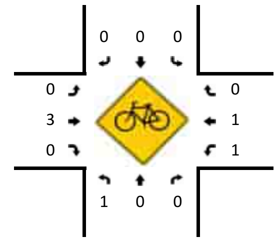


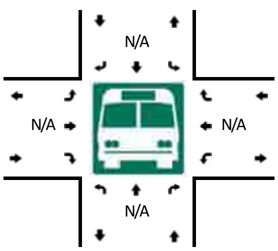
Peak-Hour: 7:30 AM -- 8:30 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

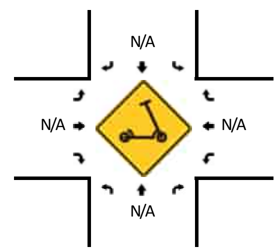












15-Min Count Period Beginning At	Rampart Dr (Northbound)				Rampart Dr (Southbound)				Winding Wy (Eastbound)				Winding Wy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	11	0	3	0	1	0	1	0	0	61	1	0	2	99	1	0	180	
7:15 AM	17	1	1	0	1	0	0	0	0	83	4	0	2	120	0	0	229	
7:30 AM	12	0	1	0	0	1	3	0	1	86	4	0	2	146	2	0	258	
7:45 AM	22	0	2	0	3	0	0	0	1	101	4	0	3	161	0	0	297	964
8:00 AM	20	1	3	0	2	0	1	0	0	94	7	0	0	139	0	1	268	1052
8:15 AM	16	1	3	0	3	4	0	0	0	89	7	0	2	153	0	0	278	1101
8:30 AM	10	0	1	0	1	1	0	0	1	90	7	0	3	110	0	0	224	1067
8:45 AM	12	2	1	0	3	0	1	0	0	71	9	0	1	120	3	0	223	993

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	88	0	8	0	12	0	0	0	4	404	16	0	12	644	0	0	1188
Heavy Trucks	0	0	0		0	0	0		0	24	0		0	12	0		36
Buses																	
Pedestrians		8				0				0				0			8
Bicycles	0	0	0		0	0	0		0	4	0		0	0	0		4
Scooters																	

Comments:

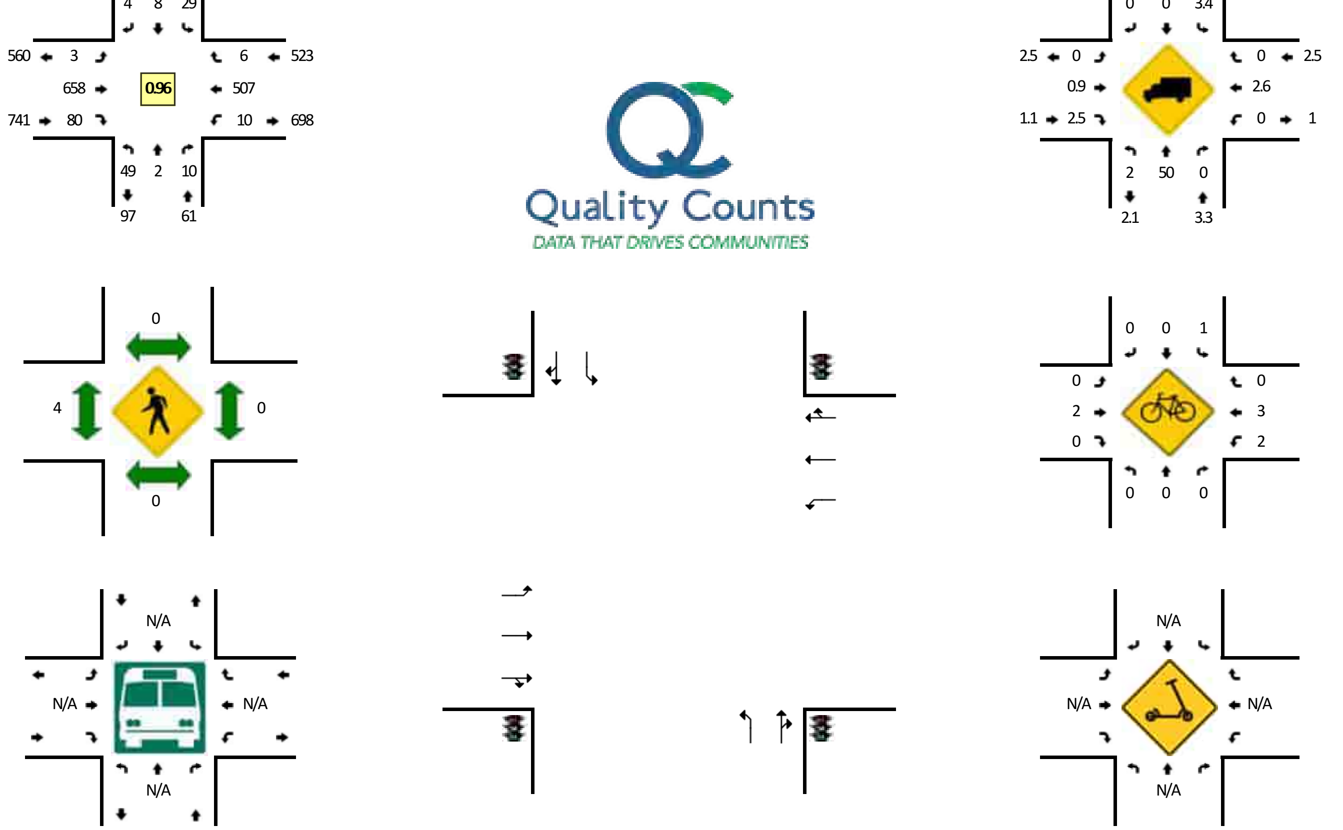
Report generated on 7/1/2022 1:53 PM
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

LOCATION: Rampart Dr -- Winding Wy
CITY/STATE: Carmichael, CA

QC JOB #: 15852712
DATE: Wed, Jun 22 2022

Peak-Hour: 4:45 PM -- 5:45 PM
Peak 15-Min: 5:00 PM -- 5:15 PM



15-Min Count Period Beginning At	Rampart Dr (Northbound)				Rampart Dr (Southbound)				Winding Wy (Eastbound)				Winding Wy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	16	0	1	0	6	0	1	0	0	167	12	1	2	107	3	0	316	
4:15 PM	9	0	3	0	3	4	1	0	1	163	13	0	2	112	0	0	311	
4:30 PM	10	1	2	0	4	2	1	0	0	153	9	0	4	112	1	0	299	
4:45 PM	13	0	5	0	8	4	0	0	0	152	19	0	3	124	0	0	328	1254
5:00 PM	11	0	2	0	8	2	2	0	0	191	24	0	1	114	2	0	357	1295
5:15 PM	9	1	2	0	5	1	1	0	1	163	13	0	4	132	3	0	335	1319
5:30 PM	16	1	1	0	8	1	1	0	2	152	24	0	1	137	1	1	346	1366
5:45 PM	17	0	4	0	9	0	0	0	0	150	14	0	5	125	0	0	324	1362

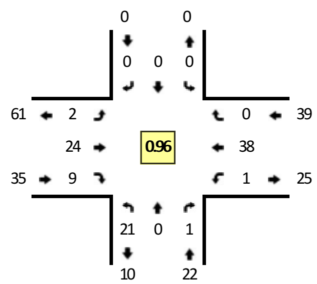
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	44	0	8	0	32	8	8	0	0	764	96	0	4	456	8	0	1428
Heavy Trucks	0	0	0		0	0	0		0	8	4		0	8	0		20
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	4	0		4	4	0		12
Scooters																	

Comments:

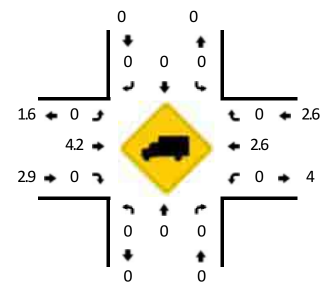
Report generated on 7/1/2022 1:53 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

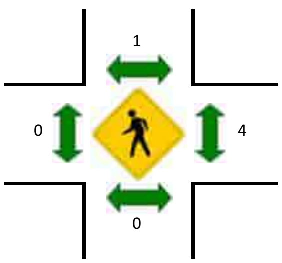
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

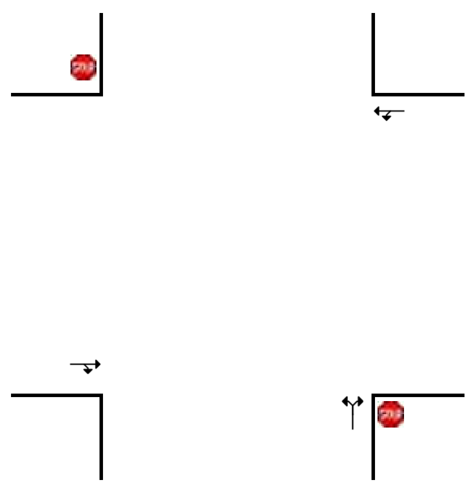
LOCATION: Mary Lynn Ln -- Rampart Dr | **QC JOB #:** 15852713
CITY/STATE: Carmichael, CA | **DATE:** Fri, Jul 29 2022

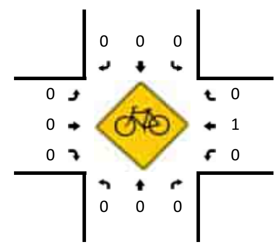


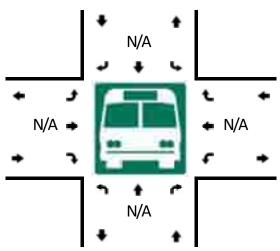
Peak-Hour: 7:30 AM -- 8:30 AM
Peak 15-Min: 7:30 AM -- 7:45 AM

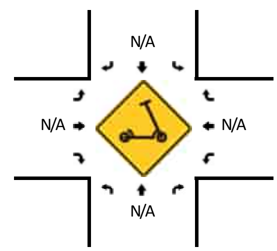












15-Min Count Period Beginning At	Mary Lynn Ln (Northbound)				Mary Lynn Ln (Southbound)				Rampart Dr (Eastbound)				Rampart Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	4	0	1	0	0	0	0	0	0	1	0	1	0	8	0	0	15	
7:15 AM	4	0	0	0	0	0	0	0	0	1	2	0	0	9	0	0	16	
7:30 AM	5	0	0	0	0	0	0	0	0	7	2	0	0	11	0	0	25	
7:45 AM	5	0	0	0	0	0	0	0	0	3	3	0	0	12	0	0	23	79
8:00 AM	5	0	1	0	0	0	0	0	0	7	4	0	1	5	0	0	23	87
8:15 AM	6	0	0	0	0	0	0	0	0	7	0	2	0	10	0	0	25	96
8:30 AM	12	0	0	0	0	0	0	0	0	6	0	0	1	5	0	0	24	95
8:45 AM	4	0	0	0	0	0	0	0	0	4	4	0	0	6	0	0	18	90

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	20	0	0	0	0	0	0	0	0	28	8	0	0	44	0	0	100
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	4	0		4
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

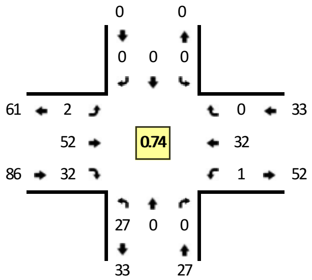
Comments:

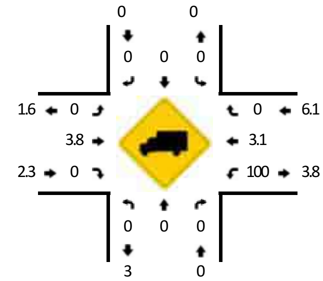
Report generated on 7/5/2022 1:53 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

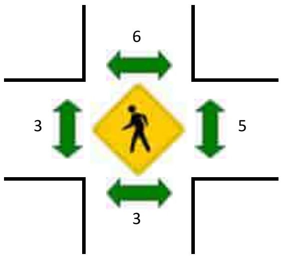
Type of peak hour being reported: Intersection Peak — Method for determining peak hour: Total Entering Volume

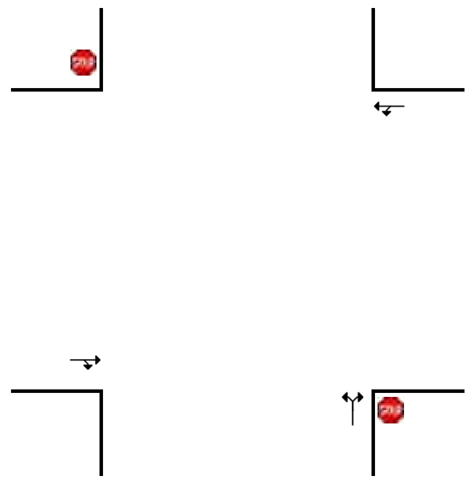
LOCATION: Mary Lynn Ln -- Rampart Dr — **QC JOB #:** 15852714
CITY/STATE: Carmichael, CA — **DATE:** Thu, Jul 28 2022

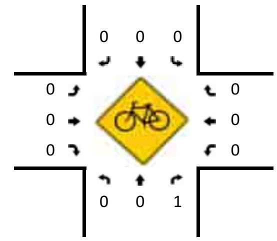
Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:30 PM -- 5:45 PM

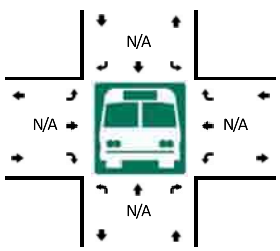


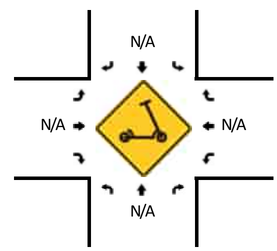












15-Min Count Period Beginning At	Mary Lynn Ln (Northbound)				Mary Lynn Ln (Southbound)				Rampart Dr (Eastbound)				Rampart Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	5	0	0	0	0	0	0	0	0	11	8	0	0	13	0	0	37	
4:15 PM	6	0	0	0	0	0	0	0	0	9	8	1	1	6	0	0	31	
4:30 PM	7	0	0	0	0	0	0	0	0	6	8	0	2	7	0	0	30	
4:45 PM	5	0	0	0	0	0	0	0	0	4	8	0	0	6	0	0	23	121
5:00 PM	3	0	0	0	0	0	0	0	0	18	4	0	0	10	0	0	35	119
5:15 PM	7	0	0	0	0	0	0	0	0	10	10	2	0	7	0	0	36	124
5:30 PM	10	0	0	0	0	0	0	0	0	19	13	0	0	7	0	0	49	143
5:45 PM	7	0	0	0	0	0	0	0	0	5	5	0	1	8	0	0	26	146

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	40	0	0	0	0	0	0	0	0	76	52	0	0	28	0	0	196
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	0	0		0
Buses																	
Pedestrians		0				8				4				4			16
Bicycles	0	0	4		0	0	0		0	0	0		0	0	0		4
Scooters																	

Comments:

Report generated on 7/5/2022 1:53 PM — SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Quality Counts
DATA THAT DRIVES COMMUNITIES

Project Number:	158527
Project Name:	Carmichael, CA
Location:	McDonald's
Date:	6/21/2022

Time	Vehicles in Queue
12:00 PM	7
12:05 PM	7
12:10 PM	3
12:15 PM	5
12:20 PM	6
12:25 PM	2
12:30 PM	6
12:35 PM	9
12:40 PM	7
12:45 PM	8
12:50 PM	12
12:55 PM	6
1:00 PM	8

Quality Counts
DATA THAT DRIVES COMMUNITIES

Project Number:	158527
Project Name:	Carmichael, CA
Location:	Carl's Jr
Date:	6/22/2022

Time	Vehicles in Queue
12:00 PM	0
12:05 PM	2
12:10 PM	2
12:15 PM	1
12:20 PM	4
12:25 PM	4
12:30 PM	5
12:35 PM	4
12:40 PM	6
12:45 PM	0
12:50 PM	3
12:55 PM	3
1:00 PM	1

Attachment B:
Summer Traffic Count Growth Factors

SACRAMENTO COUNTY

DEPARTMENT OF TRANSPORTATION

24 HOUR TRAFFIC COUNT

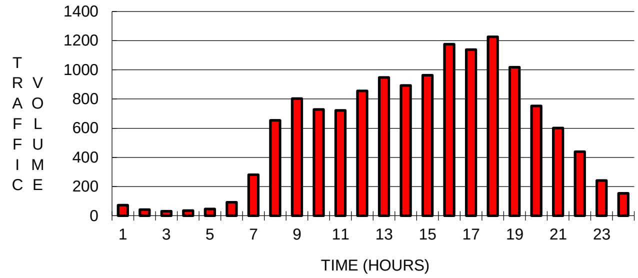
DATE:	4/22/15	START TIME:	12:00 AM	DAY:	WEDNESDAY
ZONE:	7	COUNTER NO:	827/828	LOC ID:	438916C
OBSERVER:	NBE	CHECKED BY:	NBE	TYPE:	ANNUAL COUNT

COUNT TAKEN ON: **MANZANITA AV**

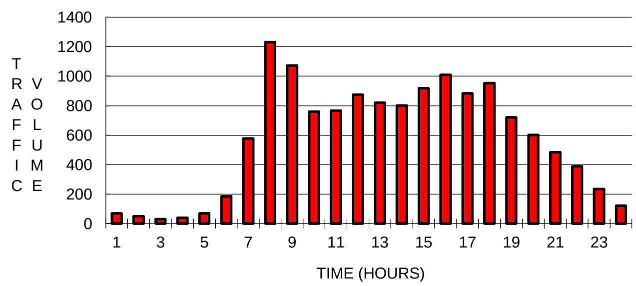
SOUTH OF **WINDING WY**

DIRECTION	N/B	S/B	N/B+S/B
NO. OF LANES	2	2	4
TIME	HOURLY TOTAL	HOURLY TOTAL	HOURLY TOTAL
0-1	73	70	143
1-2	43	51	94
2-3	31	30	61
3-4	35	39	74
4-5	48	70	118
5-6	94	185	279
6-7	282	577	859
7-8	653	1230	1883
8-9	803	1073	1876
9-10	728	759	1487
10-11	723	766	1489
11-12	856	874	1730
12-13	947	821	1768
13-14	893	802	1695
14-15	964	919	1883
15-16	1175	1010	2185
16-17	1139	884	2023
17-18	1226	953	2179
18-19	1018	721	1739
19-20	753	602	1355
20-21	602	485	1087
21-22	440	389	829
22-23	241	234	475
23-24	154	121	275
24 HOUR TOTAL	13921	13665	27586

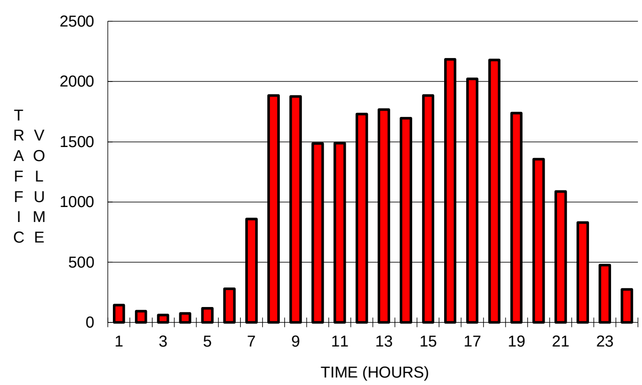
DIRECTION: N/B



DIRECTION: S/B



BOTH DIRECTIONS



County of Sacramento
Traffic Volume Report

LOCATION : MANZANITA AV
CROSS ST : WINDING WY
DIRECTION : N/B+S/B

Date: 4/22/15
WEDNESDAY

24 Hour Volume

INTERVAL BEGIN	N/B	S/B	COMBINED	INTERVAL BEGIN	N/B	S/B	COMBINED
12:00 AM	22	22	44	12:00 PM	226	196	422
12:15 AM	27	22	49	12:15 PM	252	204	456
12:30 AM	16	14	30	12:30 PM	226	204	430
12:45 AM	8	12	20	12:45 PM	243	217	460
1:00 AM	12	16	28	1:00 PM	208	196	404
1:15 AM	14	13	27	1:15 PM	220	198	418
1:30 AM	14	17	31	1:30 PM	238	204	442
1:45 AM	3	5	8	1:45 PM	227	204	431
2:00 AM	11	9	20	2:00 PM	210	235	445
2:15 AM	8	10	18	2:15 PM	229	204	433
2:30 AM	10	5	15	2:30 PM	259	224	483
2:45 AM	2	6	8	2:45 PM	266	256	522
3:00 AM	5	11	16	3:00 PM	286	240	526
3:15 AM	8	5	13	3:15 PM	295	298	593
3:30 AM	10	12	22	3:30 PM	296	244	540
3:45 AM	12	11	23	3:45 PM	298	228	526
4:00 AM	7	7	14	4:00 PM	270	226	496
4:15 AM	11	9	20	4:15 PM	258	217	475
4:30 AM	17	20	37	4:30 PM	312	215	527
4:45 AM	13	34	47	4:45 PM	299	226	525
5:00 AM	18	28	46	5:00 PM	323	254	577
5:15 AM	22	41	63	5:15 PM	295	233	528
5:30 AM	34	52	86	5:30 PM	293	247	540
5:45 AM	20	64	84	5:45 PM	315	219	534
6:00 AM	46	96	142	6:00 PM	274	188	462
6:15 AM	51	114	165	6:15 PM	286	186	472
6:30 AM	88	173	261	6:30 PM	236	169	405
6:45 AM	97	194	291	6:45 PM	222	178	400
7:00 AM	133	214	347	7:00 PM	210	187	397
7:15 AM	160	336	496	7:15 PM	202	141	343
7:30 AM	174	344	518	7:30 PM	178	124	302
7:45 AM	186	336	522	7:45 PM	163	150	313
8:00 AM	230	298	528	8:00 PM	151	128	279
8:15 AM	187	253	440	8:15 PM	149	138	287
8:30 AM	195	271	466	8:30 PM	158	100	258
8:45 AM	191	251	442	8:45 PM	144	119	263
9:00 AM	168	184	352	9:00 PM	137	117	254
9:15 AM	179	201	380	9:15 PM	124	103	227
9:30 AM	183	198	381	9:30 PM	89	93	182
9:45 AM	198	176	374	9:45 PM	90	76	166
10:00 AM	166	174	340	10:00 PM	56	85	141
10:15 AM	180	194	374	10:15 PM	76	49	125
10:30 AM	177	196	373	10:30 PM	64	50	114
10:45 AM	200	202	402	10:45 PM	45	50	95
11:00 AM	228	208	436	11:00 PM	46	30	76
11:15 AM	216	214	430	11:15 PM	33	28	61
11:30 AM	200	223	423	11:30 PM	36	30	66
11:45 AM	212	229	441	11:45 PM	39	33	72
24 HR TOTALS	13921	13665	27586				

SACRAMENTO COUNTY
DEPARTMENT OF TRANSPORTATION

24 HOUR TRAFFIC COUNT

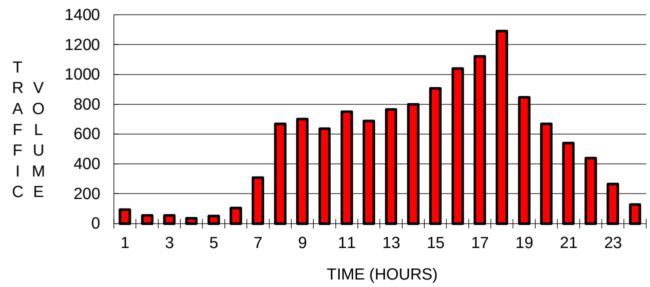
DATE: 6/7/17 START TIME: 12:00 AM DAY: WEDNESDAY
ZONE: 7 COUNTER NO: 513/514 LOC ID: 438916C
OBSERVER: NBE CHECKED BY: NBE TYPE: ANNUAL COUNT

COUNT TAKEN ON: **MANZANITA AV**

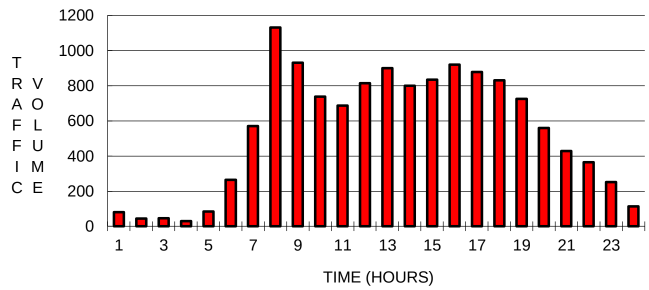
SOUTH OF **WINDING WY**

DIRECTION	N/B	S/B	N/B+S/B
NO. OF LANES	2	2	4
TIME	HOURLY TOTAL	HOURLY TOTAL	HOURLY TOTAL
0-1	93	80	173
1-2	56	45	101
2-3	54	46	100
3-4	35	29	64
4-5	51	85	136
5-6	105	265	370
6-7	308	571	879
7-8	669	1132	1801
8-9	700	931	1631
9-10	637	739	1376
10-11	750	687	1437
11-12	688	814	1502
12-13	766	901	1667
13-14	799	800	1599
14-15	907	835	1742
15-16	1040	920	1960
16-17	1122	878	2000
17-18	1292	832	2124
18-19	846	726	1572
19-20	668	559	1227
20-21	539	428	967
21-22	440	365	805
22-23	266	252	518
23-24	129	114	243
24 HOUR TOTAL	12960	13034	25994

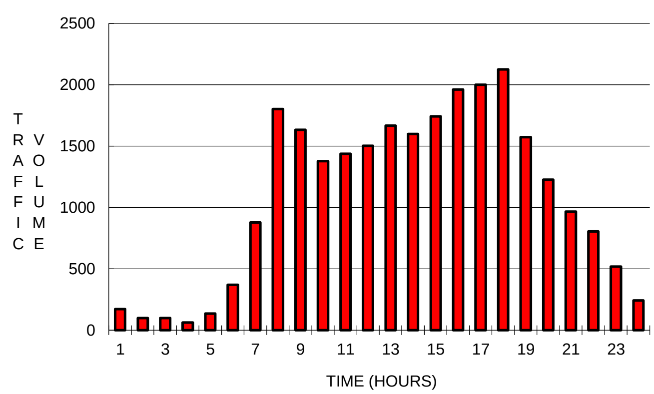
DIRECTION: N/B



DIRECTION: S/B



BOTH DIRECTIONS



County of Sacramento
Traffic Volume Report

LOCATION : MANZANITA AV
CROSS ST : WINDING WY
DIRECTION : N/B+S/B

Date: 6/7/17
WEDNESDAY

24 Hour Volume

INTERVAL BEGIN	N/B	S/B	COMBINED	INTERVAL BEGIN	N/B	S/B	COMBINED
12:00 AM	36	23	59	12:00 PM	147	222	369
12:15 AM	27	24	51	12:15 PM	188	213	401
12:30 AM	16	14	30	12:30 PM	205	224	429
12:45 AM	14	19	33	12:45 PM	226	242	468
1:00 AM	14	15	29	1:00 PM	203	200	403
1:15 AM	14	14	28	1:15 PM	218	188	406
1:30 AM	16	12	28	1:30 PM	194	200	394
1:45 AM	12	4	16	1:45 PM	184	212	396
2:00 AM	20	11	31	2:00 PM	244	188	432
2:15 AM	17	10	27	2:15 PM	211	210	421
2:30 AM	8	10	18	2:30 PM	234	216	450
2:45 AM	9	15	24	2:45 PM	218	221	439
3:00 AM	10	8	18	3:00 PM	224	234	458
3:15 AM	6	8	14	3:15 PM	280	240	520
3:30 AM	8	4	12	3:30 PM	276	224	500
3:45 AM	11	9	20	3:45 PM	260	222	482
4:00 AM	8	12	20	4:00 PM	292	200	492
4:15 AM	13	9	22	4:15 PM	274	228	502
4:30 AM	14	24	38	4:30 PM	296	226	522
4:45 AM	16	40	56	4:45 PM	260	224	484
5:00 AM	18	34	52	5:00 PM	326	218	544
5:15 AM	21	54	75	5:15 PM	328	197	525
5:30 AM	30	82	112	5:30 PM	338	208	546
5:45 AM	36	95	131	5:45 PM	300	209	509
6:00 AM	52	105	157	6:00 PM	252	187	439
6:15 AM	64	132	196	6:15 PM	232	184	416
6:30 AM	88	158	246	6:30 PM	188	181	369
6:45 AM	104	176	280	6:45 PM	174	174	348
7:00 AM	140	237	377	7:00 PM	167	149	316
7:15 AM	146	300	446	7:15 PM	186	157	343
7:30 AM	191	310	501	7:30 PM	157	138	295
7:45 AM	192	285	477	7:45 PM	158	115	273
8:00 AM	178	282	460	8:00 PM	139	112	251
8:15 AM	174	252	426	8:15 PM	134	110	244
8:30 AM	176	207	383	8:30 PM	112	114	226
8:45 AM	172	190	362	8:45 PM	154	92	246
9:00 AM	118	217	335	9:00 PM	144	111	255
9:15 AM	195	161	356	9:15 PM	112	93	205
9:30 AM	162	159	321	9:30 PM	92	73	165
9:45 AM	162	202	364	9:45 PM	92	88	180
10:00 AM	177	176	353	10:00 PM	68	74	142
10:15 AM	186	160	346	10:15 PM	82	74	156
10:30 AM	186	169	355	10:30 PM	70	60	130
10:45 AM	201	182	383	10:45 PM	46	44	90
11:00 AM	176	176	352	11:00 PM	34	40	74
11:15 AM	202	216	418	11:15 PM	32	20	52
11:30 AM	180	191	371	11:30 PM	37	32	69
11:45 AM	130	231	361	11:45 PM	26	22	48
24 HR TOTALS	12960	13034	25994				

SACRAMENTO COUNTY

DEPARTMENT OF TRANSPORTATION

24 HOUR TRAFFIC COUNT

DATE: 4/23/15 START TIME: 12:00 AM DAY: THURSDAY

ZONE: 7 COUNTER NO: 829/830 LOC ID: 438916B

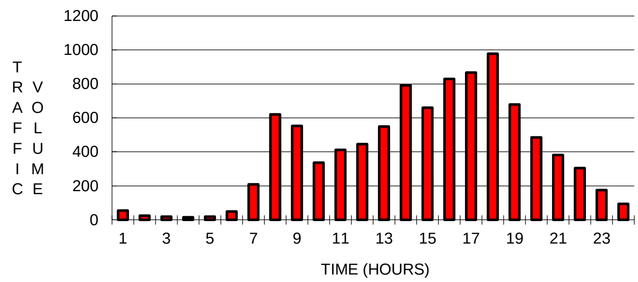
OBSERVER: NBE CHECKED BY: NBE TYPE: ANNUAL COUNT

COUNT TAKEN ON: **WINDING WY**

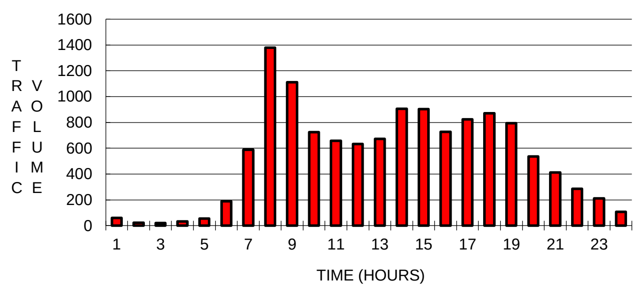
EAST OF **MANZANITA AV**

DIRECTION	E/B	W/B	E/B+W/B
NO. OF LANES	2	2	4
TIME	HOURLY TOTAL	HOURLY TOTAL	HOURLY TOTAL
0-1	56	61	117
1-2	25	23	48
2-3	20	21	41
3-4	15	32	47
4-5	20	55	75
5-6	50	189	239
6-7	209	588	797
7-8	620	1380	2000
8-9	553	1112	1665
9-10	337	724	1061
10-11	412	658	1070
11-12	446	634	1080
12-13	550	672	1222
13-14	792	906	1698
14-15	660	903	1563
15-16	830	727	1557
16-17	867	824	1691
17-18	977	871	1848
18-19	678	793	1471
19-20	485	537	1022
20-21	383	412	795
21-22	306	287	593
22-23	175	212	387
23-24	95	108	203
24 HOUR TOTAL	9561	12729	22290

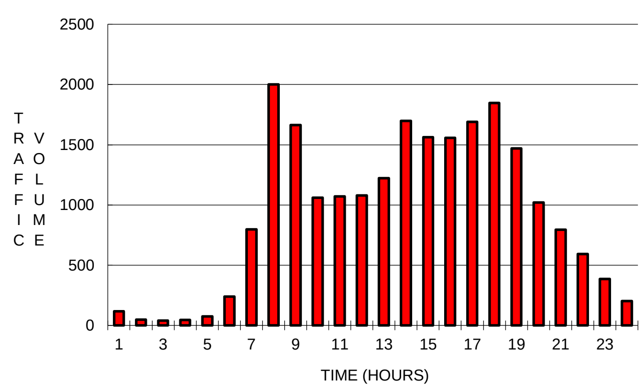
DIRECTION: E/B



DIRECTION: W/B



BOTH DIRECTIONS



County of Sacramento
Traffic Volume Report

LOCATION : WINDING WY
CROSS ST : MANZANITA AV
DIRECTION : E/B+W/B

Date: 4/23/15
THURSDAY

24 Hour Volume

INTERVAL BEGIN	E/B	W/B	COMBINED	INTERVAL BEGIN	E/B	W/B	COMBINED
12:00 AM	16	13	29	12:00 PM	150	166	316
12:15 AM	12	16	28	12:15 PM	124	165	289
12:30 AM	16	22	38	12:30 PM	130	167	297
12:45 AM	12	10	22	12:45 PM	146	174	320
1:00 AM	10	9	19	1:00 PM	150	194	344
1:15 AM	6	8	14	1:15 PM	186	234	420
1:30 AM	3	2	5	1:30 PM	216	189	405
1:45 AM	6	4	10	1:45 PM	240	289	529
2:00 AM	5	3	8	2:00 PM	169	272	441
2:15 AM	4	4	8	2:15 PM	168	191	359
2:30 AM	5	4	9	2:30 PM	139	204	343
2:45 AM	6	10	16	2:45 PM	184	236	420
3:00 AM	4	6	10	3:00 PM	200	202	402
3:15 AM	7	3	10	3:15 PM	197	189	386
3:30 AM	1	14	15	3:30 PM	215	148	363
3:45 AM	3	9	12	3:45 PM	218	188	406
4:00 AM	1	6	7	4:00 PM	226	195	421
4:15 AM	6	10	16	4:15 PM	201	215	416
4:30 AM	6	14	20	4:30 PM	218	194	412
4:45 AM	7	25	32	4:45 PM	222	220	442
5:00 AM	6	25	31	5:00 PM	248	222	470
5:15 AM	8	42	50	5:15 PM	270	203	473
5:30 AM	21	42	63	5:30 PM	225	208	433
5:45 AM	15	80	95	5:45 PM	234	238	472
6:00 AM	28	78	106	6:00 PM	184	206	390
6:15 AM	28	118	146	6:15 PM	170	174	344
6:30 AM	66	174	240	6:30 PM	172	213	385
6:45 AM	87	218	305	6:45 PM	152	200	352
7:00 AM	120	302	422	7:00 PM	140	180	320
7:15 AM	168	350	518	7:15 PM	121	122	243
7:30 AM	200	398	598	7:30 PM	114	124	238
7:45 AM	132	330	462	7:45 PM	110	111	221
8:00 AM	130	279	409	8:00 PM	96	108	204
8:15 AM	172	314	486	8:15 PM	96	108	204
8:30 AM	149	286	435	8:30 PM	111	86	197
8:45 AM	102	233	335	8:45 PM	80	110	190
9:00 AM	76	164	240	9:00 PM	86	94	180
9:15 AM	80	191	271	9:15 PM	86	70	156
9:30 AM	85	188	273	9:30 PM	74	67	141
9:45 AM	96	181	277	9:45 PM	60	56	116
10:00 AM	102	142	244	10:00 PM	42	84	126
10:15 AM	92	166	258	10:15 PM	52	56	108
10:30 AM	120	169	289	10:30 PM	46	46	92
10:45 AM	98	181	279	10:45 PM	35	26	61
11:00 AM	89	170	259	11:00 PM	32	40	72
11:15 AM	109	162	271	11:15 PM	28	19	47
11:30 AM	136	136	272	11:30 PM	17	32	49
11:45 AM	112	166	278	11:45 PM	18	17	35
24 HR TOTALS	9561	12729	22290				

SACRAMENTO COUNTY

DEPARTMENT OF TRANSPORTATION

24 HOUR TRAFFIC COUNT

DATE: 6/7/17 START TIME: 12:00 AM DAY: WEDNESDAY

ZONE: 7 COUNTER NO: 516/517 LOC ID: 438916B

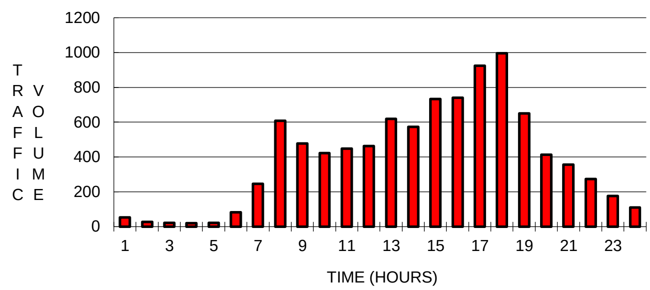
OBSERVER: NBE CHECKED BY: NBE TYPE: ANNUAL COUNT

COUNT TAKEN ON: **WINDING WY**

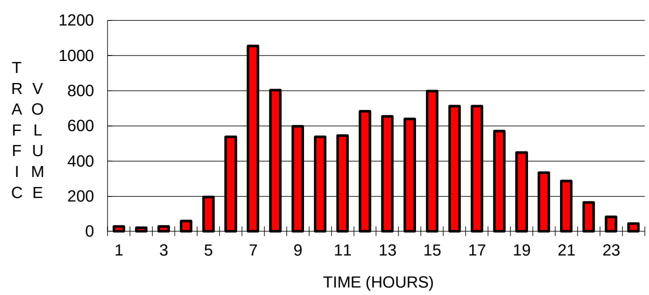
EAST OF **MANZANITA AV**

DIRECTION	E/B	W/B	E/B+W/B
NO. OF LANES	2	2	4
TIME	HOURLY TOTAL	HOURLY TOTAL	HOURLY TOTAL
0-1	53	28	81
1-2	26	21	47
2-3	22	28	50
3-4	19	59	78
4-5	21	195	216
5-6	82	537	619
6-7	246	1056	1302
7-8	608	804	1412
8-9	478	598	1076
9-10	422	538	960
10-11	449	546	995
11-12	462	683	1145
12-13	620	654	1274
13-14	573	640	1213
14-15	733	798	1531
15-16	741	713	1454
16-17	924	712	1636
17-18	996	570	1566
18-19	650	448	1098
19-20	414	334	748
20-21	356	286	642
21-22	274	165	439
22-23	176	82	258
23-24	109	44	153
24 HOUR TOTAL	9454	10539	19993

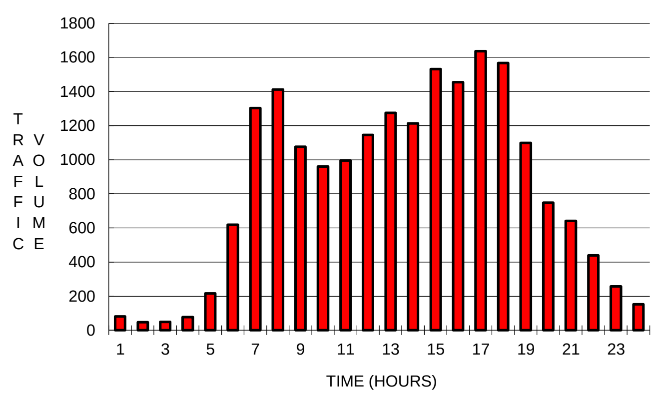
DIRECTION: E/B



DIRECTION: W/B



BOTH DIRECTIONS



County of Sacramento
Traffic Volume Report

LOCATION : WINDING WY
CROSS ST : MANZANITA AV
DIRECTION : E/B+W/B

Date: 6/7/17
WEDNESDAY

24 Hour Volume

INTERVAL BEGIN	E/B	W/B	COMBINED	INTERVAL BEGIN	E/B	W/B	COMBINED
12:00 AM	13	7	20	12:00 PM	144	176	320
12:15 AM	16	9	25	12:15 PM	152	164	316
12:30 AM	15	7	22	12:30 PM	168	158	326
12:45 AM	9	5	14	12:45 PM	156	156	312
1:00 AM	11	5	16	1:00 PM	136	128	264
1:15 AM	7	5	12	1:15 PM	150	152	302
1:30 AM	4	7	11	1:30 PM	147	158	305
1:45 AM	4	4	8	1:45 PM	140	202	342
2:00 AM	8	4	12	2:00 PM	172	172	344
2:15 AM	5	1	6	2:15 PM	174	258	432
2:30 AM	5	11	16	2:30 PM	181	184	365
2:45 AM	4	12	16	2:45 PM	206	184	390
3:00 AM	7	10	17	3:00 PM	192	178	370
3:15 AM	4	8	12	3:15 PM	184	169	353
3:30 AM	6	16	22	3:30 PM	162	160	322
3:45 AM	2	25	27	3:45 PM	203	206	409
4:00 AM	5	30	35	4:00 PM	228	184	412
4:15 AM	2	40	42	4:15 PM	204	168	372
4:30 AM	6	56	62	4:30 PM	248	162	410
4:45 AM	8	69	77	4:45 PM	244	198	442
5:00 AM	14	90	104	5:00 PM	248	176	424
5:15 AM	16	102	118	5:15 PM	254	158	412
5:30 AM	28	160	188	5:30 PM	254	120	374
5:45 AM	24	185	209	5:45 PM	240	116	356
6:00 AM	39	252	291	6:00 PM	194	122	316
6:15 AM	59	263	322	6:15 PM	184	118	302
6:30 AM	62	307	369	6:30 PM	126	116	242
6:45 AM	86	234	320	6:45 PM	146	92	238
7:00 AM	114	209	323	7:00 PM	118	90	208
7:15 AM	192	190	382	7:15 PM	124	68	192
7:30 AM	160	211	371	7:30 PM	98	86	184
7:45 AM	142	194	336	7:45 PM	74	90	164
8:00 AM	112	174	286	8:00 PM	88	84	172
8:15 AM	144	131	275	8:15 PM	88	84	172
8:30 AM	116	147	263	8:30 PM	90	66	156
8:45 AM	106	146	252	8:45 PM	90	52	142
9:00 AM	94	148	242	9:00 PM	90	46	136
9:15 AM	108	132	240	9:15 PM	67	42	109
9:30 AM	96	118	214	9:30 PM	69	43	112
9:45 AM	124	140	264	9:45 PM	48	34	82
10:00 AM	89	144	233	10:00 PM	45	27	72
10:15 AM	132	124	256	10:15 PM	56	14	70
10:30 AM	118	144	262	10:30 PM	41	21	62
10:45 AM	110	134	244	10:45 PM	34	20	54
11:00 AM	112	155	267	11:00 PM	30	11	41
11:15 AM	122	152	274	11:15 PM	23	10	33
11:30 AM	114	184	298	11:30 PM	36	15	51
11:45 AM	114	192	306	11:45 PM	20	8	28
24 HR TOTALS	9454	10539	19993				

Growth Factor Calculations:										
ON_STREET	*DIR*	*X_STREET*	*TYPE*	*DATE*	*DAY*	*NB*	*SB*	*EB*	*WB*	*TOT_24*
MANZANITA AVE	S	CYPRESS AVE	24 HOUR COUNT	2019/09/17 07:00:00+00	T	16048	18891	0	0	34939
MANZANITA AVE	S	CYPRESS AVE	24 HOUR COUNT	2016/11/15 08:00:00+00	T	14797	17644	0	0	32441
Non-Summer growth per year on Manzanita Avenue =			2.5%							
WINDING WAY	W	WALNUT AVE	24 HOUR COUNT	2017/03/15 07:00:00+00	W	0	0	8719	9289	18008
WINDING WAY	W	WALNUT AVE	24 HOUR COUNT	2015/03/26 07:00:00+00	TH	0	0	8129	9005	17134
Non-Summer growth per year on Winding Way =			2.5%							

Peak Hour Count Data (from count PDFs provided by City Staff)				
Manzanita Avenue South of Winding Way:				
		NB	SB	Total
Summer (06/2017)	AM Peak Hr	669	1132	1801
	PM Peak Hr	1292	832	2124
Non-Summer (04/2015)	AM Peak Hr	653	1230	1883
	PM Peak Hr	1175	1010	2185
Winding Way East of Manzanita Avenue:				
		EB	WB	Total
Summer (06/2017)	AM Peak Hr	608	804	1412
	PM Peak Hr	924	712	1636
Non-Summer (04/2015)	AM Peak Hr	620	1380	2000
	PM Peak Hr	977	871	1848

Non-Summer (2015) Data Grown to 2017 (2.5%/yr):				
Manzanita Avenue South of Winding Way:				
		NB	SB	Total
Non-Summer 2017	AM Peak Hr	686	1292	1978
	PM Peak Hr	1234	1061	2296
Winding Way East of Manzanita Avenue:				
		EB	WB	Total
Non-Summer 2017	AM Peak Hr	651	1450	2101
	PM Peak Hr	1026	915	1942

Non-Summer (2017) vs Summer (2017) Factors:		
Manzanita Avenue:	AM Peak Hr	1.10
	PM Peak Hr	1.08
Winding Way:	AM Peak Hr	1.49
	PM Peak Hr	1.19

Source: Sacramento County Traffic Count Program

Attachment C:

Synchro HCM 6th Edition Intersection LOS Reports

Intersection	
Intersection Delay, s/veh	18.3
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	12	6	372	9	381	1	65	179	254	48	1
Future Vol, veh/h	1	12	6	372	9	381	1	65	179	254	48	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	12	6	372	9	381	1	65	179	254	48	1
Number of Lanes	0	1	0	0	1	1	0	1	1	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	1	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	1	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	1
HCM Control Delay	10.8	20.9	12	17.3
HCM LOS	B	C	B	C

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	2%	0%	5%	98%	0%	100%	0%
Vol Thru, %	98%	0%	63%	2%	0%	0%	98%
Vol Right, %	0%	100%	32%	0%	100%	0%	2%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	66	179	19	381	381	254	49
LT Vol	1	0	1	372	0	254	0
Through Vol	65	0	12	9	0	0	48
RT Vol	0	179	6	0	381	0	1
Lane Flow Rate	66	179	19	381	381	254	49
Geometry Grp	7	7	6	7	7	7	7
Degree of Util (X)	0.132	0.322	0.039	0.721	0.594	0.532	0.095
Departure Headway (Hd)	7.201	6.476	7.448	6.817	5.615	7.537	7.012
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	496	553	484	530	640	478	509
Service Time	4.973	4.247	5.448	4.577	3.373	5.306	4.78
HCM Lane V/C Ratio	0.133	0.324	0.039	0.719	0.595	0.531	0.096
HCM Control Delay	11.1	12.3	10.8	25.4	16.3	18.6	10.5
HCM Lane LOS	B	B	B	D	C	C	B
HCM 95th-tile Q	0.5	1.4	0.1	5.9	3.9	3.1	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	120	356	23	220	592	69	41	468	123	60	589	102
Future Volume (veh/h)	120	356	23	220	592	69	41	468	123	60	589	102
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		0.99	1.00		0.99
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	120	356	23	220	592	69	41	468	123	60	589	102
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	154	807	52	339	793	92	49	779	343	75	816	362
Arrive On Green	0.09	0.24	0.24	0.10	0.25	0.25	0.03	0.22	0.22	0.04	0.23	0.23
Sat Flow, veh/h	1781	3386	218	3456	3200	372	1781	3554	1563	1781	3554	1575
Grp Volume(v), veh/h	120	186	193	220	328	333	41	468	123	60	589	102
Grp Sat Flow(s),veh/h/ln	1781	1777	1827	1728	1777	1795	1781	1777	1563	1781	1777	1575
Q Serve(g_s), s	3.4	4.6	4.7	3.2	8.8	8.9	1.2	6.1	3.5	1.7	7.9	2.8
Cycle Q Clear(g_c), s	3.4	4.6	4.7	3.2	8.8	8.9	1.2	6.1	3.5	1.7	7.9	2.8
Prop In Lane	1.00		0.12	1.00		0.21	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	154	423	435	339	440	445	49	779	343	75	816	362
V/C Ratio(X)	0.78	0.44	0.44	0.65	0.74	0.75	0.84	0.60	0.36	0.81	0.72	0.28
Avail Cap(c_a), veh/h	858	1369	1408	1664	1369	1383	858	4791	2107	858	4791	2123
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.2	16.8	16.8	22.6	18.0	18.0	25.1	18.2	17.2	24.7	18.5	16.5
Incr Delay (d2), s/veh	3.2	0.3	0.3	0.8	0.9	1.0	12.8	0.3	0.2	7.4	0.5	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	1.6	1.7	1.2	3.1	3.2	0.6	2.2	1.1	0.8	2.8	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	26.4	17.1	17.1	23.3	19.0	19.0	38.0	18.5	17.4	32.0	18.9	16.6
LnGrp LOS	C	B	B	C	B	B	D	B	B	C	B	B
Approach Vol, veh/h		499			881			632			751	
Approach Delay, s/veh		19.3			20.1			19.6			19.7	
Approach LOS		B			C			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	6.7	17.3	10.0	17.9	7.3	16.8	10.5	17.4
Change Period (Y+Rc), s	* 5.3	* 5.4	5.5	* 5	* 5.1	* 5.4	* 5.4	* 5
Max Green Setting (Gmax), s	* 25	* 70	25.0	* 40	* 25	* 70	* 25	* 40
Max Q Clear Time (g_c+I1), s	3.2	9.9	5.4	10.9	3.7	8.1	5.2	6.7
Green Ext Time (p_c), s	0.0	1.4	0.0	1.2	0.0	1.1	0.1	0.6

Intersection Summary	
HCM 6th Ctrl Delay	19.7
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	120	86	659	818	27
Future Vol, veh/h	0	120	86	659	818	27
Conflicting Peds, #/hr	0	3	3	0	0	3
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	140	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	120	86	659	818	27

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	429	848	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	4.14	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	0	574	785	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	571	783	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13	1.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	783	-	571	-	-
HCM Lane V/C Ratio	0.11	-	0.21	-	-
HCM Control Delay (s)	10.2	-	13	-	-
HCM Lane LOS	B	-	B	-	-
HCM 95th %tile Q(veh)	0.4	-	0.8	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	3	5	99	1	72	19	659	36	46	874	8
Future Volume (veh/h)	9	3	5	99	1	72	19	659	36	46	874	8
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.98	1.00		0.97	1.00		0.99
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	3	5	100	0	72	19	659	36	46	874	8
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	30	10	34	335	0	147	25	1407	77	55	1535	14
Arrive On Green	0.02	0.02	0.02	0.09	0.00	0.09	0.01	0.41	0.41	0.03	0.43	0.43
Sat Flow, veh/h	1352	451	1565	3563	0	1560	1781	3421	187	1781	3608	33
Grp Volume(v), veh/h	12	0	5	100	0	72	19	342	353	46	430	452
Grp Sat Flow(s),veh/h/ln	1803	0	1565	1781	0	1560	1781	1777	1831	1781	1777	1864
Q Serve(g_s), s	0.3	0.0	0.1	1.1	0.0	1.9	0.5	6.0	6.0	1.1	7.8	7.9
Cycle Q Clear(g_c), s	0.3	0.0	0.1	1.1	0.0	1.9	0.5	6.0	6.0	1.1	7.8	7.9
Prop In Lane	0.75		1.00	1.00		1.00	1.00		0.10	1.00		0.02
Lane Grp Cap(c), veh/h	39	0	34	335	0	147	25	731	753	55	756	793
V/C Ratio(X)	0.30	0.00	0.15	0.30	0.00	0.49	0.75	0.47	0.47	0.84	0.57	0.57
Avail Cap(c_a), veh/h	1687	0	1465	3335	0	1460	1042	2911	2999	1042	2911	3054
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	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.6	0.0	20.5	18.0	0.0	18.4	21.0	9.2	9.2	20.6	9.3	9.3
Incr Delay (d2), s/veh	1.6	0.0	0.7	0.2	0.0	0.9	15.3	0.9	0.9	12.1	0.3	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	0.1	0.4	0.0	0.6	0.3	1.7	1.8	0.6	2.0	2.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	22.2	0.0	21.2	18.2	0.0	19.3	36.2	10.1	10.1	32.7	9.6	9.6
LnGrp LOS	C	A	C	B	A	B	D	B	B	C	A	A
Approach Vol, veh/h		17			172			714			928	
Approach Delay, s/veh		21.9			18.7			10.8			10.7	
Approach LOS		C			B			B			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	4.9	23.2		8.6	5.5	22.6		6.0				
Change Period (Y+Rc), s	* 4.3	5.0		* 4.6	* 4.2	* 5		5.1				
Max Green Setting (Gmax), s	* 25	70.0		* 40	* 25	* 70		40.0				
Max Q Clear Time (g_c+I1), s	2.5	9.9		3.9	3.1	8.0		2.3				
Green Ext Time (p_c), s	0.0	1.6		0.1	0.0	9.4		0.0				
Intersection Summary												
HCM 6th Ctrl Delay			11.6									
HCM 6th LOS			B									

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	114	68	277	8	23	36	320	579	0	23	840	104
Future Volume (veh/h)	114	68	277	8	23	36	320	579	0	23	840	104
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	91	100	277	8	23	36	320	579	0	23	840	104
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	355	373	316	18	51	59	401	1819	0	27	1832	226
Arrive On Green	0.20	0.20	0.20	0.04	0.04	0.04	0.12	0.51	0.00	0.02	0.40	0.40
Sat Flow, veh/h	1781	1870	1583	477	1370	1585	3456	3647	0	1781	4603	567
Grp Volume(v), veh/h	91	100	277	31	0	36	320	579	0	23	620	324
Grp Sat Flow(s),veh/h/ln	1781	1870	1583	1847	0	1585	1728	1777	0	1781	1702	1766
Q Serve(g_s), s	3.6	3.8	14.4	1.4	0.0	1.9	7.6	8.0	0.0	1.1	11.3	11.4
Cycle Q Clear(g_c), s	3.6	3.8	14.4	1.4	0.0	1.9	7.6	8.0	0.0	1.1	11.3	11.4
Prop In Lane	1.00		1.00	0.26		1.00	1.00		0.00	1.00		0.32
Lane Grp Cap(c), veh/h	355	373	316	69	0	59	401	1819	0	27	1355	703
V/C Ratio(X)	0.26	0.27	0.88	0.45	0.00	0.61	0.80	0.32	0.00	0.85	0.46	0.46
Avail Cap(c_a), veh/h	842	884	748	872	0	749	1021	2938	0	526	2815	1460
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.6	28.7	32.9	39.9	0.0	40.2	36.5	12.1	0.0	41.6	18.8	18.8
Incr Delay (d2), s/veh	0.1	0.1	3.1	1.7	0.0	3.8	1.4	0.3	0.0	22.0	0.8	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	1.7	5.5	0.7	0.0	0.8	3.2	2.9	0.0	0.6	4.2	4.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	28.7	28.8	36.0	41.6	0.0	43.9	37.8	12.4	0.0	63.6	19.6	20.4
LnGrp LOS	C	C	D	D	A	D	D	B	A	E	B	C
Approach Vol, veh/h		468			67			899			967	
Approach Delay, s/veh		33.0			42.9			21.5			20.9	
Approach LOS		C			D			C			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	15.3	38.9		8.2	5.7	48.5		22.2				
Change Period (Y+Rc), s	5.5	* 5.2		* 5.1	* 4.4	* 5.2		5.3				
Max Green Setting (Gmax), s	25.0	* 70		* 40	* 25	* 70		40.0				
Max Q Clear Time (g_c+I1), s	19.6	13.4		3.9	3.1	10.0		16.4				
Green Ext Time (p_c), s	0.2	20.2		0.1	0.0	11.2		0.3				

Intersection Summary			
HCM 6th Ctrl Delay			24.1
HCM 6th LOS			C

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	551	33	12	891	3	104	3	13	12	7	6
Future Volume (veh/h)	3	551	33	12	891	3	104	3	13	12	7	6
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		1.00	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	3	551	33	12	891	3	104	3	13	12	7	6
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	5	1110	66	17	1190	4	142	24	106	70	36	31
Arrive On Green	0.00	0.33	0.33	0.01	0.33	0.33	0.08	0.08	0.08	0.04	0.04	0.04
Sat Flow, veh/h	1781	3400	203	1781	3632	12	1781	306	1326	1781	918	787
Grp Volume(v), veh/h	3	287	297	12	436	458	104	0	16	12	0	13
Grp Sat Flow(s),veh/h/ln	1781	1777	1827	1781	1777	1868	1781	0	1632	1781	0	1706
Q Serve(g_s), s	0.1	4.5	4.5	0.2	7.5	7.5	2.0	0.0	0.3	0.2	0.0	0.3
Cycle Q Clear(g_c), s	0.1	4.5	4.5	0.2	7.5	7.5	2.0	0.0	0.3	0.2	0.0	0.3
Prop In Lane	1.00		0.11	1.00		0.01	1.00		0.81	1.00		0.46
Lane Grp Cap(c), veh/h	5	580	597	17	582	612	142	0	130	70	0	67
V/C Ratio(X)	0.58	0.50	0.50	0.71	0.75	0.75	0.73	0.00	0.12	0.17	0.00	0.19
Avail Cap(c_a), veh/h	1297	3623	3725	1297	3623	3809	2076	0	1901	2076	0	1988
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	17.1	9.3	9.3	17.0	10.3	10.3	15.4	0.0	14.7	15.9	0.0	16.0
Incr Delay (d2), s/veh	32.5	0.2	0.2	18.6	0.7	0.7	2.7	0.0	0.2	0.4	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	1.1	1.1	0.2	1.9	2.0	0.8	0.0	0.1	0.1	0.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	49.6	9.5	9.5	35.5	11.0	11.0	18.1	0.0	14.8	16.4	0.0	16.5
LnGrp LOS	D	A	A	D	B	B	B	A	B	B	A	B
Approach Vol, veh/h		587			906			120			25	
Approach Delay, s/veh		9.7			11.3			17.7			16.4	
Approach LOS		A			B			B			B	
Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		6.2	4.7	16.0		7.4	4.7	16.0				
Change Period (Y+Rc), s		* 4.8	* 4.6	4.8		4.7	* 4.4	* 4.8				
Max Green Setting (Gmax), s		* 40	* 25	70.0		40.0	* 25	* 70				
Max Q Clear Time (g_c+I1), s		2.3	2.1	9.5		4.0	2.2	6.5				
Green Ext Time (p_c), s		0.0	0.0	1.7		0.1	0.0	1.0				
Intersection Summary												
HCM 6th Ctrl Delay			11.3									
HCM 6th LOS			B									
Notes												

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	6.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	1	57	31	1	39	13
Future Vol, veh/h	1	57	31	1	39	13
Conflicting Peds, #/hr	4	5	0	4	1	0
Sign Control	Free	Free	Stop	Stop	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	57	31	1	39	13

Major/Minor			Minor2		Major2	
Conflicting Flow All			92	17	1	0
Stage 1			91	-	-	-
Stage 2			1	-	-	-
Critical Hdwy			6.52	6.22	4.12	-
Critical Hdwy Stg 1			5.52	-	-	-
Critical Hdwy Stg 2			-	-	-	-
Follow-up Hdwy			4.018	3.318	2.218	-
Pot Cap-1 Maneuver			798	1062	1622	-
Stage 1			820	-	-	-
Stage 2			-	-	-	-
Platoon blocked, %						-
Mov Cap-1 Maneuver			0	1062	1622	-
Mov Cap-2 Maneuver			0	-	-	-
Stage 1			0	-	-	-
Stage 2			0	-	-	-

Approach			NB		SB
HCM Control Delay, s			8.5		5.5
HCM LOS			A		

Minor Lane/Major Mvmt	NBLn1	SBL	SBT
Capacity (veh/h)	1062	1622	-
HCM Lane V/C Ratio	0.03	0.024	-
HCM Control Delay (s)	8.5	7.3	0
HCM Lane LOS	A	A	A
HCM 95th %tile Q(veh)	0.1	0.1	-

Intersection	
Intersection Delay, s/veh	27.1
Intersection LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	6	2	206	20	328	8	58	385	421	64	1
Future Vol, veh/h	0	6	2	206	20	328	8	58	385	421	64	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	6	2	206	20	328	8	58	385	421	64	1
Number of Lanes	0	1	0	0	1	1	0	1	1	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	1	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	1	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	1
HCM Control Delay	12.1	18.6	21.7	42
HCM LOS	B	C	C	E

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	12%	0%	0%	91%	0%	100%	0%
Vol Thru, %	88%	0%	75%	9%	0%	0%	98%
Vol Right, %	0%	100%	25%	0%	100%	0%	2%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	66	385	8	226	328	421	65
LT Vol	8	0	0	206	0	421	0
Through Vol	58	0	6	20	0	0	64
RT Vol	0	385	2	0	328	0	1
Lane Flow Rate	66	385	8	226	328	421	65
Geometry Grp	7	7	6	7	7	7	7
Degree of Util (X)	0.135	0.703	0.02	0.492	0.606	0.893	0.128
Departure Headway (Hd)	7.356	6.574	8.853	7.832	6.649	7.633	7.109
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	488	551	404	461	544	476	504
Service Time	5.095	4.313	6.925	5.568	4.385	5.371	4.847
HCM Lane V/C Ratio	0.135	0.699	0.02	0.49	0.603	0.884	0.129
HCM Control Delay	11.2	23.5	12.1	17.9	19.1	46.8	10.9
HCM Lane LOS	B	C	B	C	C	E	B
HCM 95th-tile Q	0.5	5.6	0.1	2.7	4	9.8	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	152	565	17	177	389	85	36	679	232	96	601	118
Future Volume (veh/h)	152	565	17	177	389	85	36	679	232	96	601	118
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	152	565	17	177	389	85	36	679	232	96	601	118
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	194	745	22	284	532	115	43	892	398	123	1039	462
Arrive On Green	0.11	0.21	0.21	0.08	0.18	0.18	0.02	0.25	0.25	0.07	0.29	0.29
Sat Flow, veh/h	1781	3522	106	3456	2904	628	1781	3554	1585	1781	3554	1580
Grp Volume(v), veh/h	152	285	297	177	236	238	36	679	232	96	601	118
Grp Sat Flow(s),veh/h/ln	1781	1777	1851	1728	1777	1756	1781	1777	1585	1781	1777	1580
Q Serve(g_s), s	4.5	8.1	8.2	2.7	6.8	6.9	1.1	9.6	7.0	2.9	7.8	3.1
Cycle Q Clear(g_c), s	4.5	8.1	8.2	2.7	6.8	6.9	1.1	9.6	7.0	2.9	7.8	3.1
Prop In Lane	1.00		0.06	1.00		0.36	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	194	376	392	284	326	322	43	892	398	123	1039	462
V/C Ratio(X)	0.78	0.76	0.76	0.62	0.73	0.74	0.84	0.76	0.58	0.78	0.58	0.26
Avail Cap(c_a), veh/h	823	1313	1368	1596	1313	1298	823	4596	2050	823	4596	2043
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.5	20.0	20.0	24.0	20.8	20.9	26.3	18.8	17.8	24.8	16.3	14.6
Incr Delay (d2), s/veh	2.6	1.2	1.1	0.8	1.2	1.2	15.1	0.5	0.5	4.0	0.2	0.1
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	1.8	3.0	3.1	1.0	2.5	2.6	0.6	3.4	2.2	1.2	2.7	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	26.1	21.2	21.2	24.9	22.0	22.1	41.4	19.3	18.3	28.8	16.5	14.7
LnGrp LOS	C	C	C	C	C	C	D	B	B	C	B	B
Approach Vol, veh/h		734			651			947			815	
Approach Delay, s/veh		22.2			22.8			19.9			17.7	
Approach LOS		C			C			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	6.6	21.2	11.4	14.9	8.8	19.0	9.9	16.5
Change Period (Y+Rc), s	* 5.3	* 5.4	5.5	* 5	* 5.1	* 5.4	* 5.4	* 5
Max Green Setting (Gmax), s	* 25	* 70	25.0	* 40	* 25	* 70	* 25	* 40
Max Q Clear Time (g_c+I1), s	3.1	9.8	6.5	8.9	4.9	11.6	4.7	10.2
Green Ext Time (p_c), s	0.0	1.4	0.0	0.9	0.0	1.6	0.1	1.0

Intersection Summary	
HCM 6th Ctrl Delay	20.5
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection						
Int Delay, s/veh	1.5					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	153	93	960	816	18
Future Vol, veh/h	0	153	93	960	816	18
Conflicting Peds, #/hr	0	2	2	0	0	2
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	140	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	153	93	960	816	18

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	421	836	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	4.14	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	0	581	794	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	579	792	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.4	0.9	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	792	-	579	-	-
HCM Lane V/C Ratio	0.117	-	0.264	-	-
HCM Control Delay (s)	10.1	-	13.4	-	-
HCM Lane LOS	B	-	B	-	-
HCM 95th %tile Q(veh)	0.4	-	1.1	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	1	4	90	4	65	30	949	128	67	860	13
Future Volume (veh/h)	17	1	4	90	4	65	30	949	128	67	860	13
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
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	17	1	4	93	0	65	30	949	128	67	860	13
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	26	2	24	258	0	114	35	1705	230	85	2036	31
Arrive On Green	0.02	0.02	0.02	0.07	0.00	0.07	0.02	0.54	0.54	0.05	0.57	0.57
Sat Flow, veh/h	1687	99	1585	3563	0	1578	1781	3145	424	1781	3583	54
Grp Volume(v), veh/h	18	0	4	93	0	65	30	536	541	67	426	447
Grp Sat Flow(s),veh/h/ln	1786	0	1585	1781	0	1578	1781	1777	1793	1781	1777	1860
Q Serve(g_s), s	0.6	0.0	0.1	1.5	0.0	2.3	1.0	11.6	11.6	2.2	8.0	8.0
Cycle Q Clear(g_c), s	0.6	0.0	0.1	1.5	0.0	2.3	1.0	11.6	11.6	2.2	8.0	8.0
Prop In Lane	0.94		1.00	1.00		1.00	1.00		0.24	1.00		0.03
Lane Grp Cap(c), veh/h	28	0	24	258	0	114	35	963	972	85	1010	1057
V/C Ratio(X)	0.65	0.00	0.16	0.36	0.00	0.57	0.85	0.56	0.56	0.79	0.42	0.42
Avail Cap(c_a), veh/h	1219	0	1082	2432	0	1078	760	2123	2141	760	2123	2222
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	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.7	0.0	28.5	25.9	0.0	26.3	28.6	8.8	8.8	27.6	7.2	7.2
Incr Delay (d2), s/veh	9.3	0.0	1.2	0.3	0.0	1.7	18.4	1.0	1.0	6.0	0.1	0.1
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	0.3	0.0	0.1	0.6	0.0	0.9	0.6	3.4	3.5	1.0	2.1	2.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.0	0.0	29.6	26.2	0.0	27.9	47.0	9.8	9.8	33.6	7.3	7.3
LnGrp LOS	D	A	C	C	A	C	D	A	A	C	A	A
Approach Vol, veh/h		22			158			1107			940	
Approach Delay, s/veh		36.5			26.9			10.8			9.2	
Approach LOS		D			C			B			A	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.5	38.3		8.8	7.0	36.8		6.0				
Change Period (Y+Rc), s	* 4.3	5.0		* 4.6	* 4.2	* 5		5.1				
Max Green Setting (Gmax), s	* 25	70.0		* 40	* 25	* 70		40.0				
Max Q Clear Time (g_c+I1), s	3.0	10.0		4.3	4.2	13.6		2.6				
Green Ext Time (p_c), s	0.0	1.6		0.1	0.0	18.2		0.0				
Intersection Summary												
HCM 6th Ctrl Delay			11.5									
HCM 6th LOS			B									

Notes

User approved volume balancing among the lanes for turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	250	62	429	23	53	62	392	805	6	71	811	90
Future Volume (veh/h)	250	62	429	23	53	62	392	805	6	71	811	90
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.99	1.00		0.99
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	156	194	429	23	53	62	392	805	6	71	811	90
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	520	546	455	33	76	94	453	1509	11	91	1525	168
Arrive On Green	0.29	0.29	0.29	0.06	0.06	0.06	0.13	0.42	0.42	0.05	0.33	0.33
Sat Flow, veh/h	1781	1870	1557	558	1285	1585	3456	3615	27	1781	4660	514
Grp Volume(v), veh/h	156	194	429	76	0	62	392	396	415	71	591	310
Grp Sat Flow(s),veh/h/ln	1781	1870	1557	1842	0	1585	1728	1777	1865	1781	1702	1770
Q Serve(g_s), s	7.5	9.1	29.9	4.5	0.0	4.3	12.3	18.5	18.5	4.4	15.7	15.9
Cycle Q Clear(g_c), s	7.5	9.1	29.9	4.5	0.0	4.3	12.3	18.5	18.5	4.4	15.7	15.9
Prop In Lane	1.00		1.00	0.30		1.00	1.00		0.01	1.00		0.29
Lane Grp Cap(c), veh/h	520	546	455	109	0	94	453	741	778	91	1114	579
V/C Ratio(X)	0.30	0.36	0.94	0.70	0.00	0.66	0.86	0.53	0.53	0.78	0.53	0.53
Avail Cap(c_a), veh/h	642	674	561	664	0	571	778	1120	1176	401	2146	1115
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.5	31.0	38.4	51.2	0.0	51.1	47.3	24.3	24.3	52.1	30.4	30.5
Incr Delay (d2), s/veh	0.1	0.1	20.6	2.9	0.0	2.9	2.1	2.0	1.9	5.3	1.3	2.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	4.1	13.7	2.2	0.0	1.7	5.3	7.9	8.2	2.0	6.4	7.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.6	31.2	59.0	54.2	0.0	54.1	49.4	26.3	26.2	57.4	31.8	33.1
LnGrp LOS	C	C	E	D	A	D	D	C	C	E	C	C
Approach Vol, veh/h		779			138			1203			972	
Approach Delay, s/veh		46.4			54.1			33.8			34.0	
Approach LOS		D			D			C			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	20.1	41.6		11.7	10.1	51.5		37.7				
Change Period (Y+Rc), s	5.5	* 5.2		* 5.1	* 4.4	* 5.2		5.3				
Max Green Setting (Gmax), s	25.0	* 70		* 40	* 25	* 70		40.0				
Max Q Clear Time (g_c+I1), s	14.3	17.9		6.5	6.4	20.5		31.9				
Green Ext Time (p_c), s	0.2	18.5		0.2	0.0	15.7		0.6				

Intersection Summary	
HCM 6th Ctrl Delay	38.0
HCM 6th LOS	D

Notes

User approved volume balancing among the lanes for turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	781	95	12	602	7	58	2	12	34	9	5
Future Volume (veh/h)	4	781	95	12	602	7	58	2	12	34	9	5
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		1.00	1.00		0.99
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	4	781	95	12	602	7	58	2	12	34	9	5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	6	1051	128	17	1189	14	81	11	63	79	50	28
Arrive On Green	0.00	0.33	0.33	0.01	0.33	0.33	0.05	0.05	0.05	0.04	0.04	0.04
Sat Flow, veh/h	1781	3180	387	1781	3597	42	1781	231	1389	1781	1124	624
Grp Volume(v), veh/h	4	436	440	12	297	312	58	0	14	34	0	14
Grp Sat Flow(s),veh/h/ln	1781	1777	1790	1781	1777	1862	1781	0	1620	1781	0	1748
Q Serve(g_s), s	0.1	7.1	7.1	0.2	4.4	4.4	1.1	0.0	0.3	0.6	0.0	0.3
Cycle Q Clear(g_c), s	0.1	7.1	7.1	0.2	4.4	4.4	1.1	0.0	0.3	0.6	0.0	0.3
Prop In Lane	1.00		0.22	1.00		0.02	1.00		0.86	1.00		0.36
Lane Grp Cap(c), veh/h	6	587	592	17	588	616	81	0	74	79	0	77
V/C Ratio(X)	0.69	0.74	0.74	0.71	0.51	0.51	0.72	0.00	0.19	0.43	0.00	0.18
Avail Cap(c_a), veh/h	1358	3793	3822	1358	3793	3975	2173	0	1977	2173	0	2133
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	16.3	9.7	9.7	16.2	8.8	8.8	15.4	0.0	15.1	15.3	0.0	15.1
Incr Delay (d2), s/veh	41.7	0.7	0.7	18.4	0.3	0.2	4.4	0.0	0.5	1.4	0.0	0.4
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	0.1	1.7	1.7	0.2	1.0	1.1	0.4	0.0	0.1	0.2	0.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	58.0	10.4	10.4	34.6	9.1	9.1	19.8	0.0	15.5	16.7	0.0	15.5
LnGrp LOS	E	B	B	C	A	A	B	A	B	B	A	B
Approach Vol, veh/h		880			621			72			48	
Approach Delay, s/veh		10.7			9.6			19.0			16.3	
Approach LOS		B			A			B			B	

Timer - Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		6.2	4.7	15.6		6.2	4.7	15.6
Change Period (Y+Rc), s		* 4.8	* 4.6	4.8		4.7	* 4.4	* 4.8
Max Green Setting (Gmax), s		* 40	* 25	70.0		40.0	* 25	* 70
Max Q Clear Time (g_c+I1), s		2.6	2.1	6.4		3.1	2.2	9.1
Green Ext Time (p_c), s		0.1	0.0	1.1		0.0	0.0	1.7

Intersection Summary			
HCM 6th Ctrl Delay			10.8
HCM 6th LOS			B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	3.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	1	38	32	0	64	38
Future Vol, veh/h	1	38	32	0	64	38
Conflicting Peds, #/hr	8	11	0	8	9	0
Sign Control	Free	Free	Stop	Stop	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	38	32	0	64	38

Major/Minor	Minor2		Major2	
Conflicting Flow All	175	46	9	0
Stage 1	166	-	-	-
Stage 2	9	-	-	-
Critical Hdwy	6.52	6.22	4.12	-
Critical Hdwy Stg 1	5.52	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	4.018	3.318	2.218	-
Pot Cap-1 Maneuver	718	1023	1611	-
Stage 1	761	-	-	-
Stage 2	-	-	-	-
Platoon blocked, %				-
Mov Cap-1 Maneuver	0	1023	1611	-
Mov Cap-2 Maneuver	0	-	-	-
Stage 1	0	-	-	-
Stage 2	0	-	-	-

Approach	NB	SB
HCM Control Delay, s		4.6
HCM LOS	-	

Minor Lane/Major Mvmt	NBLn1	SBL	SBT
Capacity (veh/h)	-	1611	-
HCM Lane V/C Ratio	-	0.04	-
HCM Control Delay (s)	-	7.3	0
HCM Lane LOS	-	A	A
HCM 95th %tile Q(veh)	-	0.1	-

Intersection	
Intersection Delay, s/veh	24.6
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	12	6	424	9	418	1	65	219	288	48	1
Future Vol, veh/h	1	12	6	424	9	418	1	65	219	288	48	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	12	6	424	9	418	1	65	219	288	48	1
Number of Lanes	0	1	0	0	1	1	0	1	1	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	1	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	1	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	1
HCM Control Delay	11.3	29.9	13.7	21.3
HCM LOS	B	D	B	C

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	2%	0%	5%	98%	0%	100%	0%
Vol Thru, %	98%	0%	63%	2%	0%	0%	98%
Vol Right, %	0%	100%	32%	0%	100%	0%	2%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	66	219	19	433	418	288	49
LT Vol	1	0	1	424	0	288	0
Through Vol	65	0	12	9	0	0	48
RT Vol	0	219	6	0	418	0	1
Lane Flow Rate	66	219	19	433	418	288	49
Geometry Grp	7	7	6	7	7	7	7
Degree of Util (X)	0.138	0.413	0.042	0.853	0.684	0.628	0.1
Departure Headway (Hd)	7.519	6.792	7.981	7.096	5.889	7.856	7.329
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	475	528	451	507	610	458	487
Service Time	5.304	4.576	5.981	4.871	3.663	5.64	5.113
HCM Lane V/C Ratio	0.139	0.415	0.042	0.854	0.685	0.629	0.101
HCM Control Delay	11.5	14.3	11.3	38.8	20.6	23.1	10.9
HCM Lane LOS	B	B	B	E	C	C	B
HCM 95th-tile Q	0.5	2	0.1	8.9	5.3	4.2	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	120	380	120	276	617	76	150	530	166	126	590	102
Future Volume (veh/h)	120	380	120	276	617	76	150	530	166	126	590	102
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		0.99	1.00		0.99
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	120	380	120	276	617	76	150	530	166	126	590	102
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	154	601	187	391	798	98	246	739	325	162	796	351
Arrive On Green	0.09	0.23	0.23	0.11	0.25	0.25	0.07	0.21	0.21	0.09	0.22	0.22
Sat Flow, veh/h	1781	2656	827	3456	3177	391	3456	3554	1563	1781	3554	1567
Grp Volume(v), veh/h	120	252	248	276	344	349	150	530	166	126	590	102
Grp Sat Flow(s),veh/h/ln	1781	1777	1706	1728	1777	1791	1728	1777	1563	1781	1777	1567
Q Serve(g_s), s	3.8	7.4	7.6	4.4	10.4	10.4	2.4	8.0	5.4	4.0	8.9	3.1
Cycle Q Clear(g_c), s	3.8	7.4	7.6	4.4	10.4	10.4	2.4	8.0	5.4	4.0	8.9	3.1
Prop In Lane	1.00		0.48	1.00		0.22	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	154	402	386	391	446	450	246	739	325	162	796	351
V/C Ratio(X)	0.78	0.63	0.64	0.71	0.77	0.77	0.61	0.72	0.51	0.78	0.74	0.29
Avail Cap(c_a), veh/h	771	1231	1182	1496	1231	1241	1496	4309	1895	771	4309	1900
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.8	20.1	20.2	24.7	20.1	20.1	26.0	21.3	20.3	25.7	20.8	18.6
Incr Delay (d2), s/veh	3.2	0.6	0.7	0.9	1.1	1.1	0.9	0.5	0.5	3.1	0.5	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	2.7	2.7	1.7	3.8	3.9	0.9	3.0	1.8	1.7	3.3	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.0	20.7	20.9	25.6	21.2	21.2	26.9	21.8	20.7	28.7	21.4	18.8
LnGrp LOS	C	C	C	C	C	C	C	C	C	C	C	B
Approach Vol, veh/h		620			969			846			818	
Approach Delay, s/veh		22.4			22.4			22.5			22.2	
Approach LOS		C			C			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.4	18.3	10.5	19.5	10.3	17.4	11.9	18.1				
Change Period (Y+Rc), s	* 5.3	* 5.4	5.5	* 5	* 5.1	* 5.4	* 5.4	* 5				
Max Green Setting (Gmax), s	* 25	* 70	25.0	* 40	* 25	* 70	* 25	* 40				
Max Q Clear Time (g_c+I1), s	4.4	10.9	5.8	12.4	6.0	10.0	6.4	9.6				
Green Ext Time (p_c), s	0.1	1.4	0.0	1.3	0.0	1.2	0.2	0.9				
Intersection Summary												
HCM 6th Ctrl Delay			22.4									
HCM 6th LOS			C									
Notes												

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	120	86	853	972	27
Future Vol, veh/h	0	120	86	853	972	27
Conflicting Peds, #/hr	0	3	3	0	0	3
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	140	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	120	86	853	972	27

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	506	1002	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	4.14	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	0	512	687	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	509	685	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.2	1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	685	-	509	-	-
HCM Lane V/C Ratio	0.126	-	0.236	-	-
HCM Control Delay (s)	11	-	14.2	-	-
HCM Lane LOS	B	-	B	-	-
HCM 95th %tile Q(veh)	0.4	-	0.9	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	3	5	99	1	89	19	741	36	62	960	8
Future Volume (veh/h)	9	3	5	99	1	89	19	741	36	62	960	8
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		0.97	1.00		0.99
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	3	5	100	0	89	19	741	36	62	960	8
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	29	10	34	367	0	161	25	1487	72	77	1656	14
Arrive On Green	0.02	0.02	0.02	0.10	0.00	0.10	0.01	0.43	0.43	0.04	0.46	0.46
Sat Flow, veh/h	1352	451	1563	3563	0	1562	1781	3445	167	1781	3611	30
Grp Volume(v), veh/h	12	0	5	100	0	89	19	382	395	62	472	496
Grp Sat Flow(s),veh/h/ln	1803	0	1563	1781	0	1562	1781	1777	1835	1781	1777	1865
Q Serve(g_s), s	0.3	0.0	0.1	1.2	0.0	2.6	0.5	7.3	7.4	1.6	9.3	9.3
Cycle Q Clear(g_c), s	0.3	0.0	0.1	1.2	0.0	2.6	0.5	7.3	7.4	1.6	9.3	9.3
Prop In Lane	0.75		1.00	1.00		1.00	1.00		0.09	1.00		0.02
Lane Grp Cap(c), veh/h	39	0	34	367	0	161	25	767	792	77	815	855
V/C Ratio(X)	0.31	0.00	0.15	0.27	0.00	0.55	0.76	0.50	0.50	0.81	0.58	0.58
Avail Cap(c_a), veh/h	1528	0	1324	3020	0	1324	944	2636	2722	944	2636	2766
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	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.7	0.0	22.7	19.5	0.0	20.1	23.2	9.7	9.7	22.4	9.4	9.4
Incr Delay (d2), s/veh	1.6	0.0	0.7	0.1	0.0	1.1	16.0	1.0	0.9	7.4	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	0.1	0.5	0.0	0.9	0.3	2.2	2.3	0.7	2.5	2.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	24.4	0.0	23.4	19.7	0.0	21.2	39.2	10.7	10.7	29.8	9.7	9.7
LnGrp LOS	C	A	C	B	A	C	D	B	B	C	A	A
Approach Vol, veh/h		17			189			796			1030	
Approach Delay, s/veh		24.1			20.4			11.4			10.9	
Approach LOS		C			C			B			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.0	26.6		9.5	6.2	25.4		6.1				
Change Period (Y+Rc), s	* 4.3	5.0		* 4.6	* 4.2	* 5		5.1				
Max Green Setting (Gmax), s	* 25	70.0		* 40	* 25	* 70		40.0				
Max Q Clear Time (g_c+I1), s	2.5	11.3		4.6	3.6	9.4		2.3				
Green Ext Time (p_c), s	0.0	1.9		0.1	0.0	11.0		0.0				
Intersection Summary												
HCM 6th Ctrl Delay			12.1									
HCM 6th LOS			B									

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	128	68	277	8	23	36	320	647	0	23	910	120
Future Volume (veh/h)	128	68	277	8	23	36	320	647	0	23	910	120
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	98	110	277	8	23	36	320	647	0	23	910	120
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	353	370	313	18	51	58	396	1879	0	27	1906	250
Arrive On Green	0.20	0.20	0.20	0.04	0.04	0.04	0.11	0.53	0.00	0.02	0.42	0.42
Sat Flow, veh/h	1781	1870	1583	477	1370	1585	3456	3647	0	1781	4565	600
Grp Volume(v), veh/h	98	110	277	31	0	36	320	647	0	23	678	352
Grp Sat Flow(s),veh/h/ln	1781	1870	1583	1847	0	1585	1728	1777	0	1781	1702	1760
Q Serve(g_s), s	4.2	4.5	15.4	1.5	0.0	2.0	8.2	9.5	0.0	1.2	13.1	13.2
Cycle Q Clear(g_c), s	4.2	4.5	15.4	1.5	0.0	2.0	8.2	9.5	0.0	1.2	13.1	13.2
Prop In Lane	1.00		1.00	0.26		1.00	1.00		0.00	1.00		0.34
Lane Grp Cap(c), veh/h	353	370	313	68	0	58	396	1879	0	27	1421	735
V/C Ratio(X)	0.28	0.30	0.88	0.46	0.00	0.62	0.81	0.34	0.00	0.84	0.48	0.48
Avail Cap(c_a), veh/h	787	826	699	816	0	700	954	2747	0	492	2631	1361
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.8	30.9	35.3	42.7	0.0	43.0	39.1	12.3	0.0	44.5	19.2	19.2
Incr Delay (d2), s/veh	0.2	0.2	3.3	1.8	0.0	3.9	1.5	0.4	0.0	21.2	0.9	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	2.0	6.0	0.7	0.0	0.8	3.4	3.5	0.0	0.7	5.0	5.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	31.0	31.1	38.6	44.5	0.0	46.8	40.6	12.7	0.0	65.7	20.0	20.9
LnGrp LOS	C	C	D	D	A	D	D	B	A	E	C	C
Approach Vol, veh/h		485			67			967			1053	
Approach Delay, s/veh		35.3			45.7			21.9			21.3	
Approach LOS		D			D			C			C	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	15.9	43.0		8.4	5.8	53.1		23.2
Change Period (Y+Rc), s	5.5	* 5.2		* 5.1	* 4.4	* 5.2		5.3
Max Green Setting (Gmax), s	25.0	* 70		* 40	* 25	* 70		40.0
Max Q Clear Time (g_c+I1), s	10.2	15.2		4.0	3.2	11.5		17.4
Green Ext Time (p_c), s	0.2	22.6		0.1	0.0	12.9		0.4

Intersection Summary	
HCM 6th Ctrl Delay	24.8
HCM 6th LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	601	37	13	939	3	145	3	14	12	7	6
Future Volume (veh/h)	3	601	37	13	939	3	145	3	14	12	7	6
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		1.00	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	3	601	37	13	939	3	145	3	14	12	7	6
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	5	1132	70	18	1220	4	195	32	147	70	36	31
Arrive On Green	0.00	0.33	0.33	0.01	0.34	0.34	0.11	0.11	0.11	0.04	0.04	0.04
Sat Flow, veh/h	1781	3394	209	1781	3633	12	1781	287	1341	1781	918	787
Grp Volume(v), veh/h	3	314	324	13	459	483	145	0	17	12	0	13
Grp Sat Flow(s),veh/h/ln	1781	1777	1826	1781	1777	1868	1781	0	1629	1781	0	1704
Q Serve(g_s), s	0.1	5.3	5.3	0.3	8.5	8.5	2.9	0.0	0.3	0.2	0.0	0.3
Cycle Q Clear(g_c), s	0.1	5.3	5.3	0.3	8.5	8.5	2.9	0.0	0.3	0.2	0.0	0.3
Prop In Lane	1.00		0.11	1.00		0.01	1.00		0.82	1.00		0.46
Lane Grp Cap(c), veh/h	5	593	609	18	597	627	195	0	179	70	0	67
V/C Ratio(X)	0.62	0.53	0.53	0.72	0.77	0.77	0.74	0.00	0.10	0.17	0.00	0.19
Avail Cap(c_a), veh/h	1209	3376	3469	1209	3376	3549	1934	0	1768	1934	0	1850
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	18.4	9.9	9.9	18.2	11.0	11.0	15.9	0.0	14.8	17.1	0.0	17.1
Incr Delay (d2), s/veh	39.6	0.3	0.3	17.9	0.8	0.8	2.1	0.0	0.1	0.4	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	1.4	1.4	0.2	2.3	2.4	1.1	0.0	0.1	0.1	0.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	57.9	10.2	10.2	36.1	11.8	11.7	18.0	0.0	14.8	17.6	0.0	17.7
LnGrp LOS	E	B	B	D	B	B	B	A	B	B	A	B
Approach Vol, veh/h		641			955			162			25	
Approach Delay, s/veh		10.4			12.1			17.6			17.6	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		6.2	4.7	17.2		8.7	4.8	17.1				
Change Period (Y+Rc), s		* 4.8	* 4.6	4.8		4.7	* 4.4	* 4.8				
Max Green Setting (Gmax), s		* 40	* 25	70.0		40.0	* 25	* 70				
Max Q Clear Time (g_c+I1), s		2.3	2.1	10.5		4.9	2.3	7.3				
Green Ext Time (p_c), s		0.0	0.0	1.8		0.1	0.0	1.1				

Intersection Summary			
HCM 6th Ctrl Delay			12.1
HCM 6th LOS			B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection												
Int Delay, s/veh	6.5											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	42	0	0	1	0	57	0	31	1	39	13	5
Future Vol, veh/h	42	0	0	1	0	57	0	31	1	39	13	5
Conflicting Peds, #/hr	0	0	0	4	0	5	0	0	4	1	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	42	0	0	1	0	57	0	31	1	39	13	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	159	130	20	134	132	41	18	0	0	36	0	0
Stage 1	94	94	-	36	36	-	-	-	-	-	-	-
Stage 2	65	36	-	98	96	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	807	761	1058	838	759	1030	1599	-	-	1575	-	-
Stage 1	913	817	-	980	865	-	-	-	-	-	-	-
Stage 2	946	865	-	908	815	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	744	739	1054	815	737	1021	1599	-	-	1569	-	-
Mov Cap-2 Maneuver	744	739	-	815	737	-	-	-	-	-	-	-
Stage 1	913	797	-	976	862	-	-	-	-	-	-	-
Stage 2	889	862	-	882	795	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.1	8.8	0	5
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1599	-	-	744	1017	1569	-	-
HCM Lane V/C Ratio	-	-	-	0.056	0.057	0.025	-	-
HCM Control Delay (s)	0	-	-	10.1	8.8	7.4	0	-
HCM Lane LOS	A	-	-	B	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.2	0.1	-	-

Intersection						
Int Delay, s/veh	1.9					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	452	220	0	88	0	143
Future Vol, veh/h	452	220	0	88	0	143
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	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	452	220	0	88	0	143

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	336
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	-	-	0	-	0	660
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	660
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	12
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	660	-	-	-
HCM Lane V/C Ratio	0.217	-	-	-
HCM Control Delay (s)	12	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.8	-	-	-

Intersection	
Int Delay, s/veh	0.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	104	736	90	0	986
Future Vol, veh/h	0	104	736	90	0	986
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	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	104	736	90	0	986

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	413	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	588	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	588	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.4	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	588	-
HCM Lane V/C Ratio	-	-	0.177	-
HCM Control Delay (s)	-	-	12.4	-
HCM Lane LOS	-	-	B	-
HCM 95th %tile Q(veh)	-	-	0.6	-

Intersection						
Int Delay, s/veh	1.1					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	172	767	50	0	1092
Future Vol, veh/h	0	172	767	50	0	1092
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	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	172	767	50	0	1092

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	409	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	592	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	592	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.6	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	592	-
HCM Lane V/C Ratio	-	-	0.291	-
HCM Control Delay (s)	-	-	13.6	-
HCM Lane LOS	-	-	B	-
HCM 95th %tile Q(veh)	-	-	1.2	-

Intersection	
Int Delay, s/veh	2.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	108	39	778	56	142	950
Future Vol, veh/h	108	39	778	56	142	950
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	-	-	-	0	-
Veh in Median Storage, #	2	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	108	39	778	56	142	950

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1565	417	0	0	834	0
Stage 1	806	-	-	-	-	-
Stage 2	759	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	~ 102	585	-	-	795	-
Stage 1	400	-	-	-	-	-
Stage 2	423	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 84	585	-	-	795	-
Mov Cap-2 Maneuver	261	-	-	-	-	-
Stage 1	400	-	-	-	-	-
Stage 2	347	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	27.2	0	1.4
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	306	795	-
HCM Lane V/C Ratio	-	-	0.48	0.179	-
HCM Control Delay (s)	-	-	27.2	10.5	-
HCM Lane LOS	-	-	D	B	-
HCM 95th %tile Q(veh)	-	-	2.5	0.6	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection						
Int Delay, s/veh	2.9					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	117	39	795	49	138	920
Future Vol, veh/h	117	39	795	49	138	920
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	-	-	-	0	-
Veh in Median Storage, #	2	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	117	39	795	49	138	920

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1556	422	0	0	844	0
Stage 1	820	-	-	-	-	-
Stage 2	736	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	~ 104	580	-	-	788	-
Stage 1	393	-	-	-	-	-
Stage 2	435	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 86	580	-	-	788	-
Mov Cap-2 Maneuver	264	-	-	-	-	-
Stage 1	393	-	-	-	-	-
Stage 2	359	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	28.4	0	1.4
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	306	788	-
HCM Lane V/C Ratio	-	-	0.51	0.175	-
HCM Control Delay (s)	-	-	28.4	10.5	-
HCM Lane LOS	-	-	D	B	-
HCM 95th %tile Q(veh)	-	-	2.7	0.6	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	590	10	1	88	0	3
Future Vol, veh/h	590	10	1	88	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	110	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	590	10	1	88	0	3

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	600	0	-	300
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.14	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.22	-	-	3.32
Pot Cap-1 Maneuver	-	-	973	-	0	696
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	973	-	-	696
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	10.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	696	-	-	973	-
HCM Lane V/C Ratio	0.004	-	-	0.001	-
HCM Control Delay (s)	10.2	-	-	8.7	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-

Intersection	
Intersection Delay, s/veh	36.9
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	6	2	239	20	350	8	58	429	449	64	1
Future Vol, veh/h	0	6	2	239	20	350	8	58	429	449	64	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	6	2	239	20	350	8	58	429	449	64	1
Number of Lanes	0	1	0	0	1	1	0	1	1	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	1	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	1	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	1
HCM Control Delay	12.7	22.2	30.6	60.9
HCM LOS	B	C	D	F

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	12%	0%	0%	92%	0%	100%	0%
Vol Thru, %	88%	0%	75%	8%	0%	0%	98%
Vol Right, %	0%	100%	25%	0%	100%	0%	2%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	66	429	8	259	350	449	65
LT Vol	8	0	0	239	0	449	0
Through Vol	58	0	6	20	0	0	64
RT Vol	0	429	2	0	350	0	1
Lane Flow Rate	66	429	8	259	350	449	65
Geometry Grp	7	7	6	7	7	7	7
Degree of Util (X)	0.14	0.817	0.021	0.583	0.671	0.99	0.134
Departure Headway (Hd)	7.643	6.859	9.437	8.098	6.905	7.937	7.412
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	469	528	378	445	525	458	484
Service Time	5.387	4.602	7.525	5.839	4.646	5.68	5.155
HCM Lane V/C Ratio	0.141	0.813	0.021	0.582	0.667	0.98	0.134
HCM Control Delay	11.6	33.5	12.7	21.6	22.7	68.1	11.3
HCM Lane LOS	B	D	B	C	C	F	B
HCM 95th-tile Q	0.5	8	0.1	3.6	5	12.7	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	152	600	77	215	405	90	105	721	266	155	592	118
Future Volume (veh/h)	152	600	77	215	405	90	105	721	266	155	592	118
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	152	600	77	215	405	90	105	721	266	155	592	118
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	191	732	94	314	616	136	180	898	400	195	1090	484
Arrive On Green	0.11	0.23	0.23	0.09	0.21	0.21	0.05	0.25	0.25	0.11	0.31	0.31
Sat Flow, veh/h	1781	3168	406	3456	2894	637	3456	3554	1585	1781	3554	1577
Grp Volume(v), veh/h	152	336	341	215	247	248	105	721	266	155	592	118
Grp Sat Flow(s),veh/h/ln	1781	1777	1797	1728	1777	1755	1728	1777	1585	1781	1777	1577
Q Serve(g_s), s	5.5	11.8	11.9	4.0	8.4	8.5	2.0	12.6	10.0	5.6	9.2	3.7
Cycle Q Clear(g_c), s	5.5	11.8	11.9	4.0	8.4	8.5	2.0	12.6	10.0	5.6	9.2	3.7
Prop In Lane	1.00		0.23	1.00		0.36	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	191	411	415	314	378	374	180	898	400	195	1090	484
V/C Ratio(X)	0.80	0.82	0.82	0.69	0.65	0.66	0.58	0.80	0.66	0.80	0.54	0.24
Avail Cap(c_a), veh/h	674	1076	1088	1308	1076	1062	1308	3766	1680	674	3766	1671
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.8	24.1	24.1	29.1	23.8	23.8	30.6	23.1	22.2	28.7	19.0	17.2
Incr Delay (d2), s/veh	2.8	1.6	1.6	1.0	0.7	0.8	1.1	0.6	0.7	2.8	0.2	0.1
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	2.3	4.6	4.7	1.6	3.3	3.3	0.8	4.8	3.4	2.4	3.3	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	31.6	25.6	25.7	30.1	24.5	24.6	31.7	23.8	22.9	31.5	19.2	17.2
LnGrp LOS	C	C	C	C	C	C	C	C	C	C	B	B
Approach Vol, veh/h		829			710			1092			865	
Approach Delay, s/veh		26.7			26.2			24.3			21.1	
Approach LOS		C			C			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.7	25.7	12.6	19.1	12.3	22.1	11.4	20.3				
Change Period (Y+Rc), s	* 5.3	* 5.4	5.5	* 5	* 5.1	* 5.4	* 5.4	* 5				
Max Green Setting (Gmax), s	* 25	* 70	25.0	* 40	* 25	* 70	* 25	* 40				
Max Q Clear Time (g_c+I1), s	4.0	11.2	7.5	10.5	7.6	14.6	6.0	13.9				
Green Ext Time (p_c), s	0.1	1.4	0.0	0.9	0.1	1.8	0.1	1.2				
Intersection Summary												
HCM 6th Ctrl Delay			24.5									
HCM 6th LOS			C									
Notes												

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection						
Int Delay, s/veh	1.4					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	153	93	1088	905	18
Future Vol, veh/h	0	153	93	1088	905	18
Conflicting Peds, #/hr	0	2	2	0	0	2
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	140	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	153	93	1088	905	18

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	466	925	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	4.14	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	0	543	734	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	541	733	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.3	0.8	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	733	-	541	-	-
HCM Lane V/C Ratio	0.127	-	0.283	-	-
HCM Control Delay (s)	10.6	-	14.3	-	-
HCM Lane LOS	B	-	B	-	-
HCM 95th %tile Q(veh)	0.4	-	1.2	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	1	4	90	4	74	30	1015	128	77	916	13
Future Volume (veh/h)	17	1	4	90	4	74	30	1015	128	77	916	13
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
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	17	1	4	93	0	74	30	1015	128	77	916	13
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	26	2	24	274	0	121	35	1759	222	99	2110	30
Arrive On Green	0.02	0.02	0.02	0.08	0.00	0.08	0.02	0.55	0.55	0.06	0.59	0.59
Sat Flow, veh/h	1687	99	1585	3563	0	1579	1781	3174	400	1781	3587	51
Grp Volume(v), veh/h	18	0	4	93	0	74	30	568	575	77	454	475
Grp Sat Flow(s),veh/h/ln	1786	0	1585	1781	0	1579	1781	1777	1797	1781	1777	1861
Q Serve(g_s), s	0.6	0.0	0.2	1.6	0.0	2.9	1.1	13.3	13.3	2.7	8.9	8.9
Cycle Q Clear(g_c), s	0.6	0.0	0.2	1.6	0.0	2.9	1.1	13.3	13.3	2.7	8.9	8.9
Prop In Lane	0.94		1.00	1.00		1.00	1.00		0.22	1.00		0.03
Lane Grp Cap(c), veh/h	27	0	24	274	0	121	35	985	996	99	1045	1095
V/C Ratio(X)	0.66	0.00	0.17	0.34	0.00	0.61	0.85	0.58	0.58	0.78	0.43	0.43
Avail Cap(c_a), veh/h	1127	0	1001	2249	0	997	703	1963	1985	703	1963	2056
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	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.0	0.0	30.8	27.7	0.0	28.3	31.0	9.2	9.3	29.5	7.2	7.2
Incr Delay (d2), s/veh	9.8	0.0	1.2	0.3	0.0	1.8	17.9	1.0	1.0	5.0	0.1	0.1
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	0.3	0.0	0.1	0.6	0.0	1.1	0.6	4.1	4.1	1.2	2.4	2.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.8	0.0	32.0	28.0	0.0	30.2	48.9	10.3	10.3	34.5	7.3	7.3
LnGrp LOS	D	A	C	C	A	C	D	B	B	C	A	A
Approach Vol, veh/h		22			167			1173			1006	
Approach Delay, s/veh		39.2			29.0			11.3			9.4	
Approach LOS		D			C			B			A	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.6	42.3		9.5	7.7	40.1		6.1				
Change Period (Y+Rc), s	* 4.3	5.0		* 4.6	* 4.2	* 5		5.1				
Max Green Setting (Gmax), s	* 25	70.0		* 40	* 25	* 70		40.0				
Max Q Clear Time (g_c+I1), s	3.1	10.9		4.9	4.7	15.3		2.6				
Green Ext Time (p_c), s	0.0	1.8		0.1	0.0	19.8		0.0				
Intersection Summary												
HCM 6th Ctrl Delay			12.0									
HCM 6th LOS			B									

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	262	62	429	23	53	62	392	859	6	71	857	100
Future Volume (veh/h)	262	62	429	23	53	62	392	859	6	71	857	100
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.99	1.00		0.99
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	162	202	429	23	53	62	392	859	6	71	857	100
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	519	545	454	33	75	93	450	1546	11	91	1568	182
Arrive On Green	0.29	0.29	0.29	0.06	0.06	0.06	0.13	0.43	0.43	0.05	0.34	0.34
Sat Flow, veh/h	1781	1870	1557	558	1285	1585	3456	3617	25	1781	4631	538
Grp Volume(v), veh/h	162	202	429	76	0	62	392	422	443	71	629	328
Grp Sat Flow(s),veh/h/ln	1781	1870	1557	1842	0	1585	1728	1777	1866	1781	1702	1765
Q Serve(g_s), s	8.3	10.0	31.4	4.7	0.0	4.5	13.0	20.8	20.8	4.6	17.4	17.6
Cycle Q Clear(g_c), s	8.3	10.0	31.4	4.7	0.0	4.5	13.0	20.8	20.8	4.6	17.4	17.6
Prop In Lane	1.00		1.00	0.30		1.00	1.00		0.01	1.00		0.30
Lane Grp Cap(c), veh/h	519	545	454	108	0	93	450	759	797	91	1153	598
V/C Ratio(X)	0.31	0.37	0.95	0.70	0.00	0.67	0.87	0.56	0.56	0.78	0.55	0.55
Avail Cap(c_a), veh/h	612	643	535	633	0	545	742	1068	1122	383	2047	1061
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.2	32.8	40.4	53.8	0.0	53.7	49.7	25.0	25.0	54.6	31.2	31.3
Incr Delay (d2), s/veh	0.1	0.2	22.8	3.1	0.0	3.1	3.3	2.2	2.1	5.4	1.4	2.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.6	4.5	14.6	2.3	0.0	1.8	5.7	8.9	9.3	2.2	7.2	7.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	32.3	32.9	63.1	56.9	0.0	56.7	53.0	27.2	27.1	60.0	32.6	34.0
LnGrp LOS	C	C	E	E	A	E	D	C	C	E	C	C
Approach Vol, veh/h		793			138			1257			1028	
Approach Delay, s/veh		49.1			56.8			35.2			34.9	
Approach LOS		D			E			D			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	20.7	44.6		11.9	10.3	54.9		39.2				
Change Period (Y+Rc), s	5.5	* 5.2		* 5.1	* 4.4	* 5.2		5.3				
Max Green Setting (Gmax), s	25.0	* 70		* 40	* 25	* 70		40.0				
Max Q Clear Time (g_c+I1), s	15.0	19.6		6.7	6.6	22.8		33.4				
Green Ext Time (p_c), s	0.2	19.8		0.2	0.0	16.9		0.5				

Intersection Summary			
HCM 6th Ctrl Delay			39.5
HCM 6th LOS			D

Notes
User approved volume balancing among the lanes for turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	814	110	15	637	7	85	2	13	34	9	5
Future Volume (veh/h)	4	814	110	15	637	7	85	2	13	34	9	5
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		1.00	1.00		0.99
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	4	814	110	15	637	7	85	2	13	34	9	5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	6	1069	144	21	1236	14	117	14	92	78	49	27
Arrive On Green	0.00	0.34	0.34	0.01	0.34	0.34	0.07	0.07	0.07	0.04	0.04	0.04
Sat Flow, veh/h	1781	3136	424	1781	3599	40	1781	216	1402	1781	1123	624
Grp Volume(v), veh/h	4	461	463	15	314	330	85	0	15	34	0	14
Grp Sat Flow(s),veh/h/ln	1781	1777	1783	1781	1777	1862	1781	0	1618	1781	0	1748
Q Serve(g_s), s	0.1	8.0	8.0	0.3	4.9	4.9	1.6	0.0	0.3	0.6	0.0	0.3
Cycle Q Clear(g_c), s	0.1	8.0	8.0	0.3	4.9	4.9	1.6	0.0	0.3	0.6	0.0	0.3
Prop In Lane	1.00		0.24	1.00		0.02	1.00		0.87	1.00		0.36
Lane Grp Cap(c), veh/h	6	606	608	21	610	640	117	0	106	78	0	76
V/C Ratio(X)	0.69	0.76	0.76	0.72	0.52	0.52	0.73	0.00	0.14	0.44	0.00	0.18
Avail Cap(c_a), veh/h	1281	3579	3591	1281	3579	3751	2050	0	1862	2050	0	2012
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	17.3	10.2	10.2	17.1	9.1	9.1	15.9	0.0	15.3	16.2	0.0	16.0
Incr Delay (d2), s/veh	41.8	0.8	0.8	16.1	0.3	0.2	3.2	0.0	0.2	1.4	0.0	0.4
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	0.1	2.0	2.0	0.2	1.2	1.2	0.7	0.0	0.1	0.3	0.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	59.1	10.9	10.9	33.2	9.3	9.3	19.1	0.0	15.5	17.6	0.0	16.4
LnGrp LOS	E	B	B	C	A	A	B	A	B	B	A	B
Approach Vol, veh/h		928			659			100			48	
Approach Delay, s/veh		11.2			9.9			18.6			17.3	
Approach LOS		B			A			B			B	

Timer - Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		6.3	4.7	16.7		7.0	4.8	16.6
Change Period (Y+Rc), s		* 4.8	* 4.6	4.8		4.7	* 4.4	* 4.8
Max Green Setting (Gmax), s		* 40	* 25	70.0		40.0	* 25	* 70
Max Q Clear Time (g_c+I1), s		2.6	2.1	6.9		3.6	2.3	10.0
Green Ext Time (p_c), s		0.1	0.0	1.1		0.1	0.0	1.8

Intersection Summary			
HCM 6th Ctrl Delay			11.3
HCM 6th LOS			B

Notes
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	5.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	28	0	0	1	0	38	0	32	0	64	38	18
Future Vol, veh/h	28	0	0	1	0	38	0	32	0	64	38	18
Conflicting Peds, #/hr	0	0	0	8	0	11	0	0	8	9	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	28	0	0	1	0	38	0	32	0	64	38	18

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	237	216	55	224	225	52	56	0	0	41	0	0
Stage 1	175	175	-	41	41	-	-	-	-	-	-	-
Stage 2	62	41	-	183	184	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	717	682	1012	732	674	1016	1549	-	-	1568	-	-
Stage 1	827	754	-	974	861	-	-	-	-	-	-	-
Stage 2	949	861	-	819	747	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	660	647	1004	697	639	997	1549	-	-	1555	-	-
Mov Cap-2 Maneuver	660	647	-	697	639	-	-	-	-	-	-	-
Stage 1	827	722	-	965	853	-	-	-	-	-	-	-
Stage 2	903	853	-	778	715	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.7	8.8	0	4
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1549	-	-	660	986	1555	-	-
HCM Lane V/C Ratio	-	-	-	0.042	0.04	0.041	-	-
HCM Control Delay (s)	0	-	-	10.7	8.8	7.4	0	-
HCM Lane LOS	A	-	-	B	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.1	0.1	-	-

Intersection	
Int Delay, s/veh	1.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	854	174	0	59	0	110
Future Vol, veh/h	854	174	0	59	0	110
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	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	854	174	0	59	0	110

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	514
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	-	-	0	-	0	505
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	505
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	14.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	505	-	-	-
HCM Lane V/C Ratio	0.218	-	-	-
HCM Control Delay (s)	14.1	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.8	-	-	-

Intersection						
Int Delay, s/veh	0.6					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	84	1002	73	0	884
Future Vol, veh/h	0	84	1002	73	0	884
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	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	84	1002	73	0	884

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	538	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	488	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	488	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.9	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	488	-
HCM Lane V/C Ratio	-	-	0.172	-
HCM Control Delay (s)	-	-	13.9	-
HCM Lane LOS	-	-	B	-
HCM 95th %tile Q(veh)	-	-	0.6	-

Intersection						
Int Delay, s/veh	0.7					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	109	1072	37	0	1058
Future Vol, veh/h	0	109	1072	37	0	1058
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	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	109	1072	37	0	1058

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	555	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	475	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	475	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.8	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	475	-
HCM Lane V/C Ratio	-	-	0.229	-
HCM Control Delay (s)	-	-	14.8	-
HCM Lane LOS	-	-	B	-
HCM 95th %tile Q(veh)	-	-	0.9	-

Intersection						
Int Delay, s/veh	1.8					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	77	27	1082	39	96	963
Future Vol, veh/h	77	27	1082	39	96	963
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	-	-	-	0	-
Veh in Median Storage, #	2	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	77	27	1082	39	96	963

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1776	561	0	0	1121	0
Stage 1	1102	-	-	-	-	-
Stage 2	674	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	~ 74	471	-	-	619	-
Stage 1	280	-	-	-	-	-
Stage 2	468	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 63	471	-	-	619	-
Mov Cap-2 Maneuver	223	-	-	-	-	-
Stage 1	280	-	-	-	-	-
Stage 2	395	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	28.1	0	1.1
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	258	619	-
HCM Lane V/C Ratio	-	-	0.403	0.155	-
HCM Control Delay (s)	-	-	28.1	11.9	-
HCM Lane LOS	-	-	D	B	-
HCM 95th %tile Q(veh)	-	-	1.8	0.5	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection						
Int Delay, s/veh	1.9					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	85	26	1095	34	93	947
Future Vol, veh/h	85	26	1095	34	93	947
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	-	-	-	0	-
Veh in Median Storage, #	2	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	85	26	1095	34	93	947

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1772	565	0	0	1129	0
Stage 1	1112	-	-	-	-	-
Stage 2	660	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	~ 74	468	-	-	615	-
Stage 1	276	-	-	-	-	-
Stage 2	476	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 63	468	-	-	615	-
Mov Cap-2 Maneuver	223	-	-	-	-	-
Stage 1	276	-	-	-	-	-
Stage 2	404	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	29.7	0	1.1
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	254	615	-
HCM Lane V/C Ratio	-	-	0.437	0.151	-
HCM Control Delay (s)	-	-	29.7	11.9	-
HCM Lane LOS	-	-	D	B	-
HCM 95th %tile Q(veh)	-	-	2.1	0.5	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	939	31	3	59	0	2
Future Vol, veh/h	939	31	3	59	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	110	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	939	31	3	59	0	2

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	970	0	-	485
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.14	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.22	-	-	3.32
Pot Cap-1 Maneuver	-	-	706	-	0	528
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	706	-	-	528
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	11.8
HCM LOS			B

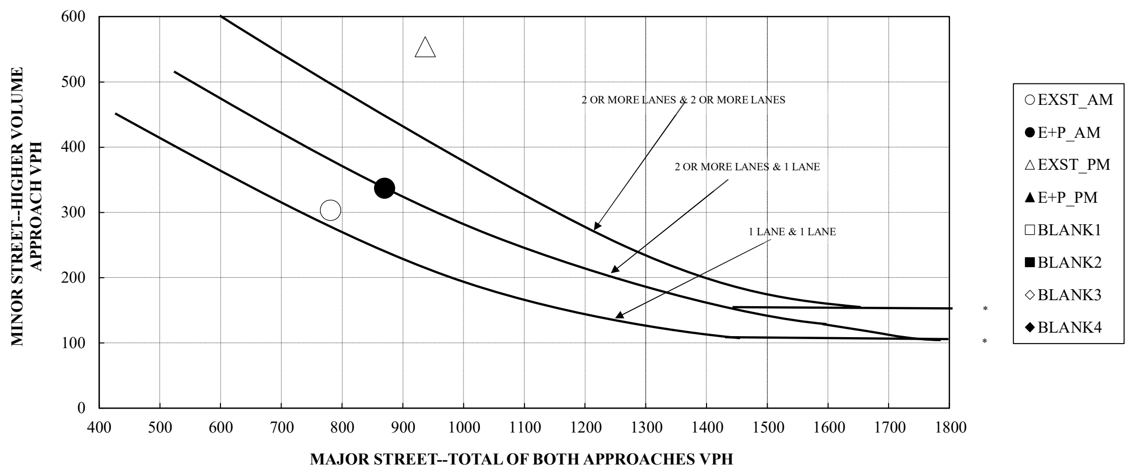
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	528	-	-	706	-
HCM Lane V/C Ratio	0.004	-	-	0.004	-
HCM Control Delay (s)	11.8	-	-	10.1	-
HCM Lane LOS	B	-	-	B	-
HCM 95th %tile Q(veh)	0	-	-	0	-

Attachment D:
CA MUTCD Peak Hour Signal Warrant #3 Worksheets

CA SIGNAL WARRANT 3 ANALYSIS

SCENARIOS: "AM & PM PEAK HOUR" CONDITIONS

FIGURE 4C-3 WARRANT 3 PEAK HOUR VOLUME (CALIFORNIA MUTCD)



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

SCENARIO	APPROACH(ES) MAJOR	APPROACH(ES) MINOR	WARRANT MET?
EXST_AM	781	303	YES
E+P_AM	870	337	YES
EXST_PM	937	554	YES
E+P_PM	1009	609	YES
BLANK1	0	0	
BLANK2	0	0	
BLANK3	0	0	
BLANK4	0	0	

Note: Major approach is the total of both approaches. Minor approach is the highest of both approaches.

Date: **October 4, 2022**

Intersection No.: **1**

Intersection: **Winding Way & College Oak Dr**

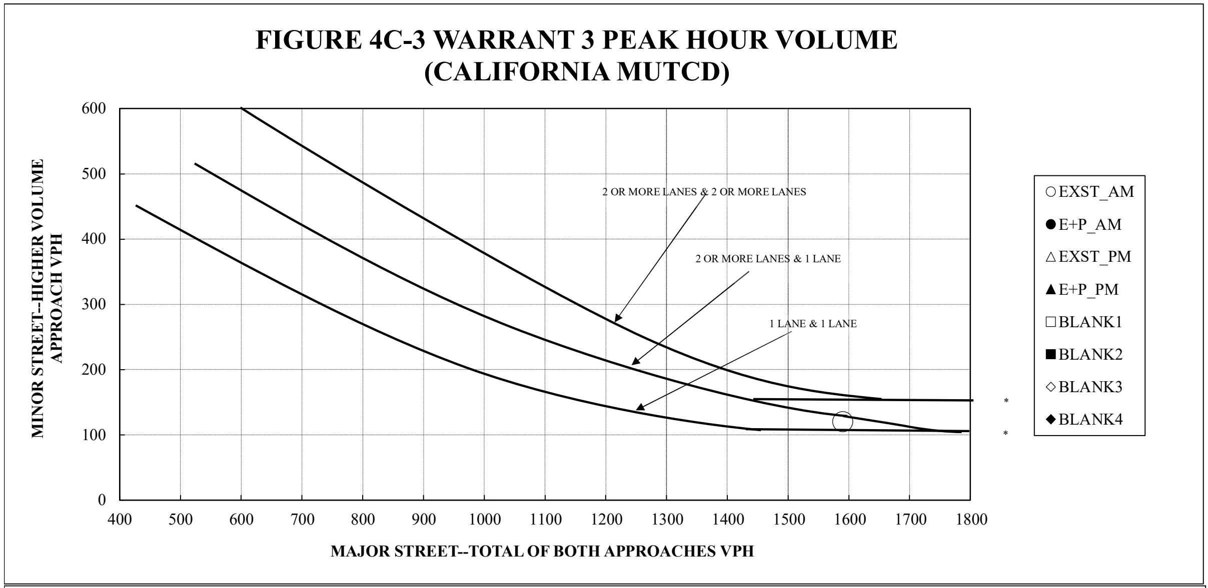
Number of lanes on MAJOR street: **1**

Number of lanes on MINOR street: **1**

WOOD RODGERS
DEVELOPING INNOVATIVE DESIGN SOLUTIONS

CA SIGNAL WARRANT 3 ANALYSIS

SCENARIOS: "AM & PM PEAK HOUR" CONDITIONS



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

SCENARIO	APPROACH(ES) MAJOR	APPROACH(ES) MINOR	WARRANT MET?
EXST_AM	1590	120	YES
E+P_AM	1938	120	YES
EXST_PM	1887	153	YES
E+P_PM	2104	153	YES
BLANK1	0	0	
BLANK2	0	0	
BLANK3	0	0	
BLANK4	0	0	

Note: Major approach is the total of both approaches. Minor approach is the highest of both approaches.

Date: **October 4, 2022**

Intersection No.: **3**

Intersection: **Manzanita Ave & Windmill Way**

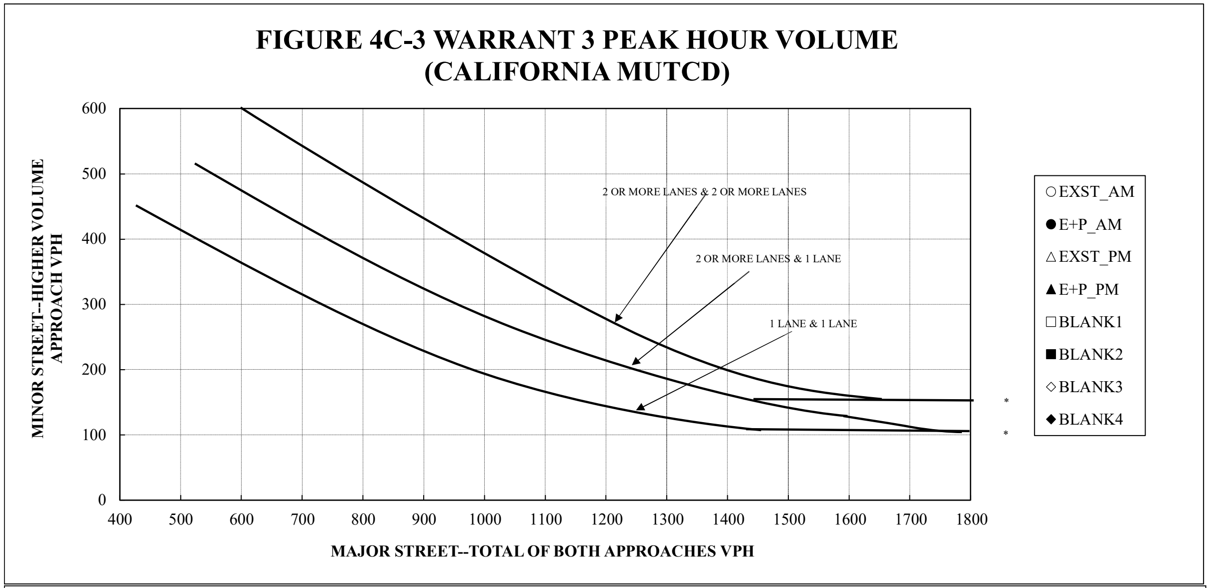
Number of lanes on MAJOR street: **2**

Number of lanes on MINOR street: **1**

WOOD RODGERS
DEVELOPING INNOVATIVE DESIGN SOLUTIONS

CA SIGNAL WARRANT 3 ANALYSIS

SCENARIOS: "AM & PM PEAK HOUR" CONDITIONS



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

SCENARIO	APPROACH(ES) MAJOR	APPROACH(ES) MINOR	WARRANT MET?
EXST_AM	84	58	NO
E+P_AM	100	57	NO
EXST_PM	134	39	NO
E+P_PM	152	39	NO
BLANK1	0	0	
BLANK2	0	0	
BLANK3	0	0	
BLANK4	0	0	

Note: Major approach is the total of both approaches. Minor approach is the highest of both approaches.

Date: October 4, 2022

Intersection No.: 7

Intersection: **Rampart Dr/Mary Lynn Ln & Residential Project Dwy 1**

Number of lanes on MAJOR street: 1

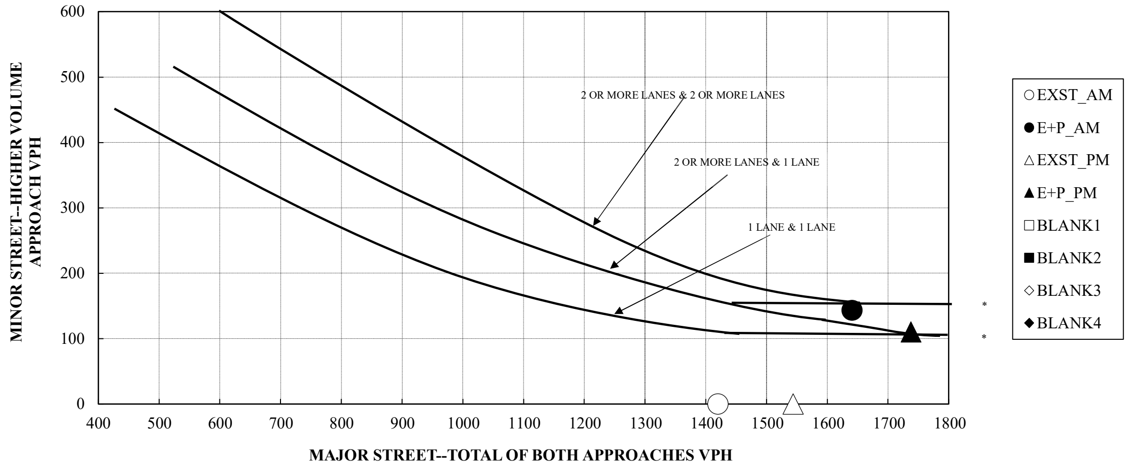
Number of lanes on MINOR street: 1

WOOD RODGERS
DEVELOPING INNOVATIVE DESIGN SOLUTIONS

CA SIGNAL WARRANT 3 ANALYSIS

SCENARIOS: "AM & PM PEAK HOUR" CONDITIONS

FIGURE 4C-3 WARRANT 3 PEAK HOUR VOLUME (CALIFORNIA MUTCD)



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

SCENARIO	APPROACH(ES) MAJOR	APPROACH(ES) MINOR	WARRANT MET?
EXST_AM	1420	0	NO
E+P_AM	1641	143	YES
EXST_PM	1544	0	NO
E+P_PM	1738	110	YES
BLANK1	0	0	
BLANK2	0	0	
BLANK3	0	0	
BLANK4	0	0	

Note: Major approach is the total of both approaches. Minor approach is the highest of both approaches.

Date: **October 4, 2022**

Intersection No.: **8**

Intersection: **Commercial Project Dwy 1 & Winding Way**

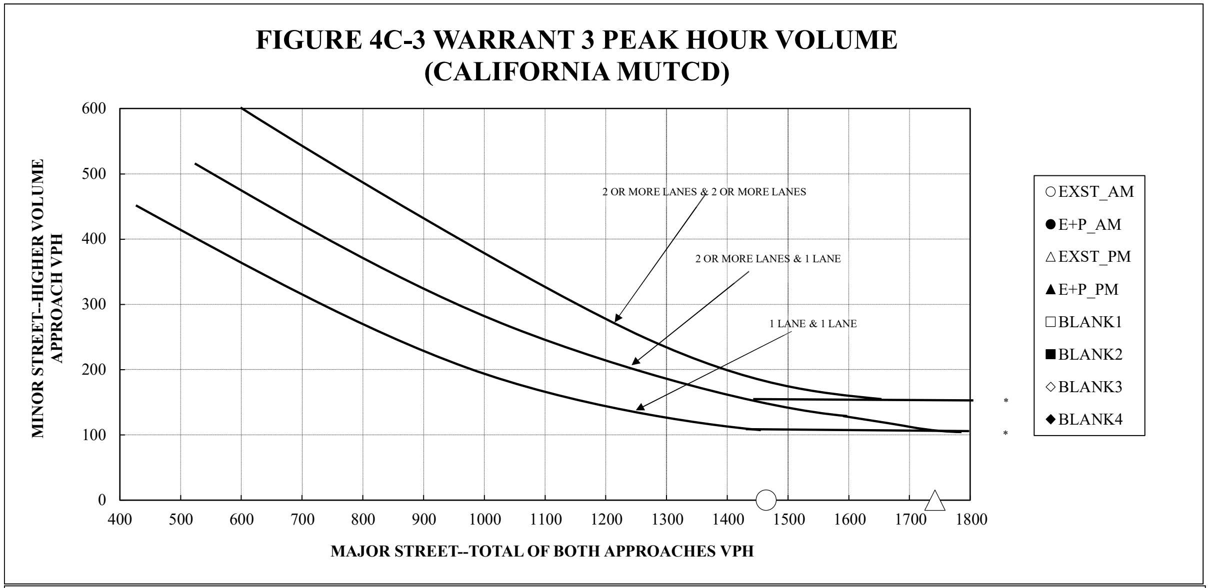
Number of lanes on MAJOR street: **2**

Number of lanes on MINOR street: **1**

WOOD RODGERS
DEVELOPING INNOVATIVE DESIGN SOLUTIONS

CA SIGNAL WARRANT 3 ANALYSIS

SCENARIOS: "AM & PM PEAK HOUR" CONDITIONS



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

SCENARIO	APPROACH(ES) MAJOR	APPROACH(ES) MINOR	WARRANT MET?
EXST_AM	1464	0	NO
E+P_AM	1812	104	YES
EXST_PM	1742	0	NO
E+P_PM	1959	84	NO
BLANK1	0	0	
BLANK2	0	0	
BLANK3	0	0	
BLANK4	0	0	

Note: Major approach is the total of both approaches. Minor approach is the highest of both approaches.

Date: **October 4, 2022**

Intersection No.: **9**

Intersection: **Manzanita Ave & Commercial Project Dwy 2**

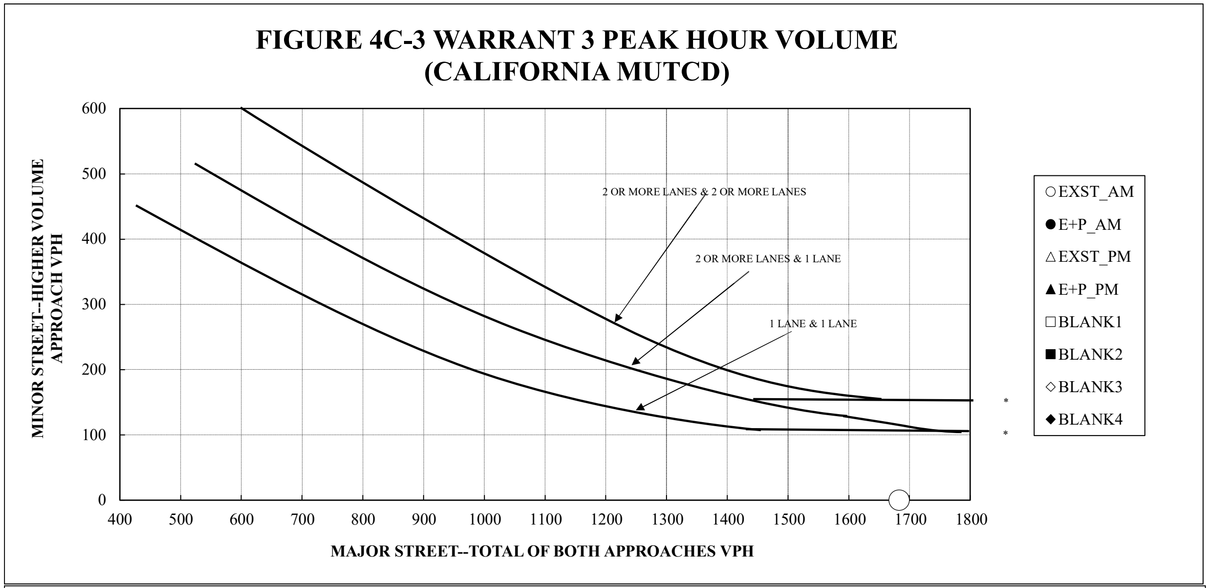
Number of lanes on MAJOR street: **2**

Number of lanes on MINOR street: **1**

WOOD RODGERS
DEVELOPING INNOVATIVE DESIGN SOLUTIONS

CA SIGNAL WARRANT 3 ANALYSIS

SCENARIOS: "AM & PM PEAK HOUR" CONDITIONS



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

SCENARIO	APPROACH(ES) MAJOR	APPROACH(ES) MINOR	WARRANT MET?
EXST_AM	1683	0	NO
E+P_AM	1909	172	YES
EXST_PM	2022	0	NO
E+P_PM	2167	109	YES
BLANK1	0	0	
BLANK2	0	0	
BLANK3	0	0	
BLANK4	0	0	

Note: Major approach is the total of both approaches. Minor approach is the highest of both approaches.

Date: **October 4, 2022**

Intersection No.: **10**

Intersection: **Manzanita Ave & Commercial Project Dwy 3**

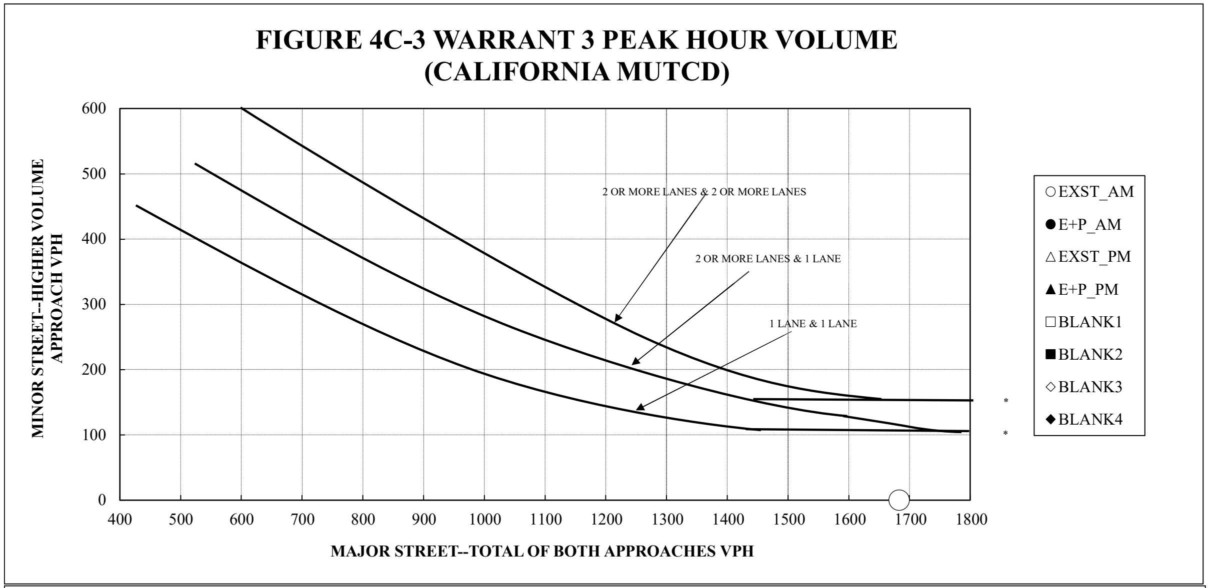
Number of lanes on MAJOR street: **2**

Number of lanes on MINOR street: **1**

WOOD RODGERS
DEVELOPING INNOVATIVE DESIGN SOLUTIONS

CA SIGNAL WARRANT 3 ANALYSIS

SCENARIOS: "AM & PM PEAK HOUR" CONDITIONS



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

SCENARIO	APPROACH(ES) MAJOR	APPROACH(ES) MINOR	WARRANT MET?
EXST_AM	1683	0	NO
E+P_AM	1926	147	YES
EXST_PM	2022	0	NO
E+P_PM	2180	104	YES
BLANK1	0	0	
BLANK2	0	0	
BLANK3	0	0	
BLANK4	0	0	

Note: Major approach is the total of both approaches. Minor approach is the highest of both approaches.

Date: October 4, 2022

Intersection No.: 11

Intersection: **Manzanita Ave & Commercial Project Dwy 4**

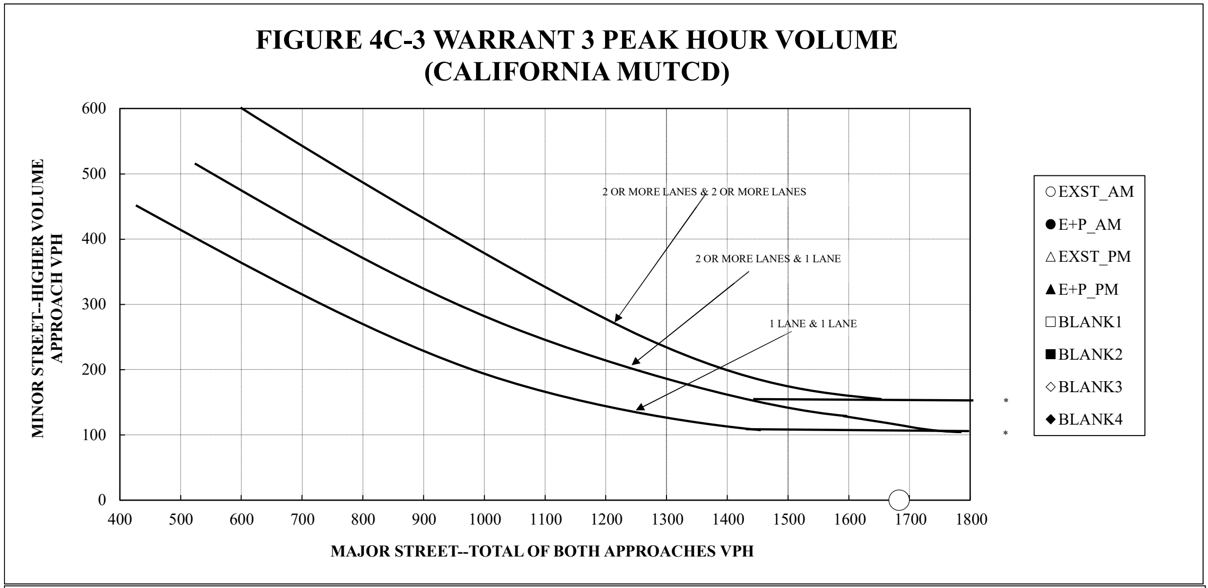
Number of lanes on MAJOR street: 2

Number of lanes on MINOR street: 1

WOOD RODGERS
DEVELOPING INNOVATIVE DESIGN SOLUTIONS

CA SIGNAL WARRANT 3 ANALYSIS

SCENARIOS: "AM & PM PEAK HOUR" CONDITIONS



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

SCENARIO	APPROACH(ES) MAJOR	APPROACH(ES) MINOR	WARRANT MET?
EXST_AM	1683	0	NO
E+P_AM	1902	156	YES
EXST_PM	2022	0	NO
E+P_PM	2169	111	YES
BLANK1	0	0	
BLANK2	0	0	
BLANK3	0	0	
BLANK4	0	0	

Note: Major approach is the total of both approaches. Minor approach is the highest of both approaches.

Date: **October 4, 2022**

Intersection No.: **12**

Intersection: **Manzanita Ave & Commercial Project Dwy 5**

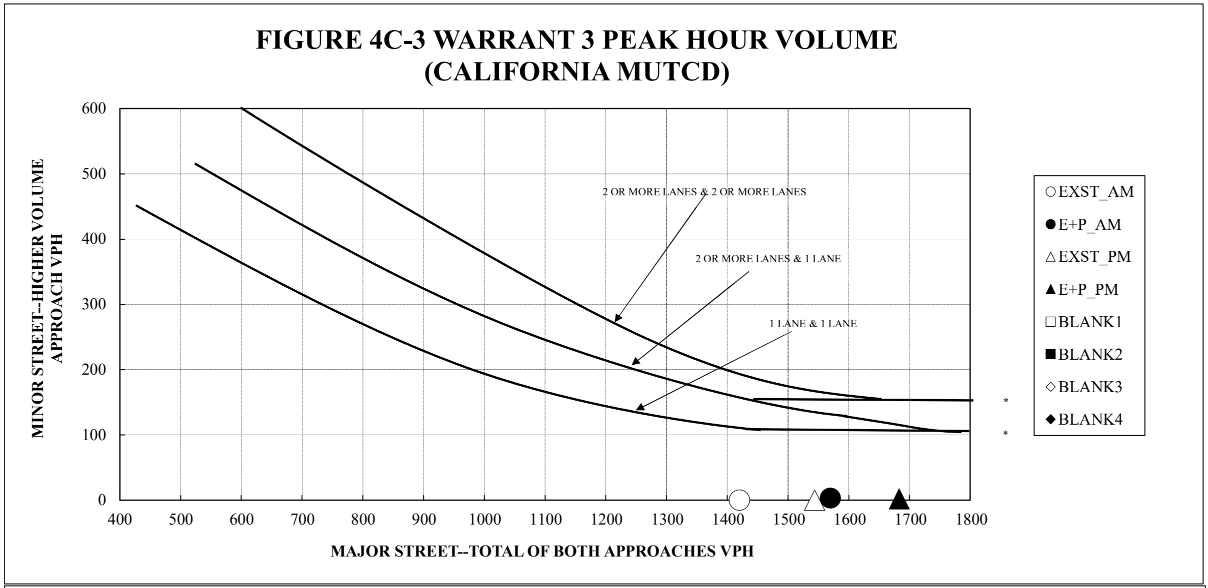
Number of lanes on MAJOR street: **2**

Number of lanes on MINOR street: **1**

WOOD RODGERS
DEVELOPING INNOVATIVE DESIGN SOLUTIONS

CA SIGNAL WARRANT 3 ANALYSIS

SCENARIOS: "AM & PM PEAK HOUR" CONDITIONS



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

SCENARIO	APPROACH(ES) MAJOR	APPROACH(ES) MINOR	WARRANT MET?
EXST_AM	1420	0	NO
E+P_AM	1570	3	NO
EXST_PM	1544	0	NO
E+P_PM	1683	2	NO
BLANK1	0	0	
BLANK2	0	0	
BLANK3	0	0	
BLANK4	0	0	

Note: Major approach is the total of both approaches. Minor approach is the highest of both approaches.

Date: **October 4, 2022**

Intersection No.: **13**

Intersection: **Residential Project Dwy 2 & Winding Way**

Number of lanes on MAJOR street: **2**

Number of lanes on MINOR street: **1**

WOOD RODGERS
DEVELOPING INNOVATIVE DESIGN SOLUTIONS

Attachment E:
Synchro Queueing Reports

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	120	379	220	661	41	468	123	60	589	102
v/c Ratio	0.50	0.37	0.48	0.69	0.30	0.55	0.28	0.37	0.59	0.21
Control Delay	43.1	24.5	38.5	30.5	45.4	30.3	13.5	45.0	28.5	11.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.1	24.5	38.5	30.5	45.4	30.3	13.5	45.0	28.5	11.7
Queue Length 50th (ft)	55	77	52	151	19	104	15	28	133	10
Queue Length 95th (ft)	131	142	108	264	61	192	67	80	238	55
Internal Link Dist (ft)		1032		683		350			930	
Turn Bay Length (ft)	310		180		190		105	265		150
Base Capacity (vph)	624	2009	1211	1965	624	3090	1375	624	3092	1363
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.19	0.18	0.34	0.07	0.15	0.09	0.10	0.19	0.07

Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	12	5	49	51	72	19	695	46	882
v/c Ratio	0.06	0.02	0.21	0.22	0.27	0.12	0.40	0.24	0.44
Control Delay	29.9	0.2	29.7	29.8	11.4	37.4	15.2	35.5	12.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.9	0.2	29.7	29.8	11.4	37.4	15.2	35.5	12.7
Queue Length 50th (ft)	3	0	12	12	0	5	58	11	40
Queue Length 95th (ft)	23	0	65	67	38	37	269	68	345
Internal Link Dist (ft)	241			1195			528		2627
Turn Bay Length (ft)			140		140	190		190	
Base Capacity (vph)	1455	1226	1313	1317	1222	899	3260	899	3284
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.00	0.04	0.04	0.06	0.02	0.21	0.05	0.27

Intersection Summary

Lane Group	EBL	EBT	EBR	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	89	93	277	31	36	320	579	23	944
v/c Ratio	0.40	0.41	0.62	0.49	0.18	0.60	0.28	0.22	0.47
Control Delay	45.0	44.8	11.8	73.7	4.8	43.9	13.0	55.3	22.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.0	44.8	11.8	73.7	4.8	43.9	13.0	55.3	22.3
Queue Length 50th (ft)	47	49	0	16	0	81	66	12	128
Queue Length 95th (ft)	122	126	75	63	10	190	214	51	282
Internal Link Dist (ft)		1111		277			658		528
Turn Bay Length (ft)	330		165			190		190	
Base Capacity (vph)	851	884	927	370	834	1086	2879	560	4030
Starvation Cap Reductn	0	0	0	0	0	0	0	0	44
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.11	0.30	0.08	0.04	0.29	0.20	0.04	0.24

Intersection Summary

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	3	584	12	894	104	16	12	13
v/c Ratio	0.02	0.34	0.08	0.52	0.36	0.06	0.05	0.05
Control Delay	33.0	12.8	32.1	14.6	28.2	16.5	23.8	19.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.0	12.8	32.1	14.6	28.2	16.5	23.8	19.1
Queue Length 50th (ft)	1	53	3	93	26	1	3	2
Queue Length 95th (ft)	11	187	25	302	106	20	20	18
Internal Link Dist (ft)		683		1082		349		370
Turn Bay Length (ft)	70		90		70			
Base Capacity (vph)	905	3337	905	3364	1433	1326	1433	1385
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	0.00	0.18	0.01	0.27	0.07	0.01	0.01	0.01

Intersection Summary

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	152	582	177	474	36	679	232	96	601	118
v/c Ratio	0.59	0.64	0.48	0.65	0.30	0.70	0.45	0.50	0.45	0.19
Control Delay	47.7	32.7	44.7	36.2	51.6	33.5	18.2	50.2	24.1	10.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.7	32.7	44.7	36.2	51.6	33.5	18.2	50.2	24.1	10.1
Queue Length 50th (ft)	73	138	44	114	18	162	49	47	130	12
Queue Length 95th (ft)	180	254	105	220	62	311	149	127	251	60
Internal Link Dist (ft)		1032		683		350			930	
Turn Bay Length (ft)	310		180		190		105	265		150
Base Capacity (vph)	551	1786	1070	1720	551	2949	1337	551	2952	1311
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.33	0.17	0.28	0.07	0.23	0.17	0.17	0.20	0.09

Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	18	4	47	47	65	30	1077	67	873
v/c Ratio	0.14	0.02	0.25	0.25	0.28	0.22	0.55	0.36	0.40
Control Delay	45.1	0.2	38.0	38.0	13.5	45.3	13.9	43.2	10.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.1	0.2	38.0	38.0	13.5	45.3	13.9	43.2	10.5
Queue Length 50th (ft)	7	0	17	17	0	11	121	24	83
Queue Length 95th (ft)	38	0	68	68	39	54	372	95	265
Internal Link Dist (ft)	241			1195			528		2627
Turn Bay Length (ft)			140		140	190		190	
Base Capacity (vph)	1122	977	1012	1019	965	666	3081	666	3133
Starvation Cap Reductn	0	0	0	0	0	0	85	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.00	0.05	0.05	0.07	0.05	0.36	0.10	0.28

Intersection Summary

Lane Group	EBL	EBT	EBR	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	155	157	429	76	62	392	811	71	901
v/c Ratio	0.69	0.68	0.74	0.60	0.15	0.73	0.57	0.56	0.58
Control Delay	73.1	72.4	13.5	70.9	10.4	64.0	34.2	82.8	40.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	73.1	72.4	13.5	70.9	10.4	64.0	34.2	82.8	40.4
Queue Length 50th (ft)	135	137	0	57	0	165	279	60	235
Queue Length 95th (ft)	251	254	110	143	39	282	456	136	354
Internal Link Dist (ft)		1111		277			658		528
Turn Bay Length (ft)	330		165			190		190	
Base Capacity (vph)	555	567	798	182	567	709	2064	365	2896
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.28	0.54	0.42	0.11	0.55	0.39	0.19	0.31

Intersection Summary

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	4	876	12	609	58	14	34	14
v/c Ratio	0.03	0.44	0.07	0.30	0.25	0.06	0.12	0.05
Control Delay	31.5	12.8	30.9	11.5	28.5	17.6	22.6	18.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.5	12.8	30.9	11.5	28.5	17.6	22.6	18.6
Queue Length 50th (ft)	1	84	3	54	15	1	8	2
Queue Length 95th (ft)	12	280	24	181	66	19	37	18
Internal Link Dist (ft)		683		1082		349		370
Turn Bay Length (ft)	70		90		70			
Base Capacity (vph)	1002	3344	1002	3395	1439	1321	1439	1422
Starvation Cap Reductn	0	429	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	0.00	0.30	0.01	0.18	0.04	0.01	0.02	0.01

Intersection Summary

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	120	500	276	693	150	530	166	126	590	102
v/c Ratio	0.55	0.55	0.58	0.73	0.46	0.66	0.39	0.56	0.64	0.23
Control Delay	50.3	30.1	43.6	35.0	46.5	37.1	17.2	50.0	33.7	12.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.3	30.1	43.6	35.0	46.5	37.1	17.2	50.0	33.7	12.5
Queue Length 50th (ft)	63	117	73	178	40	138	29	66	149	11
Queue Length 95th (ft)	147	211	146	310	90	250	102	152	262	58
Internal Link Dist (ft)		1032		158		223			930	
Turn Bay Length (ft)	310		180		190		105	265		150
Base Capacity (vph)	527	1657	1024	1661	1024	2859	1282	527	2910	1269
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.30	0.27	0.42	0.15	0.19	0.13	0.24	0.20	0.08

Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	12	5	49	51	89	19	777	62	968
v/c Ratio	0.06	0.02	0.23	0.24	0.33	0.14	0.46	0.31	0.48
Control Delay	32.9	0.2	32.8	32.9	12.0	40.6	16.3	37.9	13.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.9	0.2	32.8	32.9	12.0	40.6	16.3	37.9	13.8
Queue Length 50th (ft)	3	0	13	14	0	5	72	17	47
Queue Length 95th (ft)	25	0	69	71	44	39	312	89	386
Internal Link Dist (ft)	241			1195			528		2065
Turn Bay Length (ft)			140		140	190		190	
Base Capacity (vph)	1357	1147	1224	1228	1148	805	3234	805	3255
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.00	0.04	0.04	0.08	0.02	0.24	0.08	0.30

Intersection Summary

Lane Group	EBL	EBT	EBR	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	96	100	277	31	36	320	647	23	1030
v/c Ratio	0.44	0.44	0.63	0.53	0.19	0.61	0.32	0.23	0.49
Control Delay	49.3	49.1	12.2	81.6	4.8	46.9	13.9	59.4	22.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.3	49.1	12.2	81.6	4.8	46.9	13.9	59.4	22.4
Queue Length 50th (ft)	54	56	0	17	0	88	105	13	149
Queue Length 95th (ft)	138	144	79	66	10	201	242	53	315
Internal Link Dist (ft)		1111		277			658		528
Turn Bay Length (ft)	330		165			190		190	
Base Capacity (vph)	794	822	884	335	782	1014	2746	523	3832
Starvation Cap Reductn	0	0	0	0	0	0	0	0	100
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.12	0.31	0.09	0.05	0.32	0.24	0.04	0.28

Intersection Summary

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	3	638	13	942	145	17	12	13
v/c Ratio	0.02	0.39	0.09	0.57	0.42	0.05	0.05	0.06
Control Delay	36.3	14.1	35.3	16.1	28.7	16.0	27.0	21.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.3	14.1	35.3	16.1	28.7	16.0	27.0	21.7
Queue Length 50th (ft)	1	65	4	109	38	1	3	2
Queue Length 95th (ft)	12	221	27	346	147	20	22	19
Internal Link Dist (ft)		212		1082		349		370
Turn Bay Length (ft)	70		90		70			
Base Capacity (vph)	873	3284	873	3319	1385	1281	1385	1340
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	0.00	0.19	0.01	0.28	0.10	0.01	0.01	0.01

Intersection Summary

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	152	677	215	495	105	721	266	155	592	118
v/c Ratio	0.63	0.76	0.57	0.64	0.42	0.73	0.50	0.63	0.48	0.20
Control Delay	56.9	41.6	52.1	40.4	55.5	38.8	21.5	56.6	27.7	9.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.9	41.6	52.1	40.4	55.5	38.8	21.5	56.6	27.7	9.9
Queue Length 50th (ft)	92	206	67	145	33	214	74	94	150	13
Queue Length 95th (ft)	199	350	135	262	77	366	192	202	256	60
Internal Link Dist (ft)		1032		158		223			930	
Turn Bay Length (ft)	310		180		190		105	265		150
Base Capacity (vph)	466	1490	903	1453	903	2596	1192	466	2599	1151
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.45	0.24	0.34	0.12	0.28	0.22	0.33	0.23	0.10

Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	18	4	47	47	74	30	1143	77	929
v/c Ratio	0.15	0.03	0.27	0.27	0.33	0.25	0.58	0.42	0.40
Control Delay	49.2	0.2	42.1	42.0	14.5	49.7	14.3	47.2	9.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.2	0.2	42.1	42.0	14.5	49.7	14.3	47.2	9.8
Queue Length 50th (ft)	7	0	20	20	0	12	136	31	90
Queue Length 95th (ft)	40	0	72	72	43	56	407	112	283
Internal Link Dist (ft)	241			1195			528		2065
Turn Bay Length (ft)			140		140	190		190	
Base Capacity (vph)	1001	879	903	909	872	594	3017	594	3065
Starvation Cap Reductn	0	0	0	0	0	0	119	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.00	0.05	0.05	0.08	0.05	0.39	0.13	0.30

Intersection Summary

Lane Group	EBL	EBT	EBR	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	160	164	429	76	62	392	865	71	957
v/c Ratio	0.70	0.70	0.74	0.63	0.15	0.74	0.59	0.57	0.59
Control Delay	76.2	76.0	13.5	77.2	11.0	67.1	34.8	86.4	40.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	76.2	76.0	13.5	77.2	11.0	67.1	34.8	86.4	40.8
Queue Length 50th (ft)	146	150	0	60	0	173	312	63	260
Queue Length 95th (ft)	268	272	113	#156	40	292	493	139	378
Internal Link Dist (ft)		1111		277			658		528
Turn Bay Length (ft)	330		165			190		190	
Base Capacity (vph)	534	545	784	171	548	681	1985	351	2783
Starvation Cap Reductn	0	0	0	0	0	0	0	0	97
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.30	0.55	0.44	0.11	0.58	0.44	0.20	0.36

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	4	924	15	644	85	15	34	14
v/c Ratio	0.03	0.46	0.10	0.31	0.31	0.06	0.13	0.05
Control Delay	34.2	13.5	33.6	12.0	29.7	17.4	25.3	20.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.2	13.6	33.6	12.0	29.7	17.4	25.3	20.9
Queue Length 50th (ft)	1	100	4	63	24	1	10	3
Queue Length 95th (ft)	13	315	29	201	93	19	40	20
Internal Link Dist (ft)		212		1082		349		370
Turn Bay Length (ft)	70		90		70			
Base Capacity (vph)	945	3292	945	3350	1363	1251	1363	1347
Starvation Cap Reductn	0	632	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	0.00	0.35	0.02	0.19	0.06	0.01	0.02	0.01

Intersection Summary

Appendix H (part 2)

Transportation Impact Technical Memorandum

Memorandum

Date: October 17, 2023

To: David Rader, AECOM

From: Adrita Islam, Raina Joby, Jonathan Murillo

Subject: Winding Ranch Retail and Residential Project- Transportation Impacts Analysis

SA23-0220

Introduction

Purpose

This technical memorandum analyzes the Transportation Impacts associated with the proposed Winding Ranch Retail and Residential Project, which is proposed to be located at 4626 & 4450 Manzanita Way and 5900 Winding Way. This analysis was deemed necessary because the project requires a Community Plan Amendment and Rezone. This memorandum is divided into three sections including existing conditions near the project, followed by vehicle miles of travel (VMT) analysis, and CEQA Appendix G review.

Project Description

The project site is in the southeast corner of the Manzanita Avenue/Winding Way intersection in the unincorporated community of Carmichael/Old Foothill (APNs: 245-0011-012, -018, -020, & -021). The 24.8-acre project area is divided into commercial and residential land uses with 7.1 acres and 17.7 acres, respectively. The project falls within the Manzanita District as a part of the Fair Oaks Boulevard Corridor Plan area. The project plan consists of the following land uses:

- ***Shopping Center*** with a fueling station, convenience store, carwash and 5 retail tenant buildings, three with drive-thru components.
- **Single Family Residential –** Single Family units (RD-10) with 80 residential parcels.

The project also includes 240 units of Multifamily high-density residential section (RD-40). But this parcel is already zoned for high-density residential, and no changes are being proposed.

Vehicular access to the residential parcels would be provided by residential access streets on Winding Way and Rampart Drive. Four driveways along Manzanita Ave and one driveway on Winding Way would provide vehicular access to the shopping center. **Figure 1** shows the land use plan with access routes and access restrictions.

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Permitted Turning Movement

Stop Control

Figure 1

Winding Ranch Project Land Use Plan

Existing Conditions

This section describes and analyses the existing roadway network, transit facilities, bicycle facilities and pedestrian facilities in the project vicinity. Further, it discusses the collision history of the project site.

Roadway Network

Figure 2 shows key roadways in the project vicinity along with bike and pedestrian facilities discussed in sections that follow.

Regional Roadways

Interstate 80 (I-80) is a major interstate freeway corridor that connects major cities within Sacramento County and beyond. The closest interchange to the project site is the Madison Avenue interchange, which is approximately 2.6 miles away.

Local Roadways

Key local study area roadways area is listed below. The functional classifications (e.g., arterial, collector, etc.) of listed local roadways represent designations identifies in the Sacramento County General Plan. The number of lanes and posted speed limits of these roadways were obtained from Google Street view and their average daily traffic volume was taken from Sacramento County's Open GIS Data Portal.

- **Winding Way** is an east- west arterial that extends from Hazel Avenue in the east to College Oaks Drive in the west. It runs along the north end of the project and is planned to have two project access driveways. **Figure 1** shows the access restrictions.
    - *Lane Configuration:* Winding Way is a 4- lane road near the project site that narrows to two lanes west of Cameron Ranch Drive and east of San Juan Avenue.
    - *Average Daily Traffic:* Winding Way has average daily traffic volumes ranging from 3,000 to 22,000. Near the project site, the daily volume on Widing Way is about 15,500 vehicles[1].
    - *Speed Limit:* The posted speed limit is 40 mph on Winding Way near the project site. It reduces to 20 mph to the west near American River College. Towards the east, it reduces to 35 mph east of San Juan Avenue and 25 mph east of Sunrise Boulevard.

[1] ADT volumes are from the Traffic Counts listed in the Sacramento County's Open Data portal

https://data.saccounty.gov/datasets/traffic-count-data/explore

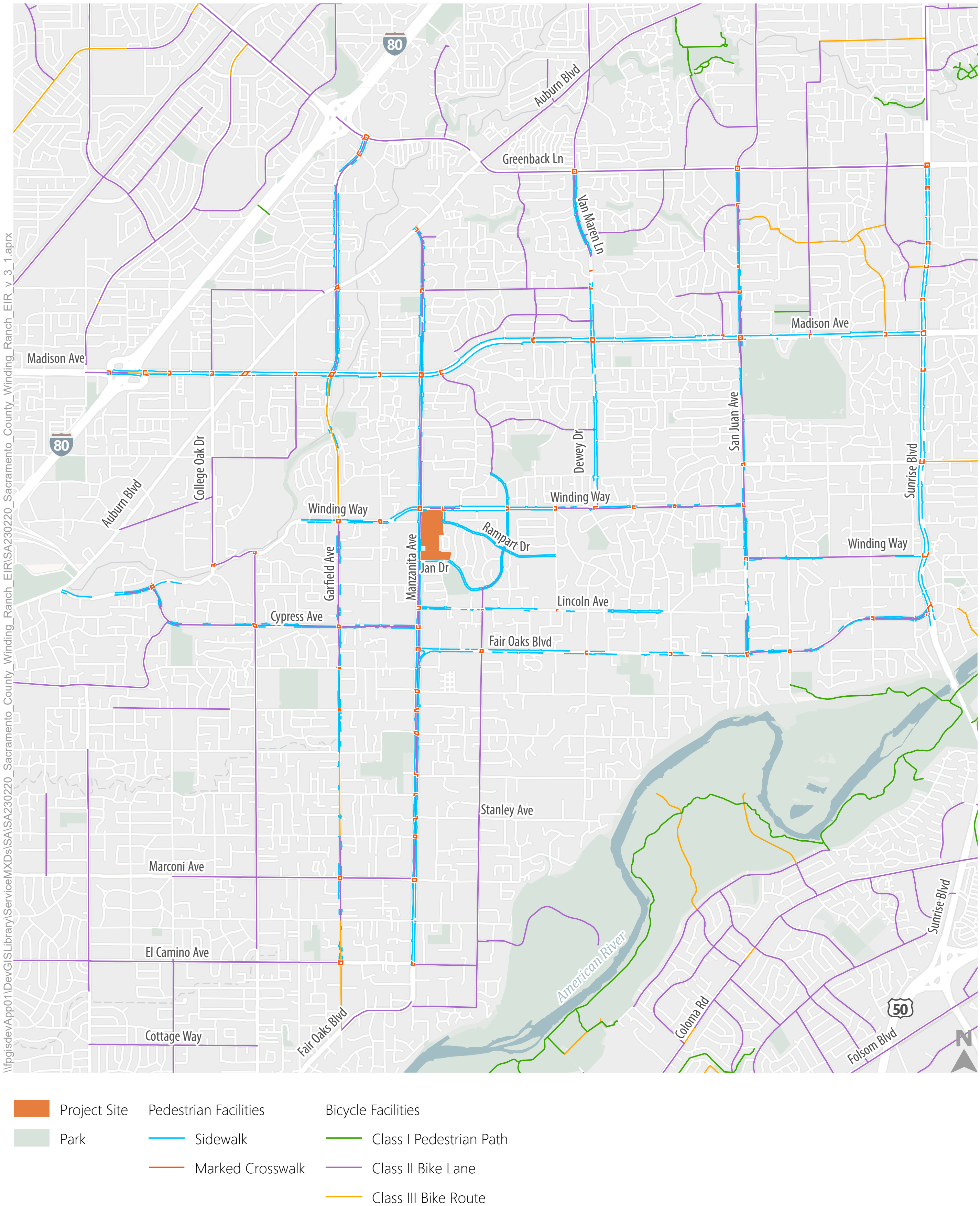


Figure 2

Local Roadways with Existing Bicycle and Pedestrian Facilities

- **Manzanita Avenue** is a north- south arterial that extends from Auburn Boulevard in the north to Fair Oaks Boulevard in the south. It runs along the west end of the project and is planned to have four project access driveways. **Figure 1** shows the access restrictions.
  - *Lane Configuration:* Manzanita Avenue has 4 lanes throughout its length.
  - *Average Daily Traffic:* Manzanita Avenue has an average daily traffic of 21,000 vehicles near the project site.
  - *Speed Limit:* The posted speed limit on Manzanita Avenue is 40 mph.
- **Madison Avenue** is an east- west thoroughfare extending from Greenback Lane near Lake Natoma in the east to Roseville Road in the west. It connects the project site to the nearest interchange 2.6 miles away. The *Sacramento County General Plan (2011)* identified the intersection of Madison Avenue and Auburn Boulevard as a potential future high-capacity intersection.
  - *Lane Configuration:* Madison Avenue has 6 lanes near the project site. However, it narrows down to 5 lanes east of Sunrise Boulevard (2 lanes eastbound and 3 lanes westbound) and further to 4 lanes east of Fair Oaks Boulevard. Similarly, to the west of the project site it narrows down to 5 lanes and then 4 lanes west of Hillsdale Boulevard and Airbase Drive respectively.
  - *Average Daily Traffic:* Madison Avenue has an average daily traffic varying from approximately 11,500 to 51,500 at different intersections. The volumes are relatively higher in segments east of I-80 and west of Sunrise Boulevard. The average daily traffic volume near the project is about 51,500.
  - *Speed Limit:* The posted speed limit on Madison Avenue is 45 mph.
- **Sunrise Boulevard** is a north- south thoroughfare extending from Sandringham Way in the north to Grant Line Road in the South connecting the project site to Roseville and Rancho Cordova.
  - *Lane Configuration:* Sunrise Boulevard has 6 lanes near the project site but narrows down to 4 lanes north of Arcadia Drive in Citrus heights and 5 lanes (3- Northbound and 2 Southbound) south of Herodian Dive in Rancho Cordova.
  - *Average Daily Traffic:* Volumes on Sunrise Boulevard ranges from 39,000 and 72000, increasing from Madison Avenue to the crossing of the American River (i.e., to the south). Near the project, Sunrise Boulevard has an average daily traffic volume of about 49,000 vehicles, (i.e., between Winding Way and Sunset Avenue).
  - *Speed Limit:* The posted speed limit is 45 mph.
- **Fair Oaks Boulevard** is an arterial that connects the project site to the City of Sacramento and City of Citrus Heights. The section of Fair Oaks Boulevard in the project vicinity is an east- west roadway that extends from Sunrise Boulevard in the east to Manzanita Avenue in the west. To the east of Sunrise Boulevard, it curves up and extends north till it intersects with Auburn Road. To the west, it curves down as an extension of Manzanita Avenue and continues west till it meets the J Street Bridge in Sacramento.
  - *Lane Configuration:* The roadway has 4 lanes near the project site and for a major portion of its length. However, it narrows down to 2 lanes between Sunrise Boulevard and Madison Avenue. In

the west it expands to 6 lanes Howe Avenue and Munroe Street before narrowing down to 4 lanes again.

- *Average Daily Traffic:* The roadway has an average of 25,500 daily vehicles in the project vicinity.
- *Speed Limit:* The posted speed limit on the roadway near the site is 35 mph.

- **Lincoln Avenue** is an east- west local street that extends from San Juan Avenue in the east to Manzanita Avenue in the west.
  - *Lane Configuration:* This roadway has 2- lanes throughout its length.
  - *Average Daily Traffic:* This local street has an ADT of 3,500 vehicles.
  - *Speed Limit:* The posted speed limit on Lincoln Avenue is 20 mph throughout its length except between Barett Road and Abraham Way where it is 35 mph.
- **San Juan Avenue** is a north- south arterial that extends from Sylvan Road in the north to Alexander Court near the American River.
  - *Lane Configuration:* San Juan Avenue has 4 lanes for a major portion of its length but narrows down to 2 lanes for the last quarter mile south of Fair Oaks Boulevard.
  - *Average Daily Traffic:* San Juan Avenue has average daily traffic of 22,000 south of Madison Avenue and 16,000 south of Winding way.
  - *Speed Limit:* The posted speed limit on San Juan Avenue near the site is 45 mph. It decreases to 40 mph north of Sunset Avenue and to 25 mph south of Fair Oaks Boulevard.
- **Garfield Avenue** is a north south arterial west of Manzanita Avenue, extending from Greenback Lane in the North to Fair Oaks Boulevard in the south.
  - *Lane Configuration:* The roadway has 4 lanes North of Winding way and narrows down to 2 lanes south of Winding way for the rest of its length.
  - *Average Daily Traffic:* The roadway has an ADT of 28500 south of Greenback Lane that decreases progressively going southbound towards Fair Oaks Boulevard.
  - *Speed Limit:* The posted speed limit on the roadway is 45 mph north of Winding Way and 35 mph south of Winding Way except in the vicinity of schools where it is 25 mph.

Bicycle Facilities

Within the project area, there are existing Class II bike lanes (i.e., existing on-street pavement markings with appropriate signage) along Manzanita Avenue and Winding Way. Residential roads adjacent to the project site, Rampart Drive and Jan Drive, have low traffic volumes and a speed limit of 15 mph making these roads bike friendly despite the absence of dedicated bicycle infrastructure.

According to Sacramento County Bike Master Plan (2011) Class II and III bike lanes are planned on the arterials and residential streets, near the project, respectively. This includes but is not limited to parts of Winding way, Jan Drive, Lincoln Avenue, Cypress Avenue and Rampart Drive. This would result in improved bike access to all schools and other destinations near the project.

Pedestrian Facilities

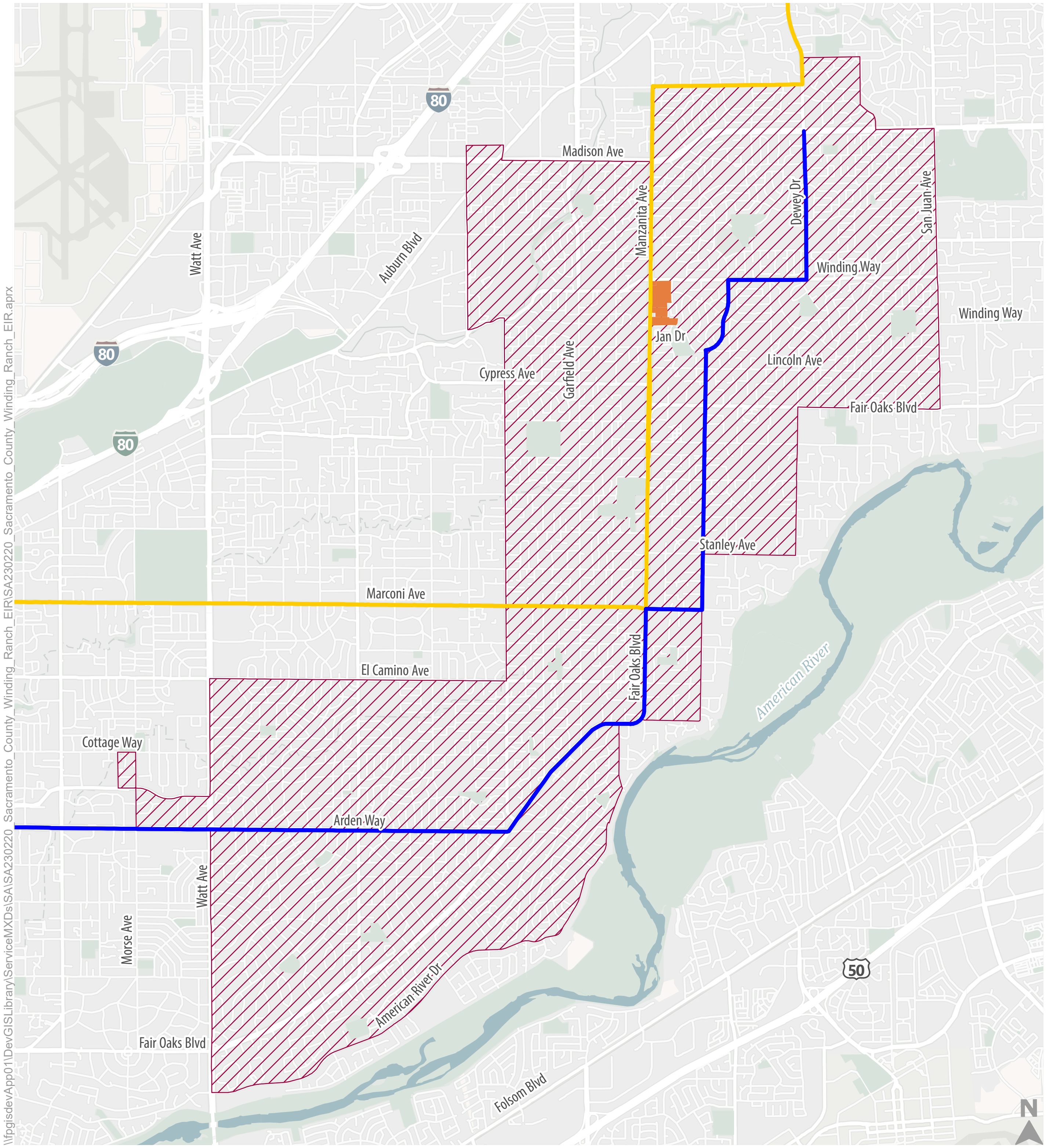
Sidewalks near the project are generally present along improved frontages. The future phase Fair Oaks Boulevard Corridor Plan aims to enhance the segment of Manzanita Avenue running along the western end of the project site with gateway signs, banners, wayfinding signs, wider sidewalks and appropriate lighting and landscaping to make it more pedestrian friendly.

Transit Facilities

Sacramento Regional Transit (SacRT) provides fixed route and on-demand transit service near the project. Routes 25 and 129 connect the project to Marconi/ Arcade light rail station and Downtown Sacramento respectively, in addition to other origins/destinations. The project site also falls within the Arden- Carmichael Zone of SacRT's microtransit service SmaRT Ride as shown in Figure 4. These routes are described below:

- **Route 25** is a local bus service that runs along Manzanita Avenue and connects the project site to Citrus Heights and Marconi/Arcade light station to the south. This route operates 7 days a week. On weekdays it operates from 5:40 AM to 9:43 PM with a 30-minute headway before 7PM and a 40 to 60-minute headway after 7 PM. On Saturdays it operates from 7:50 AM to 10:47 PM with a 45-minute headway before 7 PM and 60-minute headway after. On Sundays and Holidays, service runs between 7:07 AM and 8:04 PM with a 60-minute headway.
- **Route 129** is a peak hour only bus service that connects the project to Downtown. This route operates only on weekdays from 6:22 AM to 7:40 AM with a 24-minute headway during the morning peak hours and from 4:35 PM to 6:11 PM with a 30-minute headway during the afternoon peak hours.
- **SmaRT Ride** offers corner- to- corner service in the Arden- Carmichael zone from 7 AM to 7 PM. The project site falls within the zone and hence can use the service to access different points of interest including grocery stores, DMV, and schools near the project.

A Bus Rapid Transit service is planned along San Juan Avenue and Fair oaks Boulevard which would potentially increase transit accessibility at the project site. **Figure 3** shows Existing and planned Transit facilities near the project.



Project Site
Park

SacRT Route (Within Project Vicinity)
Route 129
Route 25
SmaRT Ride Service Area

Figure 3

Existing Transit Facilities in Project Vicinity

Collision History

This section analyzes collision data from 2019 to 2021 as obtained from Transportation Injury Mapping System (TIMS) developed by Safe Transportation Research and Education Center, UC Berkeley[2]. Data used in TIMS is from California Statewide Integrated Traffic Records System (SWITRS).

Figure 4 illustrates collisions by severity and calls out all bike and pedestrian collisions that resulted in fatalities.

For the analysis, collisions reported within the study area shown in Figure 4 were analyzed. These include collisions in parts of Citrus Heights and the unincorporated communities of Carmichael and Fair Oaks. The study area was finalized such that it included all key roadways identified near the project site. Further, collisions within a half- mile radius of the Manzanita Avenue/Winding Way intersection were investigated in detail.

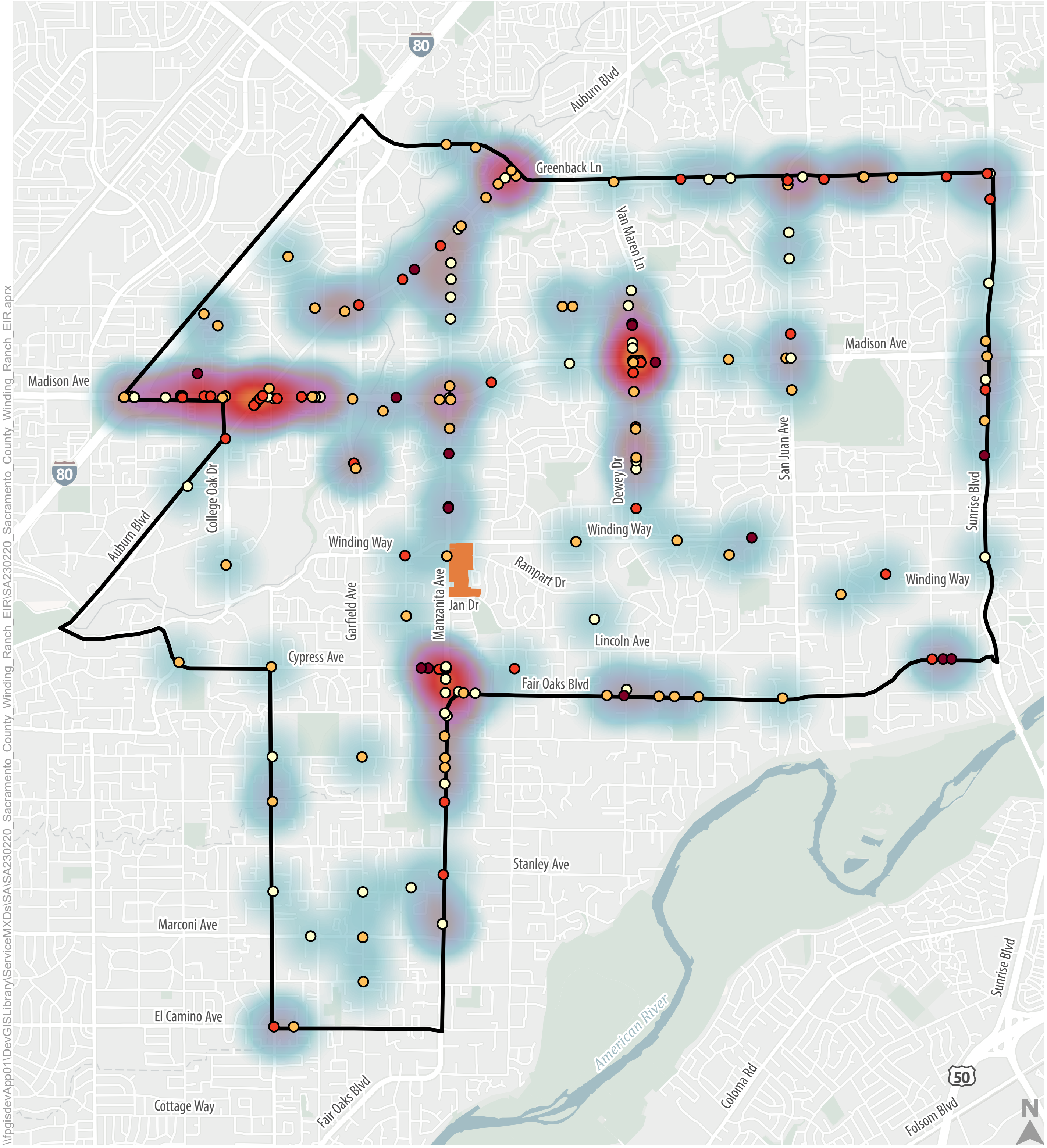
Table 1 shows the number of collisions in the study area and their location by year. A total of 1,536 collisions were reported in the analysis period of which around 30 percent occurred at intersections and 70 percent occurred mid-block. Further, a total of 12 percent (191 collisions) of total collisions involved pedestrians or bicyclists. Of these, 15 collisions involving pedestrians and 1 collision involving a bicyclist resulted in fatalities.

Within a half mile of the Manzanita Avenue/Winding Way intersection, around 46 collisions were reported of which pedestrians and bicyclists combined were involved in 11 percent of total collisions. Around 20 percent (9 collisions) of total collisions resulted in fatalities or severe injuries.

Year	Total Collisions	Location		Involved Party - Pedestrians		Involved Party - Bicyclists	
		Intersection	Mid-Block	*Collisions*		*Share of All Modes*	
2019	612	178	434	39*	6%	40	7%
2020	435	126	309	37*	9%	19	4%
2021	489	159	329	31*	6%	25*	5%
All	1,536	463	1,072	107	7%	84	5%

Notes: *Includes Fatal Collisions
Sources: SWITRS 2023, TIMS 2023, Fehr & Peers 2023

[2] https://tims.berkeley.edu/
The dataset for the year 2022 hasn't been used for this study since it is considered provisional yet and therefore potentially misses datapoints.



Project Site
Park
Collision Analysis Study Area

Pedestrian and Bicyclist Collisions 2019 - 2021 by Severity
- Fatal
- Injury (Severe)
- Injury (Other Visible)
- Complaint of Pain

Pedestrian and Bicyclist Collisions 2019 - 2021 by Density
- Sparse
- Dense

Figure 4

Collisions by Severity

Collisions that result in some injuries are categorized into four degrees of severity, Fatal, Severe Injury, Visible Injury, and Injury. Table 2 describes this data by year of collision for the study area. Around 12 percent of total collisions were identified as KSI (Fatal and Severe Injury) collisions. 31 percent of total collisions resulted in visible injuries and 56 percent resulted in minor injuries.

Table 2: Collision by Severity

Year	Total Collisions	Severity			
		Fatal	Severe Injury	Visible Injury	Injury (Complaint of Pain)
2019	612	2%	10%	26%	63%
2020	435	3%	11%	31%	55%
2021	489	2%	11%	39%	48%
All	1536	2%	10%	31%	56%

Sources: SWITRS 2023, TIMS 2023, Fehr & Peers 2023

Table 3 shows details of all KSI collisions within half-mile of the project site. Three collisions that resulted in fatalities occurred on Winding Way at Windmill Way, Manzanita Avenue at Jameson Court, and Manzanita Avenue at Winding Way. Three of the KSI collisions involved pedestrians and bicyclists, two of which were fatal.

Table 3: KSI Collisions Near the Project Site

Location	Type	Primary Collision Factor	Year
Winding Way at Crestview Drive	Overturned	Other Hazardous Violation	2019
Winding Way at Hackberry Lane	Vehicle/ Pedestrian	Pedestrian Violation	2020
Winding Way at Manzanita Avenue	Hit Object	Driving Under Influence	2020
Winding Way at Windmill Way	Sideswipe	Driving Under Influence	2020
Manzanita Avenue at Jameson Court	Broadside	Automobile Right of Way	2020
Manzanita Avenue at Jameson Court	Vehicle/ Pedestrian	Pedestrian Violation	2021
Manzanita Avenue at Winding Way	Hit Object	Other Hazardous Violation	2021
Manzanita Avenue at Muldrow Road	Sideswipe	Improper Turning	2021
Manzanita Avenue at Bourbon Drive	Head-On	Wrong Side of the Road	2021

Notes: Orange rows highlight fatal collisions
Sources: SWITRS, 2023, TIMS 2023, Fehr & Peers 2023

VMT Analysis

This chapter analyzes the proposed project's impacts to VMT. It begins by describing the regulatory background. It then presents the Analysis Methodology followed by VMT per Capita, and Project Impacts and Mitigation Measures.

Regulatory Background

Senate Bill 743

Senate Bill (SB) 743, passed in 2013, required the California Governor's Office of Planning and Research (OPR) to develop new CEQA guidelines that address traffic metrics under CEQA. As stated in the legislation, upon adoption of the new guidelines, "automobile delay, as described solely by level of service or similar measures of vehicular capacity or traffic congestion shall not be considered a significant impact on the environment pursuant to this division, except in locations specifically identified in the guidelines, if any." In December 2018, OPR published *Technical Advisory on Evaluating Transportation Impacts in CEQA ("Technical Advisory")*, which provided guidance for implementing SB 743. On December 28, 2018, the Resources Agency adopted CEQA Guidelines Section 15064.3. Under this guideline, VMT is the primary metric used to identify transportation impacts. On July 1, 2020, the provisions of Section 15064.3 became effective statewide.

Sacramento County Transportation Analysis Guidelines (TAG)

The *Sacramento County TAG* provides considerable guidance regarding the County's preferred methods for analyzing the VMT of land use and transportation projects. The TAG incorporates various elements of the *Technical Advisory*, OPR, but refinements and clarifications have been added to reflect local conditions. Technical guidance from the TAG is referenced throughout this chapter.

VMT Analysis Screening

Table 3-1 in the TAG identifies screening thresholds to quickly identify, without conducting a detailed study, when a proposed land development project would cause a less-than-significant impact to VMT. The following five screening criteria apply to mixed use projects:

1. Small Projects
2. Local Serving Retail
3. Affordable Residential Development
4. Projects Near High-Quality Transit Stations
5. Projects in VMT-Efficient Areas

Project Screening

The project has two major components that were evaluated below for each of these potential screening criteria.

Commercial Component:

1. Local-Serving Retail: With this development constituting infill development, the threshold for Local-Serving Retail is defined as 125,000 square feet of total gross floor area and does not have regional-serving uses per the TAG Appendix A. The retail component of Winding Ranch includes 38,900 square feet of gross floor area and does not have regional-serving uses. Thus, the commercial component of the project ***can be screened out*** as a local-serving retail.

Residential Component:

1. Small Projects: As per the TAG, this screening criterion refers to projects generating less than 237 average daily traffic (ADT). The Winding Ranch project would generate 831 daily trips (using ITE trip rates for Single Family Detached Housing). Since the project will generate 594 more trips compared to the "small projects" defined in the TAG, it would not qualify as a small project and cannot be screened out on this basis.
2. Affordable Housing: This screening criterion only applies to affordable units. The project does not have an affordable housing component. Therefore, this screening criterion does not apply.
3. Projects Near High-Quality Transit: This screening criterion refers to projects located within ½ mile of an existing major transit stop or an existing stop along a high-quality transit corridor. A high-quality transit corridor is defined as a corridor with fixed route bus service with service intervals no longer than 15 minutes during peak commute hours. Sacramento County DOT staff clarified that this criterion is applicable for a single route.

   The western edge of the project site along Manzanita Ave would have two bus stops for Route 25 heading in the Northbound and Southbound direction, which is considered an acceptable walking distance for accessing transit. However, as described in Existing Transit Facilities within the Existing Conditions section, with only 30-minute headways during the peak hour, it does not qualify as "high-quality transit" as they are not frequent enough. Therefore, the project cannot be screened out on this basis.
4. Projects in VMT-Efficient Areas: To aid local jurisdictions in VMT impact screening analysis, SACOG developed web-based maps from their travel demand model's 2016 estimates of residential VMT per capita (i.e., person). They have provided a map that presents 2016 baseline residential VMT per capita data using hexagon-shaped tiles (referred to as hex geography), across the SACOG region. The maps also present the region, county, and jurisdiction averages for residential VMT per capita. The map uses a range of colors to compare the VMT characteristics of each hex to the regional average, with cooler colors (i.e., blue, green, and yellow) representing VMT values that are below the regional average and warmer colors (i.e., orange, pink, and red) representing VMT values that

are above the regional average. **Figure 5** shows the relevant hex map data for the study area[3]. The project site is located within Hex DX-129 & DW-130, which has a residential VMT per capita of 50%-85% of the existing SACOG region's residential VMT per capita average. Since the TAG uses a VMT significance criteria that is 85% or less of the regional average, the project site ***can be screened*** out because it is situated in a VMT Efficient Area.

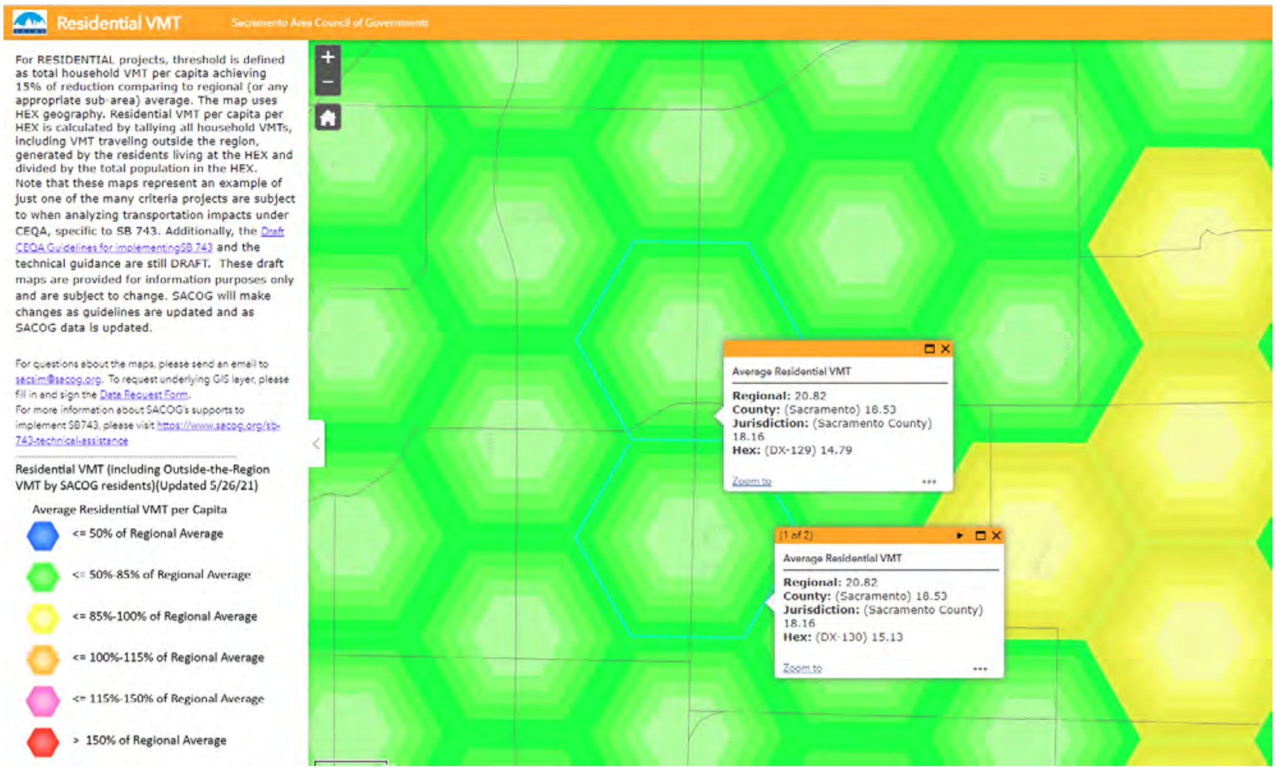


Figure 5: Hex Map for project Location

Both components of the project were screened out using criteria described in the Sacramento County TAG. No further analysis is required.

[3] Residential VMT, https://sacog.maps.arcgis.com/apps/webappviewer/index.html?id=0eac172e44514776b2f30e4324652f88&extent=-13567338.6225%2C4599309.7898%2C-13330078.0867%2C4789485.1162%2C102100

Appendix G Assessment

Would the Project:	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporation	Less-Than-Significant Impact	No Impact
a. Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☐	☐	☒	☐
b. Conflict or be inconsistent with CEQA Guidelines § 15064.3, subdivision (b)?	☐	☐	☒	☐
d. Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☒	☐
e. Result in inadequate emergency access?	☐	☐	☒	☐

Impact Analysis

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

The project site is located in the unincorporated community of Carmichael that is identified as a Center/ Corridor community (communities typically with denser and more mixed land use relative to surrounding land uses) by the 2020 MTP/SCS. Such communities as considered to be potential locations for new housing and employment in the SACOG region. The 2020 MTP/SCS forecasts roughly 20 percent increase in jobs and dwelling units in the vicinity of the project site. Therefore, a mixed-use development such as Winding Ranch aligns with 2020 MTP/SCS's vision of city and suburbs- focused regional growth and will also potentially contribute to the plan's proposed 10 percent reduction in growth rate of vehicle miles traveled (VMT)[4].

The project is housed in a vacant site in Manzanita District of the Fair Oaks Boulevard Corridor Plan[5]. The plan aims to promote walking and transit use in the Fair Oaks Boulevard Specific Plan Area. It envisions the vacant site to accommodate street oriented commercial development or mixed-use commercial and

[4] SACOG 2020 MTP/SCS, Chapter 3
[5] Fair Oaks Boulevard Corridor Plan, Sacramento County Planning Department

residential neighborhood in alignment with its land use principle, LUP 6. This information indicates that the Winding Ranch project is an important part of fulfilling land use related goals of Fair Oaks Boulevard Corridor Plan that aims to achieve a well-connected balanced mix of commercial and residential neighborhoods. This in turn will promote pedestrian activity in the vicinity.

The retail and residential land use components of the project site will increase travel demand and consequently may influence traffic operations at adjacent intersections and how transit, vehicles, bicyclists, and pedestrians access and travel through the study area. However, these changes would largely be made to ensure better flow of traffic, improve connectivity and access to the project site.

Bicycle

The project will increase bicycle travel demand because of its commercial and residential components but not to a level that is incompatible with existing infrastructure. The project plan does not interfere with the existing 5 feet wide bike lanes along Winding Way and Manzanita Avenue. Further it does not conflict with planned bikeway facilities around the study site. The entry streets and other minor streets in the residential part of the project do not have designated bicycle infrastructure. The circulation elements within the project will comply with the County's design standard and will ensure adequate and safe access for bikes in the project site. Therefore, the impact would be **less than significant**.

Pedestrian

The project will increase pedestrian trips in the vicinity because of its commercial and residential components but not to a level that is incompatible with existing infrastructure. The proposed plan includes 8 feet wide sidewalks adjacent to the property along Manzanita Avenue and Winding Way and 5 feet wide sidewalks along residential entry streets and minor residential streets in the project site which will accommodate and provide adequate access to pedestrians. The project plan does not eliminate existing facilities or conflict with planned pedestrian facilities. Therefore, this impact would be **less than significant**.

Transit

The project does not increase transit trips by a significant amount and does not include any changes that would disrupt an existing transit facility. Further the project site plan includes a bus stop near the entrance to the commercial component from Winding Way. The project will not impact the operations of the transit at the stop. Therefore, this impact would be **less than significant**.

Roadway

The project introduces 5 Commercial driveways along Manzanita Avenue and Winding Way. It also introduces Residential Entry Streets at Winding Way and Rampart Drive/ Mary Lynn Lane. The resultant intersections are minor street stop-controlled with either right-in/ right-out access, full access or left- out restricted access. These new changes to the roadway configuration intersection control type result in some increased delay at intersections in the project vicinity resulting in Level of Service (LOS) E as per the Winding Ranch Focused Access and Circulation Study and Queue Management Plan. This is within the acceptable limit as per the Sacramento County General Plan. However, as per SB 743 and Transportation Analysis Guidelines of the County of Sacramento, automobile delays or level of service of vehicle travel may no longer be used to determine transportation impacts of land development projects in CEQA. Hence, the project would not conflict with applicable transportation plans or policies. Therefore, this impact would be **less than significant**.

b. Conflict or be inconsistent with CEQA Guidelines § 15064.3, subdivision (b)?

On September 27, 2013, Governor Jerry Brown signed SB 743 into law, which initiated a process to change transportation impact analyses completed in support of CEQA documentation. SB 743 eliminates level of service (LOS) as a basis for determining significant transportation impacts under CEQA and provides a new performance metric, vehicle miles traveled (VMT). To help lead agencies with SB 743 implementation, the Governor's Office of Planning and Research (OPR) produced a Technical Advisory. CEQA Guidelines § 15064.3, subdivision (b) contains criteria for analyzing transportation impacts associated with VMT. The guidelines indicate that "Projects that decrease vehicle miles traveled in the project area compared to existing conditions should be presumed to have a less than significant transportation impact" and that "A lead agency has discretion to choose the most appropriate methodology to evaluate a project's vehicle miles traveled, including whether to express the change in absolute terms, per capita, per household or in any other measure".

The OPR Technical Advisory suggests that lead agencies may screen out VMT impacts using project size, maps, and transit availability. The lead agency in this case, the County of Sacramento indicates that that residential project located in VMT efficient areas, will tend to exhibit similarly low VMT. Further, they also specify that in developments constituting infill development, the threshold for Local-Serving Retail is defined as 125,000 square feet of total gross floor area and does not have regional-serving uses.

The project site is in an area that exhibits a residential VMT per capita of 50%-85% of the existing SACOG region's residential VMT per capita average. Additionally, the retail component of Winding Ranch includes 38,900 square feet of gross floor area and does not have regional serving uses. Therefore, the project is consistent with CEQA Guidelines § 15064.3, subdivision (b) and the impact would be **less than significant**.

c. Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

The project would not result in a change to the volume, mix, or speed of traffic that is not compatible with the design of existing roadways and transportation facilities. All project elements will be designed and constructed in compliance with City of Sacramento and RT design standards. Therefore, no increase in hazards or incompatible uses would occur, and the impact would be **less than significant**.

d. Result in inadequate emergency access?

The project would be designed to maintain high levels of accessibility and personal mobility. All project elements will be designed and constructed in compliance with Sacramento County design standards. Emergency vehicles would be able to access the project site through the designated emergency access routes in the southern part of the residential component as well as driveways and residential entry streets, all of which have a minimum 20 feet of unobstructed road width. Therefore, emergency access to and from the station will remain adequate, and the impact would be **less than significant**.